Technical Specifications For:

**BERNARDO HEIGHTS MS RELOS**

Poway Unified School District

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**Client:**
Poway Unified School District
15250 Avenue of Science
San Diego, CA 92128

**Architect:**
AlphaStudio Design Group
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Carlsbad, CA 92009
760-431-2444

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PART 1 GENERAL

1.01 PROJECT
A. Project Name: Bernardo Heights M.S. Relos.
B. Owner's Name: Poway Unified School District.
C. Architect's Name: AlphaStudio Design Group.
D. The Project consists of:
   1. Site work and incidental related work for placement of "Silver Creek Industries, Inc" Relocatable Building as outlined below:
      a. Bernardo Heights Middle School; 12990 Paseo Lucido, San Diego, CA 92128.
      1) One (1) New 32'x60' Relocatable Classroom Building.
   2. As shown in Contract Documents prepared by AlphaStudio Design Group; 6152 Innovation Way, Carlsbad, CA 92009.

1.02 DEFINITIONS
C. Furnish: To supply products to the project site, including delivery.
D. Install: To put products in place in the work ready for the intended use, including unloading, unpacking, handling, storing, assembling, installing, erecting, placing, applying, anchoring, working, finishing, curing, protecting, cleaning, and similar operations.
E. Provide: To furnish and install products.
F. Indicated: Shown, noted, scheduled, specified, or drawn, somewhere in the Contract Documents.

1.03 REGULATORY REQUIREMENTS
A. The following regulations are applicable to this project:
B. Submit copies of all permits, licenses, and similar permissions obtained, and receipts for fees paid, to the owner directly.

1.04 CONTRACT DESCRIPTION
A. The work consists of the following:
   1. Contract Work related to "Silver Creek" Relocatable Building:
      a. The Relocatable Building(s) are to be provided and installed by "Silver Creek Industries, Inc." on a new concrete foundation system constructed by the General Contractor under this contract. The site work, concrete foundation, hardscape, electrical low voltage and fire alarm systems, etc. are to be provided under this contract and coordinated with the Relocatable Building Manufacturer. Site work, including electrical and plumbing rough-in, are to be completed prior to scheduled delivery of the Relocatable Buildings. Coordination and access for delivery and installation of the Relocatable Buildings shall be provided by the General Contractor. The General Contractor shall meet with the field representative from Silver Creek Industries, Inc. PRIOR to the scheduled delivery date to determine if the building foundations(s) are ready to receive the building(s). If modifications to the building foundation are deemed necessary by Silver Creek Industries, Inc., they shall be performed so as not to affect the scheduled delivery date. Upon completion of the
installation of the Relocatable Building(s) by Silver Creek Industries, Inc., the General Contractor shall complete the site work, electrical hook-ups and electrical systems within the building(s),

b. Relocatable Building Coordination:
   1) "Silver Creek Industries, Inc"; 2830 Barrett Avenue, Perris, CA 92571; Phone, (951) 943-5393.

1.05 DELIVERY SCHEDULE
   A. The General Contractor is expected to have the site ready to receive the new Relocatable Buildings prior to anticipated delivery dates.
   B. Delivery dates for the new Relocatable Buildings shall be coordinated by the General Contractor with Silver Creek Industries, Inc. after the award of the contract and before commencement of work under this contract. The delivery of the building(s) shall also be coordinated with the District Representative.

1.06 OWNER OCCUPANCY
   A. Owner intends to continue to occupy adjacent existing building during the entire construction period.
   B. Owner intends to occupy the Project upon Substantial Completion.
   C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
   D. Schedule the Work to accommodate Owner occupancy.

1.07 CONTRACTOR USE OF SITE AND PREMISES
   A. Construction Operations: Limited to areas noted on Drawings.
   B. Arrange use of site and premises to allow:
      1. Owner occupancy.
      2. Work by Others.
      3. Work by Owner.
   C. Provide access to and from site as required by law and by Owner:
      1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
      2. Do not obstruct roadways, sidewalks, or other public ways without permit.
   D. Time Restrictions:
      1. Limit conduct of especially noisy exterior work to before or after school hours or on weekends. Coordinate with the District Representative prior to commencing work.
   E. Utility Outages and Shutdown:
      1. Limit disruption of utility services to hours the site is unoccupied.
      2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 48-hours notice to Owner and authorities having jurisdiction.
      3. Prevent accidental disruption of utility services to other facilities.

PART 2 PRODUCTS - NOT USED
PART 3 EXECUTION - NOT USED

END OF SECTION
PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
   1. Coordination.
   2. Administrative and supervisory personnel.
   4. Cleaning and protection.

1.03 COORDINATION

A. Coordinate all aspects of the Work so each portion is installed in proper relationship with the whole, so the Work progresses in the proper order, in a smooth manner, and without interference between the trades.

B. Observation of Work by others shall not be interpreted as relieving the Contractor from responsibility for coordination of all Work, superintendence of the Work, or scheduling and direction of the Work.

C. Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.
   1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
   2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

D. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
   1. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.

E. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of schedules.
   2. Installation and removal of temporary facilities.
   3. Delivery and processing of submittals.
   4. Progress Meetings.
   5. Project Closeout activities.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.01 GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.

C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.


E. Visual Effects; Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.

F. Recheck measurements and dimensions, before starting each installation.

G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

3.02 STARTING EQUIPMENT AND SYSTEMS

A. Provide manufacturer's field representative to prepare and start systems.

B. Adjust for proper operation within manufacturer's published tolerances.

C. Demonstrate proper operation of equipment to Owner's designated representative.

3.03 CLEANING AND PROTECTION

A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.
B. Documentation of changes in Contract Sum and Contract Time.
C. Contract Change procedures.
D. Correlation of Contractor submittals based on changes.
E. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, Special Conditions, and other Sections in Division 1 of these Specifications.
B. The Contract Sum and the schedule for payments are described in other Documents of the Contract.

1.03 SCHEDULE OF VALUES

A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
B. Forms filled out by hand will not be accepted.
C. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.
D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization.
F. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.
G. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.
B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
C. Forms filled out by hand will not be accepted.
D. Present required information twoon electronic media printout.
E. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.
F. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
10. Retainage.

G. Execute certification by signature of authorized officer.

H. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.

I. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.

J. Submit six copies of each Application for Payment.

K. Include the following with the application:
   1. Transmittal letter as specified for Submittals in Section 01 3000.
   2. Construction progress schedule, revised and current as specified in Section 01 3000.
   3. Release of liens from major Subcontractors and vendors.
   4. Affidavits attesting to off-site stored products.

L. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

M. PROCESSING:
   1. The Contractor shall submit a Schedule of Values to the Architect for review and comment prior to submitting the first Application for Payment.
   2. When preparing the Application for Payment each month, the Contractor shall review the proposed percentages of completion of work being applied for with the Project Inspector, who shall approve of the percentages prior to formalizing the Application for Payment. If possible, the percentages should be reviewed with the Owner, Architect and Project Inspector at the closest scheduled job meeting prior to finalizing.
   3. The Contractor shall submit six (6) copies of the Applications for Payment to the Project Inspector, who will verify the percentages, sign all copies, and forward to the Architect for signatures.
   4. The Architect will review the Application for Payment, and the Architect of Record will sign all copies and forward it to the Owner for signatures, processing and payment.
   5. Applications for Payment shall be made on a monthly basis and should be received by the Owner before the 25th of the month to expedite processing. Work for payment may be estimated or pro-rated to the end of the month if approved before hand by the Owner.
   6. Applications for Payment may include billing for project materials not on-site if these materials have been received and are being stored in a bonded warehouse. Receipts for such project materials must accompany the Application for Payment.
   7. Applications for Payment will not be processed if As-Built Drawings are not updated to the satisfaction of the Project Inspector and the Architect.

1.05 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to the Contract Documents.

B. For minor changes not involving an adjustment to the Contract Price or Contract Time, Architect will issue instructions directly to Contractor.

C. Architect's Supplemental Instructions (ASI): Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on Architect's Supplemental Instructions (A.S.I.).

D. Construction Change Directive (CCD): Architect may issue a document, signed by Owner, instructing Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
2. Promptly execute the change.

E. Proposal Request (P.R.): Architect may issue a document which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 5 days.

1. PROPOSAL REQUEST PRICING:
   a. The Contractor responds to a Proposal Request using the Proposal Request Pricing area on the Proposal Request form, a copy of which is found at the end of this section. The Contractor completes this form providing an itemized cost breakdown and indicating any extensions of time required. Upon review and acceptance of the cost submitted, and when signed by the Owner and Architect and received by the Contractor, this document becomes effective IMMEDIATELY and the Contractor shall proceed with the approved changes. Proceeding with the changes constitutes acceptance of the cost and time adjustment indicated.

F. Proposed Contract Modifications (PCM): Contractor may propose a change by submitting a request for change or Proposed Contract Modification (P.C.M.) to the Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 6000.

1. PROPOSED CONTRACT MODIFICATIONS (P.C.M.’s):
   a. If additional services are required in the opinion of the Contractor that a Proposal Request has not been issued for, the Contractor issues the Proposed Contract Modification form, a copy of which is found at the end of this section. The Contractor completes this form providing an itemized cost breakdown and any pertinent backup information deemed necessary to fully justify the cost submitted, and indicating any extensions of time required. Upon review and acceptance of the cost submitted, and when signed by the Owner and Architect and received by the Contractor, this document becomes effective IMMEDIATELY and the Contractor shall proceed with the approved changes. Proceeding with the changes constitutes acceptance of the cost and time adjustment indicated.

2. P.R. / P.C.M. REPLY:
   a. If the Architect takes exception to any portion of the Proposal Request Pricing and/or Proposed Contract Modification submitted by the Contractor, the Architect shall reply in writing using the the P.R./P.C.M. Reply form. The Contractor shall resubmit a revised P.R. or P.C.M. (utilizing the same number but with a letter suffix, i.e. "P.C.M. #1A") in response to the comments made by the Architect.
   b. Should the dollar amount of additional costs or credits attributable to the P.R. and/or P.C.M. become a point of contention, the Contractor and the Architect shall each make a reasonable effort to arrive at a mutually agreed upon dollar amount. If an agreement cannot be reached within a reasonable time frame, dollar amounts will be based on the current edition of SAYLOR PUBLICATIONS, INC. CURRENT CONSTRUCTION COSTS. Other cost estimating books or reference materials may be used for determining dollar amounts if acceptable to the General Contractor, Architect and the Owner.

G. Execution of Change Orders: All approved P.R.’s and P.C.M.’s shall be processed as Change Orders. Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract. All Change Orders must be approved by the School Districts Governing Board and D.S.A.

   1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's Proposal Request price quotation.
2. For change requested by Contractor, the amount will be based on the Contractor’s request for a Proposed Contract Modification as approved by Architect.
3. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
4. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor’s substantiation of costs as specified for Time and Material work.

I. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

J. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

K. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

L. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT
   A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
   B. Application for Final Payment will not be considered until the following have been accomplished:
      1. All closeout procedures specified in Section 01780.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Preconstruction meeting.
B. Progress meetings.
C. Construction progress schedule.

1.02 RELATED REQUIREMENTS
A. Section 01 1000 - Summary: Stages of the Work, occupancy, .
B. Section 01 3005 - Submittals: Submittal procedures.
C. Section 01 3216 - Construction Progress Schedule: Form, content, and administration of schedules.
D. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.
E. Section 01 7800 - Closeout Submittals: Project record documents.

1.03 DEFINITIONS
A. REQUEST FOR INFORMATION (R.F.I.’s):
   1. Requests for Information may be generated by the Contractor, any of the Contractor's subcontractors or the Owner's Inspector and should be directed to the Architect through the General Contractor using the form provided at the end of this section. Request for Information forms are used to help clarify and/or interpret the information contained in the Contract Documents or to resolve construction questions in the field.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING
A. Owner will schedule a meeting after Notice of Award.
B. Attendance Required:
   1. Owner.
   3. Contractor.
   4. Inspector.
   5. Project Superintendent.
C. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   4. Submission of list of Subcontractors, schedule of values, and progress schedule.
   5. Project logistics, key issuance, safety, and work hours.
   7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   8. Scheduling.
   9. Scheduling activities of a Geotechnical Engineer.
D. Architect shall record minutes and distribute copies within five days after meeting to participants, with copies to Contractor, School District, Project Inspector, participants, and those affected by decisions made.
3.02 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at an interval to be determined by the District.

B. Architect will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Owner, Architect, Job superintendent, major Subcontractors and suppliers, as appropriate to agenda topics for each meeting.

D. Agenda:
   1. Review minutes of previous meetings.
   2. Review of Work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of submittals schedule and status of submittals.
   7. Review of off-site fabrication and delivery schedules.
   9. Corrective measures to regain projected schedules.
  10. Planned progress during succeeding work period.
  11. Maintenance of quality and work standards.
  12. Effect of proposed changes on progress schedule and coordination.
  13. Safety and logistics.
  15. Change orders and potential change orders.
  16. Other business relating to Work.

E. The Architect will record minutes and distribute copies prior to the next meeting to participants, with copies to the Owner, Inspector, Contractor, other participants, and those affected by decisions made.

F. The Progress Meetings are intended to be conducted in an orderly and professional manner. Any foul language or unprofessional conduct will not be tolerated, and will result in the cessation of the meeting. Meetings shall not be recorded without the concurrence of all parties in attendance.

3.03 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 01 3216

A. Within 3 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

B. If preliminary schedule requires revision after review, submit revised schedule within 3 days.

C. Within 5 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
   1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 5 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment and two-week look ahead at each weekly meeting.

3.04 REQUEST FOR INFORMATION

A. Request for Information (RFI): Requests for Information may be generated by the Contractor, any of the Contractor's subcontractors or the Owner's Inspector and should be directed to the Architect through the General Contractor. Request for Information forms are used to help clarify and/or interpret the information contained in the contract documents or to resolve construction questions in the field.
   1. The Architect shall respond in writing within three (3) working days of receipt of the RFI. The Architect will promptly advise the Contractor when a Request for Information being
processed will be delayed beyond three (3) working days due to a need for additional information, research or coordination. The Contractor should allow sufficient review time so that the work will not be delayed as a result of the time required to process RFI's. No extension of contract time will be authorized because of failure by the Contractor to transmit RFI's to the Architect sufficiently in advance of work to permit processing.

2. Deductions for Unnecessary or Redundant RFI's: Should the Contractor or the Contractor's subcontractor submit unnecessary or redundant RFI's to the Architect for review, the Architect shall be entitled to bill the Owner at his (Architect's) hourly rate for the additional work generated by the Contractor's inefficiency. The Owner shall then deduct the comparable dollar amount from the payments due the Contractor.

3. Unnecessary and/or Redundant RFI's Include (But Are Not Limited To):
   a. RFI's questioning items or information clearly noted in the contract documents.
   b. RFI's generated as a result of a Contractor's substitution or construction error which requires additional coordination with other related items or a revision to the contract documents.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittal Log
B. Preparing and processing of submittals for review and action.
C. Preparing and processing of informational submittals.

1.02 DEFINITIONS

A. "Shop drawings" are drawings and other data prepared, by the entity who is to do the work, specifically to show a portion of the work.
B. "Product data submittals" are standard printed data which show or otherwise describe a product or system, or some other portion of the work.
   1. Product data submittals also include:
      a. Performance curves, when issued by the manufacturer for all products of that type.
      b. Selection data showing standard colors.
      c. Wiring diagrams, when standard for all products of that type.
C. "Samples" are actual examples of the products or work to be installed.
D. Informational Submittals: Submittals identified in the contract documents as to be submitted for information only.

1.03 SUBMITTAL LOG

A. Contractor shall prepare submittal log in format approved by the Architect and School District.
B. As a minimum the submittal log shall list all submittals required by the contract documents, with assigned submittal number, corresponding specification section and description of submittal.

1.04 SUBMITTALS FOR REVIEW

A. Submit the following for the architect's review and action:
   1. Shop drawings.
   2. Structural design information required by the contract documents.
   3. Product data.
   4. Samples.
   5. Submittals indicated as "for approval."
   6. Submittals for which procedures are not defined elsewhere.
B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
C. Samples will be reviewed only for aesthetic, color, or finish selection.
D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01780 - Closeout Submittals.

1.05 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Certificates.
   2. Coordination drawings.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer’s instructions.
   6. Manufacturer’s field reports.
   7. Qualification statements from manufacturers / installers.
   8. Verified Reports in accordance with Title 24, Part 1, Article 47336, C.C.R.
B. Specific submittals are described in individual sections:
1. Provide other information required by Division 15 for mechanical work.
2. Provide other information required by Division 16 for electrical work.

1.06 SUBMITTALS FOR PROJECT CLOSEOUT
A. When the following are specified in individual sections, submit them at project closeout:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   5. Other types as indicated.
B. Submit for Owner's benefit during and after project completion.

1.07 SUBMITTAL REQUIREMENTS
A. Do not commence work that requires review of any submittals until receipt of returned submittals with an acceptable action.
B. Do not allow submittals without an acceptable action marking to be used for the project.
C. Submit all submittals to the Architect.
D. All Submittals for the project shall be delivered to the Architect's office within ten (10) days from the Notice to Proceed.
E. Do not submit substitute items that have not been approved by means of the procedure specified elsewhere.
F. Do not include requests for substitution (either direct or indirect) on submittals; comply with procedures for substitutions specified elsewhere.

1.08 NUMBER OF COPIES OF SUBMITTALS
A. Documents for Review:
   1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit the number of copies which the Contractor requires, plus [four] copies which will be retained by the Architect.
   2. Larger Sheets, Not Larger Than 36 x 48 inches: Submit the number of opaque reproductions which Contractor requires, plus [four] copies which will be retained by Architect.
B. Documents for Information: Submit [three] copies.
C. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.
D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.
E. Copies in excess of the number requested will not be returned.
F. Provide additional copies, if required for operating and maintenance data, marked to indicate their purpose.
G. ELECTRONIC COPIES OF SUBMITTALS WILL BE ACCEPTED AS ALTERNATE TO HARD COPIES. Provide one copy with transmittal form in electronic format for review.

1.09 SUBMITTAL PROCEDURES
A. Coordination:
   1. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
      a. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
b. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
c. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

B. Processing:
   1. Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
      a. For each submittal for review, allow 7 days excluding delivery time to and from the Architect. Allow additional time if processing time must be delayed to permit coordination with subsequent submittals. The Architect shall promptly advise the General Contractor when a submittal being processed must be delayed for coordination.
         1) Exceptions:
            (a) Deferred Approval Submittal through the Division of the State Architect's office. Due to the nature of these submittals, no estimated return date can be given.
            (b) Complicated Shop Drawings may require more than ten days for proper review time and coordination.
            (c) If numerous Submittals are provided within a short period of time, the review time may not be able to be met. In these cases, the Contractor should clearly identify on the Submittal Transmittal which Submittals have the highest priority in terms of the Project Schedule and related construction activities.
      b. If an intermediate submittal is necessary, process the same as the initial submittal.
      c. Allow two weeks for reprocessing each submittal.
      d. When revised for resubmission, identify all changes made since previous submission.
      e. No extension of Contract Time will be authorized because of the failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing and review.

C. Submittal Preparation:
   1. Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
      a. Provide a space approximately 4” x 5” on the label or besides the title block on Shop Drawings to record the Architect's/Engineer's review and approval markings and the action taken.
      b. Include the following information on the label for processing and recoding action taken:
         1) Project Name.
         2) Date.
         3) Name and address of Architect.
         4) Name and address of District.
         5) Name and address of Subcontractor.
         6) Name and address of Supplier.
         7) Name of manufacturer.
         8) Number and title of the appropriate Specification Section.
         9) Drawing number and detail references, as appropriate.

D. Submittal Transmittal:
   1. Package each submittal appropriately for transmittal and handling. Transmit each submittal from District or General Contractor to Architect using a standard "Submittal Transmittal" form in a format that is acceptable to the Architect and District. Submittals received from sources other than the District or General Contractor will be returned without action.
2. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
3. On the transmittal, record relevant information and requests for data.
4. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
5. Deliver submittals to Architect at business address.
6. Schedule submittals to expedite the Project, and coordinate submission of related items.
7. Identify all variations from Contract Documents, and all Product or system limitations which may be detrimental to successful performance of the completed Work.
   a. Failure to identify all variations and limitations will be cause for retroactive rejection of submittals previously approved.

E. Distribution:
   1. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

1.10 COORDINATION OF SUBMITTALS
   A. Coordinate submittals and activities that must be performed in sequence, so that the architect has enough information to properly review the submittals.
   B. Coordinate submittals of different types for the same product or system so that the architect has enough information to properly review each submittal.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 TIMING OF SUBMITTALS
   A. Transmit each submittal at or before the time indicated on the approved schedule of submittals.
      1. Prepare and submit for approval a schedule showing the required dates of submittal of all submittals.
      2. Organize the schedule by the applicable specification section number.
      3. Incorporate the contractor's construction schedule specified elsewhere.
      4. ALL SUBMITTALS FOR THE PROJECT SHALL BE DELIVERED TO THE ARCHITECT'S OFFICE WITHIN TEN (10) DAYS FROM THE NOTICE TO PROCEED.
   B. Deliver each submittal requiring approval in time to allow for adequate review and processing time, including resubmittals if necessary; failure of the contractor in this respect will not be considered as grounds for an extension of the contract time.
   C. Deliver each informational submittal prior to start of the work involved, unless the submittal is of a type which cannot be prepared until after completion of the work; submit promptly.
   D. Allow a minimum of 7 business days for the first processing of each submittal. Allow more time when submittals must be coordinated with later submittals, or are more technical in nature and require more review and coordination time.
   E. Allow a minimum of 7 business days for processing of resubmittals.
   F. If a submittal must be delayed for coordination with other submittals not yet submitted, the architect may at his option either return the submittal with no action or notify the contractor of the other submittals, which must be received before the submittal can be reviewed.

3.02 SUBMITTAL PROCEDURES - GENERAL
   A. Contractor Review: Sign each copy of each submittal certifying compliance with the requirements of the contract documents.
   B. Notify the architect, in writing and at time of submittal, of all points upon which the submittal does not conform to the requirements of the contract documents, if any. All deviations form the Contract Documents must be clearly indicated on the submittal. All submittals for materials or equipment other than that specified must be submitted with properly completed Substitution Request Form.
C. Preparation of Submittals:
   1. Label each copy of each submittal, with the following information:
      a. Project name.
      b. Date of submittal.
      c. Contractor's name and address.
      d. Architect's name and address.
      e. Subcontractor's name and address.
      f. Manufacturer's name.
      g. Specification section where the submittal is specified.
      h. Numbers of applicable drawings and details.
      i. Other necessary identifying information.
   2. Pack submittals suitably for shipment.
   3. Submittals to receive architect's action marking: Provide blank space on the label or on the submittal itself for action marking; minimum 4 inches wide by 5 inches high.

D. Transmittal of Submittals:
   1. Submittals will be accepted from the contractor only. Submittals received from other entities will be returned without review or action.
   2. Submittals received without a transmittal form will be returned without review or action.
   3. Transmittal form: Use a form matching the sample form attached to this section.
   4. Fill out a separate transmittal form for each submittal; also include the following:
      a. Other relevant information.
      b. Requests for additional information.

3.03 SHOP DRAWINGS
   A. Content: Include the following information:
      1. Dimensions, at accurate scale.
      2. All field measurements that have been taken, at accurate scale.
      3. Names of specific products and materials used.
      4. Details, identified by contract document sheet and detail numbers.
      5. Show compliance with the specific standards referenced.
      6. Coordination requirements; show relationship to adjacent or critical work.
      7. Name of preparing firm.
   B. Preparation:
      1. Reproductions of contract documents are not acceptable as shop drawings.
      2. Space for architect's action marking shall be adjacent to the title block.

3.04 PRODUCT DATA
   A. Content:
      1. Submit manufacturer's standard printed data sheets.
      2. Identify the particular product being submitted; submit only pertinent pages.
      3. Show compliance with properties specified.
      4. Identify which options and accessories are applicable.
      5. Show compliance with the specific standards referenced.
      6. Show compliance with specified testing agency listings; show the limitations of their labels or seals, if any.
      7. Identify dimensions which have been verified by field measurement.
      8. Show special coordination requirements for the product.

3.05 SAMPLES
   A. Samples:
      1. Provide samples that are the same as proposed product.
      2. Where unavoidable variations must be expected, submit "range" samples, minimum of 3 units, and describe or identify variations among units of each set.
      3. Where selection is required, provide full set of all options.
B. Preparation:
   1. Attach a description to each sample.
   2. Attach name of manufacturer or source to each sample.
   3. Where compliance with specified properties is required, attach documentation showing compliance.
   4. Where there are limitations in availability, delivery, or other similar characteristics, attach description of such limitations.
   5. Where selection is required, the first submittal may be a single set of all options; after return of submittal with selection indicated, submit standard number of sets of selected item.

C. Keep final sample set(s) at the project site, available for use during progress of the work.

3.06 REVIEW OF SUBMITTALS
   A. Submittals for approval will be reviewed, marked with appropriate action, and returned.
      1. Informational submittals: Submittals will be reviewed.

3.07 RETURN, RESUBMITTAL, AND DISTRIBUTION
   A. Submittals will be returned to the contractor by mail. Perform resubmittals in the same manner as original submittals; indicate all changes other than those requested by the architect.
   B. Perform resubmittals in the same manner as original submittals; indicate all changes other than those requested by the architect.
      1. Exception: Transmittal number for resubmittals shall be the number of the original submittal plus a letter suffix; example: 05500-1 would become 05500-1 A.
   C. Distribution:
      1. Distribute returned submittals to all subcontractors and suppliers involved in work covered by the submittal.
      2. Make one copy for project record documents.

END OF SECTION
1.01 SECTION INCLUDES
   A. Preliminary schedule.
   B. Construction progress schedule, bar chart type.

1.02 REFERENCES

1.03 SUBMITTALS
   A. Within 3 days after date of Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
   B. If preliminary schedule requires revision after review, submit revised schedule within 3 days.
   C. Within 5 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
      1. Include written certification that major contractors have reviewed and accepted proposed schedule.
   D. Within 5 days after joint review, submit complete schedule.
   E. Submit updated schedule with each Application for Payment.

1.04 SCHEDULE FORMAT
   A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE
   A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT
   A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
   B. Identify each item by specification section number.
   C. Identify work of separate stages and other logically grouped activities.
   D. Provide sub-schedules to define critical portions of the entire schedule.
   E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
   F. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS
   A. Include a separate bar for each major portion of Work or operation.
   B. Identify the first work day of each week.

3.04 UPDATING SCHEDULE
   A. Maintain schedules to record actual start and finish dates of completed activities.
   B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
   C. Annotate diagrams to graphically depict current status of Work.
   D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
E. Indicate changes required to maintain Date of Substantial Completion.
F. Submit reports required to support recommended changes.

3.05 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Architect, Owner, and other concerned parties.
B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Quality assurance submittals.
B. Control of installation.
C. Testing and inspection services.
D. Manufacturers' field services.

1.02 RELATED REQUIREMENTS
A. Section 01305 - Submittals: Submittal procedures.
B. Section 01 4219 - Reference Standards.

1.03 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
   1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
C. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
D. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
   1. Submit report in duplicate within 10 days of observation to Architect for information.
   2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
E. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
   1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
   2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.04 REFERENCES AND STANDARDS - SEE SECTION 01 4219
A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
C. Obtain copies of standards where required by product specification sections.
D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 TESTING AND INSPECTION AGENCIES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing. Refer to Section 01900 - Testing and Inspection Requirements.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TESTING AND INSPECTION

A. See Specification Section 01900 for testing required.

B. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Architect and laboratory 48 hours prior to expected time for operations requiring testing/inspection services.
   5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

C. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.

D. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by the Architect. Payment for re-testing will be charged to the Contractor by deducting testing charges from the Contract Sum/Price.
3.03 MANUFACTURERS’ FIELD SERVICES
   A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
   B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers’ written instructions.

3.04 DEFECT ASSESSMENT
   A. Replace Work or portions of the Work not conforming to specified requirements.
   B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Temporary utilities.
   B. Temporary sanitary facilities.
   C. Temporary Controls: Barriers, enclosures, and fencing.
   D. Security requirements.
   E. Vehicular access and parking.
   F. Waste removal facilities and services.

1.02 TEMPORARY UTILITIES
   A. Provide and pay for all electrical power, lighting, and water required for construction purposes.
   B. New permanent facilities may be used.

1.03 TEMPORARY SANITARY FACILITIES
   A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization through to project completion.
   B. Maintain daily in clean and sanitary condition.

1.04 BARRIERS
   A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
   B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
   C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.05 FENCING
   A. Construction: Commercial grade chain link fence.
   B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.06 SECURITY
   A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.07 VEHICULAR ACCESS AND PARKING
   A. Coordinate access and haul routes with governing authorities and Owner.
   B. Provide and maintain access to fire hydrants, free of obstructions.
   C. Provide means of removing mud from vehicle wheels before entering streets.
   D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.08 WASTE REMOVAL
   A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
   B. Provide containers with lids. Remove trash from site weekly.
C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.09 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS
A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
B. Clean and repair damage caused by installation or use of temporary work.
C. Restore existing facilities used during construction to original condition.
D. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. General product requirements.
   B. Re-use of existing products.
   C. Transportation, handling, storage and protection.
   D. Product option requirements.
   E. Substitution limitations and procedures.
   F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS
   A. Section 01 4000 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS
   A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
   B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
   C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
      1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
   D. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS
   A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
   B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site. However, The Owner has the first right of refusal on all existing materials and equipment indicated to be removed, but not to be re-used.

2.02 NEW PRODUCTS
   A. Provide new products unless specifically required or permitted by the Contract Documents.
   B. Do not use products having any of the following characteristics:
      1. Made using or containing CFC’s or HCFC’s.
   C. Where all other criteria are met, Contractor shall give preference to products that:
   D. Provide interchangeable components of the same manufacture for components being replaced.

2.03 PRODUCT OPTIONS
   A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
   B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS
A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTIONS DURING THE BIDDING PERIOD
A. Substitution requests submitted later than 7 days prior to the Bid Date will not be considered.
B. Acceptable substitutions will be added to the contract documents by addendum; no verbal approvals will be valid.

3.02 SUBSTITUTIONS AFTER AWARD OF THE CONTRACT
A. Substitutions will not be considered between the Bid date and the Award of the Contract.
B. Substitutions will not be allowed after Award of the Contract except when, through no fault of the Contractor, none of the specified products are available.
   1. Architect will consider requests for substitutions only within 10 days after date of Agreement.

3.03 SUBSTITUTION PROCEDURES
A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
C. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner, including:
      a. Redesign.
      b. Additional components and capacity required by other work affected by the change.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
E. Substitutions will not be considered when submitted directly by subcontractor or supplier.
F. Substitution Submittal Procedure: Submit written request with complete data substantiating compliance of the proposed product with the requirements of the Contract Documents, utilizing the form provided at the end of this section.
   1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
   2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
   3. Substitutions shall be considered as a Change Order, and shall be approved by DSA prior to fabrication or use.
   4. The Architect will notify Contractor in writing of decision to accept or reject request.
G. Data Required with Substitution Request: Provide at least the following data:
   1. Identify product by specification section and paragraph number.
2. Manufacturer's name and address, trade name and model number of product (if applicable), and name of the fabricator or supplier (if applicable).
3. Complete Product Data.
4. A list of other projects on which the proposed product has been used, with Project Name, the Design Professionals name, and Owner contact.
5. A itemized side-by-side comparison of the proposed product to the specified product.
6. Net amount of change to the contract sum.
7. List of maintenance services and replacement materials available.
8. Statement of the effect of the substitution on the construction schedule.
9. Description of changes that will be required in other work or products if the substitute product is approved.

H. The Architect will determine the acceptability of the proposed substitution.
I. There are certain items and/or products that are specified for this project that are District Standards, where no substitutions will be accepted. If this is the case, the Substitution Request related to a District Standard shall be responded to stating such fact.
J. When the proposed substitution is accepted, provide the product (or one of the products, as the case may be) specified.

3.04 TRANSPORTATION AND HANDLING
A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
D. Transport and handle products in accordance with manufacturer's instructions.
E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.05 STORAGE AND PROTECTION
A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
B. Store and protect products in accordance with manufacturers' instructions.
C. Store with seals and labels intact and legible.
D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
E. For exterior storage of fabricated products, place on sloped supports above ground.
F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
H. Comply with manufacturer's warranty conditions, if any.
I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

J. Prevent contact with material that may cause corrosion, discoloration, or staining.

K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

L. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION
PART 1  GENERAL

1.01  SECTION INCLUDES

A. Examination, preparation, and general installation procedures.
B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
C. Pre-installation meetings.
D. Cutting and patching.
E. Surveying for laying out the work.
F. Cleaning and protection.
G. Starting of systems and equipment.
H. Demonstration and instruction of Owner personnel.
I. General requirements for maintenance service.

1.02  RELATED REQUIREMENTS

A. Section 01305 - Submittals: Submittal procedures.
B. Section 01 4000 - Quality Requirements: Testing and inspection procedures.
C. Section 01 5000 - Temporary Facilities and Controls: Temporary exterior enclosures.
D. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.
E. Section 07 8400 - Firestopping.

1.03  SUBMITTALS

A. See Section 01305 - Submittals, for submittal procedures.
B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in conformance with Contract Documents.
   3. Submit surveys and survey logs for the project record.
C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   5. Work of Owner or separate Contractor.

1.04  QUALIFICATIONS

A. For survey work, employ a land surveyor registered in California and acceptable to Architect. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.
B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in California.

