Skyline College Athletic Team Rooms

PROJECT SPECIFICATIONS

Bid Submittal

June 25, 2015

PREPARED BY:

Verde Design
Project No. 1312600

DOCUMENT 00 01 07
SIGNATURE PAGE

Structural Engineer: ZFA Structural Engineers
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San Francisco, CA 94104

Signature 6/12/15 Date Seal

Electrical Engineer:

Signature 6/17/15 Date Seal

Mechanical Engineer:

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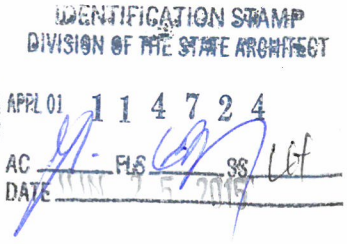

Signature 6/16/15 Date Seal


REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA
MECHANICAL

Skyline College Athletic Team Room

PROJECT SPECIFICATIONS
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SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. Abbreviated Written Summary / Scope of work: Briefly and without force and effect upon the Contract Documents, the work of the Contract can be summarized to include as follows:
   1. Modular Team Room Building
   2. Utilities and Infrastructure

B. Related sections:
   1. All pertinent sections of the specifications

1.02 REFERENCES AND REGULATORY REQUIREMENTS

A. Refer to Section 01 42 00 - References.

1.03 PROJECT LOCATION

Skyline College
3300 College Drive
San Bruno, CA 94066

1.04 CONTRACT DOCUMENTS

A. The general nature and extent of the work and the appurtenant facilities are shown on the Drawings under the title: Skyline College Athletic Team Room

B. Perform work within the Limit of Work line indicated on the Drawings and per the discretion of the District.

1.05 DRAWINGS

A. Drawings such as irrigation plans, utility plans, etc., are essentially diagrammatic. Actual runs indicated on the Drawings shall be followed as closely as coordination with the work of other trades will permit. The exact routing of such improvements and locations of equipment shall be governed by site conditions, obstructions, and locations of other utilities as acceptable to the District.

B. In the event that discrepancies arise over dimensions, product references, omissions, or written statements, these conflicts shall be immediately brought to the District's attention by the contractor. If available, this may be accomplished with the use of a "Request for Information" (RFI) form. While awaiting direction or clarification from the District, the contractor shall re-direct work as necessary so as not to cause delay to the project.

C. If discrepancies arise between plans, details, or specifications, the order of descending precedence shall be: 1.) Specifications 2.) Details 3.) Plans (ex. Details have precedence over Plans, yet Specifications have precedence over both).

D. Products, materials, labor, etc., installed or performed without proper clarification, or prior to District acceptance shall be the Contractor's sole responsibility and shall be removed, repaired, replaced, and/or reinstalled per the District direction at no additional cost to the District or its

agents.

1.06 CONTRACTOR'S DUTIES

A. Provide and pay for:
   1. Labor, materials, equipment, tools, construction equipment machinery, and other facilities and services necessary for proper execution and completion of the Contract.
   2. Water and temporary utilities required for construction excluding any metering and connection fees or charges.
      a. Subject to the discretion of the District Representative (contractor to verify), utilities which are in place and/or are in use by the District at the site (excluding telephone) may be utilized by the Contractor, to the extent available, at no cost.
   3. Other facilities and services necessary for proper execution and completion of work to provide a facility capable of operation.
   4. Legally required sales, consumer, and use taxes.

B. Permits:
   1. The District shall obtain and pay for the building permits, utility cut-offs and hook-ups including, but not limited to: water, gas, and electrical meters, sanitary and storm sewer connection fees.
   2. The contractor shall obtain and pay for other permits required by District, County and other agencies, including but not limited to business licenses and hauling & dumping permits as applicable.
   3. Provisions of required permits and licenses, whether obtained by the District Representative or the contractor, shall become a part of the Contract Documents and shall be adhered to by the contractor.

C. Comply with latest adopted edition of the governing building code and other codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of the work. Nothing in the Drawings or Specifications shall be construed to permit work not conforming to these applicable laws, ordinances, rules, and regulations. In case of conflicts between code requirements, the most restrictive shall apply; except that where the requirements of these Specifications exceed code requirements, the Specifications shall govern.

D. Attend pre-scheduled on-site job conference meetings and/or any special meetings as may be required by the District Representative.