1.05  PROJECT CONDITIONS

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

D. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

E. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

F. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.06 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner’s activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work,
assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION
A. Clean substrate surfaces prior to applying next material or substance.
B. Seal cracks or openings of substrate prior to applying next material or substance.
C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS
A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
B. Require attendance of parties directly affecting, or affected by, work of the specific section.
C. Notify Architect seven days in advance of meeting date.
D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.
E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK
A. Verify locations of survey control points prior to starting work.
B. Promptly notify Architect of any discrepancies discovered.
C. Control datum for survey is that indicated on Drawings.
D. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
E. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
F. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
G. Utilize recognized engineering survey practices.
H. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.
I. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.
J. Periodically verify layouts by same means.
K. Maintain a complete and accurate log of control and survey work as it progresses.
L. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

3.05 GENERAL INSTALLATION REQUIREMENTS
A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
E. Make neat transitions between different surfaces, maintaining texture and appearance.

### 3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Relocate items indicated on drawings.
   3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

C. Services (Including but not limited to Electrical): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      b. Provide temporary connections as required to maintain existing systems in service.
   4. Verify that abandoned services serve only abandoned facilities.
   5. Remove abandoned pipe, ducts, conduits, and equipment; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

D. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

G. Refinish existing surfaces as indicated:

H. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.

I. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
   1. Patch as specified for patching new work.

J. Clean existing systems and equipment.
K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
L. Do not begin new construction in alterations areas before demolition is complete.
M. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.
B. See Alterations article above for additional requirements.
C. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of mechanical, electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.
   6. Repair new work damaged by subsequent work.
   7. Remove samples of installed work for testing when requested.
   8. Remove and replace defective and non-conforming work.
D. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.
E. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
F. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
G. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
H. Restore work with new products in accordance with requirements of Contract Documents.
I. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
J. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.
K. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.
L. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
M. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.
N. Patch or replace surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. Repair substrate prior to patching finish. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.
3.08 PROGRESS CLEANING
A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK
A. Protect installed work from damage by construction operations.
B. Provide special protection where specified in individual specification sections.
C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
G. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.10 SYSTEM STARTUP
A. Coordinate schedule for start-up of various equipment and systems.
B. Notify Architect and owner seven days prior to start-up of each item.
C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
E. Verify that wiring and support components for equipment are complete and tested.
F. Execute start-up under supervision of applicable Contractor personnel and manufacturer’s representative in accordance with manufacturers’ instructions.
G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION
A. Demonstrate operation and maintenance of products to Owner’s personnel two weeks prior to date of Substantial Completion.
B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.
E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.12 ADJUSTING
A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.13 FINAL CLEANING
A. Execute final cleaning after Substantial Completion but before making final application for payment.

B. Use cleaning materials that are nonhazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Clean filters of operating equipment.

G. Clean debris from roofs, gutters, downspouts, and drainage systems.

H. Clean site; sweep paved areas, rake clean landscaped surfaces.

I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 MAINTENANCE
A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Furnish service and maintenance of components indicated in specification sections for one year from date of Substantial Completion.

D. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

E. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

F. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION
PART 1 GENERAL

1.01 SCOPE
A. Throughout the construction period, maintain the buildings and site in a standard of cleanliness as described in this Section.

1.02 RELATED WORK
A. In addition to standards described in this Section, comply with requirements for cleaning as described in pertinent other Sections of these Specifications.

1.03 QUALITY ASSURANCE
A. Conduct daily inspections, and more often if necessary, to verify that requirements for cleanliness are being met.
B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT
A. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.02 COMPATIBILITY
A. Use only the cleaning materials and equipment, which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

PART 3 EXECUTION

3.01 PROGRESS CLEANING
A. General:
1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.
2. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
3. At least twice each month, and when requested by the District Representative, completely remove all scrap, debris, and waste material from the job site.
4. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.
B. Site:
1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site. Restack, tidy, or otherwise service arrangements to meet the requirements of subparagraph 3.01 A above.
3. Maintain the site in a neat and orderly condition at all times.
C. Structure(s):
1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, sweep interior spaces clean.
   a. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed buy use of reasonable effort and a hand-held broom.
3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer.
of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.

4. Following the installation of finish floor materials, clean the finish floor daily, and more often if necessary, at all times while work is being performed in the space in which finish materials are installed.
   a. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from foreign material, which, in the opinion of the Architect, may be injurious to the finish floor material.

3.02 FINAL CLEANING

   A. "Clean", for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.

   B. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.01 above.

   C. Site:
      1. Unless otherwise specifically directed by the Construction Manager, broom clean paved areas on the site and public paved areas adjacent to the site.
      2. Completely remove resultant debris.

   D. Structures:
      1. Exterior:
         a. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
         b. Remove all traces of splashed materials from adjacent surfaces.
         c. If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structure.
         d. In the event of stubborn stains not removable with water, the Architect may require light sandblasting or other cleaning at no additional cost to the District.
      2. Interior:
         a. Visually inspect interior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter. All surfaces in the toilet room shall be cleaned of foreign materials due to this remodeling.
         b. Remove all traces of splashed material from adjacent surfaces.
         c. Remove paint droppings, spots, stains, and dirt from finished surfaces.
      3. Polished surfaces: To surfaces requiring routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.
      4. Windows: All windows shall be professionally cleaned on both sides.

   E. Schedule final cleaning as approved by the Architect to enable the District to accept a completely clean Work.

3.03 CLEANING DURING DISTRICT'S OCCUPANCY

   A. Should the District occupy the Work or any portion thereof prior to its completion by the Trade Contractor and acceptance by the District, responsibilities for interim and final cleaning shall be as determined by the Architect in accordance with the General Conditions of the Contract.

3.04 TRADE CONTRACTOR RESPONSIBILITY FOR MISUSE OF MATERIALS

   A. Should construction materials or debris created by the construction process not be properly stored in a secure area or placed in the proper secured debris containers and such materials are used in acts of vandalism, the contractor shall be responsible to the District and adjacent property Districts for the repair or replacement of items damaged in such vandalism.

END OF SECTION
PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
   1. Requirements preparatory to Final Inspection.
   2. Final Inspection Procedures.

B. The work includes performing all operations necessary for and properly incidental to closing out the project and assisting in Owner’s final inspection as hereinafter specified. The Conditions of the Contract and the other sections of Division 1 apply to this section as fully as if repeated herein.

C. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

1.02 RELATED SECTIONS

A. 01200 - Price and Payment Procedures; Procedures for preparation and submittal of application for final payment.

B. 01700 - Execution Requirements; Starting of systems and equipment and demonstration and instruction of Owner personnel.

C. 01740 - Cleaning; Final cleaning requirements.

D. 01780 - Closeout Submittals; Project Record Documents, Operation and Maintenance Data and Warranties and Bonds.

1.03 REQUIREMENTS PREPARATORY TO FINAL INSPECTION

A. All temporary facilities shall be removed from the site as specified in Division 01500 sections.

B. The building and site shall be thoroughly cleaned as specified in Section 01740.

C. All plumbing and mechanical equipment shall operate quietly and free from vibration. Properly adjust, repair, balance, or replace equipment producing objectionable noise or vibration in the occupied areas of the building. Provide additional brackets, bracing, other methods to prevent objectionable noise or vibration. All systems shall operate without humming, surging, or rapid cycling.

D. All operating instructions for equipment shall be properly mounted and posted as specified in their respective sections.

E. Record (As-built) Drawings shall be completed, signed, and submitted to the Architect as specified in Section 01780 - Closeout Submittals.

F. The Material and Equipment maintenance instructions, as specified in the body of the Specifications, shall be submitted to the Architect.

G. All guarantees and warranties shall be submitted to the Architect as specified in the General Conditions, and Section 01780 - Closeout Submittals.

H. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.

I. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
   1. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

J. Advise Owner of pending insurance change-over requirements.
K. Make final change-over of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of change-over in security provisions.

1.04 FINAL INSPECTION PROCEDURES

A. After all requirements preparatory to the final inspection have been completed as herein before specified, the Contractor shall notify the Architect to perform the final inspection. Notice shall be given at least one week of the time the final inspection is to be performed.

B. On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfulfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor by preparing a punch list of construction that must be completed or corrected before the certificate will be issued.

C. The Contractor or his principal superintendent, authorized to act in behalf of the Contractor, shall accompany the Architect, Consultants and Owner on the final inspection tour, as well as principal subcontractors that the Architect, Consultants or Owner may request to be present.

D. If the work has been completed in accordance with the Contract Documents, and no further corrective measures are required, the Owner will accept the Project and will include the Notice of Completion on the next Board Agenda for approval by the Board of Trustees.

E. If the work has been substantially completed in accordance with the Contract Documents, and only minor corrective measures are required, the Architect and/or Consultants will prepare a Punch List of work to be corrected and the Owner will conditionally accept the Project and will include the Notice of Completion on the next Board Agenda for approval by the Board of Trustees based upon the Contractor's assurance that the corrective measures will be completed prior to the scheduled Board Meeting.

F. Failure to include an item on the Punch List does not alter the responsibility of Contractor to complete all Work in accordance with the Contract Documents.

G. If the work has not been substantially completed in accordance with the Contract Documents, and numerous corrective measures are still required, the Owner will not accept the Project nor file for the Notice of Completion. Instead, a Punch List will be prepared, based on the information gathered from the final inspection, and the Contractor will be required to complete this work within 10 days and then call for another final inspection, following the procedures outlined above.

H. The Architect will repeat inspection when requested and assured that the Work has been substantially completed. If the re-inspection discloses any item not included on the initial Punch List the Contractor shall add these items to the Punch List.

I. The Contractor shall maintain the original full time Superintendent on the job site until all items on the Punch List are completed and accepted.

J. Results of the completed inspection will form the basis of requirements for final acceptance.

1.05 FINAL ACCEPTANCE

A. PRELIMINARY PROCEDURES:

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Architect.

3. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.

4. Submit consent of surety to final payment.

5. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Project Record Documents.
B. Operation and Maintenance Data.
C. Warranties and bonds.

1.02 RELATED REQUIREMENTS
A. Section 01305 - Submittals: Submittal procedures, shop drawings, product data, and samples.
B. Section 017000 - Execution and Closeout Requirements: Contract closeout procedures.
C. Individual Product Sections: Specific requirements for operation and maintenance data.
D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS
A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
B. All Final Project Closeout Documents shall be provided in both a hardcopy and an electronic copy on a thumbdrive.
C. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.
D. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS
A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.
B. Ensure entries are complete and accurate, enabling future reference by Owner.
C. Store record documents separate from documents used for construction.
D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Prepare a full set of transparencies of contract drawings with all record changes marked.
      a. The architect will furnish to the contractor transparencies (erasable vellums) of the original contract drawings at the cost of $10.00 (ten dollars) per sheet.
   3. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   4. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   5. Field changes of dimension and detail.
   6. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
   2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

C. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

D. Provide servicing and lubrication schedule, and list of lubricants required.

E. Include manufacturer's printed operation and maintenance instructions.
F. Include sequence of operation by controls manufacturer.

G. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

H. Additional Requirements: As specified in individual product specification sections.

### 3.05 OPERATION AND MAINTENANCE MANUALS

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

B. Prepare data in the form of an instructional manual.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

I. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Air and water balance reports.
      c. Certificates.
      d. Photocopies of warranties and bonds.

J. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

### 3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.
E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION
BERNARDO HEIGHTS MS RELOS
Poway Unified School District

SECTION 01 9100
TESTING AND INSPECTION REQUIREMENTS

PART 1 GENERAL

1.01 RELATED SECTIONS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.02 QUALITY ASSURANCE
A. Codes and Standards: Comply with provisions of the following, except where requirements of the contract documents or of governing codes and authorities having jurisdiction are more stringent:
   1. Title 24, Part 1 - Administrative Regulations of the State Building Standards Commission.
   3. Title 24, Part 4 - California Fire Code (CFC); 2016 California Fire Code.
B. Testing Laboratory Services:
   1. The owner will engage an independent testing agency to conduct tests and perform other services required for quality assurance.

1.03 TESTS
A. The Owner will select an independent testing laboratory to conduct the tests. Selection of the material required to be tested shall be by the laboratory or the Owner's representative and not by the contractor. See Form SSS-103-1, "Structural Tests and Inspections" (provided at the end of this section) for tests and inspections required to be performed under this contract.

1.04 TEST REPORTS
A. One copy of all test reports shall be forwarded to the Owner, Architect, Structural Engineer, Inspector of Record (IOR), DSA and Contractor by the testing agency. Such reports shall include all tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations as required shall also be reported. The reports shall show that the material or materials were sampled and tested in accordance with the requirements of Title 24 and with the approved specifications. Test reports shall show the specified design strength. They shall also state definitely whether or not the material or materials tested comply with the requirements.

1.05 VERIFICATION OF TEST REPORTS
A. Each testing agency shall submit to the Architect a verified report in duplicate covering all of the tests which are required to be made by that agency during the progress of the project. Such reports shall cover all tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations as required shall also be reported. The reports shall show that the material or materials were sampled and tested in accordance with the requirements of Title 24 and with the approved specifications. Test reports shall show the specified design strength. They shall also state definitely whether or not the material or materials tested comply with the requirements.

1.06 INSPECTION BY THE OWNER
A. The Owner and his representatives shall at all times have access for the purpose of inspection to all parts of the work and to the shops wherein the work is in preparation. The Contractor shall at all times maintain proper facilities and provide safe access for such inspection. The Owner shall have the right to reject materials and workmanship, which are defective, or to require their correction. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises without charge to the Owner. If the Contractor does not correct such rejected work within a reasonable time, fixed by written notice, the Owner may correct same and charge the expense to the Contractor. Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work to make an examination of work already completed by removing or tearing out the same, the Contractor shall on request promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any respect due to fault of the Contractor or his subcontractor, he shall defray all expenses of such examinations and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the additional cost of
labor and material necessarily involved in the examination and replacement shall be allowed the Contractor.

1.07 INSPECTOR - OWNER’S

A. An Inspector employed by the Owner in accordance with the requirements of the State Building Code, Title 24, Part 1, will be assigned to the work. His/her duties are specifically defined in Title 24, Part 1. The work of construction in all stages of progress shall be subject to the personal continuous observation of the Inspector. He/she shall have free access to any or all parts of the work at any time. The Contractor shall furnish the Inspector reasonable facilities for obtaining such information as may be necessary to keep him/her fully informed respecting the progress and manner of the work and character of the materials. Inspection of the work shall not relieve the Contractor from any obligation to fulfill this Contract.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Selective demolition of built site elements.

1.02 RELATED REQUIREMENTS
   A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.
   B. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
   C. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS
   A. See Section 01305 - Submittals, for submittal procedures.
   B. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.05 PROJECT CONDITIONS
   A. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
   B. Comply with other requirements specified in Section 01 7000.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE
   A. Remove paving, fences and gates, trees including all roots, landscaping and all site improvements as either indicated on drawings or as required to accomplish new work.
   B. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 2200.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS
   A. Comply with other requirements specified in Section 01 7000.
   B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
      2. Obtain required permits.
      3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
      4. Provide, erect, and maintain temporary barriers and security devices.
      5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
      6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
      7. Do not close or obstruct roadways or sidewalks without permit.
      8. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

E. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

F. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB’s, and mercury.

G. Perform demolition in a manner that maximizes salvage and recycling of materials.
   1. Dismantle existing construction and separate materials.
   2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

H. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.04 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site; do not burn or bury.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION
PART 1 GENERAL
1.01 SECTION INCLUDES
A. Concrete formwork.
B. Concrete foundations and footings.
C. Concrete reinforcement.
D. Concrete curing.

1.02 REFERENCE STANDARDS
C. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
D. ACI 302.1R - Guide for Concrete Floor and Slab Construction; 2004 (Errata 2007).
F. ACI 305R - Hot Weather Concreting; 2010.
G. ACI 306R - Cold Weather Concreting; 2010.
H. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).
I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
R. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.
U. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

1.03 SUBMITTALS
A. See Section 01305 - Submittals, for submittal procedures.
B. Product Data: Submit manufacturers’ data on manufactured products showing compliance with specified requirements and installation instructions.
C. Test Reports: Submit report for each test or series of tests specified.
D. Quality Control Submittals: Submit the following information related to quality assurance requirements specified:

1. Design data: Submit proposed mix designs and test data before concrete operations begin. Identify for each mix submitted the method by which proportions have been selected.
   a. For mix designs based on field experience, include individual strength test results, standard deviation, and required average compressive strength f(cr) calculations. Provide 30 test results from the previous 12 months from the date of the concrete pour.
   b. Indicate quantity of each ingredient per cubic yard of concrete.
   c. Indicate type and quantity of admixtures proposed or required.

2. Certifications: Submit affidavits from an independent testing agency certifying that all materials furnished under this section conform to specifications.

3. Delivery tickets: Submit copies of delivery tickets complying with ASTM C 94 for each load of concrete delivered to site.
   a. Include on the tickets the additional information specified in the ASTM document.

4. Hot weather concreting: Submit description of planned protective measures.

E. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.04 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Acquire cement from same source and aggregate from same source for entire project.

C. Follow recommendations of ACI 305R when concreting during hot weather.
   1. Well in advance of proposed concreting operations, advise the architect of planned protective measures including but not limited to cooling of materials before or during mixing, placement during evening to dawn hours, fogging during finishing and curing, shading, and windbreaks.

D. Follow recommendations of ACI 306R when concreting during cold weather.

E. If any of the test cylinders do not reach the required specified design strength, comply with C.B.C. Section 1905A.6.5 for core drilling and testing.

PART 2 PRODUCTS

2.01 FORMWORK

A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
   2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
   3. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M Grade 60 (420).
   1. Type: Deformed billet-steel bars.
   2. Finish: Unfinished, unless otherwise indicated.

B. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gage.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I or Type II Portland type.
1. Acquire all cement for entire project from same source.

   1. Acquire all aggregates for entire project from same source.

C. Water: Clean and not detrimental to concrete.

2.04 ADMIIXTURES
A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
C. Water Reducing Admixture: ASTM C494/C494M Type A.

2.05 ACCESSORY MATERIALS
A. Chemical Hardener: Fluosilicate solution designed for densification of cured concrete slabs.
B. Liquid Curing Compound: ASTM C 309, Type 1, clear or translucent.
   1. Non-yellowing formulation where subject to ultraviolet light.
   2. Where compounds are proposed for use on surfaces to which finishes, coatings, or coverings subsequently will be applied, compound shall possess demonstrated compatibility with finish, coating, or covering, and use shall be subject to approval of the architect.

2.06 BONDING AND JOINTING PRODUCTS
A. Joint Filler: Nonextruding, resilient asphalt impregnated fiberboard or felt, complying with ASTM D 1751, 1/4 inch thick and 4 inches deep; tongue and groove profile.

2.07 CONCRETE MIX DESIGN
A. Proportioning Normal Weight Concrete: Comply with the 2016 California Building Code, Chapter 19A.
B. Concrete Strength: Establish required average strength for concrete on the basis of field experience or trial mixtures, as specified in ACI 318.
C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
D. Normal Weight Concrete:
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: As indicated on drawings.
E. Admixtures:
   1. Air-entraining admixture: Add at rate to achieve specified air content.
       a. Do not use in slabs-on-grade scheduled to receive topping, unless manufacturer of topping recommends use over air-entrained concrete.
   2. Water-reducing admixture: Add as required for placement and workability.
   3. Water-reducing and retarding admixture: Add as required in concrete mixes to be placed at ambient temperatures above 90 degrees F.
   4. Do not use admixtures not specified or approved.
F. Design mixes to meet or exceed each requirement specified. Where more than one criterion is specified, the most stringent shall apply. For example, a minimum cement content or maximum water-cement ratio might result in strengths greater than the minimum specified; likewise, a greater cement content or lower water-cement ratio may be required in order to achieve the required strength.

2.08 CONTROL OF MIX IN THE FIELD
A. Slump: A tolerance of up to 1 inch above that specified will be permitted for 1 batch in 5 consecutive batches tested. Concrete of lower slump than that specified may be used, provided proper placing and consolidation is obtained.
1. If slump upon arrival at the site is lower than 1 inch below the value specified, one addition of water in accordance with ASTM C 94 will be permitted to bring slump within tolerance, provided that:
   a. A positive means is available to measure the amount of water added at the site.
   b. The specified (or approved) maximum water-cement ratio is not exceeded.
   c. Not more than 45 minutes have elapsed since batching.

B. Total Air Content: A tolerance of plus or minus 1-1/2 percent of that specified will be allowed for field measurements.
   1. Do not use batches that exceed tolerances.

2.09 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.
   1. At ambient temperatures of 85 to 90 degrees F, reduce mixing and delivery time to 75 minutes.
   2. At ambient temperatures above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
B. Verify that forms are clean and free of rust before applying release agent.
C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 INSTALLATION OF EMBEDDED ITEMS

A. General: Set anchorage devices and other items required for other work connected to or supported by cast-in-place concrete, using templates, setting drawings, and instructions from suppliers of items to be embedded.
   1. Edge Forms and Screeds: Set edge forms and intermediate screeds as necessary to achieve final elevations indicated for finished slab surfaces.

3.05 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.
B. Preparation: Provide materials necessary to ensure adequate protection of concrete during inclement weather before beginning installation of concrete.
C. Inspection: Before beginning concrete placement, inspect formwork, reinforcing steel, and items to be embedded, verifying that all such work has been completed.
   1. Wood forms: Moisten immediately before placing concrete in locations where form coatings are not used.
D. Placement - General: Comply with requirements of ACI 304 and as follows:
   1. Schedule continuous placement of concrete to prevent the formation of cold joints.
   2. Provide construction joints if concrete for a particular element or component cannot be placed in a continuous operation.
   3. Deposit concrete as close as possible to its final location, to avoid segregation.
E. Placement in Forms: Limit horizontal layers to depths which can be properly consolidated, but in no event greater than 24 inches.
   1. Consolidate concrete by means of mechanical vibrators, inserted vertically in freshly placed concrete in a systematic pattern at close intervals. Penetrate previously placed concrete to ensure that separate concrete layers are knitted together.
   2. Vibrate concrete sufficiently to achieve consistent consolidation without segregation of coarse aggregates.
   3. Do not use vibrators to move concrete laterally.

F. Hot Weather Placement: Comply with recommendations of ACI 305R when ambient temperature before, during, or after concrete placement is expected to exceed 90 degrees F or when combinations of high air temperature, low relative humidity, and wind speed are such that the rate of evaporation from freshly poured concrete would otherwise exceed 0.2 pounds per square foot per hour.
   1. Do not add water to approved concrete mixes under hot weather conditions.
   2. Provide mixing water at lowest feasible temperature, and provide adequate protection of poured concrete to reduce rate of evaporation.
   3. Use fog nozzle to cool formwork and reinforcing steel immediately prior to placing concrete.

G. Ensure reinforcement, inserts, and embedded parts will not be disturbed during concrete placement.

### 3.06 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.
   1. Remove honeycombed areas and other defective concrete down to sound concrete, cutting perpendicular to surface or slightly undercutting. Dampen patch location and area immediately surrounding it prior to applying bonding compound or patching mortar.
   2. Before bonding compound has dried, apply patching mixture matching original concrete in materials and mix except for omission of coarse aggregate, and using a blend of white and normal portland cement as necessary to achieve color match. Consolidate thoroughly and strike off slightly higher than surrounding surface.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
   1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.

### 3.07 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Surfaces Not in Contact with Forms:
   1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   2. Final Curing: Begin after initial curing but before surface is dry.
      a. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

### 3.08 REMOVAL OF FORMS:

A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be
damaged by form removal operations, and provided curing and protection operations are maintained.

3.09 RE-USE OF FORMS:
A. Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect.

3.10 FIELD QUALITY CONTROL
A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000.
B. Provide free access to concrete operations at project site and cooperate with appointed firm.
   1. Take samples at point of discharge.
   2. For pumped concrete, perform sampling and testing at the frequencies specified herein at point of delivery to pump, and perform additional sampling and testing at the same frequency at discharge from line. Results obtained at discharge from line shall be used for acceptance of concrete.
D. Slump: ASTM C 143. One test per strength test and additional tests if concrete consistency changes.
   1. Modify sampling to comply with ASTM C 94.
E. Air Content of Normal Weight Concrete: ASTM C 173 or ASTM C 231. One test per strength test performed on air-entrained concrete.
F. Concrete Temperature:
   1. Test hourly when air temperature is 90 degrees F or above.
   2. Test each time a set of strength test specimens is made.
   1. Compression test specimens: Mold and cure one set of 4 standard cylinders for each compressive strength test required.
   2. Testing for acceptance of potential strength of as-delivered concrete:
      a. Obtain samples on a statistically sound, random basis.
      b. Minimum frequency:
         1) One set per 50 cubic yards or fraction thereof for each day's pour of each concrete class.
         2) One set per 2000 square feet of slab or wall area or fraction thereof for each day's pour of each concrete class.
         3) When the above testing frequency would provide fewer than 5 strength tests for a given class of concrete during the project, conduct testing from not less than 5 randomly selected batches, or from each batch if fewer than 5.
      c. Test one specimen per set at 7 days for information unless an earlier age is required.
      d. Test 2 specimens per set for acceptance of strength potential; test at 28 days unless other age is specified. The test result shall be the average of the two specimens. If one specimen shows evidence of improper sampling, molding, or testing, the test result shall be the result of the remaining specimen; if both show such evidence, discard the test result and inform the architect.
      e. Retain one specimen from each set for later testing, if required.
      f. Strength potential of as-delivered concrete will be considered acceptable if the following criteria is met:
         1) Minimum of all sets of 3 consecutive strength test results equals or exceeds specified compressive strength f'(c).
g. Evaluate construction and curing procedures and implement corrective action when strength results for field-cured specimens are less than 85 percent of test values for companion laboratory-cured specimens.

3. Removal of forms or supports: Mold additional specimens and field-cure with concrete represented; test to determine strength of concrete at proposed time of form or support removal.

H. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

I. REINFORCING:
   1. Where samples are taken from bundles as delivered from the mill, with the bundles identified as to heat number and provided the mill analysis accompanies the report, then one tensile test and one bend test shall be made from a specimen from each in 10 tons or fractions thereof of each size fo reinforcing bar of #5 and larger in size. Owner will pay for such testing.
   2. Where positive identification of the heat number cannot be made or where random samples are to be taken, then one series of tests shall be made from each 2-1/2 tons or a fraction thereof of each size of reinforcing steel. The cost of such tests shall be borne by the Contractor.
   3. Cement will not require testing providing mill test reports indicating compliance with the Specifications are submitted to the Architect.

3.11 CONCRETE SURFACE REPAIRS:
   A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.
   B. Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush?coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.
   C. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike?off slightly higher than surrounding surface.
   D. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.
   E. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
   F. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.
   G. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non?reinforced sections regardless of width, spalling, pop?outs, honeycomb, rock pockets, and other objectionable conditions.
   H. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.
   I. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired
areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.

J. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete

3.12 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
   1. Test reports shall contain the following data:
      a. Project name, number, and other identification.
      b. Name of concrete testing agency.
      c. Date and time of sampling.
      d. Concrete type and class.
      e. Location of concrete batch in the completed work.
      f. All information required by respective ASTM test methods.

B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Nondestructive testing devices such as impact hammer or sonoscope may be used at architect's option for assistance in determining probable concrete strength at various locations or for selecting areas to be cored, but such tests shall not be the sole basis for acceptance or rejection.

E. The testing agency shall make additional tests of in-place concrete as directed by the architect when test results indicate that specified strength and other concrete characteristics have not been attained.
   1. Testing agency may conduct tests of cored cylinders complying with ASTM C 42 and 2605(g), or tests as directed.
   2. Cost of additional testing shall be borne by the contractor when unacceptable concrete has been verified.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Sheet membrane waterproofing at portable classroom building foundation walls adjacent to concrete walk and mow curbs.

1.02 REFERENCE STANDARDS
   F. ASTM D1876 - Standard Test Method for Peel Resistance of Adhesives (T-Peel Test); 2008.
   J. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover; 2008a (Reapproved 2013).

1.03 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data for membrane.

1.04 QUALITY ASSURANCE
   A. Membrane Manufacturer Qualifications: Company specializing in waterproofing sheet membranes with three years experience.
   B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience.

1.05 FIELD CONDITIONS
   A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until liquid or mastic accessories have cured.

1.06 WARRANTY
   A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
   B. Contractor shall correct defective Work within a five year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to Owner.
   C. Provide five year manufacturer warranty for waterproofing failing to resist penetration of water, except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 PRODUCTS

2.01 WATERPROOFING APPLICATIONS
   A. Self-Adhered Modified Bituminous Sheet Membrane:
1. Location: Foundation walls.

2.02 MEMBRANE MATERIALS

A. Self-Adhered Modified Bituminous Membrane:
   1. Thickness: 60 mil (0.060 inch).
   2. Tensile Strength:
      a. Film: 5000 pounds per square inch, minimum, measured according to ASTM D882 and at grip-separation rate of 2 inches per minute.
      b. Membrane: 325 pounds per square inch, minimum, measured according to ASTM D412 Method A, using die C and at spindle-separation rate of 2 inches per minute.
   3. Elongation at Break: 350 percent, minimum, measured according to ASTM D412.
   4. Water Vapor Permeance: 0.05 perm, maximum, measured in accordance with ASTM E96/E96M.
   5. Low Temperature Flexibility: Unaffected when tested according to ASTM D1970/D1970M at minus 20 degrees F, 180 degree bend on 1 inch mandrel.
   6. Peel Strength: 10 pounds per inch, minimum, when tested according to ASTM D903.
   7. Lap Adhesion Strength: 19 pounds per inch, minimum, when tested according to ASTM D1876.
   8. Puncture Resistance: 60 pounds, minimum, measured in accordance with ASTM E154/E154M.
   9. Water Absorption: 0.1 percent increase in weight, maximum, measured in accordance with ASTM D570, 24 hour immersion.
   10. Hydrostatic Resistance: Resists the weight of 230 feet when tested according to ASTM D5385/D5385M.
   11. Adhesives, Sealants, Tapes, and Accessories: As recommended by membrane manufacturer.
   12. Manufacturers:
      d. Substitutions: See Section 01 6000 - Product Requirements.

B. Seaming Materials: As recommended by membrane manufacturer.
C. Membrane Sealant: As recommended by membrane manufacturer.
D. Surface Conditioner: Primer type, compatible with membrane.

2.03 ACCESSORIES

A. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and waterproofing materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.

3.02 PREPARATION

A. Protect adjacent surfaces not designated to receive waterproofing.
B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.
C. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.
D. Apply waterproofing to concrete surfaces after minimum cure time required by manufacturer.
E. Fill non-moving joints and cracks with a filler compatible with waterproofing materials.
F. Seal moving cracks with sealant, not rigid filler, using procedures recommended by sealant and waterproofing manufacturers.

3.03 INSTALLATION - MEMBRANE

A. Install membrane waterproofing in accordance with manufacturer’s instructions.

B. Roll out membrane. Minimize wrinkles and bubbles.

C. Self-Adhering Membrane: Remove release paper layer. Roll out on substrate with a mechanical roller to encourage full contact bond.

D. Overlap edges and ends and seal by method recommended by manufacturer, minimum 3 inches. Seal permanently waterproof. Apply uniform bead of sealant to joint edge.

E. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.

F. Weather lap joints on sloped substrate in direction of drainage. Seal joints and seams.

3.04 PROTECTION

A. Do not permit traffic over unprotected or uncovered membrane.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Sealants and joint backing.

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data indicating sealant chemical characteristics.
   C. Manufacturer's Installation Instructions: Indicate special procedures.

1.04 QUALITY ASSURANCE
   A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
   B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.05 FIELD CONDITIONS
   A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.06 COORDINATION
   A. Coordinate the work with all sections referencing this section.

1.07 WARRANTY
   A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
   B. Correct defective work within a five year period after Date of Substantial Completion.
   C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS
   A. Polyurethane Sealants:
      4. Substitutions: See Section 01 6000 - Product Requirements.
   B. Acrylic Emulsion Latex Sealants:
      4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SEALANTS
   A. Type E1 - General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25, Uses M, G, and A; multi- component.
      1. Color: To match adjacent surfaces.
2. Applications: Use for:
   a. Control, expansion, and soft joints in masonry.
   b. Joints between concrete and other materials.
   c. Joints between metal frames and other materials.
   d. Other exterior joints for which no other sealant is indicated.

B. Type A1 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
   1. Applications: Use for:
      a. Interior wall and ceiling control joints.
      b. Joints between door and window frames and wall surfaces.
      c. Other interior joints for which no other type of sealant is indicated.

C. Type E5 - Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, I, M and A; single component.
   1. Color: to match adjacent surface.
   2. Applications: Use for:
      a. Joints in sidewalks and vehicular paving.

2.03 ACCESSORIES
   A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
   B. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
   C. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION
3.01 EXAMINATION
   A. Verify that substrate surfaces are ready to receive work.
   B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION
   A. Remove loose materials and foreign matter that could impair adhesion of sealant.
   B. Clean and prime joints in accordance with manufacturer's instructions.
   C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
   D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION
   A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
   B. Perform installation in accordance with ASTM C1193.
   C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
   D. Install bond breaker where joint backing is not used.
   E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
   F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
   G. Tool joints concave.

3.04 CLEANING
   A. Clean adjacent soiled surfaces.
3.05 PROTECTION
   A. Protect sealants until cured.

   END OF SECTION
SECTION 09 9000
PAINTING AND COATING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Extent of painting work is indicated on drawings and schedules, and as herein specified.

B. Work includes:
   1. Painting and finishing of interior and exterior exposed items and surfaces throughout project, except as otherwise indicated.
   2. Field painting of exposed bare and covered pipes and ducts (including color coding), and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work, except as otherwise indicated.
   3. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.

C. Paint exposed surfaces whether or not colors are designated in finish or color schedules elsewhere in the Contract Documents, except where a surface or material is specifically indicated not to be painted or is to remain natural.
   1. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces.
   2. If color or finish is not designated, the Architect will select from standard colors or finishes available.

D. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

E. Following categories of work are not included as part of field-applied finish work.
   1. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items.
   2. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, pipe spaces, and shafts.
   3. Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.
   4. Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting.

F. Following categories of work are included under other sections of these specifications:
   1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for metal fabrication, metal doors and frames, and similar items.
   2. Unless otherwise specified, shop priming of fabricated components such as architectural woodwork, wood casework, and shop-fabricated or factory-built mechanical and electrical equipment or accessories is included under other sections of these specifications.
   3. Mechanical and Electrical Work: Painting of mechanical and electrical work is part of Division 15 and 16, respectively.

G. Do not paint over any code-required labels, such as Underwriters’ Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

1.02 SUBMITTALS

A. Product Data: Submit the following:
   1. Materials list of items proposed to be provided under this Section.
      a. List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer’s catalog number and general classification.
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
3. Manufacturer's recommended installation procedures which will become the basis for accepting or rejecting actual installation procedures used on the Work.
4. Color charts showing colors and finishes available from the proposed manufacturer in the specified products.
   a. The number of colors to be used in any given room or space shall be determined by the Architect but will not exceed three.
   b. After color selection, the Architect will furnish color chips for surfaces to be coated.
5. Samples for verification purposes: Provide samples of each color and material to be applied, as requested by Architect/District.

1.03 QUALITY ASSURANCE

A. Environmental Protection: Provide coating materials that conform to the restrictions of the California Air Resources Board (CARS) and local Air Pollution Control District. Notify the Architect of any paint specified herein which fails to conform to the Air Quality Management District Rules for the location of this project. In localities where the specified coating or paint is prohibited, the Architect may direct the substitution of acceptable coating systems.

B. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer and use only within recommended limits.

C. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials to the job site in original, new, and unopened containers bearing the manufacturer's name and label and the following information:
   1. Product name or title of material.
   2. Product description (generic classification or binder type).
   3. Manufacturer's stock number and date of manufacture.
   4. Contents by volume, for pigment and vehicle constituents.
   5. Thinning instructions.
   6. Color name and number.

B. Provide proper storage to prevent damage to, and deterioration of, paint materials.

C. Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

D. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.05 JOB CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).

C. Do not apply paint in snow, rain, fog, or mist, when the relative humidity exceeds 85 percent, at temperatures less than 5 deg F (3 deg C) above the dew point, or to damp or wet surfaces.
   1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.
PART 2 - PRODUCTS

2.01 MATERIALS

A. Base Manufacturer: Sherwin Williams.

B. Exterior Finishes
   1. Stucco/ Masonry substrates
      a. Primer: B51W00620 - PrepRite ProBlock Interior/Exterior Latex Primer/Sealer White, Application per manufacturer data sheet Data and specifications Previously Painted stucco/masonry substrates
      b. Primer: - Loxon Concrete & Masonry Primer/Sealer, Application per manufacturer data sheet data and specifications, New unpainted stucco/masonry
      c. Topcoat: A80W01151 - SuperPaint Exterior Latex Application per manufacture Data sheet and specifications Note: color and sheen to be selected on per job bases

2. Wood - Exterior
   a. Primer: B51W00620 - PrepRite ProBlock Interior/Exterior Latex Primer/Sealer White, Application per manufacturer data sheet data and specifications, New and Previously painted and repaired substrates
   b. Primer: B42W08041 - Exterior Latex Wood Primer, Application per manufacturer data sheet data and specifications New unpainted wood
   c. Topcoat: A80W01151 - SuperPaint Exterior Latex, Application per manufacturer data sheet and specifications Note: color and sheen to be selected on per job bases

3. Steel/Ferrous Most Metal Doors & Frames, Gates, Handrails, Supports, etc.
   a. Primer: 866A01320 - PROCRYL Primer, Application per manufacturer data sheet data and specifications New unpainted metal
   b. Primer: 851W00620tPrepRite® ProBlock Interior/Exterior Latex Primer/Sealer, White, Application per manufacturer data sheet data and specifications Previously painted and repaired substrates
   c. Topcoat: 853W01151 - Pro Industrial Waterbased Alkyd Urathane Application per manufacturer data sheet data and specifications Note: color and sheen to be selected on per job bases

C. Interior Finishes
   1. Drywall
      a. Primer: 851W00620 - PrepRite ProBlock Interior/Exterior Latex Primer/Sealer White, Application per manufacturer data sheet data and specifications Previously painted substrates
      b. Primer: B28W08000 - PVA Drywall Primer & Sealer White Application per manufacturer data sheet data and specifications Drywall New and unpainted
      c. Primer: B51T00600 - Prime Rx Peel Bonding Primer Clear Application per manufacturer data sheet data and specifications Drywall Peeling, Old Plaster or Wallpaper removal
      d. Topcoat: A87W01151 - SuperPaint Interior Late, Application per manufacturer data sheet data and specifications Note: color and sheen to be selected on per job bases

2. Steel/ Metal / Doors Frames, Handrails, Trim
   a. Primer: 866A01320 - PROCRYL Primer, Application per manufacturer data sheet data and specifications New unpainted metal
   b. Primer: B51W00620 - PrepRite ProBlock Interior/Exterior Latex Primer/Sealer White, Application per manufacturer data sheet data and specifications Previously painted and repaired substrates
   c. Topcoat: 853W01151 - Pro Industrial Waterbased Alkyd Urathane Application per manufacturer data sheet data and specifications Note: color and sheen to be selected on per job bases

3. Wood - Interior Trim Doors and Frames, Handrails
   a. Primer: B42W08041 - Exterior Latex Wood Primer, Application per manufacturer data sheet data and specifications New unpainted wood
b. Primer: B51W00620 - PrepRite ProBlock Interior/Exterior Latex Primer/Sealer White, Application per manufacturer data sheet data and specifications Previously painted and repaired substrates

c. Topcoat: B53W01151 - Pro Industrial Waterbased Alkyd Urethane Application per manufacturer data sheet data and specifications Note: color and sheen to be selected on per job bases

D. Colors and Glosses: The Architect/District will be the sole judge of acceptability of the various glosses obtained from the materials proposed to be used in the Work.

E. Undercoats and Thinners: Provide undercoat paint produced by the same manufacturer as the finish coat. Use only the thinners recommended by the paint manufacturer and use only to the recommended limits. Insofar as practicable, use undercoat, finish coat, and thinner material as parts of a unified system of paint finish.

2.02 APPLICATION EQUIPMENT

A. For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint.

B. Compatibility: Prior to actual use of application equipment, use all means necessary to verify that the proposed equipment is actually compatible with the material to be applied and that the integrity of the finish will not be jeopardized by use of the proposed application equipment.

2.03 OTHER MATERIALS

A. All other materials, not specifically described but required for a complete and proper installation of the work of this Section, shall be new first-quality of their respective kinds, and as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

B. Commencement of installation of any products of this Section shall be considered as acceptance of the substrate and conditions as being satisfactory for proper installation of products of this Section.

3.02 MATERIALS PREPARATION

A. Mix and prepare painting materials in strict accordance with the manufacturer's recommendations.

B. Store materials not in actual use in tightly covered containers.

C. Maintain containers used in storage, mixing, and application of paint in a clean condition, free from foreign materials and residue.

D. Stirring: Stir all materials before application to produce a mixture of uniform density, and as required during the application of materials. Do not stir into the material any film which may form on the surface. Remove the film and, if necessary, strain the material before using.

3.03 SURFACE PREPARATION

A. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces.
   1. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

B. Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to cleaning. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
C. Surface Preparation:
   1. Clean and prepare surfaces to be painted in accordance with the manufacturer's instructions for each particular substrate condition and as specified.
   2. Provide barrier coats over incompatible primers or remove and reprime. Notify Architect in writing of problems anticipated with using the specified finish-coat material with substrates primed by others.

D. Cementitious Materials: Prepare concrete, concrete masonry block, and cement plaster surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
   1. Use abrasive blast-cleaning methods if recommended by the paint manufacturer.
   2. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

E. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
   1. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before application of primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   2. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
   3. When transparent finish is required, backprime with spar varnish.
   4. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
   5. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.

F. Ferrous Metals: Clean nongalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council.
   1. Blast steel surfaces clean as recommended by the paint system manufacturer and in accordance with requirements of SSPC specification SSPC SP 10-
   2. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
   3. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.

G. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

3.04 MATERIALS PREPARATION

A. Carefully mix and prepare paint materials in accordance with manufacturer's directions.
   1. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
   2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
   3. Use only thinners approved by the paint manufacturer, and only within recommended limits.
B. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.05 PAINT APPLICATION

A. Coordinate as required with other work to assure proper and adequate provision in other work for interface with the work of this Section.

B. Perform the work of this Section in strict accordance with the original design, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended application procedures. Use applicators and techniques best suited for substrate and type of material being applied.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
   1. Paint colors, surface treatments, and finishes are indicated in finish and color schedules elsewhere in the Contract Documents.
   2. Provide finish coats that are compatible with primers used.
   3. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even smooth surface in accordance with the manufacturer's directions.
   4. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
   5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector cover's, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.
   6. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
   7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
   8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
   9. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
  10. Sand lightly between each succeeding enamel or varnish coat.
  11. Omit primer on metal surfaces that have been shop-primed and touch up painted.

D. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

E. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.

F. Mechanical and Electrical Work: Painting mechanical and electrical work is limited to items exposed in mechanical equipment rooms and in occupied spaces.

G. Mechanical items to be painted include but are not limited to:
   1. Piping, pipe hangers, and supports.
   2. Tanks.
3. Ductwork.
4. Insulation.
5. Supports.
6. Motors and mechanical equipment.
7. Accessory items.

H. Electrical items to be painted include but are not limited to:
   1. Conduit and fittings.
   2. Switchgear.

I. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

J. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material that is required to be painted or finished and has not been prime coated by others. Recolat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing.

K. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.06 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

B. Upon completion of painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping, using care not to scratch or damage adjacent finished surfaces.

3.07 PROTECTION

A. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.08 PAINTING SCHEDULE - EXTERIOR

A. Exterior Wood Surfaces:
   1. Gloss:
      a. 1 coat Exterior Wood Primer
      b. 2 coats Exterior Acrylic Gloss Enamel
   2. Semi-Gloss:
      a. 1 coat Exterior Wood Primer
      b. 2 coats Exterior Acrylic Semi-gloss Enamel
   3. Flat:
      a. 1 coat Exterior Wood Primer
      b. 2 coats Exterior Acrylic Emulsion Flat Paint

B. Exterior Zinc-coated Metal Surfaces:
   1. Gloss:
      a. 1 coat Exterior galvanized metal primer.
      b. 1 coat Exterior Enamel Undercoat or Exterior Acrylic Gloss Enamel
      c. 1 coat Exterior Acrylic Gloss Enamel
   2. Semi-Gloss:
      a. 1 coat Exterior galvanized metal primer.
b. 1 coat Exterior Enamel Undercoat or Exterior Acrylic Semi-gloss Enamel  
c. 1 coat Exterior Acrylic Semi-gloss Enamel  

C. Exterior Ferrous Metal Surfaces:  
1. Gloss:  
   a. 2 coats Exterior Ferrous Metal Primer (Omit first coat on shop primed surfaces.  
   b. 1 coat Exterior Enamel Undercoat or Exterior Acrylic Gloss Enamel  
   c. 1 coat Exterior Acrylic Gloss Enamel  
2. Semi-Gloss:  
   a. 2 coats Ferrous Metal Primer (Omit first coat on shop primed surfaces.  
   b. 1 coat Exterior Enamel Undercoat or Exterior Acrylic Semi-gloss Enamel  
   c. 1 coat Exterior Acrylic Semi-gloss Enamel  

D. Exterior Concrete and Plaster Surfaces:  
1. Flat:  
   a. 1 coat Exterior Concrete and Plaster Primer  
   b. 1 coat Exterior Acrylic Emulsion Flat Paint  

3.09 PAINTING SCHEDULE - INTERIOR  
A. Interior Metal Surfaces:  
1. Gloss:  
   a. 1 coat Interior Ferrous Metal Primer*  
   b. 1 coat Interior Enamel Undercoat or Interior Acrylic Gloss Enamel  
   c. 1 coat Interior Acrylic Gloss Enamel  
2. Semi-Gloss:  
   a. 1 coat Interior Ferrous Metal Primer (Omit 1st coat on shop primed surfaces)  
   b. 1 coat Interior Enamel Undercoat or Interior Acrylic Semi-Gloss Enamel  
   c. 1 coat Interior Acrylic Semi-Gloss Enamel  
B. Interior Gypsum Wallboard Surfaces:  
1. Semi-Gloss:  
   a. 1 coat Gypsum Wallboard Primer/Sealer  
   b. 2 coats Interior Latex Semi-Gloss Enamel  
2. Eggshell:  
   a. 1 coat Gypsum Wallboard Primer/Sealer  
   b. 1 coat Interior Latex Eggshell Enamel  
3. Flat:  
   a. 1 coat Gypsum Wallboard Primer/Sealer  
   b. 2 coats Interior Flat Latex Paint  
C. Interior Plaster Surfaces:  
1. Semi-Gloss:  
   a. 1 coat Interior Plaster Primer/Sealer  
   b. 2 coats Interior Latex Semi-Gloss Enamel  
2. Eggshell:  
   a. 1 coat Interior Plaster Primer/Sealer  
   b. 2 coats Interior Latex Eggshell Enamel  
3. Flat:  
   a. 1 coat Interior Plaster Primer/Sealer  
   b. 2 coats Interior Flat Latex Paint  
D. Miscellaneous: Construction visible through screen vents and grilles shall have one heavy coat of flat black paint.  

END OF SECTION
BERNARDO HEIGHTS MS RELOS
Poway Unified School District

SECTION 10 1400
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Room and door signs.

1.02 REFERENCE STANDARDS
A. Title 24, Part 2. C.C.R., 2016 California Building Code, Chapter 11B.

1.03 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
   1. When room numbers to appear on signs differ from those on the drawings, include the drawing room number on schedule.
   2. Submit for approval by Owner through Architect prior to fabrication.
D. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

1.04 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Package signs as required to prevent damage before installation.
B. Package room and door signs in sequential order of installation, labeled by floor or building.
C. Store tape adhesive at normal room temperature.

PART 2 PRODUCTS

2.01 SIGNAGE APPLICATIONS
A. Room and Door Signs: Provide a sign for every doorway included within the contract work, whether it has a door or not, not including corridors, lobbies, and similar open areas.

2.02 SIGN TYPES
A. Acrylic Room and Accessibility Signs:
   1. Cast acrylic sheet: Manufacturer's standard 1/8 inch thickness and as follows:
      a. Color as selected by architect from manufacturer's full range.
      b. Acrylic matte clear sheets with overall thickness of 1/8 inch.
   2. Unframed panel signs: Fabricate signs with edges mechanically and smoothly finished to comply with the following requirements:
      a. Edge: Square cut (or eased).
      b. Corner: Radius to 1".
   3. Graphic content and style: Provide sign copy that complies with requirements indicated below and in the sign schedule and drawings for size, spacing, content, mounting height and location, material, finishes and colors of signage.
      a. Pictograms and other artwork to be reversed-applied vinyl or silk-screened process in colors as indicated (or raised image via machine-routed raised copy).
   4. Colored coatings for acrylic sheets:
      a. For background colors, provide Pantone Matching System colored coatings, including inks and paints, that are recommended by acrylic manufacturer for optimum adherence to surface and that are non-fading for application intended.
b. For raised copy colors (machine routed copy) provide manufacturer's full range of solid through color applique colors.

5. Raised characters shall comply with CBC Section 11B-703.2.
   a. Depth: It shall be 1/32 inch (0.8 mm) minimum above their background and shall be sans serif uppercase and be duplicated in Braille.
   b. Height: It shall be 5/8 inch (15.9 mm) minimum and 2 inches (51 mm) maximum based on the height of the uppercase letter "I". CBC Section 11B-703.2.5.
   c. Finish and Contrast: Characters and their background shall have a non-glare finish. Character shall contrast with their background with either light character on a dark background or dark characters on a light background. CBC Section 11B-703.5.1.
   d. Proportions: It shall be selected from fonts where the width of the uppercase letter "O" is 60% minimum and 110% maximum of the height of the uppercase letter "I". Stroke thickness of the uppercase letter "I" shall be 15% maximum of the height of the character. CBC Sections 11B-703.2.4 and 11B-703.2.6.
   e. Character Spacing: Spacing between individual raised characters shall comply with CBC Section 11B-703.2.7 and 11B-703.2.8.
   f. Format: Text shall be in a horizontal format. CBC Section 11B-703.2.9.
   g. Braille: It shall be contracted (Grade 2) and shall comply with CBC Sections 11B-703.3 and 11B-703.4. Braille dots shall have a domed or rounded shape and shall comply with CBC Table and Figure 11B-703.3.1.
   h. Mounting Height: Tactile characters on signs shall be located 48" minimum to the baseline of the lowest Braille cells and 60" maximum to the baseline of the highest line of raised characters above the finish floor or ground surface. CBC Section and Figure 11B-703.4.1.
   i. Mounting Location: A tactile sign shall be located per CBC Section and Figure 11B-703.4.2 as follows:
      1) alongside a single door at the latch side
      2) on the inactive leaf at double doors with one active leaf.
      3) to the right of the right hand door at double doors with two active leaves.
      4) on the nearest adjacent wall where there is no wall space at the latch side of a single door or at the right side of double doors with two active leaves.
      5) so that a clear floor space of 18"x18" minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degree open position.
   j. Visual Characters shall comply with CBC Section 11B-703.5 and shall be 40" minimum above finish floor or ground.
   k. Pictograms shall comply with CBC Section 11B-703.6.
   l. Symbols of Accessibility shall comply with CBC Section 11B-703.7.
   m. Variable Message Signs shall comply with CBC Section 11B-703.8.

B. Color and Font: Unless otherwise indicated:
   1. Character Font: Helvetica, Arial, or other sans serif font.
   2. Character Case: Upper case only.
   3. Background Color: As selected by Architect.

2.03 ACCESSORIES
A. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. Attach wall and door mounted panel signs to surfaces using the methods indicated below:
1. Vinyl tape mounting: Use double sided foam tape, of the thickness indicated, to mount signs to smooth, non-porous surfaces. Do not use this method for vinyl covered or rough surfaces.

2. Silicone adhesive mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach signs to irregular, porous or vinyl covered surfaces. Use double sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.

C. Install neatly, with horizontal edges level.

D. Mounting height as indicated on the drawings.

E. Locate signs in accordance with approved shop drawings and ADAAG requirements. Install so that sign location is clear of door swing when reading sign.

F. Protect from damage until Substantial Completion; repair or replace damage items.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Interior manual roller shades.

1.02 ADMINISTRATIVE REQUIREMENTS
A. Sequencing:
   1. Do not fabricate shades until field dimensions for each opening have been taken with field conditions in place.
   2. Do not install shades until final surface finishes and painting are complete.

1.03 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
C. Selection Samples: Include fabric samples in full range of available colors and patterns.
D. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
B. Installer Qualifications: Company specializing in performing work of this type with minimum 5 years of documented experience with shading systems of similar size and type.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.
B. Handle and store shades in accordance with manufacturer's recommendations.

1.06 FIELD CONDITIONS
A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.07 WARRANTY
A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
B. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
   1. Shade Hardware: One year.
   2. Fabric: One year.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Interior Manually Operated Roller Shades:
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ROLLER SHADES
A. General:
   1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
   2. Provide shade system that operates smoothly when shades are raised or lowered.
1. Description: Single roller, manually operated fabric window shades.
   a. Drop Position: Regular roll.
   b. Mounting: Window jamb mounted.
2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
3. Roller Tubes:
   b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
   c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
   d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.
4. Hembars: Designed to maintain bottom of shade straight and flat.
5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.
   a. Provide a permanently lubricated brake assembly mounted on a oil-impregnated hub with wrapped spring clutch.
   b. Brake must withstand minimum pull force of 50 pounds in the stopped position.
   c. Mount clutch/brake assembly on the support brackets, fully independent of the roller tube components.
6. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 pound minimum breaking strength. Provide upper and lower limit stops.
   a. Chain Retainer: Chain tensioning device complying with WCMA A100.1.
7. Accessories:
   a. Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; baked enamel finish.

2.03 SHADE FABRIC
   A. Fabric: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
   1. Manufacturers:
      b. Substitutions: See Section 01 6000 - Product Requirements.
   3. Performance Requirements:
      a. Flammability: Pass NFPA 701 large and small tests.
      b. Fungal Resistance: No growth when tested according to ASTM G21.

2.04 ROLLER SHADE FABRICATION
   A. Field measure finished openings prior to ordering or fabrication.
   B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
   1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window stool.
   2. Horizontal Dimensions - Inside Mounting: Fill openings from jamb to jamb.

PART 3 EXECUTION
3.01 EXAMINATION
   A. Examine finished openings for deficiencies that may preclude satisfactory installation.
   B. Start of installation shall be considered acceptance of substrates.
3.02 INSTALLATION
   A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
   B. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.03 CLEANING
   A. Clean soiled shades and exposed components as recommended by manufacturer.
   B. Replace shades that cannot be cleaned to “like new” condition.

3.04 PROTECTION
   A. Protect installed products from subsequent construction operations.

END OF SECTION
ARTICLE 1  SUMMARY

1.1 This Division of the specification outlines the provisions of the contract work to be performed under this Division.

1.2 This Section applies to and forms a part of each section of specifications in Division 26 and all work performed under the electrical and communications contracts.

1.3 In addition, work in this Division is governed by the provisions of the bidding requirements, contract forms, general conditions and all sections under general requirements.

1.4 These specifications contain statements which may be more definitive or more restrictive than those contained in the General Conditions. Where these statements occur, they shall take precedence over the General Conditions.

1.5 Where the words ‘provide’ or ‘provision’ are used, it shall be definitely interpreted as ‘furnishing and installing complete in operating condition’. Where the words ‘as indicated’ or ‘as shown’ are used, it shall mean as shown on contract drawings.

1.6 Where items are specified in the singular, this Division shall provide the quantity as shown on drawings plus any spares or extras mentioned on drawings or specifications. All specified and supplied equipment shall be new.

ARTICLE 2  CONTRACTOR QUALIFICATIONS

2.1 The Contractor shall have a current California C-10 Electrical Contractor’s license and all individuals working on this project shall have passed the Department of Industrial Relations Division of apprenticeship Standards – “Electrician Certification Program.”

ARTICLE 3  CODES, PERMITS AND FEES

3.1 Comply with all applicable laws, ordinances, rules, regulations, codes, or rulings of governmental units having jurisdiction as well as standards of NFPA, and serving utility requirements.

3.2 Obtain permits, fees, inspections, meter and the like, associated with work in each section of this Division.

3.3 Installation procedures, methods and conditions shall comply with the latest requirements of the Federal Occupational Safety and Health Act (OSHA).

ARTICLE 4  EXAMINATION OF PREMISES

4.1 Examine the construction drawings and premises prior to bidding. No allowances will be made for not being knowledgeable of existing conditions.

ARTICLE 5  STANDARDS
5.1 The following standard publications of the latest editions enforced and supplements thereto shall form a part of these specifications. All electrical work must, as a minimum, be in accordance with these standards.

5.1.1 2016 California Electrical Code (CEC), Part 3 Title 24 CCR.
5.1.2 National Fire Protection Association.
5.1.3 Underwriters’ Laboratories, Inc. (UL).
5.1.4 Certified Ballast Manufacturers’ Association (CBM).
5.1.5 National Electrical Manufacturers’ Association (NEMA).
5.1.6 Institution of Electrical & Electronics Engineers (IEEE).
5.1.7 American Society for Testing & Materials (ASTM).
5.1.8 National Board of Fire Underwriters (NBFU).
5.1.9 National Board of Standards (NBS).
5.1.10 American National Standards Institute (ANSI).
5.1.11 Insulated Power Cable Engineers Association (IPECS).
5.1.12 Electrical Testing Laboratories (ETL).
5.1.14 2016 California Building Code (CBC), Part 2, Title 24 CCR.
5.1.15 2016 California Fire Code (CFC), Part 9, Title 24, CCR.
5.1.16 2016 NFPA 72 with California State Amendments
5.1.17 National Electrical Testing Association (NETA), 2010 or most current

ARTICLE 6 DEFINITIONS

6.1 Concealed: Hidden from sight, as in trenches, chases, hollow construction, or above furred spaces, hung ceilings - acoustical or plastic type, or exposed to view only in tunnels, attics, shafts, crawl spaces, unfinished spaces, or other areas solely for maintenance and repair.

6.2 Exposed, Non-Concealed, Unfinished Space: A room or space that is ordinarily accessible only to building maintenance personnel, a room noted on the 'finish schedule' with exposed and unpainted construction for walls, floors, or ceilings or specifically mentioned as 'unfinished'.

6.3 Finish Space: Any space ordinarily visible, including exterior areas.

ARTICLE 7 WORK AND MATERIALS

7.1 Unless otherwise specified, all materials must be new and of the best quality. Materials previously incorporated into other projects, salvaged, or refurbished are not considered new. Perform all labor in a thorough and workmanlike manner.

7.2 All materials provided under the contract must bear the UL label where normally available. Note that this requirement may be repeated under equipment specifications. In general, such devices as will void the label should be provided in separate enclosures and wired to the labeled unit in proper manner.

ARTICLE 8 SHOP DRAWINGS AND SUBMITTALS

8.1 Submit shop drawings and all data in accordance with Division 1 of these specifications and as noted below for all equipment provided under this Division.

8.2 Shop drawings submittals demonstrate to the Architect that the Contractor understands the design concept. The Contractor demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication
and installation methods of material and equipment he intends to use. If deviations, discrepancies, or conflicts between submittals and specifications are discovered either prior to or after submittals are processed, notify the Architect immediately.

8.3 Manufacturer’s data and dimension sheets shall be submitted giving all pertinent physical and engineering data including weights, cross sections and maintenance instructions. Standard items of equipment such as receptacles, switches, plates, etc., which are cataloged items, shall be listed by manufacturer.

8.4 Index all submittals and reference them to these specifications. All submittal items shall be assembled and submitted, one for each specification section. (Multiple specification sections may be grouped together in one common submittal binder, as long as each individual section is clearly identified.) Partial or incomplete submittal sections will not be reviewed.

ARTICLE 9 EQUIPMENT PURCHASES

9.1 Arrange for purchase and delivery of all materials and equipment within 20 days after approval of submittals. All materials and equipment must be ordered in ample quantities for delivery at the proper time. If items are not on the project in time to expedite completion, the Owner may purchase said equipment and materials and deduct the cost from the contract sum.

9.2 Provide all materials of similar class or service by one manufacturer.

ARTICLE 10 COOPERATIVE WORK

10.1 Correct without charge any work requiring alteration due to lack of proper supervision or failure to make proper provision in time. Correct without charge any damage to adjacent work caused by the alteration.

10.2 Cooperative work includes: General supervision and responsibility for proper location and size of work related to this Division, but provided under the other sections of these specifications, and installation of sleeves, inserts, and anchor bolts for work under each section in this Division.

ARTICLE 11 VERIFICATION OF DIMENSIONS

11.1 Scaled and figured dimensions are approximate only. Before proceeding with work, carefully check and verify dimensions, etc., and be responsible for properly fitting equipment and materials together and to the structure in spaces provided.

11.2 Drawings are essentially diagrammatic, and many offsets, bends, pull boxes, special fittings, and exact locations are not indicated. Carefully study drawings and premises in order to determine best methods, exact location, routes, building obstructions, etc. and install apparatus and equipment in manner and locations to avoid obstructions, preserve headroom, keep openings and passageways clear, and maintain proper clearances.

ARTICLE 12 CUTTING AND PATCHING

12.1 All cutting, and patching shall be in accordance with Division 1 of these specifications and as noted below.
12.2 Cut existing work and patch as necessary to properly install new work. As the work progresses, leave necessary openings, holes, chases, etc., in their correct location. If the required openings, holes, chases, etc., are not in their correct locations, make the necessary corrections at no cost to the Owner. Avoid excessive cutting and do not cut structural members including wall framing without the consent of the Architect.

ARTICLE 13 CLOSING-IN OF UNINSPECTED WORK

13.1 Cover no work until inspected, tested, and approved by the Architect. Where work is covered before inspection and test, uncover it and when inspected, tested, and approved, restore all work to original proper condition at no additional cost to Owner.

ARTICLE 14 EXCAVATION AND BACKFILL

14.1 All excavation and backfill shall be in accordance with Division 1 of these specifications and as noted below.

14.2 Perform all necessary excavation, shoring, and backfilling required for the proper laying of all conduits inside the building and premises, and outside as may be necessary.

14.3 Excavate all trenches open cut, keep trench banks as nearly vertical as practicable, and sheet and brace trenches where required for stability and safety. Excavate trenches true to line and make bottoms no wider than necessary to provide ample work room. Grade trench bottoms accurately. Machine grade only to the top line of the conduits, doing the remainder by hand. Do not cut any trench near or under footings without first consulting the Architect. All trenches shall be done in accordance with OSHA standards and regulations.

14.4 Backfilling shall be done with each layer compacted before another layer is added. No stones or coarse lumps shall be laid directly on a conduit or conduits.

14.5 Trenches shall be filled with the specified material. Sod, if any, shall be removed in cut sections and replaced in same manners.

14.6 Provide pumps and drainage of all open trenches for purposes of installing electrical duct and wiring.

14.7 Perform all backfilling in accordance with the requirements of and under the direction of the Geotechnical Engineer.

14.8 Where new underground trenching is required on sites or in any area where existing underground utilities exist, the Contractor shall provide an independent professional utility locating service to locate exact vertical and horizontal locations of all existing utilities. Where existing utilities are found the Contractor shall hand dig those areas to avoid disruption. The Contractor shall be responsible for immediate repairs to existing underground utilities damaged during construction. The Contractor shall repair all existing asphalt, concrete and landscape surfaces damaged or removed during construction to match their original conditions. Where trenching extends through public streets or roadways, the Contractor shall notify underground service alert in addition to the independent locating service 48 hours before start of construction to determine location of existing utilities by calling (800) 422-4133.

ARTICLE 15 CONCRETE
15.1 Where used for structures to be provided under the contract such as bases, etc., concrete work, and associated reinforcing shall be as specified under Division 3 of these specifications.

15.2 See other sections for additional requirements for underground vaults, cable ducts, etc.

ARTICLE 16 ACCESSIBILITY

16.1 Install all control devices or other specialties requiring reading, adjustment, inspection, repairs, removal, or replacement conveniently and accessibly throughout the finished building.

16.2 All required access doors or panels in walls and ceilings are to be furnished and installed as part of the work under this Section. Refer to Division 1 of these specifications and as noted below.

16.3 Where located in fire rated assemblies, provide doors which match the rating of the assembly and are approved by the jurisdictional authority.

16.4 Refer to ‘finish schedule’ for types of walls and ceilings in each area and the architectural drawings for rated wall construction.

16.5 Coordinate work of the various sections to locate specialties requiring accessibility with others to avoid unnecessary duplication of access doors.

ARTICLE 17 FLASHING

17.1 Flash and counter flash all conduits penetrating roofing membrane as shown on Architectural drawings. All work shall be in accordance with Division 7 of these specifications.

ARTICLE 18 IDENTIFICATION OF EQUIPMENT

18.1 All electrical equipment shall be labeled, tagged, stamped, or otherwise identified in accordance with the following schedules:

18.1.1 General:

18.1.1.1 In general, the installed laminated nameplates as hereinafter called for shall also clearly indicate its use, areas served, circuit identification, voltage and any other useful data.

18.1.1.2 All auxiliary systems, including communications, shall be labeled to indicate function.

18.1.2 Lighting and Local Panelboards:

18.1.2.1 Panel identification shall be with white and black micarta nameplates. Letters shall be no less than 3/8” high.

18.1.2.2 Circuit directory shall be two column typewritten card set under glass or glass equivalent. Each circuit shall be identified by the room number and/or number of unit and other pertinent data as required.

18.1.3 Distribution Switchboards and Feeders Sections:
18.1.3.1 Identification shall be with 1" x 4" laminated white micarta nameplates with black lettering on each major component, each with name and/or number of unit and other pertinent data as required. Letters shall be no less than 3/8" high.

18.1.3.2 Circuit breakers and switches shall be identified by number and name with 3/8" x 1-1/2" laminated micarta nameplates with 3/16" high letters mounted adjacent to or on circuit breaker or switch.

18.1.4 Disconnect Switches, Motor Starters and Transformers:

18.1.4.1 Identification shall be with white micarta laminated labels and 3/8" high black lettering.

18.1.5 All communication system terminal boxes including T.V., telephone/intercom, security, fire alarm, clock, and computer networking shall be provided with white micarta laminated labels and 3/8" high black lettering.

ARTICLE 19 CONSTRUCTION FACILITIES

19.1 Furnish and maintain from the beginning to the completion all lawful and necessary guards, railings, fences, canopies, lights, warning signs, etc. Take all necessary precautions required by City, State Laws, and OSHA to avoid injury or damage to any persons and property.

19.2 Temporary power and lighting for construction purposes shall be provided under this Section. All work shall be in accordance with Division 1 of these specifications.

ARTICLE 20 GUARANTEE

20.1 Guarantee all material, equipment and workmanship for all sections under this Division in writing to be free from defect of material and workmanship for one year from date of final acceptance, as outlined in the general conditions. Replace without charge any material or equipment proven defective during this period. The guarantee shall include performance of equipment under all site conditions, conditions of load, installing any additional items of control and/or protective devices, as required.