E. Promptly submit written notice to the District Representative of any observed variance in Contract Documents from legal requirements. Appropriate modifications to Contract Documents will be performed by the District Representative to incorporate such necessary modifications.
   1. Contractor shall assume responsibility for work performed and known to be contrary to such requirements.

F. Enforce strict discipline and good order among the contractor's or sub-contractor's employees per the discretion of the District Representative.

G. Prior to bidding, the contractor shall visit the site to become familiar with existing conditions and the requirements of the work.

H. The contractor shall be held to have examined the site and to have compared it with the Drawings and Specifications, to have carefully examined all of the Contract Documents and to have satisfied himself as to the conditions under which the work is to be performed before entering in this Contract. No allowance shall subsequently be made on behalf of the contractor on account of an error on his part or his negligence or failure to acquaint him with the conditions of the site.

All discrepancies found shall be brought to the attention of the District Representative by the

contractor prior to bid date.

I. Examine site and verify that site conditions are acceptable to begin any work. Verify that work specified elsewhere has been completed to an appropriate stage to begin any applicable work. This includes, but is not limited to: lines, grades and surfaces prepared by others. Notify the District Representative in writing of any irregularities or unacceptable conditions. Start of work by contractor shall indicate contractor's acceptance of site conditions.

J. Throughout the job the contractor shall be responsible for the general safety of the public and shall take appropriate means at no extra cost to District to provide a safe and secure job site to the satisfaction of the District Representative.

K. Verify all measurements, materials and systems taken from the Drawings and Specifications. Contractor shall be responsible for all investigations, field measurements layouts, and coordination necessary to properly fit, install and complete the work required, including integration of new work into, and with existing.

L. Contractor shall deliver, receive, store, protect, install and apply all materials in accordance with manufacturer's and/or industry specifications and instructions unless specifically modified and shown otherwise in the Contract Documents. All installations shall be tight, smooth, level, straight, true to line, and secure.

1.07 PROTECTION OF PROPERTY, MATERIALS AND WORK

A. Contractor shall be held responsible insofar as his operations are concerned for the care, protection, and preservation of the adjoining premises, buildings, trees, landscaping, utilities, walks, streets, and adjacent properties from damage resulting from or incidental to this Contract.

B. Protect all existing structures, planted areas and improvements not designated for removal. Any damage to existing structures including asphalt paving, utilities, and fixtures shall be replaced to an "as was" or better condition, at contractor's expense, per the direction and satisfaction of the District Representative.

C. All materials and equipment, both before and after installation, shall be properly protected by the contractor from the weather and other hazards and kept in a clean and orderly manner.

D. All utility piping and conduit stub-outs, and parts or equipment left unconnected shall be capped, plugged, or otherwise properly protected by the contractor to prevent damage or the intrusion of dirt or other foreign matter.

E. Materials and equipment damaged or containing defects developed before acceptance of the work shall be replaced with new at the contractor's expense.

1.08 WORK SEQUENCE / SCHEDULE

A. The sequence and scheduling of the work to be performed by the contractor shall be subject to review and acceptance by the District Representative. The contractor shall submit a Submittal Progress Log and Schedule in accordance with Section 01 33 00 – Submittals prior to starting work. Project schedules shall conform to Specification Section 01 33 00.

1.09 CONTRACTOR'S USE OF PREMISES

A. Confine operations to areas immediately within the proposed project sites.
   1. Develop and utilize construction access and haul routes as per the rules and regulations pertaining to the locale in which the work is to be performed and per the discretion of the District Representative.

2. Do not encumber site with materials or equipment.

B. Limit use of premises for work and construction operations to allow for work by other contractors.
   1. Conduct operations so as not to cause unnecessary delay or hindrance to other contractors.
   2. Conduct, adjust, correct, and coordinate work with others to prevent project discrepancies and/or delays.

C. Assume full responsibility for protection and safekeeping of products stored on premises and work performed until Final Acceptance of the work.

D. Move stored products under contractor's control which interfere with operations of the District.

E. Obtain and pay for use of additional storage or work areas needed for construction operations.

1.10 WORK HOURS AND WORK DURING ONGOING ACTIVITIES

A. Carry on the work as quietly as possible to prevent possible annoyance to adjacent properties. Avoid unnecessary noise at all times. Comply with all local noise regulations or requirements. Absolutely no work, delivery of equipment or materials shall take place between the hours of 5:00 PM and 8:00 AM, or during non-working hours/days without written authorization by the District Representative.