ARTICLE 21 PATENTS

21.1 Refer to the General Conditions for Contractor's responsibilities regarding patents.

ARTICLE 22 EQUIPMENT ROUGH-IN

22.1 Rough-in all equipment, fixtures, etc. as designed on the drawings and as specified herein. The drawings indicate only the approximate location of rough-ins. Mounting heights of all switches, receptacles, wall mounted fixtures and such equipment must be coordinated with the Architectural Designs. The Contractor shall obtain all rough-in information before progressing with any work for rough-in connections. Minor changes in the contract drawings shall be anticipated and provided for under this Division of the specifications to comply with rough-in requirements.

ARTICLE 23 OWNER FURNISHED AND OTHER EQUIPMENT

23.1 Rough-in and make final connections to all Owner furnished equipment shown on the drawings and specified, and all equipment furnished under other sections of the specifications.
ARTICLE 24  EQUIPMENT FINAL CONNECTIONS

24.1 Provide all final connections for the following:

24.1.1 All equipment furnished under this Division.

24.1.2 Electrical equipment furnished under other sections of the specification.

24.1.3 Owner furnished equipment as specified under this Division.

ARTICLE 25  INSERTS, ANCHORS, AND MOUNTING SLEEVES

25.1 Inserts and anchors must be:

25.1.1 Furnished and installed for support of work under this Division.

25.1.2 Mounting of equipment that is of such size as to be free standing and that equipment which cannot conveniently be located on walls, such as motor starters, etc., shall be rigidly supported on a framework of galvanized steel angle of Unistrut or B-line systems with all unfinished edges painted.

25.1.3 Furnish and install all sleeves as required for the installation of all work under all Sections of this Division and for all communication systems including any communication systems described in this Section which are bid to the General Contractor. Sleeves through floors, roof, and walls shall be as described in “Conduit and Fittings” Section 26 05 33.

ARTICLE 26  SEISMIC ANCHORING

26.1 All switchgear and other free-standing electrical equipment or enclosures shall be anchored to the floor and braced at the top of the equipment to the structure. Where details have not been provided on the drawings, anchorage shall comply with CBC Section 16 16A.1.12. The Contractor shall submit drawings signed by the Contractors registered structural Engineer indicating method of compliance prior installation.

26.2 All sound systems, communication, signal or data networking equipment or enclosures shall be anchored to the structure. Where details have not been provided on the drawings, anchorage shall comply with CBC Section 16 16A.1.12. The Contractor shall submit drawings signed by the Contractors registered Structural Engineer indicating method of compliance prior to installation.

ARTICLE 27  RUST PROOFING

27.1 Rust proofing must be applied to all ferrous metals and shall be in accordance with Section 05500 of these specifications and as noted below.

27.1.1 Hot-dipped galvanized shall be applied and after forming of angle-iron, bolts, anchors, etc.

27.1.2 Hot-dipped galvanized coating shall be applied after fabrication for junction boxes and pull boxes cast in concrete.
ARTICLE 28  GENERAL WIRING

28.1 Where located adjacent in walls, outlet boxes shall not be placed back to back, nor shall extension rings be used in place of double boxes, all to limit sound transmission between rooms. Provide short horizontal nipple between adjacent outlet boxes, which shall have depth sufficient to maintain wall coverage in rear by masonry wall.

28.2 In those instances where outlet boxes, recessed terminal boxes, or recessed equipment enclosures are installed in a fire rated assembly, provide "Flamesafe FSD 1077" fire stopping pads or approved equal, over the outlet or box.

28.3 Complete rough-in requirements of all equipment to be wired under the contract are not indicated. Coordinate with respective trades furnishing equipment or with the Architect as the case may be for complete and accurate requirements to result in a neat, workmanlike installation.

ARTICLE 29  SEPARATE CONDUIT SYSTEMS

29.1 Each electrical and signal system shall be contained in a separate conduit system as shown on the drawings and as specified herein. This includes each power system, each lighting system, each signal system of whatever nature, telephone, standby system, sound system, control system, fire alarm system, etc.

29.2 Further, each item of building equipment must have its own run of power wiring. Control wiring may be included in properly sized conduit for equipment feeders of #6 AWG and smaller, having separate conduit for larger sizes.

ARTICLE 30  CLEANUP

30.1 In addition to cleanup specified under other sections, thoroughly clean all parts of the equipment. Where exposed parts are to be painted, thoroughly clean off any spattered construction materials and remove all oil and grease spots. Wipe the surface carefully and scrape out all cracks and corners.

30.2 Use steel brushes on exposed metal work to carefully remove rust, etc., and leave smooth and clean.

30.3 During the progress of the work, keep the premises clean and free of debris.

ARTICLE 31  PAINTING

31.1 Paint all unfinished metal as required in accordance with Division 1 of these specifications. (Galvanized and factory painted equipment shall be considered as having a sub-base finish.)

ARTICLE 32  PROJECT CLOSEOUT

32.1 Prior to completion of project, compile a complete equipment maintenance manual for all equipment supplied under sections of this Division, in accordance with Division 1 of these specifications and as described below.

32.2 Equipment Lists and Maintenance Manuals:

32.2.1 Prior to completion of job, Contractor shall compile a complete equipment list and maintenance manuals. The equipment list shall include the following items for
every piece of material equipment supplied under this Section of the specifications:

32.2.1.1 Name, model, and manufacturer.

32.2.1.2 Complete parts drawings and lists.

32.2.1.3 Local supply for parts and replacement and telephone number.

32.2.1.4 All tags, inspection slips, instruction packages, etc., removed from equipment as shipped from the factory, properly identified as to the piece of equipment it was taken from.

32.3 Maintenance manuals shall be furnished for each applicable section of the specifications and shall be suitably bound with hard covers and shall include all available manufacturers’ operating and maintenance instructions, together with “as-built” drawings to properly operate and maintain the equipment. The equipment lists and maintenance manuals shall be submitted in duplicate to the Architect for approval not less than 10 days prior to the completion of the job. The maintenance manuals shall also include the name, address, and phone numbers of all subcontractors involved in any of the work specified herein. Four copies of the maintenance manuals bound in single volumes shall be provided.

ARTICLE 33 RECORD DRAWINGS

33.1 The Division 26 Contractor shall maintain record drawings as specified in accordance with Division 1 of these specifications, and as noted below.

33.2 Drawings shall show locations of all concealed underground conduit runs, giving the number and size of conduit and wires. Underground ducts shall be shown with cross section elevations and shall be dimensioned in relation to permanent structures to indicate their exact location. Drawing changes shall not be identified only with referencing CORs and RFIs, the drawings shall reflect all of the actual additions or changes made. All as-built drawing information shall be prepared by the contractor in AutoCAD, updating the contract computer files as needed to reflect actual installed conditions for all site plans, lighting, power, communication, networking, audio visual, security or fire alarms systems included in the scope of work for this project.

33.3 One set of these record drawings shall be delivered to the Architect. The engineer will review documents for completeness, and will not be responsible for editing contractor computer files.

ARTICLE 34 CHANGES AND EXTRA WORK

34.1 When changes in work are requested, the Division 26 Contractor shall provide unit prices for the work involved in accordance with Division 1 of these specifications, and the following:

34.1.1 The material Costs shall not exceed the latest edition of the “Trade Service” end column “C” price list. The materials prices may be higher only where the Contractor can produce invoices to substantiate higher material costs. The Contractor shall submit a print out copy of the trade service sheets with the change order to substantiate these values.

34.1.2 The labor Costs shall not exceed the latest edition of the “NECA Manual of Labor Units” normal column.
34.2 When credits in work are requested, the Division 26 Contractor shall provide unit prices for the work involved in accordance with Division 1 of these specifications, and the following:

34.2.1 The Material Costs shall not be less than 80% of the latest edition of the “Trade Service” end column price list. The materials prices may be lower only where the Contractor can produce invoices to substantiate lower material costs. Restocking fees may also be included in this amount where applicable.

34.2.2 The Labor Costs shall not be less than 80% of the latest edition of the “NECA Manual of Labor Units” normal column.

34.3 Conduit pricing for conduits of all types sized 3” or smaller.

When changes in the scope of work require the Contractor to estimate conduit installations, they shall NOT include labor values (only material cost may be included) for any of the below items. The labor values for conduit installation represented in the NECA manual are inflated to a point where additional labor for the below items can not be justified.

34.3.1 Couplings.

34.3.2 Set Screw or Compression Fittings, locknuts, Bushings and washers.

34.3.3 Conduit straps and associated screws or nails.

34.3.4 LB fittings or other specialty fittings or specialty mounting hardware may be included where needed.

34.4 Wire pricing for all types and sizes.

When changes in the scope of work require the Contractor to estimate wire installations they shall NOT include labor values (only material cost may be included) for any of the below items. The labor values for wire installation represented in the NECA manual are inflated to a point where additional labor for the below items can not be justified.

34.4.1 Locknuts, Bushings, tape, wire markers.

34.5 When changes in the scope of work require other equipment installations such as lighting fixtures, panelboards, switchboards, wiring devices, communications equipment etc. the Contractor shall NOT include labor values (only material cost may be included) for any of the below items. The labor values for these equipment items represented in the NECA manual are inflated to a point where additional labor for the below items can not be justified.

34.5.1 Associated screws, nails, bolts, anchors or supports.

34.5.2 Locknuts, washers, tape.

34.6 The total labor hours for extra work will be required to be calculated as follows:

34.6.1 Change orders with 1 to 30 total labor hours

<table>
<thead>
<tr>
<th>Labor Category</th>
<th>Percentage of Total Labor Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Laborer</td>
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<tr>
<td>Journeyman</td>
<td>10%</td>
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<tr>
<td>Foreman</td>
<td>80%</td>
</tr>
</tbody>
</table>
34.6.2 Change orders with 31 to 100 total labor hours

<table>
<thead>
<tr>
<th>Role</th>
<th>Percentage of Total Labor Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Laborer</td>
<td>20%</td>
</tr>
<tr>
<td>Journeyman</td>
<td>40%</td>
</tr>
<tr>
<td>Foreman</td>
<td>40%</td>
</tr>
</tbody>
</table>

34.6.3 Change orders with over 100 total labor hours

<table>
<thead>
<tr>
<th>Role</th>
<th>Percentage of Total Labor Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Laborer</td>
<td>30%</td>
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<tr>
<td>Journeyman</td>
<td>50%</td>
</tr>
<tr>
<td>Foreman</td>
<td>20%</td>
</tr>
</tbody>
</table>

34.7 When change orders are issued which allow the work to be completed in the normal sequence of construction, the labor rates shall be based on the most current “Prevailing Wage” – straight time total hourly rate. When change orders require the Contractor to work out of sequence the “Prevailing Wage” – daily overtime hourly rate shall apply. Special condition situations shall be reviewed on an individual basis for alternate hourly rate schedules.

34.8 Costs will not be permitted for additional supervision on site or office time for processing any change order other than the 10% overhead allowance as described in Division 1. Cost for special equipment required to install items for an individual change order are permitted and must be individually identified. Lump Sum cost for small tools or any other cost not specifically required for the change order are not permitted.

34.9 Contractor estimates shall be formatted to clearly identify each of the following:

34.9.1 Line item description of each type of material or labor item.

34.9.2 Description of quantity for each item.

34.9.3 Description of (material cost per / quantity).

34.9.4 Description of (labor cost per / quantity).

34.9.5 Description of total labor hour breakdown per Foreman, Journeyman or General Laborer as described above.

ARTICLE 35 ELECTRONIC FILES

35.1 The Contractor shall make a written request directly to Johnson Consulting Engineers for electronic drawing files. As a part of the written request, please include the following information:

35.1.1 Clearly indicate each drawing sheet needed (i.e., E1.1, E2.1, etc.).

35.1.2 Identify the name, phone number, mailing address and e-mail address of the person to receive the files.

35.1.3 Provide written confirmation and agreement with the requirements described for payment of computer files, as described below.

35.2 Detail or riser diagram sheets, or any other drawings other than floor plans or site plans, will not be made available to the Contractor.
35.3 Files will only be provided in the AutoCAD format in which they were created.

35.4 Requests for files will be processed as soon as possible; a minimum of 7 working days should be the normal processing time. The Contractor shall be completely responsible for requesting the files in time for their use.

END OF SECTION
PART 1 – GENERAL

1.1 Furnish and install wire and cable for branch circuits and feeders specified herein and as shown on the electrical drawings.

1.2 Submittals: Submit manufacturers’ data for the following items:

1.2.1 All cables and terminations

1.3 Common submittal mistakes which will result in the submittals being rejected:

1.3.1 Not including all items listed in the above itemized description.

1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining, or clouding the items to be reviewed, or crossing out the items which are not applicable.

1.3.3 Not including actual manufacturer’s catalog information of proposed products.

1.3.4 Do not include multiple manufacturers for similar products and do not indicate “or approved equal” statements, or “to be determined later” statements. The products being submitted must be the products installed

PART 2 – PRODUCTS

2.1 Wire and cable Rated 120 volt to 600 volt.

2.1.1 All wire and cable shall be new, 600 volt insulated copper, of types specified below for each application. All wire and cable shall bear the UL label and shall be brought to the job in unbroken packages. Wire insulation shall be the color as specified herein and shall be type THWN-2. Insulated conductors shall be installed in all exterior exposed raceways. Conductors for branch circuit lighting, receptacle, power and miscellaneous systems shall be a minimum of No. 12 AWG. Increase conductor size to No. 10 AWG for 120 volt circuits greater than 100 feet from the panel to the load and for 277 volt circuits greater than 200 feet from the panel to the load. Circuit home-runs indicated to be larger than No. 12 must be increased the entire length of the circuit, including equipment grounding conductor. Wire sizes No. 14 through No. 10 shall be solid. No. 8 and larger shall be stranded.

2.1.2 Aluminum conductors will be permitted (only where specifically identified on the drawings. See “600 Volt Feeder Schedule”) in sizes 2/0 or larger. Conductors shall be listed by Underwriters Laboratories (UL) and suitable for operation at 600 volts or less, at a maximum operating temperature of 90°C maximum in wet or dry locations. Conductors shall be marked “SUN-RES”. Aluminum alloy conductors shall be compact stranded conductors of STABILLOY® (AA-8030) as manufactured by Alcan Cable or Listed equal. AA-8000 Series aluminum alloy conductor material shall be recognized by The Aluminum Association.

2.1.3 MC type armored cable reference Section 26 05 33.

2.2 Wire and cable for systems below 120 volts.
2.2.1 All low voltage and communications systems cables routed underground shall be provided with a moisture resistant outer jacket, West Penn “Aquaseal” or equal, unless otherwise specified.

PART 3 - EXECUTION

3.1 Wire and cable shall be pulled into conduits without strain using powdered soapstone, mineralac, or other approved lubricant. In no case shall wire be repulled if same has been pulled out of a conduit run for any purpose. No conductor shall be pulled into conduit until conduit system is complete, including junction boxes, pull boxes, etc.

3.2 All connections of wires shall be made as noted below:

3.2.1 Connections to outlets and switches: Wire formed around binding post of screw.

3.2.2 No. 10 wire and smaller: Circuit wiring connections to lighting fixtures and other hard wired equipment shall be made with pressure type solderless connectors, Buchanan, Scotchlock, Wing Nut, or approved equal. Alternate “WAGO” #773 series or “IDEAL” #32, 33, 34 and 39 series push wire style connectors are also acceptable.

3.3 All wiring shall be continuous without splicing unless where specifically noted on the drawings or where permitted below.

3.3.1 No. 10 wire and smaller above grade: Quantities as needed, connection made with pressure type solderless connectors, Scotchlock or equal.

3.3.2 No. 10 wire and smaller below grade: Quantities as needed, connection made with ‘Raychem’ long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide ‘Raychem’ WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate products must be UL listed for direct burial/submersible and rated to (1000V).

3.3.3 No. 8 wire and larger above grade: Quantities only where indicated, ‘Raychem’ long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide ‘Raychem’ WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate products must be UL listed for direct burial/submersible and rated to (1000V).

3.3.4 No. 8 wire and larger below grade: Quantities only where indicated, ‘Raychem’ long barrel compression terminals with crimping tool and quantity of crimps as recommended by manufacturer, provide ‘Raychem’ WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate products must be UL listed for direct burial/submersible and rated to (1000V).

3.4 All wiring throughout shall be color coded as follows:

<table>
<thead>
<tr>
<th></th>
<th>480 volt system</th>
<th>208 or 240 volt system</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Phase</td>
<td>Brown</td>
<td>Black</td>
</tr>
<tr>
<td>B Phase</td>
<td>Orange</td>
<td>Red</td>
</tr>
<tr>
<td>C Phase</td>
<td>Yellow</td>
<td>Blue</td>
</tr>
<tr>
<td>Neutral</td>
<td>Grey</td>
<td>White</td>
</tr>
<tr>
<td>Ground</td>
<td>Green</td>
<td>Green</td>
</tr>
</tbody>
</table>

©JCE #19028
3.5 Wiring must be color coded throughout its entire length, except feeders may have color coded plastic tape at both ends and any other accessible point.

3.6 All control wiring in a circuit shall be color coded, each phase leg having a separate color, and with all segments of the control circuit, whether in apparatus or conduit, utilizing the same color coding.

3.7 At all terminations of control wiring, the wiring shall have a numbered T&B or Brady plastic wire marker.

3.8 Cables when installed are to be properly trained in junction boxes, etc., and in such a manner as to prevent any forces on the cable which might damage the cable.

3.9 All conductors to be installed into a common raceway, shall be pulled into the raceway at the same time.

3.10 All conductors shall be installed in such a manner as to not exceed the manufacturers’ recommended pulling tension and bending radius. The equipment used for pulling must be specifically designed for the purpose. Motorized vehicles such as pickup trucks, are not acceptable.

END OF SECTION
PART 1 – GENERAL

1.1 Furnish and install grounding and grounding conductors and electrodes as specified herein and as shown on the drawings.

1.2 Submit catalog data for all components.

1.3 **Common submittal mistakes which will result in the submittals being rejected:**

   1.3.1 Not including all items listed in the above itemized description.

   1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.

   1.3.3 Not including actual manufacturer's catalog information of proposed products.

   1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – EXECUTION

2.1 Grounding

   2.1.1 All panelboard cabinets, equipment, enclosures, and complete conduit system shall be grounded securely in accordance with pertinent sections of CEC Article 250. Conductors shall be copper. All electrically operated equipment shall be bonded to the grounded conduit system. All non-current carrying conductive surfaces that are likely to become energized and subject to personal contact shall be grounded by one or more of the methods detailed in CEC Article 250. All ground connections shall have clean contact surfaces. Install all grounding conductors in conduit and make connections readily accessible for inspection.

   2.1.2 Provide an insulated equipment grounding conductor in all branch circuit and feeder raceway systems, sized in accordance with CEC 250-1122.

   2.1.3 Provide an additional individual insulated grounding conductor for each circuit which contains an isolated ground receptacle or surge suppression receptacle.

   2.1.4 Grounding of metal raceways shall be assured by means of provisions of grounding bushings on feeder conduit terminations at the panelboard, and by means of insulated continuous stranded copper grounding wire extended from the ground bus in the panelboard to the conduit grounding bushings.

   2.1.5 Except for connections which access for periodic testing is required, make grounding connections which are buried or otherwise inaccessible by exothermite type process.

   2.1.6 The following ohmic values shall be test certified for each item listed. A written report signed and witnessed by the project IOR shall be provided to the engineer.
If the ohmic value listed cannot be obtained additional grounding shall be installed to reach the value listed.

2.1.6.1 Service. ...................... 10 ohms.

2.1.6.2 Step down transformers and non-current carrying metal parts .......................... 25 ohms.

2.1.6.3 Manholes, handholes, etc. .......................... 10 ohms.

END OF SECTION
PART 1 – GENERAL

1.1 Furnish and install conduit and fittings as shown on the drawings and as specified herein.

1.2 Submit Manufacturer’s data on the following:
   1.2.1 Conduit.
   1.2.2 Fittings.
   1.2.3 Fire stopping Material.
   1.2.4 Surface Raceways.
   1.2.5 Type MC or MC-PCS cable provide construction details and UL “E” number.

1.3 Common submittal mistakes which will result in the submittals being rejected:
   1.3.1 Not including all items listed in the above itemized description.
   1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
   1.3.3 Not including actual manufacturer’s catalog information of proposed products.
   1.3.4 Do not include multiple manufacturers for similar products and do not indicate “or approved equal” statements, or “to be determined later” statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

2.1 Rigid steel conduit, intermediate metal conduit (IMC), electrical metallic tubing (EMT) and flexible metallic conduit shall be steel, hot dipped galvanized after fabrication.

2.2 PVC conduit shall be Carlon or approved equal.

2.3 Liquid tight flexible metal conduit shall be Anaconda Sealtite type UA or approved equal. Fittings shall be Appleton, Crouse-Hinds, Steel City, T&B, or equivalent.

2.4 MC type armored cable, when utilized, shall be provided with the following:
   2.4.1 Comply with UL 1479 and CEC 330
   2.4.2 90°C, copper, THHN conductors.
   2.4.3 Minimum #12 insulated grounding conductor.
   2.4.4 Conductors sized No. 10 and smaller shall be solid, No. 8 and larger shall be stranded.
   2.4.5 Oversized (150%) neutrals or separate neutrals shall be provided.
2.4.6 Increase phase conductors to No. 10 AWG for 120 volt circuits greater than 100 feet from panel to load and for 277 volt circuits greater than 200 feet from panel to load. Where required increase conductor sizes for entire length of circuit.

2.4.7 Interlocked armored aluminum sheath.

2.4.8 AC or BX type armored cable shall not be substituted in lieu of MC type cable.

2.4.9 Color code cable according to cable type and configuration.

2.4.10 Acceptable manufacturers are AFC and Alflex.

2.5 MC-PCS luminary armored cable, when utilized, shall be provided with the following:

2.5.1 Comply with UL 1479 and CEC 330

2.5.2 90°C, copper, THHN conductors.

2.5.3 Minimum #12 insulated grounding conductor.

2.5.4 Lighting phase conductors sized No. 10 and smaller shall be solid, lighting control conductors shall be sized no. 16 solid.

2.5.5 Interlocked armored aluminum sheath.

2.5.6 AC or BX type armored cable shall not be substituted in lieu of MC type cable.

2.5.7 Color code phase cable according to cable type and configuration. Color code control conductors purple/gray.

2.5.8 Acceptable manufacturers are AFC and Alflex.

2.6 Fire stopping material shall provide an effective seal against fire, heat, smoke and fire gases. Fire stopping material shall be tested to comply with ASTME 814 and UL 1479. The submittal for this product shall include the UL listed system number and installation requirements for each type of penetration seal required for this project.

2.7 Each length of conduit shall be stamped with the name or trademark of the manufacturer and shall bear the UL label.

2.8 All plastic conduit shall be rigid, schedule 40, heavy wall PVC. All PVC conduit shall be UL listed. Underground utility company conduits shall comply with local utility co. requirements.

2.9 Plastic conduit shall be stored on a flat surface, and protected from the direct rays of the sun.

2.10 Where branch circuit or communication raceways cannot be concealed in ceilings or walls and are required to be exposed in interior spaces, provide nonmetallic surface raceway system sized per the manufacturer capacity requirements. A full complement of nonmetallic fittings must be available and matching device boxes and cover plates must be provided. The color of the raceway system, components and boxes shall be (white). Where data networking cabling is to be installed, all raceway fittings shall meet Category 5 radius requirements. Where specific raceway types have been noted on the drawings they shall be as follows:
BERNARDO HEIGHTS MIDDLE SCHOOL RELOS  
Poway Unified School District

2.10.1 System 'SR'  
Hubbell  WALLTRAK 1 series  
Wiremold  ECLIPSE PN05series  
Panduit  LD5 series  
Hellerman-Tyton  TSR2 series

2.10.2 System 'SR2'  
Hubbell  WALTRAK 22  
Wiremold  2300D Series  
Panduit  D2P10  
Hellerman-Tyton  TSR3 series

2.10.3 System 'SR3'  
Hubbell  BASETRAK series  
Wiremold  5400 - series  
Panduit  70 series  
Hellerman-Tyton  MCR Infostream” series

Provide with offset boxes, inline boxes may only be used where specifically shown on the drawings.

PART 3 – FITTINGS

3.1 All metallic fittings, including those for EMT, flexible conduit, or malleable iron. Die cast fittings of any other material are not permitted.

3.2 Locknuts shall be steel or malleable iron with sharp clean cut threads.

3.3 Entrance seals shall be 0.Z. type FSK or equivalent.

3.4 Bushings and locknuts: Where conduits enter boxes, panels, cabinets, etc., they shall be rigidly clamped to the box by locknuts on the outside, and a lock nut and plastic bushing on the inside of the box. All conduits shall enter the box squarely.

3.5 Furnish and install insulated bushings as per CEC article No. 300 - 4 (F) on all conduits. The use of insulated bushings does not exclude the use of double locknuts to fasten conduit to the box.

3.6 Transition from plastic to steel conduits shall be with PVC female threaded adaptors.

3.7 Couplings and connectors for rigid steel or IMC conduit must be threaded, or compression type (set screw fittings are not permitted).

3.8 Couplings and connectors for EMT shall be compression, watertight. Set screw connectors are not acceptable, except for systems below 120 volts.

3.9 MC or MC-PCS type armored cable shall be provided with listed clamp type die cast zinc set screw connectors. Anti-short bushings shall be provided at all cable ends.

3.10 Connectors for flexible metal conduit shall be steel or malleable iron with screw provided to clinch the conduit into the adapter body. For sizes up to ¾” a screw-in, "Jake type,” fitting may be used.

3.11 Install approved expansion fittings, or liquid tight flex conduit with a minimum 6” slack for conduits passing through all expansion and seismic joints.

PART 4 - EXECUTION
4.1 All branch circuits shall be installed concealed in walls or above ceilings or in concrete floor slabs. PVC conduits installed in concrete floor slabs shall transition to PVC coated rigid steel where conduits penetrate above finished grade or finished floor.

4.2 Conduit sizes for various numbers and sizes of wire shall be as required by the CEC, but not smaller than ½” for power wiring and ¾” for communications and fire alarm systems unless otherwise noted. Conduit in slab or below grade shall be ¾” minimum trade size, unless otherwise identified.

4.3 Conduit size shall be such that the required number and sizes of wires can be easily pulled in and the Contractor shall be responsible for the selection of the conduit sizes to facilitate the ease of pulling. Conduit sizes shown on the drawings are minimum sizes in accordance with appropriate tables in the CEC. If because of bends or elbows a larger conduit size is required, the Contractor shall so furnish without further cost to the Owner.

4.4 The Contractor shall be entirely responsible for the proper protection of this work from the other trades on the job. When conduit becomes bent or holes are punched through same, or outlets moved after being roughed-in, the Contractor shall replace same, without additional cost to the Owner.

4.5 Rigid steel conduit or IMC shall be used as follows:

4.5.1 Exposed exterior locations.

4.5.2 Exposed interior locations below eight feet above floor, except in electrical rooms and closets.

4.5.3 In hazardous or classified areas as required by CEC.

4.6 EMT conduit shall be used for areas as follows:

4.6.1 All interior communications, signal, and data networking systems.

4.6.2 All interior power wiring systems where not required to be in rigid steel, IMC or flexible conduit.

4.7 Flexible conduit shall be used for areas as follows:

4.7.1 To connect motors, transformers, and other equipment subjected to vibration or where specifically detailed on the drawings.

4.7.2 Flexible conduit shall not be used to replace EMT in other locations where the conduit will be exposed.

4.7.3 Flexible metal conduit shall be ferrous. Installation shall be such that considerable slack is realized. The conduit shall contain separate code sized grounding conductor.

4.7.4 Liquid tight flexible conduit shall be used in conformance with CEC in lengths not to exceed 4’. For equipment connections, route the conduit at 90 degrees to the adjacent path for point of connection. The conduit shall contain separate code sized grounding conductor. Use liquid tight flexible conduit for all equipment connections exposed in possible wet, corrosive or oil contaminated areas, e.g., shops and outside areas.

4.8 MC armored cable may be used as follows:
4.8.1 All branch circuit wiring for lighting and power circuits where permitted and installed in compliance with UL 1569 and CEC 330.

4.9 MC-PCS luminary armored cable may be used as follows:

4.9.1 All Lighting branch circuit wiring for lighting circuits where permitted and installed in compliance with UL 1569 and CEC 300-22(c), 330. This cable permits conductors of control circuits to be placed in a cable with lighting power circuits or class 1 circuits.

4.9.2 It shall not be considered an acceptable option to install lighting control class 1 circuits as an open wire installation.

4.10 MC and MC-PCS armored cable shall not be used for the following areas:

4.10.1 Any exterior, underground or buried in concrete circuits.

4.10.2 Any circuits feeding HVAC equipment or pumps or any circuit with 30 AMPS or greater overcurrent protection.

4.10.3 Any exposed interior locations except in electrical, communication or mechanical equipment rooms.

4.10.4 Any exposed interior damp/wet locations, kitchens, science classrooms, shop areas, or concealed in science classroom casework, unless provided with approved PVC jacket.

4.10.5 Any hazardous rated area.

4.11 Plastic conduit shall be used for all exterior underground, in slab, and below slab on grade conduit installations. Install bell ends at all conduit terminations in manholes and pull boxes. Where plastic conduit transitions from below grade to above grade, no plastic conduit shall extend above finished exterior grade, or above interior finished floor level.

4.12 Plastic conduit joints shall be made up in accordance with the manufacturer's recommendations for the particular conduit and coupling selected. Conduit joint couplings shall be made watertight. Plastic conduit joints shall be made up by brushing a plastic solvent cement on the inside of a plastic fitting and on the outside of the conduit ends. The conduit and fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly.

4.13 All underground conduit depths shall be as detailed on the drawings or a minimum of 30” below finished grade (when not specifically detailed otherwise), for all exterior underground conduits. Where concrete slurry or concrete encasement is provided, include “Red” color dye in mixture.

4.14 All underground conduits for power systems (600V and higher), shall be concrete encased and a minimum of 48” below grade or as detailed on the drawings. Where concrete slurry or concrete encasement is provided, include “Red” color dye in mixture.

4.15 Conduit shall be continuous from outlet to outlet, cabinet or junction box, and shall be so arranged that wire may be pulled in with the minimum practical number of junction boxes.

4.16 All conduits shall be concealed wherever possible. All conduit runs may be exposed in mechanical equipment rooms, electrical equipment rooms, electrical closets, and in
existing or unfinished spaces. No conduit shall be run exposed in finished areas without the specific approval of the Architect.

4.17 All raceways which are not buried or embedded in concrete shall be supported by straps, clamps, or hangers to provide a rigid installation. Exposed conduit shall be run in straight lines at right angles to or parallel with walls, beams, or columns. In no case shall conduit be supported or fastened to other pipes or installed to prevent the ready removal of other trades piping. Wire shall not be used to support conduit.

4.18 It shall be the responsibility of the Contractor to consult the other trades before installing conduit and boxes. Any conflict between the location of conduit and boxes, piping, duct work, or structural steel supports, shall be adjusted before installation. In general, large pipe mains, waste, drain, and steam lines shall be given priority.

4.19 Conduits above lay-in grid type ceilings shall be installed in such a manner that they do not interfere with the "lift-out" feature of the ceiling system. Conduit runs shall be installed to maintain the following minimum spacing wherever practical:

4.19.1 Water and waste piping not less than 3".

4.19.2 Steam and steam condensate lines not less than 12".

4.19.3 Radiation and reheat lines not less than 6".

4.20 Provide all necessary sleeves and chases required where conduits pass through floors or walls as part of the work of this section. Core drilling will only be permitted where approved by the Architect.

4.21 All empty conduits and surface mounted raceways shall be provided with a ¼" polypropylene plastic pull cord and threaded plastic or metal plugs over the ends. Fasten plastic "Dymo" tape label to exposed spare conduit to identify "power" or "communication" system, and to where it goes.

4.22 The ends of all conduits shall be securely plugged, and all boxes temporarily covered to prevent foreign material from entering the conduits during construction. All conduit shall be thoroughly swabbed out with a dry swab to remove moisture and debris before conductors are drawn into place.

4.23 Bending: Changes in direction shall be made by bends in the conduit. These shall be made smooth and even without flattening the pipe or flaking the finish. Bends shall be of as long a radius as possible, and in no case smaller than CEC requirements.

4.23.1 For power conduits for conductors (600v and below), provide minimum 36" radius (vertical) and 72" radius (horizontal) bends.

4.23.2 For power conduits for conductors (greater than 600v), provide minimum 72" radius (vertical) and 72" radius (horizontal) bends.

4.24 Supports: Conduit shall be supported at intervals as required by the California Electrical Code. Where conduits are run individually, they shall be supported by approved conduit straps or beam clamps. Straps shall be secured by means of toggle bolts on hollow masonry, machine screws or bolts on metal surfaces, and wood screws on wood construction. [No perforated straps or wire hangers of any kind will be permitted. Where individual conduits are routed, or above ceilings, they shall be supported by hanger rods and hangers.] Conduits installed exposed in damp locations shall be provided with clamp backs under each conduit clamp, to prevent accumulation of moisture around the conduits.
4.25 Where a number of conduits are to be run exposed and parallel, one with another, they shall be grouped and supported by trapeze hangers. Hanger rods shall be fastened to structural steel members with suitable beam clamps or to concrete inserts set flush with surface. A reinforced rod shall be installed through the opening provided in the concrete inserts. Beam clamps shall be suitable for structural members and conditions. Rods shall be galvanized steel 3/8" diameter minimum. Each conduit shall be clamped to the trapeze hanger with conduit clamps.

4.26 All concrete inserts and pipe clamps shall be galvanized. All steel bolts, nuts, washers, and screws shall be galvanized, or cadmium plated. Individual hangers, trapeze hangers and rods shall be prime-coated.

4.27 Openings through fire rated floors/walls and/or smoke walls through which conduits pass shall be sealed by Fire stopping material to comply with Division 1 to seal off flame, heat, smoke and fire gases. Sleeves shall be provided for power or communication system cables which are not installed in conduits and shall be sealed inside and out to comply with manufacturers UL system design details. Where multiple conduits and/or cable tray systems pass thru fire-rated walls at one location, the Contractor shall submit copies of the manufacturers UL system design details proposed for use on this project. All Fire stopping material shall have an hourly fire-rating equal to or higher than the fire rating of the floor or wall through which the conduit, cables, or cable trays pass.

4.28 Provide cap or other sealing type fitting on all spare conduits. Conduits stubbed into buildings from underground where cable only extends to equipment, the conduit/cable end shall be sealed to prevent moisture from entering the room or space.

4.29 All conduits which part of a paralleled feeder or branch circuit are shall be installed underground.

4.30 All conduits which are required as a part of systems specified in Divisions 27 or 28, or any other low voltage communication systems, shall be furnished and installed by the Division 26 Contractor.

4.30.1 The Contractor shall coordinate all conduit requirements with each system supplier prior to bid to determine special conduit system requirements.

4.30.2 The Contractor shall provide a pull rope in all conduits for these systems.

4.30.3 The Contractor shall provide conduit sleeves for all open cable installations thru rated walls or block walls. Provide conduit from each building main termination cabinet or backboard to the nearest accessible ceiling for access into all electrical or communications rooms.

4.31 In addition to the above requirements, the following requirements shall apply to all data networking conduits:

4.31.1 Flexible metal conduit may only be used where required at building seismic and/or expansion joints.

4.31.2 All underground conduits shall be provided with minimum 24" radius elbows (vertical) and 60" (horizontal).

4.31.3 No length of conduit above grade shall be installed to exceed 150 feet between pull boxes, or points of connection, unless where specifically detailed on the drawings.
4.31.4 No length of conduit shall be installed to exceed two 90 degree bends between pull boxes, or points of connection, unless where specifically detailed on the drawings.

4.32 Where surface raceways are installed in interior spaces, the Contractor shall take care to route in straight lines at right angles to or parallel with walls, beams, or columns. All raceways and device boxes shall be securely screwed to the finish surface with zinc screw "Auger" anchors Stk #ZSA1K by Gray Bar Electric or equal. Tape adhesive application will not be permitted.

4.33 The Contractor who installs surface raceway systems shall provide and install complete with wire retention clips, one for every (8) vertical feet or (5) horizontal feet or portion thereof. This Contractor shall also provide each raceway channel with pull strings.

4.34 It shall be the responsibility of the Contractor installing the raceway to coordinate the installation of raceway device plates and inserts with the communications or data contractors.

4.35 MC or MC-PCS cable shall be cut using a specific metallic sheath armor stripping tool. The use of hacksaws, dikes or any other tools not specifically designed to remove the armor sheath will not be permitted.

4.36 MC or MC-PCS cables installed in attic spaces or above lay-in ceilings shall be installed to be protected from physical damage. The cable shall be mounted along the sides or bottom of joists, rafters or studs.

4.37 Support wires used for supporting ceilings, lighting fixtures or other equipment items shall not be used to support MC or MC-PCS cables. Conduits, duct work, piping or any other equipment shall not be used to support or mount MC cables.

4.38 MC or MC-PCS cable supports, fasteners and clips shall be designed specifically for use with MC cables. Standard conduit supports, fasteners and clips, nails or other items are not permitted for installing MC cables.

END OF SECTION
PART 1 – GENERAL

1.1 Furnish and install electrical wiring boxes as specified and as shown on the electrical drawings.

1.2 Submit manufacturer’s data for all items.

1.3 **Common submittal mistakes which will result in the submittals being rejected:**

   1.3.1 Not including all items listed in the above itemized description.

   1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.

   1.3.3 Not including actual manufacturer’s catalog information of proposed products.

   1.3.4 Do not include multiple manufacturers for similar products and do not indicate “or approved equal” statements, or “to be determined later” statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

2.1 Boxes shall be as manufactured by Steel City, Appleton, Raco, or approved equal.

2.2 All boxes must conform to the provisions of Article 370 of the CEC. All boxes shall be of the proper size to accommodate the quantity of conductors enclosed in the box. Minimum box size shall be 4” square x 1-1/2” deep.

2.3 Boxes generally shall be hot dipped galvanized steel with knockouts. Boxes on exterior surfaces or in damp locations shall be corrosion resistant, cast ferroalloy and shall have threaded hubs for rigid conduit and neoprene gaskets for their covers. Boxes shall be Appleton Type FS, Crouse-Hinds, or the approved equal. Conduit bodies shall be corrosion resistant, cast malleable iron. Conduit bodies shall have threaded hubs for rigid conduit and neoprene gaskets for their covers. Conduit bodies shall be Appleton Unilets, Crouse-Hinds, or the approved equal. Where recessed, boxes shall have square cut corners.

2.4 Deep boxes shall be used in wall covered by wainscot or paneling and in walls or glazed tile, brick, or other masonry which will not be covered with plaster. Through the wall type boxes shall not be used unless specifically called for. All boxes shall be nongangable. Boxes in concrete shall be of a type to allow the placing of conduit without displacing the reinforcing bars. All lighting fixture outlet boxes shall be equipped with the proper fittings to support and attach a light fixture.

2.5 All light, switch, receptacle, fire alarm devices and similar outlets shall be provided with approved boxes, suitable for their function. Back boxes shall be furnished and installed as required for the equipment and/or systems under this contract.

2.6 Pull and junction boxes shall be code gauge boxes with screw covers. Boxes shall be rigid under torsional and deflecting forces and shall be provided with angle from framing.
where required. Boxes shall be 4" square with a blank cover in unfinished areas and with a plaster ring and blank cover in finished areas. Covers for flush mounted oversize boxes shall extend ¾" past boxes all around. Covers for 4" square boxes shall extend ¼" past box all around.

2.7 All terminal cabinets and junction boxes or equipment back boxes which are required as a part of systems specified in Divisions 27 or 28, or any other low voltage communication systems, shall be furnished and installed by the Division 26 Contractor.

2.7.1 The Division 26 Contractor shall coordinate all box requirements with each system supplier prior to bid to determine special cabinet or back box requirements. The Contractor shall also provide stainless steel blank cover plates for all low voltage systems installed for future equipment.

2.7.2 The Contractor shall provide all plywood backboards indicated on walls or inside equipment enclosures. All backboards shall be a minimum of ¾" thick fire rated type plywood.

2.7.3 The Contractor shall coordinate exact rough in locations and requirements with each system supplier.

2.8 In addition to the above requirements, boxes for data networking wiring and equipment shall comply with the following:

2.8.1 All boxes shall be a minimum of 4-11/16" square x 2-1/8" deep.

2.8.2 Where pull boxes are required on individual conduits 1-¼" or smaller, provide 4-11/16" square x 2-1/8" deep boxes. Where pull boxes are required on conduits larger than 1-¼" for straight pull through, provide eight times the conduit trade size for box length. Where pull boxes are required on conduits larger than 1-¼" for an angle or a U-pull through installation, provide a minimum distance of six times the conduit trade size between the entering and exiting conduit run for each cable.

2.9 Recessed boxes installed in fire rated floors/walls and /or smoke walls shall be sealed by Fire stopping material to comply with Division 1 to seal off flame, heat, smoke and fire gases. The Contractor shall submit copies of the manufacturers UL system design details proposed for use on this project. All Fire stopping material shall have a hourly fire-rating equal to or higher than the fire rating of the floor or wall through which the conduit, cables, or cable trays pass.

PART 3 – EXECUTION

3.1 Boxes shall be installed where required to pull cable or wire, but in finished areas only by approval of the Architect. Boxes shall be rigidly attached to the structure, independent of any conduit support. Boxes shall have their covers accessible. Covers shall be fastened to boxes with machine screws to ensure continuous contact all around. Covers for surface mounted boxes shall line up evenly with the edges of the boxes.

3.2 Outlets are only approximately located on the plans and great care must be used in the actual location of the outlets by consulting the various detailed drawings and specifications. Outlets shall be flush with finished wall or ceiling, boxes installed symmetrically on such trim or fixture. Refer to drawings for location and orientation of all outlet boxes.
3.3 Furnish and install all plaster rings as may be required. Plaster rings shall be installed on all boxes where the boxes are recessed. Plaster rings shall be of a depth to reach the finished surface. Where required, extension rings shall be installed so that the plaster ring is flush with the finished surface.

3.4 All cabinets and boxes shall be secured by means of toggle bolts on hollow masonry; expansion shields and machine screws or standard precast inserts on concrete or solid masonry; machine screws or bolts on metal surfaces and wood screws on wood construction. All wall and ceiling mounted outlet boxes shall be supported by bar supports extending from the studs or channels on either side of the box. Boxes mounted on drywall or plaster shall be secured to wall studs or adequate internal structure.

3.5 Boxes with unused punched-out openings shall have the openings filled with factory-made knockout seals.

3.6 Where standby power and normal power are to be located in the same outlet box or 480V in a switch box, install partition barriers to separate the various systems.

3.7 All device boxes and junction boxes for fire alarm system shall be painted red and shall be 4-11/16” square by 2-1/8” deep. No exceptions.

END OF SECTION
PART 1 – GENERAL

1.1 Furnish and install branch circuit panel boards as specified herein and as indicated on the drawings. Submit manufacturers’ data on all items.

1.2 Submit manufacturers’ data on all panel boards and components including:

1.2.1 Enclosures and covers

1.2.2 Breakers

1.2.3 Surge Protective Device (SPD) equipment

1.2.4 Incident energy level calculations

1.2.5 Common submittal mistakes which will result in the submittals being rejected:

1.2.5.1 Not arranging the circuit breakers in panels to match the orientations indicated on the drawings. In other words, if a 30 amp breaker is shown on the drawing in Space #2, this must be the location it appears on the submittal schedule. Standard factory arrangements will not be accepted.

1.2.5.2 Not including all items listed in the above itemized description.

1.2.5.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.

1.2.5.4 Not including actual manufacturer’s catalog information of proposed products.

1.2.5.5 Do not include multiple manufacturers for similar products and do not indicate “or approved equal” statements or “to be determined later” statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

2.1 The interrupting rating of circuit breakers shall be 10,000 amps for the 120/208 system and 14,000 amp for 277/480 volt systems. Refer to drawings for higher interrupting rating requirements. All components and equipment enclosures shall be manufactured by the same manufacturer. Circuit breakers shall be permitted to be series rated to limit the available fault current to no more than the above ratings.

2.2 All panels shall be fully bussed. Recessed panel enclosures shall be a maximum of 20” wide and 5-3/4” deep for all panels 600 amp rated and less.

2.3 All buses shall be tin-plated aluminum and shall be located in the rear of the panelboard cabinet. Individual circuit breakers shall be bolt on type and removable from the cabinet without disturbing the bussing in any way. All panel boards shall contain ground busses.
Panel covers shall be door in door style, with one lock. Door lock shall allow access to breakers only. Access to wireways without removal of cover shall be permitted by (non removable) screws behind the locked door. Panel cover shall be provided with full length piano hinge. All locks for all panels provided in this project shall be keyed alike.

Each panel shall have a two-column circuit index card set under glass or glass equivalent on the inside of the door. Each circuit shall be identified as to use and room or area. Areas shall be designated by room numbers. Room numbers shown on the drawings may change and contractor shall verify final room numbers with the architect prior to project completion.

Tandem mounted or wafer type breakers are not acceptable.

Multiple breakers shall have one common trip handle or be internally connected. Handle ties are not acceptable.

Breaker arrangements shown in the drawings shall be maintained. The circuit breakers in panels must match the orientations indicated on the drawings. In other words, if a 30 amp breaker is shown on the drawing in Space #2, this must be the location it appears on the submittal schedule. Standard factory arrangements will not be accepted.

Where conductor sizes exceed the standard breaker lug wire range, or where multiple conductors per phase are required, the panelboard manufacturer shall provide the breaker with suitable lugs for terminating the specified conductors.

Acceptable manufacturers are Square D, Eaton, Siemens or General Electric.

Equipment manufactured by any other manufacturers not specifically listed in Section 2.10 are not considered equal, or approved for use on this project.

Surge Protective Devise (SPD)


The panelboard shall be UL 67 Listed and the SPD shall be UL 1449 labeled as Type 1 or Type 2 or as Type 4 intended for Type 1 or Type 2 applications. SPD shall be factory installed integral to the panel board.

The SPD panelboard shall be top or bottom feed according to requirements. A circuit directory shall be located inside the door.

SPD shall meet or exceed the following criteria:

For standard areas supply SPD having 100kA per phase surge current capacity. For mountain and desert areas (areas with over 5 lightning strikes per year), SPD shall have a per phase surge current capacity of 200kA.

UL 1449 – Third Edition Revision; effective September 29, 2009, Voltage Protection Ratings shall not exceed the following:

<table>
<thead>
<tr>
<th>VOLTAGE</th>
<th>L-N</th>
<th>L-G</th>
<th>N-G</th>
<th>L-L</th>
<th>MCOV</th>
</tr>
</thead>
</table>
2.15.3 SPD shall be UL labeled with 100kA Short Circuit Current Rating (SCCR).

2.16 UL 1449 - Third Edition Revision; effective September 29, 2009, Voltage Protection Ratings shall not exceed the following:

<table>
<thead>
<tr>
<th>VOLTAGE</th>
<th>L-N</th>
<th>L-G</th>
<th>N-G</th>
<th>L-L</th>
<th>MCOV</th>
</tr>
</thead>
<tbody>
<tr>
<td>208Y/120</td>
<td>700V</td>
<td>700V</td>
<td>700V</td>
<td>1200V</td>
<td>150V</td>
</tr>
<tr>
<td>480Y/277</td>
<td>1200V</td>
<td>1200V</td>
<td>1200V</td>
<td>2000V</td>
<td>320V</td>
</tr>
</tbody>
</table>

2.17 SPD shall be UL labeled with a minimum 100kVA short circuit rated (SCCR).

2.18 UL 1449 Listed Maximum Continuous Operating Voltage (MCOV) (verifiable at UL.com):

<table>
<thead>
<tr>
<th>System Voltage</th>
<th>Allowable System Voltage Fluctuation (%)</th>
<th>MCOV</th>
</tr>
</thead>
<tbody>
<tr>
<td>208Y/120</td>
<td>25%</td>
<td>150V</td>
</tr>
<tr>
<td>480Y/277</td>
<td>15%</td>
<td>320V</td>
</tr>
</tbody>
</table>

2.19 SPD shall incorporate a UL 1283 listed EMI/RFI filter with minimum attenuation of - 50dB at 100 kHz. No filtering is required for a 100kA SPD.

2.20 Suppression components shall be heavy duty 'large block' MOVs, each exceeding 30mm diameter.

2.21 Type 4 SPD shall include a serviceable, replaceable module.

2.22 SPD shall be equipped with the following diagnostics:

2.22.1 Visual LED diagnostics including a minimum of one green LED indicator per phase, and one red service LED.

2.22.2 No other test equipment shall be required for SPD monitoring or testing before or after installation.

2.23 SPD shall have a response time no greater than 1/2 nanosecond

2.24 SPD shall have a 10 year warranty

2.25 The SPD panelboard shall have removable interior

2.26 The SPD panelboard main bus shall be aluminum and rated for the load current required

2.27 The SPD panelboard shall include a 200% rated neutral assembly with copper neutral bus

2.28 The unit shall be provided with a safety ground bus

 SPD Quality Assurance

2.29 Manufacturer Qualifications: Engage a firm with at least 5 years experience in manufacturing transient voltage surge suppressors.
2.30 Manufacturer shall be ISO 9001 or 9002 certified.

2.31 The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

2.32 The SPD shall be compliant with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

PART 3 – EXECUTION

3.1 Painting of panelboard covers in finished areas shall be done by the general contractor.

3.2 Provide a spare 3/4” conduit stubbed to an accessible area for each of every three (3) spares or spaces provided in recessed panel boards.

3.3 All lugs shall be torque tested in the presence of the inspector of record.

Arc Flash and Shock Hazard

3.4 The Contractor is to provide, and submit to the engineer for approval, incident energy level calculations as determined using the methodologies described in NFPA 70E or IEEE standard 1584-2002.

3.4.1 All studies shall be performed by “Emerson Electric” (858) 695-9551, MTA (858) 472-0193, or Terra Power Solutions (858) 380-8170. Studies performed by manufactures or other engineering or testing companies must submit qualifications for approval by Johnson Consulting Engineers, 7 days prior to bid for this project.

3.5 A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with NFPA 70E, section 110.16. Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high.

3.6 The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department

3.7 The design goal is to minimize the incident energy to which a maintenance employee may be exposed.

END OF SECTION
PART 1 – GENERAL

1.1 Furnish and install all wiring devices as shown on drawings and as herein specified. Unless otherwise noted, device and plate numbers shown are Hubbell and shall be considered the minimum standard acceptable. Other acceptable manufacturers are Pass and Seymour, Leviton, General Electric and Bryant.

1.2 Submit manufacturers’ data on all items.

1.3 **Common submittal mistakes which will result in the submittals being rejected:**

1.3.1 Not correctly indicating ampacity rating of proposed devices.

1.3.2 Not including all items listed in the above itemized description.

1.3.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.

1.3.4 Not including actual manufacturer’s catalog information of proposed products.

1.3.5 Do not include multiple manufacturers for similar products and do not indicate “or approved equal” statements or “to be determined later” statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

2.1 All switches shall be of the quiet mechanical type, Specification Grade, 20 amp, 120/277 volt AC as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>HUBBELL</th>
<th>LEVITON</th>
<th>PASS &amp; SEYMOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Pole</td>
<td>CS120</td>
<td>CS1202</td>
<td>CS20AC1</td>
</tr>
<tr>
<td>Two Pole</td>
<td>CS1222</td>
<td>CS2202</td>
<td>CSB20AC2</td>
</tr>
<tr>
<td>Three-way</td>
<td>CS320</td>
<td>CS3202</td>
<td>CS20AC3</td>
</tr>
<tr>
<td>Key Switch</td>
<td>HBL1221L</td>
<td>1221-2L</td>
<td>PS20AC1-L</td>
</tr>
</tbody>
</table>

2.2 All switches shall have the "on" and the "off" position indicated on the handle. If switches of higher ampere ratings are required, they shall be of similar type and quality as those shown above. Groups of switches shown at one location shall be installed under a single plate up to a maximum of six where more than six switches are shown coordinate arrangement with the Architect.

2.3 Dimmer switches for incandescent lamp loads shall be square-law type, slide control dimmer with OFF position, Lutron or Hubbell "Nova-T" Series NT-600 (0-500 watt load), NT-1000 (501-900 watt load), NT-1500 (901-1500 watt load), or equal (no known equal).

2.4 All convenience receptacles and special outlets throughout shall be grounding type. Convenience receptacles shall be side wired, parallel slot, two pole, three wire, 20 amp as follows:
2.5 All safety or tamper proof receptacles shall have no exposed external current carrying metal parts and shall have integral wiring leads suitable for two or three wire installations.

2.6 Special receptacles shall be as noted on the drawings.

2.7 Weatherproof plates shall be designed to meet CEC Article 410-57, wet location listed with cover "open." Where weatherproof receptacles have been identified to be provided with locking covers, the cover shall be as manufactured by Pass & Seymour #4600-8 or Cole Lighting 310 Series. Rough-in requirements vary between manufacturers. Contractor to field verify requirements prior to installation.

2.8 All plates throughout shall be stainless steel. Where wiring devices are installed in concrete block walls, provide oversized 3-1/2" x 5" cover plates.

2.9 All devices shall be white unless otherwise noted or a special purpose outlet.

2.10 Unless where specifically detailed on the drawings, floor boxes shall be PVC suitable for concrete poured floors of minimum 3-1/2" depth, with a modular design to gang two or three sections together.

2.10.1 Carlon #E976 series or approved equal

2.10.2 Provide brass cover with brass carpet flange unless otherwise detailed.

PART 3 – EXECUTION

3.1 Switches for room lighting shall be located no more than 12" center line from door jamb at plus 48" center line above finished floor or +46" to top of devices where located over casework, reference CBC Figure 11B-5D.

3.2 All receptacles shall be mounted at plus 18" to center line above finished floor unless noted or shown otherwise. All receptacles shall be installed with the ground pin up, at the top of the receptacle to comply with IEEE 602-1986.

3.3 Furnish and install wall plates for all wiring devices, and outlet boxes, including special outlets, sound, communication, signal, and telephone outlets, etc. as required. All cover plates shall be appropriate for type of device.

END OF SECTION
SECTION 26 90 90

TESTING

PART 1 – GENERAL

1.1 Upon completion of the electrical work, the entire installation shall be tested by the Contractor, and demonstrated to be operating satisfactorily to the Architect, Engineer, Inspector and Owner.

1.2 All testing and corrections shall be made prior to demonstration of operation to the Architect, Engineer, Inspector and Owner.

1.3 In addition to the demonstration of operation, the Contractor is also required to review the content and quality of instructions provided on items demonstrated with the Architect, Engineer, Inspector and Owner.

PART 2 – EXECUTION

2.1 Wiring shall be tested for continuity, short circuits and/or accidental grounds. All systems shall be entirely free from “grounds,” “short circuits,” and any or all defects.

2.2 Motors shall be operating in proper rotations, and control devices functioning properly. Check all motor controllers to determine that properly sized overload devices are installed, and all other electrical equipment for proper operation.

2.3 Tests and adjustments shall be made prior to acceptance of the electrical installation by the Architect, and a certificate of inspection and acceptance of the electrical installation by local inspection authorities shall be provided.

2.4 All equipment or wiring provided which tests prove to be defective or operating improperly shall be corrected or replaced promptly, at no additional cost to the Owner.

2.5 Test all motor and feeder circuits with a “megger” tester to determine that insulation values conform to Section 110-20, California Electrical Code (CED). Test reports must be submitted and approved by the engineer before final acceptance.

2.6 Test all grounding electrode connections to assure a resistance of no more than 10 ohms is achieved. Augment grounding until the ohmic value stated above is achieved. Provide certified test results to the Architect, Engineer and Inspector.

END OF SECTION
ARTICLE 1 - SUMMARY

1.1 This Division of the specifications outlines the provisions of the contract work to be performed as a sub contract under the Division 26 scope of work. Reference the Division 26 Electrical General Provisions for scope of work and general requirements.

1.2 In addition, work in this Division is governed by the provisions of the bidding requirements, contract forms, general conditions and all sections under Division 1 requirements.

END OF SECTION
PART 1 – GENERAL

1.1 Include all labor, equipment and materials necessary for providing a complete networking infrastructure system as described herein and/or as indicated on the drawings.

1.2 Related specification sections:

1.2.1 Section 26 01 00 - General Provisions.
1.2.2 Section 26 05 33 - Conduit and Fittings.
1.2.3 Section 26 05 19 - Conductors.
1.2.4 Section 26 05 34 – Outlet and Junction Boxes.

1.3 Approved Products and minimum contractor certifications

1.3.1 All components shall be manufactured by one of approved manufacturers, the installing contractor must have the accompanying certification from the product manufacturer for installation of a “Warranted System” as required by each manufacturer and as indicated in these specifications. Acceptable manufacturers are:

1.3.2 KRONE

1.3.2.1 Installing contractor must be KRONE TSC certified to install this system.

1.3.3 Systems or components as manufactured by Hitachi or any other manufacturer’s which not specifically listed in 1.3 are, are not approved for use on this project. Specified system warranties are to be established between the component manufacturers and the owner, warranties between the cable manufacturer or installing contractor and the owner are not considered equal.

1.3.4 Installing contractor qualifications: Firms and their personnel must be regularly engaged in the installation of data networking cabling and equipment for systems of similar type and scope. The contractor must have a full service office able to respond to emergency callouts during the warranty period. The contractor must also provide complete installation of all wiring and devices or equipment. Subcontracts with Division 26 contractors or other warranted or non-warranted contractors for supervised installation of any part of this system is not approved. All conduit and standard back boxes will be furnished and installed by the Division 26 contractor. Specialty boxes will be furnished by the equipment supplier and installed by the Division 26 contractor.

1.3.5 Equipment qualifications: It is the intent of these specifications that each bidder provide all hardware, components and installation services that are necessary to ensure a fully operational Category-6 wiring system including
warranties, proposed in the EIA/TIA Category-6 and the ISO Class E drafts.

1.3.6 **Warranty:** Warranty shall be a full “Performance Warranty” installed by a “Certified Contractor” as specified by one of the approved manufacturer’s A “Component Warranty” will not be considered equal. All components, labor, and ‘Link Performance Criteria” shall be warranted by one of the approved manufacturers. Warranty shall be to the customer for 15-years (some warranty programs may be greater, this is a minimum requirement) after Customer acceptance and sign-off of the completed system. The contractor must provide documentation from one of the approved manufacturers as indicated in Section 1.3 indicating their qualifications for installation of this system in compliance with the manufacturers warranty requirements as a warranted contractor.

1.4 In order to ensure project cohesion, a single point of contact is required to provide a “TURNKEY” solution. The work covered under this section of the specification consists of furnishing all labor; conduits, boxes and trenching; cabling; equipment; supplies; materials, and training. The Contractor will perform all operations necessary for the “TURNKEY” and fully completed installation in accordance with the specifications herein. As such, the successful contractor must be factory trained on all aspects of system hardware. The successful Contractor shall be a California licensed C7 or C10 premise wiring contractor as defined in this specification. Subcontractors may not be utilized in the implementation of the plant wiring installation or certification process. The contractor shall provide a licensed, qualified Division 26 contractor for installation of all conduits, outlet and junction boxes, trenching and pull box installations.

1.5 The drawings indicate a schematic routing of cables above ceilings. The Contractor shall field-verify the most appropriate routing of all above-ceiling cable prior to bid. Where cables penetrate through walls a conduit sleeve shall be provided. Where cables pass through fire rated walls, the conduit sleeve shall be sealed to maintain the rating of the wall assembly.

1.6 Phase I Submittal shall be made within (20) working days after the award of the contract by the District. This submittal shall include the following:

1.6.1 Complete bills of quantities, including all materials, components, devices, and equipment required for this work. The bills of quantities shall be tabulated respective of each and every system as specified, and shall contain the following information for each Section listed:

   1.6.1.1 Description and quantity of each item.
   1.6.1.2 Manufacturer’s Name and Model Number.
   1.6.1.3 Manufacturer’s Specification Sheet.

1.6.2 Include with submittals all warranty information and a description of support and maintenance services to be provided. Also include all licenses and maintenance agreements required for continued operation of the equipment.
1.7 Phase II submittal shall be provided within (20) working days after the approval of the Phase I submittals and prior to any fabrication or field conduit installations. All shop drawings shall be engineered and drawn on a CAD System. Each submission shall include 'D' or 'E' size print copies to match the contract drawings, and (1) Phase II submittals drawings shall include the following.

1.7.1 MDF or IDF equipment or rack elevations will be required to be provided including, cable routing and position of all components.

1.7.2 Provide labeling plan which identifies the proposed scheme for identifying all components including Racks, patch panels (fiber and copper), ports and cables (fiber and copper).

1.8 Common submittal mistakes which will result in submittals being rejected:

1.8.1 Not including the qualifications of the installing contractor.

1.8.2 Not including all items listed in the above itemized description.

1.8.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.

1.8.4 Not including actual manufacturer's catalog information of proposed products.

1.8.5 Do not include multiple manufacturers for similar products and do not indicate “or approved equal” statements, or “to be determined later” statements. The products being submitted must be the products installed.

1.9 The contractor shall make a written request directly to Johnson Consulting Engineers for electronic drawing files. As a part of the written request, please include the following information:

1.9.1 Clearly indicate each drawing sheet needed (i.e., E1.1, E2.1, etc.).

1.9.2 Identify the name, phone number, mailing address and e-mail address of the person to receive the files.

1.9.3 Provide written confirmation and agreement with the requirements described for payment of computer files, as described below.

1.9.4 Detail or riser diagram sheets, or any other drawings other than floor plans or site plans, will not be made available to the contractor.

1.9.5 Files will only be provided in the AutoCAD format in which they were created (i.e., version 14 or version 2000i).

1.9.6 Requests for files will be processed as soon as possible; a minimum of 7 working days should be the normal processing time. The contractor shall be completely responsible for requesting the files in time for their use.

1.9.7 CAD files will be made available via e-mail or on disk, depending on the quantity of files requested. The contractor requesting the files will be
required to pay $50.00 per drawing plan, or $300.00 maximum, whichever is less.

PART 2 - PRODUCTS

2.1 Equipment racks have been detailed on the drawings and additional component information requirements have been described in the MDF or IDF products sections. The following is a list of approved manufacturers for each type of rack system.

2.1.1 Alternate equipment manufacturers other than those indicated will not be reviewed or approved for use on this project.

2.1.2 (Enclosed Wall/Floor Mount) shall be manufactured by Middle Atlantic SR-40-32 Series. Reference drawing details and specifications for complete requirements.

2.1.3 Data (271000) Contractor shall refer to the Integrated Audio-Visual Diagrams for additional requirements to be provided by the 271000 Contractor. Coordinate installation of cabling with the 272000 Contractor and provide as shown in the A/V wiring diagrams in the detail sheets.

Main Distribution Frame (MDF Room is Existing)

2.2 The Main Distribution Frame shall be the central wiring and equipment location for the infrastructure systems. The contractor shall include the following items at this location.

2.2.1 Fiber optic termination equipment (rack mounted), including all associated installation hardware. The equipment must have sufficient number of ports to connect all fibers in every cable terminated at this location. Provide 25% spare capacity for future wiring requirements. All fiber feed cables shall be terminated in a single fiber optic patch panel up to 144 strands. Additional strands shall be terminated in the largest size required to contain the remaining fibers. Mount fiber optic termination panel in the existing MDF racks.

2.2.2 Additional items required for the MDF are as follows:

2.2.2.1 Fiber patch cords shall be provided and connected to the electronics by others.

2.2.2.2 Provide all other items as detailed on the drawings.

Intermediate Distribution Frame (New IDF in Classroom ‘S7’)

2.3 The Intermediate Distribution Frame shall be a secondary wiring and equipment location for the data networking system. The contractor shall include the following items at this location.

2.3.1 Provide 8”-0” high x 3/4” thick, as detailed on drawings, flame resistant plywood mounting backboard, painted with fire resistant paint white or color
to match. Contractor shall provide minimum one side finish grade plywood. Backboard shall be mounted with finish side out, regardless of location of fire rating stamp.

2.3.2 Fiber optic termination equipment (rack mounted), including all associated installation hardware for fiber feed cables. The equipment must have sufficient number of ports to connect all fibers in every cable terminated at this location.

2.3.3 All patch panels shall be labeled with the classroom number on the panel as well as the port ID number silk screened on the panel by the manufacturer. This is a District Standard requirement. Patch panel must be Krone Part #6653 1 677-24 or 6653 1 677-48. No approved equal.

2.3.4 Category-6 Modular Patch Panels (rack mounted) with RJ45 style connectors, for terminating all twisted pair cable from each data outlet served from this location. Provide 25% spare capacity for future wiring requirements. All patch panels shall be 24 minimum or 48 port maximum. Provide cable support bars at the rear of each patch panel such as Krone Part #6652 2 023-02 or equal.

2.3.5 Provide equipment enclosure as detailed in the drawings. Provide seismic bolting to the wall as shown on detail drawings. Enclosure shall be furnished with the following accessories:

2.3.5.1 Wall-mounted cabinets shall be furnished with (1) single sided shelf for each cabinet.

2.3.5.2 (1) Grounding kit, connect grounding conductor to nearest ground buss bar.

2.3.5.3 (2) Rack mounted surge arrest style power strip “APC” # NET9RM with (9) outlets and (1) always on outlet, guarded master on-off switch. Provide with minimum 15-foot cord.

2.3.5.4 In wall mounted cabinets provide combination vertical/horizontal managers with vertical rings. Provide Middle Atlantic Part #HCM-1DV managers.

2.3.5.5 In wall mounted cabinets provide (1) thermostatic fan control, Middle Atlantic Part #FC-4-1C and (2) quiet fan housings, Middle Atlantic Part #QFAN per cabinet. Install fans in top panel of cabinet. Fans must be plugged into the thermostatic fan controller to operate properly.

2.3.6 Additional items required at each IDF closet are as follows:

2.3.6.1 Furnish Optional Network Management Card Model #AP9631 with environmental monitoring capabilities

2.3.6.2 UPS and battery pack shall be installed in the bottom of the rack. Contractor shall furnish Category-6 patch cable for connection to optional network card in UPS. Coordinate programming with the District IT Department.
2.3.6.3 Fiber patch cords shall be provided and connected to the electronics by others.

2.3.6.4 Provide (4) foot (white) Category-6 (patch panel end) patch cords with pre-molded boot, provide quantity equal to 50% of the total data cable drops or ports to be provided. Patch cords shall be in compliance with the manufacturer's "Channel" warranty requirements.

2.3.6.5 Provide (10) foot (white) Category-6 (workstation end) patch cords with pre-molded boot, provide quantity equal to 50% of the total data cable drops or ports provided. Patch cords shall be in compliance with the manufacturer’s “Channel” warranty requirements.