B. When connecting new utilities to existing, and similar operations, the contractor shall time and coordinate with District Representative, facility operators, and utility companies such operations to minimize interference with existing activities and operations.

1.11 MATERIALS

A. All materials and equipment used in the work herein specified shall be new, first class, condition (unless otherwise noted or scheduled), suited to the intended use.

B. Materials shall be delivered to the site and stored in original containers sheltered from the elements, but readily accessible for inspection by the District Representative until installed.

C. Materials of the same general type shall be of the same make and quality throughout the work to provide uniform appearance, operation, and maintenance ease.

E. Equipment specified by manufacturer's number shall include all accessories, controls, etc., listed in catalog as standard equipment. Furnish optional or additional accessories as specified.

E. Where no specified make of material or equipment is specified, any product by a reputable manufacturer which conforms to the requirements of the Construction Documents may be used with the District Representative's acceptance.

F. Materials and equipment shall be current products by manufacturers regularly engaged in the production of such products.
   1. All equipment items shall be supported by service organizations, which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the Specified Warranty Period.

1.12 NUISANCE WATER

A. The contractor shall protect the work at all times from damage, and shall take measures to prevent delays in the progress of the work caused by nuisance water, such as rainfall, irrigation water and groundwater.

B. The contractor shall dispose of nuisance water using appropriate mechanical means at their sole expense and without adverse effects upon the District, or any other property.

C. The contractor shall comply with any and all applicable non-point source pollution regulations required by the District.

1.13 REFERENCE POINTS

A. The contractor shall leave all existing stakes and reference points in their existing locations unless directed or authorized otherwise by the District Representative. The contractor shall set additional stakes and reference points as necessary to properly establish horizontal and vertical controls required for the work.

1.14 COORDINATION:

A. The contractor shall coordinate all items of work to assure efficient and orderly sequence of installation of construction elements.
   1. The contractor shall make provisions for accommodating items installed by the District or under separate contracts.
   2. The contractor shall coordinate and cooperate fully with all other agencies, sub-contractors, or utility company personnel furnishing labor, materials, or services, so that the work, as a whole, shall be executed in the most efficient manner and without conflict or delay.

B. The contractor shall verify that characteristics of interrelated operating equipment are compatible and coordinate work having interdependent responsibilities for installing of mechanical, irrigation, or electrical work, which may be indicated diagrammatically on Drawings.

C. The contractor shall coordinate space requirements and installation of work, which is indicated diagrammatically on Drawings.
   1. Follow routing shown for pipes, and conduits as closely as possible, run lines parallel with lines of construction edges whenever possible.
   2. Utilize spaces efficiently for other installations, for maintenance, and for repairs.
   3. Work out all conditions involving work of all trades in advance of installation. If necessary, and before work proceeds in areas with constricted clearances, prepare supplementary drawings for District Representative review, showing all work in "tight" areas. Provide supplementary drawings and additional work necessary to overcome spatially constricted conditions.

D. Differences or disputes concerning coordination, interference or extent of work between divisions shall be decided by the District Representative.

E. Access Doors and Panels:
   1. Coordinate access door and panel requirements with each trade installing work to which access must be available to the District Representative from time to time.

1.15 CUTTING AND PATCHING

A. Contractor shall be responsible for all cutting, fitting, or patching of work which may be required to make its several parts come together properly and fix it to receive or be received by work of other trades.

B. Any cost caused by defective or poorly timed work shall be borne by the responsible party, as

determined by the District Representative. Contractor shall not endanger any work, persons or construction by cutting, digging, or otherwise, and shall not alter the work of any other contractor except as acceptable to the District Representative.

C. Patching of all openings for new installations and all openings resulting from the removal or relocation of any installations shall be done with material of the same type adjoining openings and as acceptable to the District Representative.

1.16 CLEANING DURING CONSTRUCTION

A. Execute weekly cleaning operations to keep the work, site, streets, and adjacent properties free from accumulations of waste materials, rubbish, and windblown debris resulting from construction operations.
   1. The District Representative may, at any time during construction, order general clean up of the site at no additional cost to the District.