2.3.6.6 Provide (3) foot and (6) foot (green) 6-wire, 6-conductor, straight through (patch panel end) patch cords for connection of the telephone drops in the IDF closet. Provide quantity of (25) of each length patch cord for MDF closet. Custom item - Part # RJ12-5GN-3-CAX and RJ12-5GN-6-CAX respectively. No equal or alternate acceptable. Contact Graybar Electric at 858-578-8606 for availability.

2.3.6.7 Provide all other items as detailed on the drawings.

2.4 Campus Indoor/Outdoor Fiber Optic Feed Cable

2.4.1 Provide one continuous fiber optic cable routed from the Main Distribution Frame fiber patch panel to each Intermediate Distribution Frame fiber patch panel, and/or other locations as shown on the drawings.

2.4.2 Fiber optic cable shall be rated for indoor/outdoor applications. Construction shall consist of: all dielectric, stranded loose tube with central strength member, no more than six strands per tube, flame retardant PVC or PE jacket, rated OFNR, water blocking gel in tubes or dry water-blocking compound, and blank fillers as required. Central tube type fiber will not be considered equal.

2.4.3 Fiber optic feed cable shown as multimode must be installed in a single jacket. Provide 12-strand multimode cable for all fiber optic feed runs unless otherwise noted on the Riser Diagram.

2.4.4 Cable shall contain one or all types of fibers listed below:

2.4.4.1 Provide Multimode 50/125 micron fiber optic glass, (minimum OM4 laser-optimized grade) for dual mode operation at 850 nm and 1300 nm wave lengths. Maximum attenuation at 3.0dB/km @ 850nm and 1.0dB/km @ 1310nm. Quantity of fibers as per detail drawings. Minimum gigabit ethernet distance guarantee of 1100 meters @ 850nm and 600 meters @ 1300nm. Minimum 10 gigabit ethernet distance guarantee of 550 meters @ 850nm/1300nm. Fiber shall be ISO-TIA Standard OM4 rated.

2.4.5 Each fiber optic cable shall the contain the quantity of strands of optical fibers as detailed on the drawings. A pull string shall be placed with all
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fiber cable at the time of installation. Outdoor rated fiber runs in excess of 150 feet shall be provided with a minimum 1/4" pull rope for future access. All empty and spare site conduits shall be provided with a minimum 1/4" pull rope for future access.

2.4.6 All fibers in a multi-fiber cable shall be fully operational within the required performance characteristics. If any individual fiber does not meet the minimum standards, the entire cable must be replaced, end to end, including connectors, without any additional expense to the customer.

2.4.7 Acceptable cables shall be:

Krone — #50/125 Ultra MultiMode OM4

Above glass types are an example of product names per manufacturer. Confirm requirements for indoor/outdoor fiber cable with riser drawings and site plans. Part numbers for composite style cable will vary greatly. Confirm part numbers with manufacturer.

2.4.8 All fibers in a multi-fiber cable shall be fully operational within the required performance characteristics. If any individual fiber does not meet the minimum standards, the entire cable must be replaced, end to end, including connectors, without any additional expense to the customer.

2.5 Voice / Data Station Cable

2.5.1 Provide one Category-6, 4-pair, unshielded twisted pair (UTP) cable from the nearest MDF or IDF to each RJ45 data outlet port indicated on the drawings. Dual port outlets will require two such cables. Four port outlets will require four cables.

2.5.2 Category 6 cables shall be copper wire, individually insulated and color coded.

2.5.3 The cables shall be UL or ETL rated and UL verified in compliance with proposed Category-6.

2.5.4 The cables shall be UL or ETL rated and UL verified in compliance with proposed Category-6.

Krone — # TN6SR-XXYY

2.5.5 Where data cables are indicated to run underground, contractor shall use a Category-6 flooded cable: Comm Scope - Ultra Media Series - #6NF4.

2.6 IDF to MDF Voice/Multimedia Feed Cables

2.6.1 Provide multi-pair UTP Category 3 cable from each IDF to the MDF as indicated on drawings. Cable must be 24 AWG, 22 AWG will not be approved as an acceptable equal.

2.6.2 For voice feed cables, terminate all pairs in the MDF on 66-type "M150" termination blocks, Siemon part #66M150. Terminate remote IDF pairs of
the cable on 66-type termination blocks with modular adapters. Cables shall be terminated with two pair per 6-position, 4-wire, RJ14C modular adapter position. One (1) block will be required per 25-pair feed cable. Follow standard voice color codes for termination. Provide Siemon Part # S66M2-5T-124LR or equal. Blocks will be rack mounted on a cross connect frame with a Siemon Part # CC-2014-NS-NB. See details on plans for further instructions.

2.6.3 All voice feed cables will be tagged on the incoming cable with a typed permanent label with information as to its origin, house pair count, and cable destination. All 66-type blocks shall be labeled with type written labels that fit the termination blocks (66 block labels and holders). Ports shall be identified on both ends of the feed cable.

2.6.4 Provide rack mount distribution rings for the 66 blocks mounted at the IDF locations. Provide distribution rings for all blocks in the MDF closet.

2.6.5 Ground and bond feed cables at one end of cable to aluminum shield with approved “bullet bond” type ground lug and #10 AWG green ground wire. Connect ground wire to closet ground buss bar.

2.6.6 Acceptable manufacturers shall be: Cable Systems Int. or Essex #ARMM type Series for indoor riser cable applications.

2.6.7 Acceptable manufacturers shall be Cable Systems Int. #ANMW type or Essex Sealpic series for outdoor cable applications.

Maximum cable outside diameters shall be as follows:

25 Pair  –  .61 in.
50 Pair  –  .77 in.
100 Pair –  .99 in.
200 Pair –  1.29 in.

2.6.8 Data contractor responsible for providing the telephone equipment vendor with detailed feed cable documentation as well as identifying all of the physical cable in the MDF and IDF locations. Contractor shall have all installation, termination and documentation of voice feed cables completed, and released to the telephone equipment vendor, a minimum of three weeks prior to the cut-over date set by the District.

2.7 Voice/Data Outlets

2.7.1 Unshielded twisted pair data outlets shall be an RJ45 Enhanced performance type 8-position / 8 conductor modular jacks, and shall comply with proposed Category-6 performance requirements, single port, dual port or four port as noted on drawings. All outlets shall be wired in an EIA/TIA 568B configuration.

2.7.2 Category-6 UTP local origination outlets shall be of the same type and manufacture as the data outlets. Refer to drawings for faceplate configurations.

2.7.3 For single port data outlet or single port voice outlet locations, the faceplates shall have space for two connections with one port fully
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operational for connection to all of the specified protocols. The second port shall be covered by a blank plate.

2.7.4 For dual port data, dual port voice, or dual port voice/data outlet locations, the faceplates shall have space for two connections with both ports fully operational for connection to all of the specified protocols.

2.7.5 For triple port data outlet or any combination of voice and data totaling three ports, the faceplates shall have space for four connections with three ports fully operational for connection to all of the specified protocols. The fourth port shall be covered by a blank plate.

2.7.6 For quad port data outlet or any combination of voice and data totaling four ports, the faceplates shall have space for four connections with all four ports fully operational for connection to all of the specified protocols.

2.7.7 For dual port data outlet locations with local origination, the faceplates shall have space for four connections with all ports fully operational for connection to all of the specified protocols. The fourth port shall be covered by a blank plate.

2.7.8 For single port voice outlet locations intended for wall telephone connections, a wall telephone type faceplate with attachment studs shall be provided. The wall telephone jack shall be 8-pin, RJ45 type and use IDC wire terminations only. Screw terminal type jacks will not be accepted as an alternative.

2.7.9 All data outlet faceplates shall be white and shall have a unique sequential identification number applied to faceplate. Hand written labels are not permitted. Faceplates, with the exception of wall telephone outlets, shall include interchangeable colored icons or color coded port inserts and label windows. All color schemes shall be approved by the customer prior to installation.

2.7.10 Colored inserts and icons are required for this project. Refer to the detail drawings for the exact color scheme to be provided. Inserts submitted that do not follow the color and identification requirements will be rejected. Inserts installed that do not follow the color coding as shown in the detail drawings will be rejected at the Contractor's expense.

2.7.11 All labels will be installed under label windows. Labels adhered to the surface of the faceplate will not be accepted.

2.7.12 Reference the drawings for special outlet configurations or plate requirements.

PART 3 - INSTALLATION

3.1 Upon completion of 10% of the cabling installation, the contractor shall notify the engineer for an inspection of the methods and types of materials used on the project. The contractor shall give a minimum of 72 hours notification to the engineer for the inspection. The contractor will be given a written review of the findings, so if adjustments are required, they can be done before the project proceeds.
3.2 Pull strings will be provided with all cable runs including but not limited to; conduit stub ups, conduit sleeves, cable trays, open wiring routes, innerduct, and point-to-point conduits. Pull strings shall be free from cable bundles in open wiring routes. Pull strings shall not be substituted for pull ropes.

3.3 Velcro cable management straps are required on all Category-6 cable bundles, the last 20 feet or upon entry into equipment closet, a maximum of 12” apart. Cable bundles shall also be routed through cable management or “D” rings in the equipment closet.

3.4 Data contractor shall supply protective bushings or slide on rings at the ends of all exposed conduits used for the data system cabling. This is to include all conduits installed for any future data cabling requirements. Contractor shall submit planned protection bushing prior to installation of cabling for approval.

3.5 Velcro cable management straps are required on the rear of the equipment racks and on the patch cords within the vertical cable managers. Straps shall be a maximum of 12” apart.

3.6 Every fiber in every fiber optic cable must be terminated at both ends on a fiber patch panel in the IDF closet or on a faceplate in the classroom location. Termination shall be accomplished using Duplex SC type connectors with a long strain relief boot, except for fiber ran to station locations where a short boot shall be used.

3.7 All SC connectors shall be of the same manufacture to ensure compatibility. Polarity of fiber strands must be observed at all times.

3.8 Labeling

3.8.1 Each cable run shall be permanently labeled at each end with a unique sequential number which corresponds to a similar number provided for each data outlet and punch down point. A printed label shall be placed at each of the following locations;

3.8.1.1 On the cable at the rear of the patch panel or termination block. Requires the use of a self laminating wrap around label. Brady Label self laminating 1.2" by 1.5" wrap around label Part # 29689. No approved equal.

3.8.1.2 On each cable in the j-box behind the faceplate location. Requires the use of a self laminating wrap around label. Brady Label self laminating 1.2" by 1.5" wrap around label Part # 29689. No approved equal.

3.8.1.3 On the face of the patch panel, provide a 3/4” by 3/4” label with a letter or number identifying the patch panel designation.

3.8.1.4 On the face of the faceplate in the label holder window.

3.8.2 Hand written labels are not permitted. Where cable ID includes room number identification the contractor shall obtain written verification of actual room numbers prior to beginning labeling (numbers on plans do not always match actual room numbers). Cable pulling cross reference lists will not be accepted with final documentation.
3.8.3 Each patch panel port shall be identified with a unique sequential labeling scheme. Port identification labeling pattern shall be consistent throughout the project.

3.8.4 All faceplates shall be identified with permanent printed labels. Labels must not be subject to removal by incidental contact. Contractor shall be responsible for replacing defective labeling for a period of one year from date of final sign-off of project.

3.8.5 All fiber optic and UTP feed cables shall be identified with a permanent, water resistant, printed labels. Labeling information shall include closet identifications, quantity of conductors (UTP) or strands (fiber) and house pair designations (UTP).

3.8.6 Labeling will follow recommended EIA/TIA standards or as requested by the customer. Contractor will confirm labeling pattern prior to final identification or testing. All test results will be identified by the final labeling scheme.

3.8.7 All fiber optic cables and/or innerduct shall be tagged with fiber optic warning tags in every manhole or pullbox. Fiber warning tags shall also be placed at each end of the cable in the termination closets in clear view. A minimum of (3) tags are required at each end. Fiber warning tags shall be placed on fiber optic cable and/or innerduct routed through open ceiling environments at increments no less than 15 feet apart.

3.9 Where open wiring cables are run through the ceiling space (only permitted where specifically noted on the drawings), the wire shall be bundled together and supported above the ceiling.

3.10 All cables must be fastened to the building structure via “j-hooks” or an approved Category 6 suspension system, and not directly in contact with ceiling system. For “j-hooks” maximum fill capacity is as follows: 1-5/16” hooks – 35 cables; 2” hooks - 60 cables; 4” hooks - 120 cables. For quantities beyond 120 cables use a sling support system such as “Erico Cable Cat” or equal. Maximum fill capacity 200 cables. D-rings, “Caddy #WMX cable hangar”, “Caddy Bridle Rings”, drive rings or any other type of wire ring support is not allowed.

3.11 Where cables pass through a fire-resistant portion of the structure, conduit sleeves shall be provided to maintain the rating of the wall penetrated. Sealing of all penetrations with an approved fire barrier is required. Conduits and sleeves must remain accessible for future use. Permanent sealants may not be used to seal sleeves and conduits.

3.12 Fiber optic cables connecting to equipment racks shall be installed with not less than 20 feet of slack cable between the rack and the terminal backboard. See drawings for fiber optic service loop requirements.

3.13 Provide 6 inches of cable slack at computer data system outlets inside conduit box.

3.14 In an accessible ceiling area, provide a 10-foot (circle 8 configuration) service loop above the data/voice outlet locations. Service loop must be tied up off of ceiling tiles or ceiling surface. Neatly coil cable without exceeding minimum bend radius.
limitations. **Do not provide length in excess of 15 feet.** May cause improper test results.

3.15 The minimum bending radius for all cables and the maximum pulling tension shall not exceed manufacturer's recommendations.

3.16 Cables installed in manholes and pullboxes on terminal backboards shall be installed on wall mounted cable support racks.

3.17 Provide a full 360-degree loop of cable around manhole and pullbox interiors.

3.18 Cable pulling shall use a split mesh grip over the cable jacket. Connection directly to optical fibers and copper wire conductors shall not occur.

3.19 When pulled through conduits, cable pulling lubricants shall be continuously applied to all cables and be specifically approved by the manufacturer.

3.20 Where cables are pulled through or pulled from a center of run, pull without splices or terminations, lead out the cables at all manholes, pullboxes, and conduits, taking care to feed them in again by hand for the next run.

3.21 For each cable pull where a cable direction change is required, flexible feed-in tubes, pullout devices, multi-segmented sheaves, etc., shall be used to ensure proper cable pulling tensions and side wall pressures. Cables shall not be pulled directly around a short right angle bend. Any device or surface the cable comes in contact with when under pull-in tension shall have a minimum radius 50% greater than the final specified minimum installed cable bending radius. The maximum possible size radius sheaves and feed-in tubes, usable in the available working space, shall be provided in all situations, to ensure the minimum possible cable sidewall pulling pressure. Do not use devices with multi-segment "roller" type sheaves.

3.22 Cable lengths over 250 feet shall be machine pulled, not hand pulled. Cables shall be pulled in a continuous, smooth operation without jerking or stop-start motion after initiation of pull. Maximum cable pulling speed shall be less than 50 feet per minute. Minimum pulling speed shall be greater than 15 feet per minute.

3.23 When pulling cable through conduit, cables shall be pulled straight into or out of the raceway without bends at the raceway entrance or exit. Pull in cable from the end having the sharpest bend (i.e., bend shall be closest to the reel.) Keep pulling tension to minimum by liberal use of lubricant, hand turning of reel, and slack feeding of cable into duct entrance. Employ not less than one man at reel and one at manhole or pullbox during this operation. Cables shall be pulled directly from cable reels.

3.24 All cables shall be new and extend continuous from each MDF or IDF backboard or rack to all voice/data outlets or other equipment locations.

3.25 Where cables are not installed in a conduit or other raceway system, they shall not be routed parallel with other line voltage equipment or wiring (120 volt and above) within 36" or within 12" of line voltage equipment or wiring where crossing. Where Flooded Enhanced Category-5 cables or outdoor rated fiber optic cables are routed exposed through ceilings for more than 50'-0", install in innerduct or EMT conduit system.
PART 4 - TESTING

4.1 All Category-6 cables shall be point to point (link) tested after installation/termination, and verified to operate at minimum 1000Mbps. Performance of installed cables shall satisfy all current addendums to the EIA/TIA 568A standard for Category-6 wiring. In addition, testing shall satisfy all proposed amendments to the existing ISO/IEC requirements. The wiring shall support all specified communication protocols. Testing shall support the Category-6 requirements by the EIA/TIA.

4.2 Upon completion of testing cable links, the Contractor shall supply a copy of the original database files downloaded from the tester in original format on disk. Contractor shall provide with database files an original copy of the tester’s manufacturer software program (included in original cost) for record management and archiving, in a Windows format (e.g., MicroTest’s software program - ScanLink ver.

4.2.1 10 PC for Windows, WaveTek’s software program-LTRM ver.1.07, etc). The manufacturer’s software program will be used by the engineer to review all test results, and then turned over to the customer to keep as their record copy with the final approved test results. Provide (3) copies of tests on disk.

4.3 Contractor will repair or replace cable runs or connecting hardware that do not meet specified criteria.

4.4 Upon completion of submittal of original test results, and after review and approval of those results, the contractor shall provide testing equipment and personnel to randomly re-test 10% or 20 drops minimum, whichever is greater, of all UTP cable locations on the campus in the presence of the designated customer representative and project engineer. The customer representative shall choose which cables are to be retested. If 10% of the re-tested cables fail to match the previously submitted original tests, the contractor must hire an independent testing firm to re-test all UTP cable on the campus, at no cost to the customer. All cables which do not meet the specifications criteria as determined by the independent test report, shall be replaced and retested by the contractor at no cost to the customer. Final sign-off of the testing shall be approved after receipt of all other documentation.

4.5 Multimode fiber optic cables shall be tested bi-directionally at 850nm and 1300nm. All fiber strands shall be tested with a power meter and light source as well as an OTDR (Optical Time Domain Reflectometer). OTDR fiber tests for runs under 100 meters are not required. All fiber test results shall contain final source and destination information that matches IDF or MDF labeling shown on drawings. Fiber test results shall be submitted as hard copy and on floppy disk in Microsoft Excel format.

4.6 Test procedures shall comply with EIA/TIA 526-14 Method B. Test results shall meet the minimum following criteria:

4.6.1 Fiber optic test results shall not exceed 2db attenuation loss in addition to inherent loss published by manufacturer tested at minimum 2000 Mhz for 850nm and 500 Mhz for 1300nm for the fiber optic cable.
4.6.2 Test all voice/data cables minimum Category-6 UTP cable to test results for “Link Testing” requirements @ 250 Mhz per current EIA/TIA draft requirements. Any cables which do not meet these minimum requirements shall be replaced or repaired at no cost to the customer.

4.7 End to end attenuation termination points measure the power loss between end points from both directions.

4.8 End to end attenuation testing shall be performed with a temporary test jumper cable at each end of the installed fiber cable. The test jumper shall be the same size as the installed cable. The measured attenuation of the test jumpers, test connectors, and test interconnection sleeve between the two test jumpers shall be less than 1dB as calibrated at the time of the test at indicated wave lengths and frequencies.

4.9 Provide (3) hard bound copies of “E-size” drawings and (1) disk copy in AutoCAD 14 or 2000 format copy of floor plan drawings of each building. These drawings shall include all outlet locations, major cable routes and outlet and cable identification numbers. Provide detailed elevations of each MDF or IDF locating all equipment and connections.

END OF SECTION
PART 1 - GENERAL

1.1 The Contractor shall provide additional clocks and intercom components to the existing wireless clock and existing intercom system. Refer to the drawings, and as described in these specifications as may be required as specified herein.

1.2 The contractor shall provide loudspeakers and clocks as shown on the drawings or as noted in these specifications. Provide and connect all conductors and terminal strips in cabinets and backboards necessary to provide for the functions and the requirements specified herein.

1.3 Related Specification Sections:

1.3.1 Section 26 01 00 - General Provisions
1.3.2 Section 26 05 33 - Conduit and Fittings
1.3.3 Section 26 05 19 - Conductors
1.3.4 Section 26 05 34 - Outlet and Junction Boxes

1.4 Acceptable Intercom manufacturers shall be Dukane to match the existing system.

1.5 Acceptable clock manufacturers shall be Primex to match the existing system.

Quality Assurance

1.6 All items of equipment including wire and cable shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections. The distributor must also provide complete installation of all wiring and devices or equipment. All conduit and standard backboxes will be furnished and installed by the electrical contractor. Supervised installation of the wiring and intercom/clock devices shall be permitted with the following conditions:

1.6.1 The intercom/clock system shall be warranted by the manufacturer's representative per the contract agreement.

1.7 The contractor shall be an established communications and electronics contractor that has had and currently maintains a locally run and operated business for at least five years. The contractor shall utilize a duly authorized distributor of the equipment supplied for this project location with full manufacturer's warranty privileges.

1.8 The contractor shall show satisfactory evidence, upon request, that the supplier maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The supplier shall maintain at his facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

1.9 UL Compliance: Comply with requirements of UL 50. The communication system supplied shall be listed by Underwriter's Laboratories under UL Standard 1459. A copy of
the UL listing card for the proposed system shall be included with the contractor’s submittal. The system shall also comply with PCC Part 68 Regulations.

1.10 Installation and start up of all systems shall be under the direct supervision of a local agency regularly engaged in installation, repair, and maintenance of such systems. The supplier shall be accredited by the proposed equipment manufacturers and be prepared to offer a service contract for system maintenance on completion of the guarantee period.

1.11 The agency providing equipment shall be responsible for providing all specified equipment and mentioned services for all equipment as specified herein. The agency must be a local authorized distributor of all specified equipment for single source of responsibility and shall provide documents proving such. The agency must provide written proof that the agency is adequately staffed with factory-trained technicians for all of the specified equipment.

1.12 The contractor shall guarantee availability of local service by factory-trained personnel of all specified equipment from an authorized distributor of all equipment specified under this section. On-the-premise maintenance shall be provided at no cost to the purchaser for a period of one (1) year from date of installation unless damage or failure is caused by misuse, abuse, neglect, or accident.

1.13 Deliver products in factory containers. Store in clean, dry space in original containers. Protect products from fumes and construction traffic. Handle carefully to avoid damage.

Support

1.14 Telephone Support: Free telephone support must be provided during normal business hours from the manufacturer.

1.15 Remote Updates: All application software must be upgradable by modem without site visits and without interrupting normal operations of other applications.

1.16 Remote Maintenance and Diagnostics: The vendor must have full access to the system via modem to do all of the following without shutting down the system to users.

1.16.1 Direct access to data base
1.16.2 Direct access to error logs
1.16.3 Direct access to removable stoppage
1.16.4 Defragment files and drives Start up and shut down any or all voice processes
1.16.5 Run a program to check the disk

Submittals

1.17 Phase I Submittal shall be made within (20) working days after the award of the contract by the District. This submittal shall include the following:

1.17.1 Complete bills of quantities, including all materials, components, devices, and equipment required for this work. The bills of quantities shall be
tabulated respective of each and every system as specified, and shall contain the following information for each item listed:

1.17.1.1 Quantity of each type of equipment item
1.17.1.2 Description of each item
1.17.1.3 Manufacturer's Name and Model Number
1.17.1.4 Manufacturer's Specification Sheet
1.17.1.5 Equipment items which have individual components, will require that all component parts be listed individually.
1.17.1.6 Description of any specialty backbox requirements
1.17.1.7 All wiring types required for installation of this system

1.18 Phase II Submittal shall be provided within (20) working days after the approval of the Phase I submittals and prior to any fabrication or field conduit installations. All shop drawings shall be engineered and drawn on a CAD System. Each submission shall include 'D' or 'E' size print copies to match the contract drawings, and (1) data disk copy with files in a AutoCAD 14 format. Building floor plan CAD files on disk, will be made available via express mail after the receipt of payment of $50.00 per building floor plan, or $300.00 minimum which ever is greater. Contractor shall make the request for drawings in writing directly to Johnson Consulting Engineers, confirmation of the request and a release form will be forwarded to the contractor to include a signed copy with payment prior to release of files. Detail or riser diagram sheets or any other drawings other than floor or site plans, will not be made available to the contractor. Phase II submittals drawings shall include the following.

1.18.1 The phase II contractor drawings will not be required unless changes to the design are needed. The contractor shall provide a letter indicating if they will be using the contract drawings or providing their own drawings as apart of the Phase I submittal. A complete as-built design shall be provided at the completion of construction to reflect actual installation of the system and shall follow the parameters as indicated in section 1.8 above and as described below.

1.18.2 Complete floor plans showing the locations throughout the project of all receptacles, conduits, wireways, tray, pullboxes, junction boxes, equipment locations, and other devices.

1.18.3 Typical system riser diagrams, specialty equipment or rack elevations will be required to be provided, including equipment designations, punch block arrangements, and all intercom and other associated equipment

2 PART 2 - PRODUCTS

Intercom / Class Pass Bell System

2.1 The intercom system central switch is existing.

2.2 The central switch shall utilize standard dual tone multi-frequency (DTMF) signaling for conformance with standard telephone practices. Those systems which utilize "smart" instruments which do not generate tones shall not be considered equal.
BERNARDO HEIGHTS MIDDLE SCHOOL RELOS
Poway Unified School District

2.3 Each classroom shall be equipped with a speaker.

2.4 The central switch shall be supplied with a two-way amplified communication path to locations equipped with speakers. The intercom amplifier shall be capable of delivering at least twelve (12) watts RMS and shall contain an automatic level control.

2.5 The system shall be required to provide automatic switching of the talk path to a telephone mode, during the course of a call, should the telephone associated with the speaker be lifted from its cradle.

2.6 The system shall be required to provide facilities for calling a staff (classroom) station by dialing the station number.

2.7 The system shall provide the capability of assigning speaker locations to any one or more of the eight (8) software programmable zones for zone paging or time tone signal reception. Systems using a mechanical means (such as dip switches or jumpers) to assign zones shall not be acceptable.

2.8 Separate paging zones, each of which may be programmed in software to belong to any combination of zones.

2.9 Provide for the distribution of emergency announcements and for the distribution of manually activated tones to all locations with speakers from any authorized telephone.

2.10 The system shall provide a "priority line" for administrators. All system functions shall be accessible through the priority line. The "priority line" shall have override control of the "normal line".

2.11 The system shall be equipped with power amplifiers to facilitate the distribution of All-Call Announcements, Zone Paging, Emergency Evacuation Tones and Program Material.

Intercom System Components

2.12 Interior recessed ceiling or wall speaker - 8" loudspeaker unit with 25 volt multi-tap transformer and 6 oz. magnet. Provide square 2-piece ceiling baffle for mounting speaker unit, baffle shall have concealed speaker mounting studs. Utilize in all areas, classrooms, hallways, etc., Unit shall be flush mounted and shall be finished in white epoxy paint. See drawings for locations and quantities required

2.13 Exterior speaker - provided recessed, waterproof sand color 8" square plastic faceplate. Soundolier #SQLK-8 series with recessed enclosure or equal. Provide with 15watt loudspeaker Soundolier # APF-15 or equal. See drawings for locations and quantities required

2.14 Intercom Call Button - Dual Intercom call button on a single gang faceplate. Top button shall be red in color and have the word "Emergency" silk screened on plate below button. The bottom button shall be white in color and have the word "Call" silk screened on plate below button. Provide Rauland Part # RS-508.
Class Pass Bell Scheduling System

2.15 The Pass Class Bell notification system component is existing. Tie new building into the existing Pass Class Bell System.

Wireless Clock System

2.16 Wireless clock system is existing. Clock system transmitters are existing.

2.17 Acceptable clock manufacturer shall be by Primex Wireless, N3211 County Road H, Lake Geneva WI 53147 (800) 537-0464 FAX (262) 248-0061 EMAIL www.primexwireless.com (no approved equal).

2.18 Clock system shall continually synchronize clocks throughout the facility, and shall be capable of clock readouts in multiple time zones where desired.

2.19 Clock locations shall be as indicated, and clocks shall be fully portable, capable of being relocated at any time.

Project Site Conditions

2.20 Clocks shall not be installed until painting and other finish work in each room is complete.

Sequence of Operation

2.21 Clock: When the batteries are inserted into the clock: A) Press the red button when the red second hand is at the 12:00 position. At this time the microprocessor will lock in the location of the second hand. B) After the red second hand has passed over the minute hand (first second hash mark after minute hand), press and release the red button. At this time the microprocessor then assumes the location of the hour hand.

2.22 After the red button has been pressed twice, the microprocessor will start searching the channels. It will start at channel No. 1 and proceed one by one until it either decodes a valid signal or reaches channel No. 16. If no signal is detected the receiver will be shut off and try again later. If a signal is received, the microprocessor will store the channel number, set the clock to the receive time, then for the next minute the clock will beep every time that it receives a valid time signal. If the clock is in a good signal area it will beep once a second. If the clock beeps every few seconds, the clock is in a marginal signal area. Clocks can operate in marginal signal areas, but battery life will be about 25 percent shorter.

2.23 After initial set, the clock will shut off the receiver. On a pre-scheduled basis, the microprocessor will turn the receiver back on and starting with the stored channel, it will again look for a valid time signal. However, the beeper will not operate.

2.24 If the clock has not decoded a valid time signal for seven days, then it will go back to double step mode. Non-signal reception can be caused by low battery voltage. If this occurs, replace the batteries.
2.1 Clocks: Primex Wireless clocks, 12-1/2-inch diameter as selected, color and finish as selected from manufacturer’s standard colors and finishes. Clocks shall be wall mounted (unless using ceiling mounted model), and 12-1/2-inch diameter clocks shall have polycarbonate from and polycarbonate lens. Face shall be white. Hour and minute hands shall be black. Clocks shall be provided with red sweep second hand.

2.1.1 Clocks shall be battery operated, and shall have 5-year battery life.

2.1.2 Clocks shall be capable of automatically adjusting for Daylight Saving Time. An on-off switch located on the transmitter shall disable this function if desired.

2.1.3 Time shall be automatically updated from the transmitter 6 times per day.

2.1.4 Clocks shall remember the time during changing of batteries.

2.1.5 Clock lock: Tamper proof/theft resistant hangers and slots in the backs of the clocks.

2.1.6 Provide (2) alkaline D cell batteries with each clock.

2.1.7 All clocks shall be furnished with the custom school logo faceplate. The artwork for the clock faces shall be furnished to the Contractor from the District.

2.1.8 Clock receivers shall be as follows:
   2.1.8.1 Decode sensitivity: > - 110 dBm
   2.1.8.2 Receiver power: Two alkaline “D” cells
   2.1.8.3 Antenna type: Internal
   2.1.8.4 Antenna gain: -7 dBi

2.1.9 If transmitter stops transmitting valid time signals due to power failure, the clocks will continue to function as accurate quartz clocks until a valid time signal is decoded.

Clocks: (Perform the following operations with each clock)

2.1 Install D cell batteries.

2.2 Set clock to correct time in accordance with manufacturer’s instructions.

2.3 Observe clock until valid signs re received and clock adjusts itself to correct time.

2.4 Install the clock on the wall in the indicated location, plumb, level and tight against wall. Attach using Clock-Lock hanging method and suitable fasteners as approved by clock manufacturer.
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Poway Unified School District

2.5 Wire Guards: Secure to wall, using approved theft-resistant fasteners.

Adjusting

2.6 Prior to final acceptance, inspect each clock, adjust as required, and replace parts which are found defective.

Cleaning

2.7 Prior to final acceptance, clean exposed surfaces of clocks, using cleaning methods recommended by clock manufacturer. Remove temporary labels from clock faces. Do not remove labels from backs of clocks.

Demonstration

2.8 Provide training to Owner’s representative on setting and adjusting clocks, replacing batteries and routine maintenance.

3 PART 3 - EXECUTION

3.1 Wiring enclosures, terminal cabinets, outlets, frames of cabinet racks and other enclosures shall be grounded. Furnish and install #8 type THWN, green grounding wire from main public address terminal cabinet to console equipment rack main terminal. Frame of console and all circuit wiring requiring grounding shall be grounded to ground system at equipment rack main terminal. All loudspeaker circuits and communication circuits shall operate balanced to ground. Bonding shall be provided to assure equal potential measurement between the chassis of all amplifiers, power supplies, etc. Bond to the control cabinet and the green grounding conductor of the power circuit serving the equipment.

3.2 Circuits shall be grounded as recommended by manufacturer or equipment to which they are connected unless otherwise specified.

3.3 All wiring shall test free of grounds and shorts.

3.4 All wiring for the complete system shall be new wire. Any wires pulled through in underground junction boxes shall be continuous with no splices in these boxes. The wiring shall be intact without cuts in the protective outer jacket. All splices shall be made at building communication cabinets or main backboard, using terminal strips in all cases.

3.5 All buildings which can not comply with NEC 800 -30 (FPN) # 4, shall be properly protected for lightning and static electrical discharge. Provide all conductors entering or leaving the building with in line fuses, or 188 type blocks with gas tube protectors.

3.6 All intercom wires and cables installed shall contain all necessary conductors and/or cables to all devices shown on the Drawings and the contractor shall make all necessary conductor terminations to all devices for a complete system. All intercom/clock wiring between buildings shall be individual shielded cables to each speaker, provide 25% spare additional cables to each building. All Cables routed
underground shall be suitable for wet location provided with UL listed wet location insulation or flooded type cable construction.

3.7 All cables shall be installed within conduits, boxes, and cabinets unless where otherwise indicated approved on the drawings. Where open cable is approved all cables shall be neatly bundled and supported from the structure.

3.8 Where cables not approved for open wire interior applications, are routed more than 50’-0” through the building, install cables in innerduct or EMT conduit.

3.9 All cables provided shall be UL listed.

3.10 All cables shall be delivered to the site in unbroken packages. Packages shall be inspected and approved by the District Inspector before opening.

3.11 All cabling shall be identified in each terminal cabinet and junction box. Where cables are routed through underground handholes each building and each system shall be identified with wet location ID tags.

3.12 Console and Cabinet Rack Equipment Installation: All equipment within each console and cabinet rack shall be logically arranged for accessibility of convenient maintenance. Equipment shall be mounted on shelves or panels and shall be securely attached. All cabinets and/or racks shall be seismically anchored to comply with T24 regulations.

3.13 Amplifiers, power supplies and other heavy devices shall be mounted on steel shelves made by manufacturer of console and cabinet racks. Cabinet, console, and panel faces, including drawers shall be same color.

3.14 Wiring within console and cabinets shall be installed to conform to standard engineering practice, and shall be terminated on terminal strips having a terminal for each required external connection. Wiring shall be cabled, laced and securely fastened in place so that no weight is imposed on any equipment, control switches or terminals. Wires carrying audio power shall be shielded. Input and output circuits and terminal strips shall be installed to provide separation necessary for proper operation. Wires shall be identified by number and chart.

3.15 Conductor shields for each system shall be grounded at one location only. Grounding shall be done within console and cabinet racks. There shall be no metallic connection between systems. Conduits for system and 120 volt AC system shall be bonded together at console and all cabinet racks.

3.16 120 Volt AC supply shall be connected from each piece of equipment directly to power strips provided by system supplier. The power strip shall be provided with a “SO” type power cord to connect to the building power receptacle.

3.17 Lines and cables within cabinets and on main terminal backboards shall be carefully cable-strapped. Cables shall be formed in rectangular configuration. Each cable shall be properly numbered in numerical order and shall maintain same number throughout site.
3.18 Conductors shall be color-coded and individual cables shall be rung out, and tagged with code wire markers. Each cable index strip shall be typed and installed on terminal cabinet door.

3.19 Terminations and connections throughout system shall be on terminal blocks, except at equipment which requires removal for servicing. Connections to such equipment and cables shall be screw-terminal type or plug-in type. Cables shall be identified as to buildings and rooms served, and terminated in all terminal cabinets and backboards.

3.20 Blocks shall be mounted in vertical rows only. Cable with lowest number shall be terminated on upper left side, with next cable in numerical order just below first cable and so on. When left side of first row of blocks is full, next cable in numerical order shall be terminated on the upper right side of first row of blocks, and so on.

3.21 Do not pass grouped cables in area that is to be used for jumpering. Cables shall enter blocks from top or bottom only, and shall not be in same area as jumper wires.

3.22 Contractor shall submit shop drawings to the Architect, for approval, indicating proposed wire tag designations for cables and terminal block layout for all terminal cabinets and backboard locations.

3.23 For all wall mounted handset locations the contractor shall furnish and install wall plates to allow for flush mounting of the handset. Where infrastructure cabling in installed by other contractors the supplier of the handset devices shall furnish required plates to the cabling contractor or replace the plates at the time of handset installation.

3.24 Where any digital phone location is located more than 1000 cable feet from the telephone switching equipment, the contractor shall provide a remote switch node or other equipment to properly amplify the signal to those locations.

**General Performance Requirements**

3.25 Contractor shall compile all data needed (room names, room numbers, drawings with station locations, etc.) to program the complete system. System programming shall be limited to features specified in this Specification.

3.26 Reproduction of speech shall be clear, high fidelity, and with all frequencies within range of system faithfully reproduced with no detectable noise, hum, or distortion.

3.27 Reproduction shall be attained at sound levels sufficient to override noise levels typical for schools, to provide a thoroughly satisfactory and serviceable system.

3.28 Audio level of intercommunication system shall be attained at sound levels sufficient to override noise levels typical for schools, to provide a thoroughly satisfactory and serviceable system with a minimum of 70 dB isolation between public address and intercommunication signals. The contractor shall adjust the individual speaker taps at any location the district requires lower or higher sound levels.
Inspection and Test upon Completion

3.29 Check out and final connections to the system shall be made by a factory-trained technician in the employ of a manufacturer of the products installed. In addition, factory-trained technicians shall demonstrate operation of the complete system and each major component to the Owner.

3.30 System field wiring diagrams shall be provided to the owner by the system manufacturer prior to completion of the installation.

3.31 All materials and installation shall be guaranteed to be free of defects in material and workmanship for two years after final acceptance of installation and test.

3.32 Upon completion of the installation, four (4) copies of complete operational instructions shall be furnished, complete with record drawings. Instructions shall include part numbers and names, addresses, and telephone numbers of parts source. Final payment shall not be made until operational and maintenance manuals have been received.

3.33 Upon completion of the installation of the equipment, contractor shall provide to the owner a signed statement from the equipment manufacturer that the system has been tested and functions properly according to the specifications.

Operation and Training

3.34 Warranty service calls made by telephone to this contractor or his designated representative shall hereby be defined as proper notification that warranty service is required.

END OF SECTION
ARTICLE 1 - SUMMARY

1.1 This Division of the specifications outlines the provisions of the contract work to be performed as a sub contract under the Division 26 scope of work. Reference the Division 26 Electrical General Provisions for scope of work and general requirements.

1.2 In addition, work in this Division is governed by the provisions of the bidding requirements, contract forms, general conditions and all sections under Division 1 requirements.

END OF SECTION
PART 1 – GENERAL

1.1 Work Included:

1.1.1 Furnish and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a complete and operating fire alarm system.

1.2 Related Work:

1.2.1 Division 26 01 00: Electrical General Provisions
1.2.2 Division 26 05 33: Conduit and Fittings
1.2.3 Division 26 05 34: Outlet and Junction Boxes

1.3 The equipment and installation shall comply with the current applicable provisions of the following standards:

CBC - 2016. . . . . . California Building Code (CBC), Part 2, Title 24, CCR.
CEC - 2016. . . . . . California Electrical Code, (CEC), Part 3, Title 24, CCR.
CFC - 2016. . . . . . California Fire Code (CFC), Part 9, Title 24, CCR.

1.4 The system and all components shall be listed by Underwriters Laboratories, Inc. for use in Fire Protective Signaling Systems under the following standards as applicable:

UL 38 . . . . . . . . . . . . . Manually Actuated Signaling Boxes.
UL 50 . . . . . . . . . . . . . Cabinets and Boxes.
UL 268 . . . . . . . . . . . . Smoke Detectors for Fire Protective Signaling Systems.
UL 268A . . . . . . . . . . . Smoke Detectors for Duct Applications
UL 346 . . . . . . . . . . . . Waterflow Indicators for Fire Protective Signaling Systems.
UL 464 . . . . . . . . . . . . Audible Signaling Appliances.
UL 521 . . . . . . . . . . . . Heat Detectors for Fire Protective Signaling Systems.
UL 864 . . . . . . . . . . . . Control Units for Fire Protective Signaling Systems.
UL 1481 . . . . . . . . . . . Power supplies for Fire Protective Signaling Systems.
UL 1971 . . . . . . . . . . . Visual Signaling Appliances.

1.5 Only Fire Alarm Control Panel Equipment and Peripheral Field Devices have been shown on the Contract Bid Single Line Block Diagram. Specific and complete wiring between Control Equipment andPeripheral Equipment has been deleted for clarity.

1.6 Submittal shall be made in accordance with Division 26 01 00 – Shop Drawings and Submittals. This submittal shall include the following:

1.6.1 Complete bills of quantities, including all materials, components, devices, wiring and equipment required for this work. The bills of quantities shall be tabulated respective of each and every system as specified, and shall contain the following information for each item listed:

1.6.1.1 Quantity of each type of equipment item.
1.6.1.2 Quantities of 10% spare devices as per 1.16.
1.6.1.3 Description of each item.
1.6.1.4 Manufacturer's Name and Model Number.
1.6.1.5 Manufacturer's Specification Sheet.
1.6.1.6 Back box type and dimensions per device type.
1.6.1.7 California State Fire Marshall Listing Sheets for all components.
1.6.1.8 Equipment items which have individual components, will require that all component parts be listed individually.
1.6.1.9 Letter indicating the contractor's intent to comply with Phase II submittal drawings.

1.7 Phase II Submittal shall be provided **within (20) working days** after the approval of the Phase I submittals and prior to any fabrication or field conduit installations. All shop drawings shall be engineered and drawn on a CAD System. Each submission shall include 'D' or 'E' size print copies to match the contract drawings, and one (1) data disk copy with files in an AutoCAD 2000i or 2004 format. Building floor plan CAD files on disk, will be made available via express mail after the receipt of payment of $50.00 per building floor plan, or $300.00 minimum which ever is less. Contractor shall make the request for drawings in writing directly to Johnson Consulting Engineers, confirmation of the request and a release form will be forwarded to the contractor to include a signed copy with payment prior to release of files. Detail or riser diagram sheets or any other drawings other than floor or site plans, will not be made available to the contractor.

1.7.1 Provide complete shop drawings to include the following:

1.7.1.1 Complete floor plans, at scale of contract documents, showing the locations throughout the project of all devices, panels conduits, wireways, tray, pullboxes, junction boxes, number and type of conductors, and other devices.

1.7.1.2 Point to point wiring diagrams showing wiring from panel terminals to each device.

1.7.1.3 Riser diagram indicating all wiring and circuits.

1.7.1.4 Current State Fire Marshal listing sheets for all components and devices.

1.7.1.5 Provide battery power supply calculations, indicate point of power supply connection, means of disconnect, over-current protection, etc. for each panel.

1.7.1.6 Provide detailed information on conductors to be used-manufacturer, type, size, insulation, etc.

1.7.1.7 Provide voltage drop calculations for all conductor run is from each panel (i.e., main FACP, remotes, power extenders, etc.) for each panel.

1.7.1.8 Provide written sequence of system operation matrix.

1.7.1.9 Provide list of zones. (Every device that is addressable.)

1.7.1.10 Provide detailed drawing for annunciator panel indicating all zones and initiating devices.
1.8 **Common submittal mistakes which will result in submittals being rejected:**

1.8.1 Not including the qualifications of the installing contractor.

1.8.2 Not including all items listed in the above itemized description.

1.8.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.

1.8.4 Not including actual manufacturer’s catalog information of proposed products.

1.8.5 Do not include multiple manufacturers for similar products and do not indicate “or approved equal” statements, or “to be determined later” statements. The products being submitted must be the products installed.

1.9 All equipment and material shall be new and unused, and listed by Underwriter's Laboratories for the specific intended purpose. All control panel components and field peripherals shall be designed for continuous duty without degradation of function or performance. All equipment covered by this specification or noted on Installation Drawings shall be equipment suited for the application and shall be provided by a single manufacturer or be recognized and UL listed as compatible by both manufacturers.

1.10 It will be the responsibility of the Contractor to ensure proper specification adherence for system operation, final connection, test, turnover, warranty compliance, and after-market service. The distributor of the equipment specified must be factory-trained and certified.

1.11 Basic System Functional Operation, upon operation of any automatic, manual or other initiation device the following shall occur:

1.11.1 The system alarm LED shall flash.

1.11.2 A local piezo electric signal in the control panel shall sound.

1.11.3 A backlit 80-character LCD display shall indicate all information associated with the fire alarm condition, including the alarm point and its location within the protected premises.

1.11.4 History storage equipment shall log the information associated with each new fire alarm control panel condition, along with time and date of occurrence.

1.11.5 All system output programs assigned via control by event equations to be activated by the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

1.11.6 LED display and audible signaling at the remote annunciator indicating building, fire zone, and type of device. Annunciator shall also provide a separate audible signal for CO detection with a green flashing light, with classroom number indication.

1.11.7 Automatic retransmission to a UL central station for fire department notification.

1.11.8 Automatic shut down of air conditioning units shall be performed by control modules at each unit when required as part of a complete area coverage design.
scheme. Each building shall shut down all A/C units and dampers within that building as one zone.

1.12 All equipment and components shall be new, and the manufacturer’s current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approval agency for use as part of a protective signaling system.

1.13 All equipment and components shall be installed in strict compliance with manufacturer's recommendations. Consult the manufacturer’s installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

1.14 All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place. Fasteners and supports shall be adequate to support the required load.

1.15 All wiring shall be installed in a conduit system.

1.16 The contractor shall provide as a part of this contract additional control modules, heat detectors, smoke detectors, CO detector, duct detectors, manual pull stations, strobes, speakers, speaker/strobes exterior speakers devices etc. along with all required programming, to equal 10% of the total quantity of devices shown on the drawings, or a minimum of three (3) for each type, whichever is greater. Installation of 50’ of conduit, boxes and all wiring for each of the devices shall be included, and required locations coordinated with CSFM final approved shop drawings. Any devices not required to be included during construction shall be delivered to the District at the completion of the project. The quantities of these devices shall be listed as a part of the Phase I submittals.

1.17 The installing contractor shall provide a copy of current documentation, indicating that the contractor installing the fire alarm systems or devices and wiring, is certified by Underwriters Laboratories (UL) in its product directories under the listing category “PROTECTIVE SIGNALING SERVICES - LOCAL, AUXILIARY, REMOTE STATION, AND PROPRIETARY.” The contractor shall be certified by the manufacturer to install and program the system. The contractor must also provide complete installation of all wiring and equipment, and software programming. Supervised installation of the wiring, devices and/or any software programming shall not be permitted.

1.17.1 The installing contractor must also be an “authorized dealer” by the equipment manufacturer, and must have completed all required training prior to the bid of this project.

1.17.2 The fire alarm system installation shall be warranted by the manufacturer’s representative.

1.17.3 The Contractor shall have a current California C-10 or C-7 Contractor’s License, and all individuals working on this project shall have passed the Department of Industrial Relations Division of Apprenticeship Standards – “Fire / Life Safety Certification Program.”

1.17.4 The installing contractor shall provide, at the time of submittal, a letter of intent to provide an extended service warranty. This warranty shall extend for a total of three (3) years, starting at the completion, testing, and training of this project. The service warranty shall cover all material and labor to keep operational all system devices installed under this project and shall include two (2) complete U.L. system’s tests and cleaning of all devices at year two (2) and year three (3)
of the warranty. Routine cleaning of devices, other than at the two (2) specified U.L. system’s testing periods, will not be included as a part of this warranty.

1.17.5 The installing contractor shall provide, at the time of submittal, a letter indicating that the installation crew for this project meets the following NICET certifications:

1.17.5.1 25% of the installing field personnel must have completed NICET Level 2 Certification.

1.17.5.2 One of the installing field personnel and/or supervisor must have completed NICET Level 3 Certification.

1.17.5.3 Contractor shop drawings shall be signed by an individual who has completed NICET Level 4 Certification.

1.18 All conduit and standard backboxes will be furnished and installed by the Division 26 Contractor. Specialty boxes will be furnished by the equipment supplier to be installed by the Division 26 Contractor.

1.19 Equipment and materials shall be the standard product of FCI.

1.20 Alternate equipment as manufactured by any other manufacturer not specifically listed above will not be approved for use on this project.

1.21 D.S.A approved drawings are included as a part of the drawing set.

PART 2 - PRODUCTS

2.1 Main Fire Alarm Control Panel:

2.1.1 Fire alarm control panel shall be FCI E3 series with voice evacuation.

2.1.2 The system shall be controlled and supervised by a microprocessor based monitoring fire alarm control panel. The systems shall be addressable, field configurable, programmable and editable. The system shall continuously scan devices for change of status. Each device shall have its own unique address, but shall also be grouped by building as a separate zone for remote annunciation and alarm report purposes.

2.1.3 The fire alarm control panel shall be housed in a lockable, code gauge steel cabinet with 80character LCD display, master controller operators panel, indicating lamps, silence switch and reset switch mounted on cabinet front. The fire alarm control panel shall be physically and visually located in the general office for monitoring by staff, and shall sound the “Voice Message” in all zones. Signal duration shall be field programmable and initially set at three minutes. Provide all control modules, synchronous modules, etc., to provide a complete working system per all codes that apply.

2.1.4 The fire alarm control panel shall come with standardized software for on-site customization of the system. The unit shall be capable of providing a 600-event historical log with zone or point selectable alarm verification.

2.1.5 Provide a minimum 100 watts of amplification in each FACP with a minimum of 25% spare capacity.
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2.1.6 The unit shall support a minimum of 3000 intelligent addressable points and one output point, SPST contact per zone. Provide the number of modules necessary to control and supervise fire alarm devices as shown on the Drawings, as well as to provide 25% spare capacity.

2.1.7 The unit shall also provide a minimum of (2) class B strobe circuits with additional circuits as indicated on the drawings.

2.1.8 The fire alarm control panel shall be capable of providing a walk test.

2.2 The power feed for the FACP shall be 3-wire, 120volt, AC, single phase (20A circuit) permanently labeled “FIRE ALARM CONTROL POWER”, terminating at the master fire alarm control and supervisory panel. The label shall be red with 1/4” high white lettering. The source circuit breaker must be provided with a lock-on device.

2.3 In addition to the AC circuit, the panel shall be equipped with a DC battery to activate an audible alarm and pilot light in case of a power failure on the AC circuit.

2.4 The master fire alarm panel shall be equipped with a manual pull lever type, supervised report station.

2.5 With the exception of the manually operated report station required at the master fire alarm panel and large assembly areas, the remainder of the school facility shall be equipped with approved, electronically supervised, automatic fire detection devices, such that every room, space, including concealed spaces, such as the attic spaces above ceilings, etc., is provided with approved coverage.

2.6 REMOTE POWER SUPPLIES shall provide a minimum of (4) Class B NAC circuits.

2.7 SPEAKER / STROBE DEVICE shall be of the semi-flush type designed for mounting to a standard 4 11/16” deep electrical back box. Each device shall be provided with a semi-flush accessory plate. Exterior speakers shall be weatherproof. The strobe unit shall have a meantime between failure (MTBF) of 1,000 hours or greater. The strobe section shall have a minimum flash rate of approximately one flash per second, with candela rating as per UL standard 1971. Housing shall be white.

2.7.1 In areas containing two or more audible devices, or three or more visual devices, these devices shall be synchronized, Per NFPA 72, Chapter 18 California Amendments (2016).

2.8 SPEAKERS shall operate at either 25 or 70 VRMS and provide tap setting from 1/8 to 2 watts and provide efficient design for high intelligibility at a minimum wattage across a frequency range of 300 to 8000 HZ and shall be white in color. Speakers shall be ADA, NFPA and ANSI compliant.

2.8.1 Speakers for typical classrooms shall be tapped at ¼ watt with exterior speakers tapped at 2 watts. Other areas such as Theaters, Auditoriums, Gymnasiums, Team Rooms, Cafeterias, Kitchens and all shop areas shall be tapped at ½ watt.

2.8.2 Contractor shall also include (2) additional site visits within the first year to adjust speaker output on a space by space basis as requested by the owner.

2.9 STROBES. The strobe unit shall have a meantime between failure (MTBF) of 1,000 hours or greater. The strobe section shall have a minimum flash rate of approximately

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one flash per second, with candela rating as per UL standard 1971. Housing shall be white.

2.9.1 In areas containing two or more audible devices, or three or more visual devices, these devices shall be synchronized, per NFPA 72, Chapter 18 California Amendments (2016).

2.9.2 Maximum pulse duration to be 0.20 of a second with an ADAAG 4.28.3(3). Visual alarms maximum duty cycle of 40%.

2.9.3 Capable of providing minimum candela. Intensity as shown on plans (effective strength measured at the source).

2.9.4 The flash rate to be a minimum of 1 Hz and a maximum of 2 Hz per NFPA 18.5.3.1.

2.10 HEAT DETECTOR DEVICES shall be analog addressable, fixed temperature x rate of rise, fixed at 200°F and a 15°F/min rate of rise. In janitor rooms equipped with kilns, devices shall be fixed at 200°F.

2.11 SMOKE DETECTOR DEVICES shall be analog addressable, photo-electric.

2.12 DIGITAL ALARM COMMUNICATOR TRANSMITTER. The control panel shall meet the requirements of UL 864 for central station connections, and shall be UL listed for use with the fire alarm control panel. The communicator shall be connected to supervise two telephone lines, all wiring required for this connection shall be provided by the fire alarm contractor Coordinate interface with District monitoring company as required.

PART 3- EXECUTION

3.1 All wiring shall be (min) #18 AWG copper or as noted on drawings. All underground conductors shall be UL wet location rated for use in wet locations, West Penn “Aquaseal” or equal. There shall be no splices in underground handholes or vaults. A multi-conductor cable rated for use in wet locations will also be acceptable. It must be labeled “FIRE ALARM” in all pull boxes, using a water-tight labeling system.

3.2 Interior, dry location wiring for low voltage initiating circuits shall be #18 AWG copper, twisted shielded pair minimum, signaling circuits shall be No. 14 AWG minimum, and wiring for 120 volt circuits shall be No. 12 AWG minimum. All wiring shall be color coded, solid copper conductor. Use of power limited cable shall be restricted to controls listed for this purpose. Single conductors shall be type THHN/THWN-2 insulated copper.

3.3 Wire markers shall be provided for each wire connected to equipment. The marker shall be of the taped bank type, of permanent material, and shall be suitable and permanently stamped with the proper identification. The markers shall be attached in a manner that will not permit accidental detachment. Changing of wire colors within circuits shall be unacceptable.

3.4 A terminal cabinet shall be installed in the electric room for the fire alarm systems at each building. All fire alarm wiring shall terminate on UL approved strips in this terminal cabinet. All wiring shall be labeled at each termination strip. Wiring shall be configured such that all end-of-line resistors will be installed at the terminal cabinet.

3.5 Fire Sprinkler Activation detecting System(s) shall each be indicated on a separate zone in the fire alarm control panel.
3.6 Fire Alarm Control Panel and all other equipment shall be mounted with the center of all operable reset buttons, located a maximum of 48" front approach / 54" side approach above floor level.

3.7 Contractor shall provide complete wiring between all equipment.

3.8 The Fire Alarm/Life Safety Installation shall comply fully with all Local, State and National Codes, and the Local Authority Having Jurisdiction (AHJ) DSA.

3.9 The Fire Alarm Control Panel and power supply shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the Panelboard as FIRE ALARM CIRCUIT.

3.10 The Control Panel Cabinet shall be grounded securely to a power system ground conductor. Provide a 1/2-inch conduit and 1#12 grounding conductor to the building electrical service ground bus.

3.11 Conduit shall enter into the Fire Alarm Control Panel back box only at those areas of the back box which have factory conduit knockouts.

3.12 All field wiring shall be completely supervised. In the event of a primary power failure, disconnected standby battery, removal of any internal modules, or any open circuits in the field wiring; an audible and visual trouble signal will be activated until the system and its associated field wiring are restored to normal condition.

3.13 All cables and wiring shall be listed for Fire Alarm/Life Safety use, and shall be of the type as required by and installed per CEC Article 760.

3.14 Final System Acceptance

3.14.1 Provide an NFPA Certificate of Compliance to DSA and the engineer of record. Complete fire alarm system shall comply with Chapter 14 of NFPA for testing and inspection and be sound-tested for audibility in all spaces requiring voice evacuation. This testing shall be performed in the presence of the project electrical engineer. Adjust speaker taps or provide additional speakers as required to provide correct audibility.

3.14.2 Beam detectors shall be tested by two methods:

3.14.2.1 Manual slow cover test to confirm reflector alignment is correct.

3.14.2.2 Software fire test per UL268.5 to demonstrate when signal level is reduced simulating obstruction the detector will go into alarm.

3.14.3 The system will be accepted only after a satisfactory test of the entire system has been accomplished by a Factory-Trained Distributor in the presence of a representative of the authority having jurisdiction and the Owner's representative. This contractor shall provide all personnel, ladders and testing equipment to assist the local authority in completing this test. Actuate each device and verify that the system performs as specified.

3.14.4 The Contractor will present a complete set of "as-built" Fire Alarm/Life Safety system drawings, and the factory supplied Operator's Manuals as required by the General Provisions section of this specification.
3.14.5 Once the system has been tested and the certificate of compliance completed, the contract shall not be considered complete until after owner training has been completed. The contractor shall notify in writing their intent to provide the training for the system. This notification shall be given to the Division 21 Contractor, Architect and the Project Engineer a minimum of 2 weeks prior to the scheduled training session. The Division 21 Contractor and/or the architect shall be responsible for notifying the owner to confirm that the appropriate District personnel will be made available for this training session. If the Division 21 Contractor does not receive confirmation that the training session can be performed on the proposed date, then another time shall be provided. The training shall consist of the following:

3.14.5.1 Provide a minimum of one (1) four-to-six -hour training period located at the project site, to instruct District personnel in proper operation of all systems.

3.14.5.2 Provide a minimum of three (3) complete owner operation manuals for the District records.

3.14.5.3 Provide a minimum of two (2) complete as built sets of drawings for the District records.

3.14.5.4 Provide all spare parts as described in part 1 of these specifications

3.14.5.5 Provide written confirmation and proposed scheduled dates for follow up training and 1-year complete system test.

3.15 Follow up Training

3.15.1 Provide as a part of this contract, the follow up instructional training period within six (6) months after the final acceptance of the systems. This training shall include a minimum of one four-to-six-hour training period to instruct District personnel in proper operation of all systems and shall instruct the District technicians how to repair any non-operational parts of the system as required. All defective parts shall be replaced at no cost to the owner.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of existing debris.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.
B. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
C. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
D. Section 31 2200 - Grading: Topsoil removal.
E. Section 31 2200 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.03 PROJECT CONDITIONS

A. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
B. Comply with other requirements specified in Section 01 7000.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Material: As specified in Section 31 2200 - Grading

PART 3 EXECUTION

3.01 SITE CLEARING

A. Comply with other requirements specified in Section 01 7000.
B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 EXISTING UTILITIES AND BUILT ELEMENTS

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
B. Protect existing utilities to remain from damage.
C. Do not disrupt public utilities without permit from authority having jurisdiction.
D. Protect existing structures and other elements that are not to be removed.

3.03 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by new building structure, new paving, new landscaping, and planting beds.
B. Install substantial, highly visible fences at least 3 feet high to prevent inadvertent damage to vegetation to remain:
C. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.
D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
   1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
   2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches or as required by new improvements.
3. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.

E. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

3.04 DEBRIS
A. Remove debris, junk, and trash from site.
B. Leave site in clean condition, ready for subsequent work.
C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Removal of topsoil.
   B. Rough grading the site for building pads.
   C. Finish grading.

1.02 RELATED REQUIREMENTS
   A. Section 31 1000 - Site Clearing.
   B. Section 31 2316.13 - Trenching: Trenching and backfilling for utilities.

1.03 REFERENCES
   B. ASTM D 1557-91 -- Test Methods for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft-lb/ft3 (2,700 kN m/m3)); 1991.
   D. ASTM D 2487-93 -- Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System); 1993.

1.04 SUBMITTALS
   A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.05 QUALITY ASSURANCE
   A. Perform Work in accordance with State of California, Public Works Department standards.
      1. Testing Laboratory Services:
         a. The owner will secure and pay for the services of a geotechnical engineer to reasonably classify existing soil materials, to explore through a subsoil study and recommend the required over-excavations and depth of final bottom of over-excavations, to recommend and to classify proposed borrow materials when necessary, to verify compliance of materials with specified requirements, and to perform required field and laboratory testing and to provide grading and foundation recommendations.

1.06 PROJECT CONDITIONS
   A. Protect above- and below-grade utilities that remain.
   B. Protect plants, lawns, and other features to remain as a portion of final landscaping.
   C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from grading equipment and vehicular traffic.

1.07 SITE CONDITIONS
   A. The owner makes no representation as to the existing soil or sub-surface conditions or its suitability for the proposed/intended use. The Contractor shall take all necessary measures required to verify and substantiate the existing site conditions, and incorporate in his bid the required materials, methods and labor required to provide an acceptable finished product based on the provisions and requirements of this section.
   B. Site Utilities:
1. Advise utility companies of excavation activities before starting excavations. Locate and identify underground utilities passing through work area before starting work.
2. If underground utilities are encountered in locations other than indicated, immediately advise utility owners before proceeding. Amend project record documents to show actual locations.
3. Protect existing utilities indicated to remain.
4. Do not interrupt existing utilities without advance notice to and written approval from the owner.
5. Repair or replace any existing utilities that are damaged due to the work of this contract at no cost to the owner.

PART 2 PRODUCTS

2.01 MATERIALS
A. Where sufficient approved materials are not available from required excavations on site, obtain and pay for materials from approved sources off site without charge to the owner. If import material will be required, contractor shall comply with the environmental requirements of DTSC.
B. For each soil material proposed for use as fill or backfill, whether obtained on or off site, testing laboratory shall classify soil material, develop Proctor curve, and perform any other tests required.
C. Obtain approval of the architect / geotechnical engineer for each soil material.
D. Topsoil: Friable clay loam surface soil.
E. Satisfactory Topsoil: Fertile agricultural soil, typical for locality, capable of sustaining vigorous plant growth; free of subsoil, rocks larger than 2 inches in diameter, clay, toxic matter, plants, weeds, and roots.
F. Backfill and Fill Materials: Materials classified as satisfactory.
G. Satisfactory Fill Material (ASTM D 2487): Clean deposits free of roots, stumps, vegetation, deleterious matter, trash, debris, and unsuitable materials as approved in the field by the project geotechnical consultant and classified as follows:
   1. GW (well-graded gravel).
   2. GP (poorly graded gravel).
   3. GM (silty gravel).
   4. SW (well-graded sand).
   5. SM (silty sand).
H. Unsatisfactory Fill Material (ASTM D 2487):
   1. GC (clayey gravel).
   2. SP (poorly graded sand).
   3. SC (clayey sand).
   4. CL (clean clay).
   5. ML (silt).
   6. OL (organic clay).
   7. OL (organic silt).
   8. CH (fat clay).
   9. MH (elastic silt).
   10. OH (organic clay).
   11. OH (organic silt).
   12. PT (peat).
I. Subbase Materials: Well-graded, clean, sound, durable particles of crushed stone, crushed blast furnace slag, or crushed gravel, and screenings. Obtain the architect's / soil engineer's approval of source, quality, and gradation.
PART 3 EXECUTION

3.01 EXAMINATION
A. Verify that survey bench mark and intended elevations for the Work are as indicated.
B. Verify the absence of standing or ponding water.

3.02 PREPARATION
A. Identify required lines, levels, contours, and datum.
B. Stake and flag locations of known utilities.
C. Protection: Provide markers indicating limits of work and clear identification of items and areas requiring protection.
D. Provide barricades, temporary fences, warning signs, and warning lights around open excavations as necessary to prevent injury to persons.
E. The contractor is solely responsible for determining the potential for injury to persons and damage to property. Any indication of temporary fencing delineated on the drawings is a minimum requirement, and does not relieve the contractor of the responsibility of providing adequate protection of the work.
   1. Where such potential is present, take appropriate protective measures.
   2. Protect persons from injury and protect existing and new improvements from damage caused directly or indirectly by construction operations.
F. Do not allow excavation subgrades and soil at foundations to be subjected to effects of rain or other sources of excessive moisture. Provide protective covering materials and divert site drainage and run off as necessary. Should prepared, compacted subgrades be damaged by rain or excessive moisture, remove soil materials to the depth required by the Soils Engineer and replace with acceptable materials and recompact in conformance with specified requirements.
G. Locate, identify, and protect from damage above- and below-grade utilities to remain.
H. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.
I. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.
J. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

3.03 EROSION CONTROL
A. To the maximum extent practicable, prevent erosion or displacement of soils and discharge of soil-bearing water runoff to adjacent properties and waterways.

3.04 COMPLIANCE WITH STATE STORM WATER PERMIT FOR CONSTRUCTION
A. Contractor shall be required to comply with all conditions of the State Water Resources Control Board (State Water Board) National Pollutant Discharge Elimination System General Permit for Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity (the "Permit") for all construction activity which results in the disturbance of in excess of five acres of total land area or which is part of a larger common area development or sale. It shall be the Contractor's responsibility to evaluate cost of compliance with the Storm Water Pollution Prevention Program (SWPPP) in bidding on this contract. Contractor shall comply with all requirements of the State Water Resources Control Board. Contractor shall include all costs of compliance with specified requirements in the contract amount.
B. Contractor shall be responsible for implementing and complying with the provisions of the Permit and the SWPPP, including the standard provisions, monitoring and reporting.
requirements as required by Permit. Contractor shall provide copies of all reports and monitoring information to the Owner.

C. Contractor shall comply with the lawful requirements of any applicable municipality, the County, drainage district, and other local agencies regarding discharges of storm water to separate storm drain system or other watercourses under their jurisdiction, including applicable requirements in municipal storm water management programs.

D. Failure to comply with the Permit is in violation of federal and state law. Contractor hereby agrees to indemnify and hold harmless the Owner, its officers, agents, and employees from and against any and all claims, demands, losses or liabilities of any kind or nature which Owner, its officers, agents, and employees may sustain or incur for noncompliance with Permit arising out of or in connection with the project, except for liability resulting from the negligence or willful misconduct of Owner, its officers, agents or employees. Owner may seek damages from Contractor for delay in completing the contract in accordance with Article 6 of the General Conditions, caused by the Contractor's failure to comply with Permit.

3.05 PROTECTION OF TREES

A. Provide temporary guards to protect trees and vegetation to remain. Place guards so as to prevent all forms of vehicular traffic or parking within drip lines.
   1. Do not allow excess foot traffic within drip lines.
   2. Do not stockpile construction materials, soil, or aggregates within drip lines.
   3. Water trees and other vegetation to remain within limits of the area of construction activities as required to maintain their health during course of construction operations.

B. Engage a qualified arborist to remove branches or roots to the extent required by this specification or shown on the drawings.