B. Provide on-site containers for the collection of waste materials, debris and rubbish.

C. Remove hazardous waste materials, debris, and rubbish from the site periodically and properly dispose of such materials at legal disposal areas.
   1. Location of legal disposal sites and all costs incurred from waste disposal and transportation shall be the responsibility of the contractor.
   2. Waste material or debris shall not be buried or burned on the site.

1.17 PROJECT COMPLETION

A. Conform to Section 01 77 00 - Contract Closeout.

B. The contractor shall, at completion of the project, leave all work installed properly operating and in a thoroughly clean condition.

C. Thoroughly instruct the District Representative and any applicable operation and maintenance personnel in the contents of the "operations and maintenance manual." Refer to Section 01 33 00 - Submittals.

PART 2 PRODUCTS - Not Applicable

PART 3 EXECUTION - Not Applicable

END OF SECTION

SECTION 01 31 00

PROJECT SCHEDULES AND REPORTS

1.01 SUMMARY

A. The Master Project Schedule shall be based on the following dates. In preparing the Master Project Schedule the Contractor is reminded that the continuing operation of the Skyline College Team Room is of paramount importance and the contractor should take every opportunity of sequencing and scheduling the Work to take advantage of school holidays and vacation periods.

B. Seven (7) days following issuance of the Notice of Award, the initial version of the Master Project Schedule shall be provided per submittal requirements. This schedule shall present an orderly and realistic plan for completion of the Work, in conformance with requirements as specified herein. Any changes or adjustments that the District Representative deems appropriate will be incorporated in the Master Project Schedule.

C. The characteristics, format and detail of the Master Project Schedule shall be reviewed by the District Representative and evaluated for conformance with the contract duration specified, the requirements contained herein, and the sufficiency of detail to enable monitoring of work under the Contract Documents and coordinating with that of other contractors.

D. The Master Project Schedule will include the following information:

1. Time scale no greater than weekly.
2. No activity on schedule shall have duration longer than fifteen (15) workdays, with exception of submittal, approval, fabrication and procurement activities, unless otherwise approved by District Representative. Activity durations shall be total number of actual work days required to perform that activity.
3. The start and completion dates of all items of Work, their major components, and milestone completion dates, if any.
4. District-furnished materials and equipment, if any, identified as separate activities.
5. Dependencies (or relationships) between activities.
6. Processing/approval of submittals and shop drawings for all Contract required material and equipment. Activities that are dependent on submittal acceptance or material delivery shall not be scheduled to start earlier than expected acceptance or delivery dates. Include time for submittals, resubmittals, and reviews by District. Coordinate with accepted schedule for submission of shop drawings, samples and other submittals. Contractor shall be responsible for all impacts resulting from resubmittal of shop drawings and submittals.
7. Procurement of major equipment, through receipt and inspection at jobsite, identified as separate activity. Include time for fabrication and delivery of manufactured products for the Work. Show dependencies between procurement and construction.
8. Activity description; what Work is to be accomplished and where.
9. Activity durations shall be in work days.

E. Contractor shall monitor progress of Work and adjust Master Project Schedule each month to reflect actual progress and any anticipated changes to planned activities. Each update shall continue to show all work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed.

F. District reserves right to require Contractor to adjust, add to, or clarify any portion of schedule which may be deemed to be insufficient for monitoring of Work or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.

G. Updating, changing or revising of any report, curve, schedule or narrative submitted to District by Contractor under this Contract, nor District's review or acceptance of any such report, curve, schedule or narrative shall not have the effect of amending or modifying, in any way, the Contract Substantial Completion date or milestone dates or of modifying or limiting, in any way, Contractor's obligations under this Contract.

H. Overall time of completion and time of completion for each milestone shown on Master Project Schedule shall adhere to times provided in this document, unless an earlier (advanced) time of completion is requested by Contractor and agreed to by District. Any such agreement shall be formalized by a Change Order.

1. District is not required to accept an earlier (advanced) schedule, i.e., one that shows early completion dates for the Contract Times.
2. Contractor shall not be entitled to extra compensation in event agreement is reached on an earlier (advanced) schedule and Contractor completes its Work, for whatever reason, beyond completion date shown in earlier (advanced) schedule but within the Contract Times.
3. A schedule showing the work completed in less than the Contract Times, which has been accepted by District, shall be considered to have Project Float. The Project Float is the time between the scheduled completion of the work and Ready-For-Occupancy date. Project Float is a resource available to both District and the Contractor.