C. Excavate within drip line of trees only where indicated.

D. Where underground utilities must pass within drip line, hand-dig tunnels to avoid cutting main lateral roots and taproots. Minor roots may be cut only when necessary.
   1. Where root system is damaged or cut back, prune branches to maintain root/branch balance.

E. Immediately protect exposed roots until re-establishment in backfill. Cover with approved mulching material and keep continuously moist.

F. Where cutting is required, cut branches and roots using properly sharpened tools and without breaking members.

G. Promptly repair any damaged trees to prevent death or loss of vigor.
   1. Where the contractor's operations result in dead or severely damaged trees, remove trees and provide new trees of similar size, except provide 6 inch-caliper trees to replace existing trees over 6 inches caliper.
      a. Species as selected by the architect.

3.06 DEWATERING

A. Do not allow surface or ground water to flow into or accumulate in excavations.

B. Do not allow water to flow in an uncontrolled fashion across the project site or to erode slopes or to undermine foundations. Do not allow water to be diverted onto adjacent properties. Arrange excavation operations so as to provide continual and effective drainage of excavations.

C. Provide and maintain temporary diversion ditches, dikes, and grading as necessary; do not use trench excavations for this purpose. When required by surface or subsurface water conditions, provide sumps, wellpoints, French drains, pumps, and other control measures necessary to keep excavations free of water. When existence of ground water near or above final excavation level is indicated or suspected, provide control measures prior to excavating to lower water level and maintain water level continuously below working level.
3.07 EXCAVATIONS
A. General: Excavation includes the removal of any and all materials necessary to achieve the required subgrade elevations and includes any required over-excavation necessary to achieve the required sub-grade compaction, and the reuse or disposal of such materials.
B. Unnecessary Excavation: The expense of excavation of materials outside of limits indicated or ordered in writing by the architect and the correction thereof to the satisfaction of the architect shall be borne by the contractor.
   1. Unnecessary excavation other than under footings: Either place compacted fill or otherwise correct conditions, as required by the Soils Engineer.
C. Excavation for Structures:
   1. Excavate beyond footings and foundations so as to allow proper construction and inspection of concrete formwork and other materials. Excavate to the required elevation.
      a. Tolerance: Plus or minus 0.10 foot.

3.08 STORAGE
A. Stockpile materials to be used for filling and backfilling, including excavated materials classified as satisfactory soil materials, at locations indicated or as directed. Stockpile in a manner to freely drain surface water; cover if necessary to prevent wind-blown dust.
   1. Store soil materials without intermixing. Protect from contamination with other soils or debris.
   2. Do not stockpile materials inside of drip line of trees to remain.

3.09 FILLING AND BACKFILLING
A. Preparation: Backfill excavations as soon as practicable. Complete the following operations before backfilling:
   1. Inspection and acceptance of below-grade construction.
   2. Inspection, testing, and approval of underground utilities.
   3. Surveying of underground utilities for record documents.
   4. Concrete formwork removal.
   5. Removal of loose material, muck, debris, and trash from excavation.
   6. Installation of temporary or permanent horizontal bracing for structures to receive backfill.
B. Installation: Place approved soil materials in 6 to 8 inch maximum layers to required elevations. Compact to minimum 90% of the corresponding maximum density (ASTM D 1557).
   1. Do not place material on muddy or uncompacted surfaces.
C. Installation: Place fill materials to required elevations in lifts of required depth. Provide fill materials beneath each area as indicated.
   2. Paved areas: Subbase material.
   3. Exterior steps/ramps: Subbase material.
   4. Building slabs: Capillary water barrier material.
   5. Piping/conduit: Subbase material where indicated; otherwise use satisfactory soil materials.

3.10 COMPACTION
A. Place materials used in backfilling and filling in layers not exceeding loose depths as follows:
   1. Heavy equipment compaction: 8 inches.
B. Place material simultaneously on opposite sides of walls, small structures, utility lines, etc. to avoid displacement or overstressing.
C. In-Place Density Requirements: Compact soil to not less than the values given below, expressed as a percentage of maximum density at optimum moisture content.
   1. Unpaved areas: Top 12 inches of bottom of over-excavation and subsequent lifts:
      a. 90 percent.
2. Paved areas: Top 12 inches of bottom of over-excavations and subsequent lifts, except the upper one foot from rough finish grade:
   a. 90 percent.
   b. 90 percent within upper one foot below base coarse.
3. Exterior steps and ramps: Top 12 inches of bottom of over-excavation and subsequent lifts:
   a. 90 percent.
4. Building areas and structures: Top 12 inches of bottom of over-excavation and subsequent lifts:
   a. 90 percent.
5. Utility trenches: Compact backfill and fill materials to in-place density specified for applicable area of trench, but in no case less than 90 percent.

D. Moisture Control: During compaction, control moisture of bottom of over-excavations and subsequent lifts to within tolerances from optimum moisture content as recommended by testing laboratory. Wet surface with water when additional moisture is required. Aerate soil to aid in drying or replace soil when excessive moisture is present.

3.11 ROUGH GRADING
A. General: Smooth grade to a uniform surface that complies with compaction requirements and required lines, grades, and cross sections and is free from irregular surface changes.
B. Provide smooth transition between existing adjacent grades and changed grades. Cut out soft spots, fill low spots, and cut down high spots to conform to required surfaces tolerances.
C. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
D. Do not remove topsoil when wet.
E. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
F. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
G. When excavating through roots, perform work by hand and cut roots with sharp axe.
H. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.
I. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.
J. Slope grades to direct water away from structures and to prevent ponding. Finish subgrade to required elevations within the following tolerance:
   1. Unpaved areas: Plus or minus 0.10 foot.
   2. Paved areas: Plus or minus 0.05 foot.
   3. Exterior steps and ramps: Plus or minus 0.05 foot.
   4. Inside building lines: 1/2 inch in 10 horizontal feet.

3.12 FINISH GRADING
A. Before Finish Grading:
   1. Trench backfilling has been inspected.
   2. Verify subgrade has been contoured and compacted.
B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.
C. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.
D. Place topsoil in areas indicated.
E. Place topsoil during dry weather.
F. Remove roots, weeds, rocks, and foreign material while spreading.
G. Near plants spread topsoil manually to prevent damage.
H. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
I. Lightly compact placed topsoil.
J. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

3.13 TOLERANCES
A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.
B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch).

3.14 REPAIR AND RESTORATION
A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.
B. Trees to Remain: If damaged due to this work, trim broken branches and repair bark wounds; if root damage has occurred, obtain instructions from Architect as to remedy.
C. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.15 FIELD QUALITY CONTROL
A. Testing Laboratory Services: Provide timely notice to testing laboratory. Do not proceed with construction until testing of each bottom of over excavation and lift of fill or backfill has been performed and required inspections and approvals have been obtained.
B. Maximum Density at Optimum Moisture Content: Determine in accordance with ASTM D 1557-91.
C. In-Place Density Tests: ASTM D 1557-90 (sand cone method), ASTM D 2167 (rubber balloon method), or ASTM D 2922 (nuclear method), as applicable.
D. If testing service reports indicate that subgrade or fills are below specified density, scarify or remove and replace to the required depth, recompact, and retest at no cost to the owner.

3.16 MAINTENANCE
A. Completed Areas: Protect from damage by pedestrian or vehicular traffic, freezing, erosion, and contamination with foreign materials.
   1. Repair and re-establish grades to specified tolerances in settled, eroded, or rutted areas.
B. Damaged Areas: Where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction and whether due to subsequent construction operations or weather conditions, restore materials to required conditions: Scarify or remove and replace to the required depth, return to optimum moisture content, and compact materials to the required density before continuing construction.
C. Correction: Should settling occur within the project correction period, remove finished surfacing, add additional approved material, compact material, and reconstruct surfacing. Construct surfacing to match and blend in with adjacent surfacing as nearly as practicable.

3.17 CLEANING
A. Stockpile any excess satisfactory topsoil in locations on site as directed by the architect. Properly dispose of unsatisfactory topsoil off site.
B. Remove any unsatisfactory soil, trash, debris, and other materials not required for use on the project and legally dispose of it off the owner's property.
C. On-site burning is not permitted.
D. Remove unused stockpiled topsoil. Grade stockpile area to prevent standing water.
E. Leave site clean and raked, ready to receive landscaping.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Excavating for paving and site structures.

1.02 RELATED REQUIREMENTS
A. Section 01 7000 - Execution and Closeout Requirements: General requirements for dewatering of excavations and water control.
B. Section 31 2200 - Grading: Grading.

1.03 PROJECT CONDITIONS
A. Verify that survey bench mark and intended elevations for the Work are as indicated.
B. Protect plants, lawns, rock outcroppings, and other features to remain.
C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 3 EXECUTION

2.01 EXAMINATION
A. Verify that survey bench mark and intended elevations for the work are as indicated.

2.02 PREPARATION
A. Identify required lines, levels, contours, and datum locations.
B. See Section 31 2200 for additional requirements.
C. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Architect.

2.03 EXCAVATING
A. Underpin adjacent structures that could be damaged by excavating work.
B. Excavate to accommodate new structures and construction operations.
C. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
D. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
E. Do not interfere with 45 degree bearing splay of foundations.
F. Cut utility trenches wide enough to allow inspection of installed utilities.
G. Hand trim excavations. Remove loose matter.
H. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 2323.
I. Grade top perimeter of excavation to prevent surface water from draining into excavation.
J. Remove excavated material that is unsuitable for re-use from site.
K. Remove excess excavated material from site.

2.04 FIELD QUALITY CONTROL
A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
B. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

2.05 PROTECTION
A. Divert surface flow from rains or water discharges from the excavation.
B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Keep excavations free of standing water and completely free of water during concrete placement.

END OF SECTION
PART 1  GENERAL

1.01  SECTION INCLUDES
   A. Backfilling and compacting for utilities outside the building.

1.02  REFERENCES
   B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)); 2012.
   D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN m/m^3)); 2012.
   F. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

1.03  DEFINITIONS
   A. Finish Grade Elevations: Indicated on drawings.
   B. Subgrade Elevations: 30 inches below finish grade elevations indicated on drawings to the top of the electrical ductbank, unless otherwise indicated.

1.04  SUBMITTALS
   A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   B. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
   C. Compaction Density Test Reports.

1.05  DELIVERY, STORAGE, AND HANDLING
   A. When necessary, store materials on site in advance of need.
   B. Verify that survey bench marks and intended elevations for the Work are as indicated.
   C. Protect plants, lawns, rock outcroppings, and other features to remain.
   D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2  PRODUCTS

2.01  FILL MATERIALS
   A. General Fill: Conforming to State of California Public Works Department standard.

2.02  PLASTIC WARNING TAPE
   A. Acid and alkali-resistant polyethylene film specifically manufactured for marking and identifying underground utilities.
      1. Minimum width, 6 inches; minimum thickness, 4 mils.
      2. Metallic core encased in protective jacket resistant to corrosion and detectable by metal detector when tape is buried 3-feet deep.
B. Continuous printed inscription shall describe utility. Tape color:
1. Electric: Red.
2. Gas: Yellow.
3. Telephone: Orange.
4. CATV: Orange.

2.03 SOURCE QUALITY CONTROL
A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.
B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
C. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION
3.01 EXAMINATION
A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 PREPARATION
A. Identify required lines, levels, contours, and datum locations.
B. See Section 31 2200 for additional requirements.
C. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Architect.

3.03 TRENCHING
A. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
C. Do not interfere with 45 degree bearing splay of foundations.
D. Cut trenches wide enough to allow inspection of installed utilities.
E. Hand trim excavations. Remove loose matter.
F. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
G. Remove excavated material that is unsuitable for re-use from site.
H. Remove excess excavated material from site.
I. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.
J. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect.

3.04 PREPARATION FOR UTILITY PLACEMENT
A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.05 BACKFILLING
A. Backfill and compact in 8” maximum lifts to contours and elevations indicated using specified materials.
B. Fill up to subgrade elevations unless otherwise indicated.
C. Employ a placement method that does not disturb or damage other work.
D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
E. Maintain optimum moisture content of fill materials to attain required compaction density.
F. Correct areas that are over-excavated.
   1. Thrust bearing surfaces: Fill with concrete.
   2. Other areas: Use general fill, flush to required elevation, compacted to minimum 90 percent of maximum dry density.
G. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under paving and similar construction: 90 percent of maximum dry density.

3.06 BEDDING AND FILL AT SPECIFIC LOCATIONS
A. Utility Piping and Conduits:
   1. Bedding: Use Fill Type sand, gravel, crushed aggregate, or native free draining granual material having sand equivalent of not less than 50 and expansion coefficient of not more than .5 of 1%.
   2. Cover with general fill.
   3. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.

3.07 TOLERANCES
A. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.
B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.

3.08 FIELD QUALITY CONTROL
A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.
B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor"), ASTM D 1557 ("modified Proctor"), or AASHTO T 180.
C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.09 CLEANING
A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Asphalt Concrete Paving.
   B. Pavement-marking paint.
   C. Surface sealer.

1.02 REFERENCE STANDARDS
   A. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types; 1997.
   D. Standard Specifications, State of California, Department of Transportation (Caltrans).

1.03 SUBMITTALS
   A. Mix Design:
      1. Submit for approval each job-mix formula proposed for work of this section.
   B. Approved Mix:
      1. Furnish licensed weighmaster certificates with each load of asphalt concrete delivered to
         project. Yield of asphalt concrete material shall be twenty four (24) pounds per square foot
         of paving area based on two inch thickness after rolling. A five (5) percent tolerance will
         be allowed between total calculated weight and actual weight incorporated in the work.

1.04 QUALITY ASSURANCE
   A. Perform Work in accordance with State of California Public Work's standard.
      1. Provide aggregate base asphalt concrete and installation complying with Standard
         Specifications for Public Works Construction (PWC Specifications), current edition, and
         the Regional Supplement Amendments to the Standard Specifications for Public Works
         Construction, current edition, and as herein specified.
   C. Obtain materials from same source throughout.
   D. Installer's Qualifications: Firm specializing in paving installation, with not less than 5 years of
      experience in installation of paving similar to that required for this project.
   E. Testing and Inspection:
      1. The owner will engage an independent testing and inspection agency to perform quality
         control procedures and to prepare test reports.

1.05 REGULATORY REQUIREMENTS
   A. Conform to applicable code for paving work on public property.

1.06 FIELD CONDITIONS
   A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F,
      or surface is wet or frozen.
   B. Place bitumen mixture when temperature is not more than 15 F degrees below bitumen
      supplier's bill of lading and not more than maximum specified temperature.

PART 2 PRODUCTS

2.01 MATERIALS
   A. Aggregate for Base Course: Angular crushed washed stone; free of shale, clay, friable material
      and debris.
   B. Aggregate for Binder Course: In accordance with State of California Public Work's standards.
C. Aggregate for Wearing Course: In accordance with State of California Public Work's standards.
D. Fine Aggregate: In accordance with State of California Public Work's standards.
E. Mineral Filler: Finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter.
F. Seal Coat:
   2. Playground areas and adjacent access drives, walks and ramp transitions: Seal coat shall be "Plush-Tex", as manufactured by Koch Asphalt Co., or an approved equal.
G. Pavement-Marking Paint: Chlorinated rubber-alkyd paint (FS TT-P-115, Type III); factory-mixed, quick-drying, and non-bleeding.
H. Wood Headers, Stakes, Benders and Splices: "Foundation" grade redwood as graded by Redwood Inspection Service. Minimum 2" thick lumber for headers and stakes and minimum 1" thick boards for splices. Use galvanized nails for fastening.

2.02 ASPHALT PAVING MIXES AND MIX DESIGN
A. Base Course: 3.0 to 6 percent of asphalt cement by weight in mixture in accordance with AI MS-2.
C. Wearing Course: 5 to 7 percent of asphalt cement by weight in mixture in accordance with AI MS-2.
D. Submit proposed mix design of each class of mix for review prior to beginning of work.
E. Asphalt Concrete:
   1. Top course in playground areas: PWC Specifications, Section 203-6, Class E-PG 64-10. Rolled thickness shall be 1".
   2. Parking areas, driveways and first course of playground areas: PWC Specifications, Section 203-6, Class C1-PG 64-10. Rolled thickness in parking areas and driveway shall be as shown on the plans. Rolled thickness of first course in playground areas shall be specified thickness as shown on plans minus the 1" top course.

2.03 SOURCE QUALITY CONTROL
A. Test mix design and samples in accordance with AI MS-2.

PART 3 EXECUTION
3.01 GENERAL
A. Comply with cross sections, elevations, and grades indicated on the drawings.
B. Prepare and install pavement structures in accordance with practices recommended in the "Asphalt Paving Manual"; Publication MS-8; Asphalt Institute, except to the extent that such practices are superseded by specific requirements of this section.

3.02 EXAMINATION
A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
B. Verify gradients and elevations of base are correct.
C. Notify architect in writing of any unsatisfactory conditions. Do not begin paving installation until these conditions have been satisfactorily corrected.
D. Commencement of paving work shall constitute acceptance of subbase conditions.

3.03 PREPARATION
A. General: Immediately before placing asphalt concrete mix, remove all loose or deleterious material from surface over which pavement will be placed. Ensure that subbase is properly prepared to receive paving.
   1. Aggregate subbase:
a. Sweep loose granular particles from surface of aggregate course. Do not dislodge or disturb in any way the aggregate embedded in compacted surface of subbase course.

b. Proof roll prepared sub-base surface to check for unstable areas and areas requiring additional compaction. Repair these areas as required. Do not begin paving work until deficient sub-base areas have been corrected and are ready to receive paving.

3.04 INSTALLATION

A. Techniques:

1. Placing the mix:
   a. Spread mix at minimum temperature of 225 degrees F.
   b. Place asphalt concrete mix on prepared surface and strike off. Place inaccessible and small areas using hand tools.
      1) Check mat frequently during placement, to verify correct thickness.
   c. Before rolling operations begin, check surface using template and straightedge, and correct irregularities.
   d. Width of paving strips:
      1) Place mix in paving strips at least 10 feet wide.
      2) Roll first paving strip after placement. Place subsequent paving strips, extending rolling operation to overlap preceding strips.
   e. Coursing requirements:
      1) Lifts:
         a. Base Course:
            1) Place plant-mixed asphalt concrete base course in single lift.
            2) Compact to 95 percent.
            3) Moisture Content: Use only the amount of moisture needed to achieve the specified compaction.
   
2. Joints:
   a. General: Construct joints to form continuous bond between adjoining portions of work. Ensure that texture and density of pavement are continuous across the joint. Surface across joint shall form smooth, uninterrupted plane and shall not pond water.
   b. Joint locations include the following:
      1) Between pavements laid on successive days.
      2) At any point in paving where material already laid has become cold because of delay.
   c. Clean by brushing, or cut fresh vertical face using power saw if necessary, wherever contact surface of previously constructed pavement has become coated by dust, sand, or other objectionable material.
   d. Apply thin tack coat on vertical contact surface before beginning placement of new material.

3. Rolling:
   a. Start rolling operation as soon as hot mix will bear weight of roller and can be compacted without unacceptable displacement of material.
   b. Comply with roller manufacturer's recommended rolling speed, but in no case exceed 3 miles per hour.
   c. Avoid sharp turns and abrupt starts and stops.
   d. Compact mixture in areas inaccessible to rollers using hot hand tampers or vibrating plate compactors.
   e. Breakdown rolling:
      1) If grade is not absolutely level, begin breakdown rolling on low side of spread. Progress toward high side.
      2) Execute initial breakdown pass with drive wheel forward toward the direction of paving.
      3) Examine surface immediately after breakdown rolling. Repair as necessary by loosening material in defective areas and filling with hot material.
   f. Second (intermediate) rolling:
1) Execute second rolling as soon as possible after breakdown rolling, while mixture is still hot enough to achieve maximum density.
2) Continue repeating the pattern until mixture has been compacted thoroughly.

g. Finish rolling:
1) Execute finish rolling while mixture is sufficiently warm to allow removal of roller marks.
2) Continue rolling operation until maximum density is achieved and roller marks are entirely eradicated.

4. Seal Coat:
a. Parking Areas, Driveways, Walkways and Ramps: Dilute the asphalt emulsion with water at the rate of 1 part emulsion to 1 part water and apply at a rate of 0.1 gallons (of diluted material) per square yard. Emulsion shall be applied uniformly over entire area, and extreme care must be exercised so there will be no spots with excess material which would remain tacky.

b. Playground Areas:
1) Prior to application of Plush-Tex, the asphalt concrete pavement surface shall be clean and free of all dust, dirt, debris and foreign matter. The pavement surface can be cleaned by use of power vacuums, compressed air and/or washing with water. If washed with water, allow surface of pavement to dry prior to application.
2) Minor depressions and "bird baths" shall be located and leveled prior to application of seal coat. Locate minor depressions and "bird baths" which need to be filled by flooding area with water. All depressions of more than 1/8" under a 10 foot straight edge and all damaged areas such as foot prints, animal tracks or tire tracks are to be filled.
   (a) Depressions of 1/4" or less shall be filled with undiluted Plush-Tex and struck off with a straight edge. Care should be taken to blend the outside edge of the area leveled into the existing pavement surface so as not to create an unsightly ridge or shadow.
   (b) Depressions greater than 1/4" in depth may be filled with a mixture of one-part Plush-Tex to one-part clean sand by volume. For depressions greater than 1/4" in depth, the leveling may have to be done in multiple applications. After the area leveled has cured dry, it shall be rolled with a mechanical roller.

3) Application: (Minimum of two.)
   (a) Plush-Tex should be mixed thoroughly to an even consistency prior to application. Plush-Tex may be diluted up to 20 percent by volume with clean fresh water. Care should be taken to thoroughly mix the water with Plush-Tex so that the material is of an even consistency.
   (b) Apply Plush-Tex to the surface by pouring from a can or wheeled container in continuous parallel lines and spreading immediately with rubber faced squeegees or with long-handled hair brooms. Pull the squeegee or broom on an angle from the line of spread so as to continually roll the material toward the operator and not overflow or "spill" on its forward edge away from the operator. After each coat has dried, remove any ridges or shadows with scrapers.
   (c) Plush-Tex shall be applied in two or more applications. A minimum total of undiluted Plush-Tex for two applications should be 0.54 gallons per square yard. The controlling factor, however, shall not be the number of applications nor the quantity of Plush-Tex, but shall be the following specified result:
      (1) After the final coat of Plush-Tex has been applied and allowed to dry thoroughly, its surface shall be smooth and uniform, showing no evidence of course or uneven texture.
      (2) The completed surface shall not vary more than 1/8" from a 10-foot straight edge.
5. Patching:
   a. Remove paved areas which are contaminated with foreign materials or which are
defective in any way. Replace removed material with fresh, hot mix. Compact by
rolling until maximum density and smoothness are achieved and there is no
detectable variation between patch and adjacent paving.
   b. Patch or re-pave area as required as a result of reconstruction or adjusting manholes,
cleanouts, vaults, grates, etc. to proper grade.

6. Restriction of traffic:
   a. Upon completion of rolling operations, do not permit vehicular traffic on pavement
   until it has cooled and hardened sufficiently.
   b. Erect clearly-visible barricades and take other measures as required to protect
   pavement.

7. Wood Headers:
   a. Install along all edges of asphalt concrete paving except where concrete paving,
walks and curbs occur. Set top edge of header to conform to grade of asphalt paving.
   Benders of lesser thickness may be used to form returns.
   b. Space stakes not exceed 4' on centers, unless otherwise noted. Drive stakes to a
depth of 1" below the top of the header and nail to headers.
   c. Splice joints between individual header boards with a 1" thick board same height as
header and not less than 24" long.

B. Interface with Other Products:
   1. Pavement marking:
      a. Do not begin application of pavement-marking paint until architect has approved
marking placement.
         1) Verify proper placement of each color of marking paint.
      b. Sweep and clean pavement surface thoroughly, immediately before application of
marking paint. Pavement shall be dry and in proper condition to receive paint.
      c. Use mechanical paint applicator to create pavement marks with consistently even
edges. Apply 2 coats at paint manufacturer's recommended spreading rates.

2. Installation Tolerances:
   a. Maximum allowable variance of in-place compacted thickness from design thickness
   -- base course: Plus 1/2 inch, minus zero inches.
   b. Maximum allowable variance of surface smoothness - base course: Plus or minus
   1/4 inch.
      1) Use 10-foot straightedge moved systematically over entire paved area to
determine compliance with surface smoothness tolerance indicated.
   c. In-place density: Pavement shall be compacted to at least 96 percent of density
obtained by laboratory compaction.

3.05 FIELD QUALITY CONTROL
   A. See Section 01 4000 - Quality Requirements, for general requirements for quality control.
   B. General: Test in-place asphalt concrete courses for compliance with requirements for
thickness, surface smoothness and density. Repair or remove and replace unacceptable
paving as directed by Architect.
   C. Thickness: In-place compacted thickness will not be acceptable if exceeding following
allowable variation from required thickness.
      1. Base Course: Specified thickness minus 1/2".
      2. Surface Course: Specified thickness plus or minus 1/4".
   D. Surface Smoothness: Test unfinished surface of each asphalt concrete course for smoothness,
using 10' straight edge applied parallel with, and at right angles to centerline of paved area.
   Surface will not be acceptable if exceeding the following tolerances for smoothness.
      1. Base Course Surface: 1/4".
      2. Wearing Course Surface: 1/8".
E. Flood Test: Prior to application of seal coats, perform a flood test in the presence of the Owner's representative.
   1. Method:
      a. Flood the entire asphalt concrete paved areas with water by use of a tank truck or hoses.
      b. If a depression occurs, where water ponds to a depth of more than 1/8", fill or otherwise correct to provide proper drainage.
      c. Feather and smooth the edges of fill so that the joint between fill and original surface is invisible.

F. Densities:
   1. Density of the asphalt concrete after rolling shall be 95 percent of the density obtained with the California Kneading Compactor per California Test 304.
      a. Density of the aggregate base course shall be 95 percent of maximum relative density.

G. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.

3.06 PROTECTION
   A. Immediately after placement, protect pavement from mechanical injury for 7 days or until surface temperature is less than 140 degrees F.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES
A. Concrete walks.

1.02 REFERENCE STANDARDS
A. 2016 California Building Code, Chapter 19A.
C. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
E. ACI 305R - Hot Weather Concreting; 2010.
F. ACI 306R - Cold Weather Concreting; 2010.
N. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

1.03 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Design Data: Indicate mix design.

1.04 QUALITY ASSURANCE
A. Perform work in accordance with ACI 301.
B. Obtain cementitious materials from same source throughout.
C. Follow recommendations of ACI 305R when concreting during hot weather.
D. Follow recommendations of ACI 306R when concreting during cold weather.

1.05 ENVIRONMENTAL REQUIREMENTS
A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.
PART 2 PRODUCTS

2.01 FORM MATERIALS
   A. Wood form material, profiled to suit conditions.
   B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D 1751) or sponge rubber or cork (ASTM D 1752).
      1. Thickness: 1/2 inch.

2.02 REINFORCEMENT
   A. Reinforcing Steel: ASTM A615/A615M Grade 40 (280); deformed billet steel bars; unfinished finish.
   B. Steel Welded Wire Reinforcement: Plain type, ASTM A 185/A 185M; in flat sheets; unfinished.
   C. Dowels: ASTM A615/A615M Grade 40 (280); deformed billet steel bars; unfinished finish.

2.03 CONCRETE MATERIALS
   A. Obtain cementitious materials from same source throughout.
   B. Cement: ASTM C150 Sulfate Resistant - Type V portland type, grey color.
   C. Fine and Coarse Mix Aggregates: ASTM C33.
   D. Fly Ash: ASTM C618, Class C or F.
   E. Water: Clean, and not detrimental to concrete.

2.04 ACCESSORIES
   A. Curing Compound: ASTM C 309, Type 1, Class A.
   B. Joint Sealer: Type as specified in Section 07900.

2.05 CONCRETE MIX DESIGN
   A. Proportioning Normal Weight Concrete: Comply with the 2016 California Building Code, Chapter 19A.
   B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
   C. Concrete Properties:
      1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,000 psi. minimum or as noted on the drawings.
      2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
      3. Minimum cement content per cubic yard: 6.5 sacks.
      5. Total Air Content: 4 percent, determined in accordance with ASTM C173/C173M.
      6. Maximum Slump: 3 inches.
      7. Maximum Aggregate Size: 1 inch.

2.06 MIXING
   A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
   B. Verify gradients and elevations of base are correct.

3.02 SUBBASE
   A. Prepare subbase in accordance with State of California Public Works standards.

3.03 PREPARATION
   A. Moisten base to minimize absorption of water from fresh concrete.
3.04 FORMING
A. Place and secure forms to correct location, dimension, profile, and gradient.
B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.05 REINFORCEMENT
A. Place reinforcement at midheight of slabs-on-grade.
B. Interrupt reinforcement at contraction joints.
C. Place dowels to achieve pavement and curb alignment as detailed.

3.06 PLACING CONCRETE
A. Place concrete in accordance with ACI 304R.
B. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.
C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
D. Apply surface retarder to all exposed surfaces in accordance with manufacturer's instructions.

3.07 JOINTS
A. Align curb, gutter, and sidewalk joints.
B. Place 1/2 inch wide expansion joints at 20 foot intervals and to separate paving from vertical surfaces and other components and in pattern indicated.
   1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.
   2. Secure to resist movement by wet concrete.
C. Provide scored joints:
   1. At 5 feet intervals, or as indicated on the drawings.
   2. Between sidewalks and curbs.
   3. Between curbs and pavement.

3.08 FINISHING
A. Sidewalk Paving: (Surfaces less than 6% slope): medium broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.
B. Sidewalk / Ramp Paving: (Surfaces greater than 6% slope): heavy broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.
C. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.09 JOINT SEALING
A. See Section 07 9005 for joint sealer requirements.

3.10 TOLERANCES
A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
B. Maximum Variation From True Position: 1/4 inch.

3.11 FIELD QUALITY CONTROL
A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000.
   1. Provide free access to concrete operations at project site and cooperate with appointed firm.
   2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

B. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.12 CONCRETE CURING

A. Comply with requirements of ACI 308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Moist cure and maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
   1. Normal concrete: Not less than 5 days.

C. Surfaces Not in Contact with Forms:
   1. Start initial curing as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   2. Begin final curing after initial curing but before surface is dry.
      a. Curing compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.13 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

END OF SECTION
PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fence framework, fabric, and accessories.
B. Excavation for post bases; concrete foundation for posts and center drop for gates.
C. Manual gates and related hardware.

1.02 REFERENCE STANDARDS

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Chain Link Fences:
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

C. Concrete: Ready-mixed, complying with ASTM C 94/C 94M; normal Portland cement; 2,500 psi strength at 28 days, 3 inch slump; 3/4 inch nominal size aggregate.
D. Provide black vinyl coated fence where noted on the drawings.
2.03 COMPONENTS

A. Line Posts:
   1. 1.90" O.D. (1-1/2 NPS) for fences less than 72 inches in height.
   2. 2.375" O.D. (2 NPS) for fences 72 inches and higher.

B. Corner and Terminal Posts:
   1. 2.375" O.D. (2 NPS) for fences less than 72 inches in height.
   2. 2.875" O.D. (2-1/2 NPS) for fences 72 inches and higher.

C. Gate Posts:
   1. Up to 6'-0" Leaf Width: 2.875" O.D. (2-1/2 NPS); 5.79 lbs./ft.
   2. Over 6'-0" to 13'-0" Leaf Width: 4.0" O.D. (3-1/2 NPS); 9.11 lbs./ft.
   3. Over 13'-0" to 18'-0" Leaf Width: 6.625" O.D. (6 NPS); 18.97 lbs./ft.

D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.

E. Fabric: 2 inch diamond mesh interwoven wire, 9 gage thick, top and bottom selvage knuckle / knuckle.

F. Tension Wire: 6 gage thick steel, single strand.

G. Tie Wire: Aluminum alloy steel wire.

2.04 ACCESSORIES

A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

C. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; fork latch with gravity drop and padlock hasp; keeper to hold gate in fully open position.

D. Gates at Path of Travel:
   1. Gates at path of travel must comply with exit door requirements (Section 1008 C.B.C.). All gates in path of egress to a public way or to a safe dispersal area shall have panic hardware per C.B.C. 1008.1.9 and 1008.2. See details on drawings.
   2. Gates at path of travel shall be provided with hardware that does not require pinching, grasping, or twisting motion to operate and shall be provided with a solid kick plate 10" minimum high 3" maximum from the paving on both sides of the gate.

2.05 FINISHES

A. Components (Other than Fabric): Galvanized in accordance with ASTM A123/A123M, at 1.7 oz/sq ft.

B. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.

C. Accessories: Same finish as framing.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that line of fence has been properly identified.

B. Verify that proper grade has been established.

C. Verify location of underground utilities and structures.

D. Begin fence construction only after adequate clearance on both sides of fence is available.

3.02 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with ASTM F 567.

B. Place fabric on outside of posts and rails.

C. Set intermediate posts plumb, in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.

D. Line Post Footing Depth Below Finish Grade: ASTM F 567.
E. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F 567.
F. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.
G. Provide top rail through line post tops and splice with 6 inch long rail sleeves.
H. Install center brace rail on corner gate leaves.
I. Do not stretch fabric until concrete foundation has cured 28 days.
J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
K. Position bottom of fabric 2 inches above finished grade.
L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
N. Gates at Path of Travel:
   1. Gates across an exit to a public way or to a safe dispersal area shall have panic hardware.
   2. Gates at path of travel must comply with exit door requirements (CBC Section 1008)

3.03 TOLERANCES
A. Maximum Variation From Plumb: 1/4 inch.
B. Maximum Offset From True Position: 1 inch.
C. Components shall not infringe adjacent property lines.

END OF SECTION