I. Float Districtship: Neither District nor Contractor owns float. The Project owns the float. As such, liability for delay of the Substantial Completion Date rests with the party whose actions, last in time, actually cause delay to the Substantial Completion Date.

1. For example, if Party A uses some, but not all of the float and Party B later uses remainder of the float as well as additional time beyond the float, Party B shall be liable for the time that represents a delay to the Substantial Completion Date.
2. Party A would not be responsible for the time since it did not consume all of the float and additional float remained; therefore, the Substantial Completion Date was unaffected.

J. Master Project Schedule shall be the basis for evaluating job progress, payment requests, and time extension requests. Responsibility for developing Contract schedule and monitoring actual progress as compared to Master Project Schedule rests with Contractor.

K. Failure of Master Project Schedule to include any element of the Work or any inaccuracy in Master Project Schedule will not relieve Contractor from responsibility for accomplishing the Work in accordance with the Contract. District's acceptance of schedule shall be for its use in monitoring and evaluating job progress, payment requests, and time extension requests, and shall not, in any manner, impose a duty of care upon District, or act to relieve Contractor of its responsibility for means and methods of construction.

L. Acceptance of Contractor's schedule by District will be based solely upon schedule's compliance with Contract requirements.

1. By way of Contractor assigning activity durations and proposing sequence of Work, Contractor agrees to utilize sufficient and necessary management and other resources to perform work in accordance with the schedule.
2. Upon submittal of schedule update, updated schedule shall be considered "current" schedule.
3. Submission of Contractor's schedule to District shall not relieve Contractor of total responsibility for scheduling, sequencing, and pursuing Work to comply with requirements of Contract Documents, including adverse effects such as delays resulting from ill-timed work.

M. Submittal of Master Project Schedule, and subsequent schedule updates, shall be understood to be Contractor's representation that the schedule meets requirements of Contract Documents and that Work shall be executed in sequence indicated on the schedule.

N. Following acceptance of Contractor's Master Project Schedule, Contractor shall monitor progress of Work and adjust schedule each month to reflect actual progress and any anticipated changes to planned activities.

1. Each schedule update submitted shall be complete, including all information requested for the original Master Project Schedule submittal.
2. Each update shall continue to show all work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed.

O. Updating the schedule to reflect actual progress shall not be considered revisions to the schedule. Since scheduling is a dynamic process, revisions to activity durations and sequences are expected on a monthly basis.

1.02 TIME IMPACTS EVALUATION FOR CHANGE ORDERS, AND OTHER DELAYS

A. When Contractor is directed to proceed with changed work, the Contractor shall prepare and submit, within five (5) calendar days from the direction to proceed, a time impact evaluation (TIE) which includes both a written narrative and a schedule diagram depicting how the changed work affects other schedule activities. The schedule diagram shall show how the Contractor proposes to incorporate the changed work in the schedule, and how it impacts the current schedule update critical path. The Contractor is also responsible for requesting time extensions based on the TIE's impact on the critical path. The diagram must be tied to the main sequence of schedule activities to enable District to evaluate the impact of changed work to the scheduled critical path. Contractor shall be required to comply with these requirements for all types of delays such as, but not limited to, Contractor/Subcontractor delays, adverse weather delays, strikes, procurement delays, fabrication delays, etc.

B. Contractor shall be responsible for all costs associated with the preparation of Time Impact Evaluations, and the process of incorporating them into the current schedule update. The Contractor shall provide District with 4 copies of each TIE.

C. Once agreement has been reached on a TIE, the Contract Times will be adjusted accordingly. If agreement is not reached on a TIE, the Contract Times may be extended in an amount District allows, and the Contractor may submit a claim for additional time claimed by contractor.

D. Time Extensions. The Contractor is responsible for requesting time extensions for time impacts that, in the opinion of the Contractor, impact the critical path of the current schedule update.

E. Where an event for which District is responsible impacts the projected Substantial Completion date, the Contractor shall provide a written mitigation plan, including a schedule diagram, which explains how (e.g., increase crew size, overtime, etc.) the impact can be mitigated. The Contractor shall also include a detailed cost breakdown of the labor, equipment and material the Contractor would expend to mitigate District caused time impact. The Contractor shall submit its mitigation plan to District within 7 calendar days from the date of discovery of said impact. The Contractor is responsible for the cost to prepare the mitigation plan.

F. Failure to request time, provide TIE, or provide the required mitigation plan will result in Contractor waiving its right to a time extension and cost to mitigate the delay.

G. No time will be granted under this Contract for cumulative effect of changes.

H. District will not be obligated to consider any time extension request unless requirements of Contract Documents are complied with.

I. Failure of the Contractor to perform in accordance with the current schedule update shall not be

excused by submittal of time extension requests.

J. If the Contractor does not submit a TIE within the required seven (7) calendar days for any issue, it is mutually agreed that the Contractor does not require a time extension for said issue.

1.03 "LOOK AHEAD" SCHEDULE

A. Contractor shall be required to provide a 3 week "outlook" project schedule at each weekly construction meeting. This schedule shall identify each task to be completed on that workday for the three week time period.

1.04 Weekly Construction Reports. On a weekly basis, Contractor shall submit a weekly activity report to District for each workday, including weekends and holidays, when worked. Contractor shall develop the weekly construction reports on a computer generated data-base capable of sorting daily Work, manpower and man hours by Contractor, Subcontractor, area, sub-area, and change order work. Upon request of District, furnish computer disk of this data base. Obtain District's written approval of weekly construction report data base format prior to implementation. Include in report:

1. Project name and Project number.
2. Contractor's name and address.
3. Weather, temperature and any unusual site conditions.
4. Brief description and location of the day's scheduled activities and any special problems and accidents, including Work of Subcontractors. Descriptions shall be referenced to CPM scheduled activities.
5. Worker quantities for its own Work force and for Subcontractors of any tier.
6. Equipment, other than hand tools, utilized by Contractor and Subcontractors.

1.05 RECOVERY SCHEDULE

A. When any critical path item is delayed by more than five (5) working days, Contractor shall provide a "“recovery" schedule within three (3) working days. This schedule shall identify how the Contractor proposes to achieve the necessary project milestones.

1.06 Verified Reports. Contractor shall complete and verify construction reports on a form prescribed by the Division of the State Architect and file reports at the completion of the Work; at the suspension of work for a period of more than one month; whenever the services of Contractor are terminated for any reason; and at any time a special verified report is required by the Division of the State Architect. Refer to section 4-336 and section 4-343 of Part 1, Title 24, California Code of Regulations.

1.07 Before commencing any portion of Work, Contractor shall inform District Representative as to time and place at which Contractor wishes to commence Work, and nature of work to be done, in order that District Representative may make proper provision for inspection of Work, and for making measurements necessary for record and payment. Information shall be given to District Representative a reasonable time in advance of time at which Contractor proposes to begin Work, so that District Representative may make necessary preliminary work without inconvenience or delay to Contractor.

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1 GENERAL

1.01 SUMMARY

A. Scope of work:
   1. Submit all items specified herein and as noted elsewhere in the Contract Documents.

B. Related sections:
   1. All pertinent sections of the specifications

1.02 SCHEDULE OF SUBMITTALS

A. Within ten (10) working days from date of Notice To Proceed, the contractor shall submit to the District a comprehensive list of all submittals and the Submittal Progress Log and Schedule (refer to Section 01 11 00-Summary Of Work) for review and acceptance. The submitted list shall be broken down by specification section, material / product and other applicable information. The log shall be reviewed and accepted prior to submission of actual submittals.

B. Upon acceptance by the District Representative, the list and Progress Schedule shall become part of the Contract Documents. **All project submittals shall be submitted to the District Representative within ten (10) working days from the date of the Notice To Proceed unless noted otherwise.**

C. Coordinate the Progress Schedule with all sub-contractors, material suppliers, etc. to ensure adherence to the schedule.

D. Revise and update the Progress Schedule on a monthly basis to reflect on-going construction conditions and sequences.

E. Submit one copy of the Progress Schedule monthly to the District Representative showing all revisions for review and comment. Coordinate this submittal with Progress Payment requests or as acceptable to the District Representative.

1.03 IDENTIFICATION OF SUBMITTALS

A. Identify each submittal with the following information:
   1. Date and revision dates
   2. Project title and number
   3. The names of:
      a. Sub-contractor
      b. Supplier
      c. Manufacturer
      d. Separate detailer when pertinent
   4. Identifications of product or material (the submitted product must be clearly identified).
   5. Applicable standards
   6. Identification of deviations from Contract Documents
   7. Contractor's stamp, initialed or signed, certifying review of submittal, verification of field measurements, and compliance with Contract Documents.

PART 2 PRODUCTS

2.01 PRODUCT LITERATURE

A. Contractor will have the option to provide electronic or hardcopy submittals. Preferred method is electronic.

1. Electronic Submittal: Include transmittal sheets and highlighted product data sheets.
2. Hardcopy Submittal: Submit four (4) copies of the manufacturer's printed data and instructions to the District Representative for review. Two (2) copies shall be to be returned to the contractor and two (2) copies shall be retained by the District Representative.

B. Clearly indicate, by colored highlight or colored stamp (USING A COLOR THAT WILL COPY), which portion of the literature is submitted to be reviewed for compliance with the Contract Documents.

2.02 SHOP DRAWINGS

A. Shop drawings shall be drawn accurately to a scale sufficiently large to depict all aspect of the items and its methods of connection to the work. Submit shop drawings to the District Representative in the quantity specified in "PRODUCT LITERATURE" above.

B. Review of the shop drawings by the District Representative shall not relieve the contractor of the responsibility for errors and/or omissions in the design of adequate connections or satisfactory construction of the work or conformance to applicable codes, etc.

C. Clearly indicate, by colored highlight or colored stamp (USING A COLOR THAT WILL COPY), the desired deviations from the Drawings (as applicable).

2.03 SAMPLES

A. Samples shall be of the actual article(s) to be furnished.

B. Submit four (4) samples to the District Representative for review. Two (2) samples shall be returned to the contractor and two (2) shall be retained by the District Representative.

C. When specifically acceptable to the District Representative the returned sample(s) may be used in the work as an installed item.

D. Construct the work, or re-submit in accordance with the District Representative's review.

2.04 COLORS AND PATTERNS

A. As required in related sections of these Specifications, submit actual color chips of specified colors and patterns as applicable to the actual material proposed for use in the work. Submit quantity as noted in "SAMPLES" above.

2.05 MANUALS

A. Submit four (4) copies of all required manuals.

B. Unless specified elsewhere, all manuals shall be bound in identical plastic binders approximately 8.5" x 11" in size and shall contain at least the following:
1. Label on the front cover and binding edge stating general nature of the manual
2. Neatly typed table of contents.
3. Complete instructions regarding operation and maintenance of all equipment to be

furnished as part of the work.

4. Complete list of replaceable parts with part numbers and name and address of nearest supplier.

5. Copies of all guarantees and warranties issued.
6. Copies of reviewed shop drawings.
7. Photographs of exposed work before final covering, if required by the District Representative.

C. When the manual includes manufacturer's catalog "cut-sheets", clearly indicate the actual items installed in the project.

PART 3 EXECUTION

3.01 SUBMITTAL ORGANIZATION

A. Unless otherwise directed by the District Representative, organize all submittals in categories by specification section number from which the submittal was requested and submit all at one time in format as described in "MANUALS" above.

B. District Representative reserves the right to reject incomplete or partial submittals.

3.02 SUBMITTAL REVIEW

A. Contractor shall sign or stamp all submittals as verification that the submittal complies with the Contract Documents.

B. The District Representative shall review all submittals and respond with one of the following markings:
1. No Exceptions Taken
2. Furnish as Corrected
3. Revise and Resubmit

C. The District Representative's review of submittals shall not relieve the contractor from responsibility for deviations from the Constructions Documents unless the contractor has called the District Representative's attention to such deviations and secured written acceptance, nor shall it relieve the contractor from the responsibility for errors and/or omissions in shop drawings or other data.

3.03 RESUBMITTAL REQUIREMENTS

A. General:
1. The contractor shall make all submittals in advance of scheduled dates of installation to provide ample time for District Representative's review, for possible revision and re-submittal, placing orders, necessary delivery lead times and for delivery to project site.
2. In scheduling, the contractor shall allow at least ten (10) full working days for the District Representative's review following receipt of the submittal. If a submittal is time sensitive, the contractor shall clearly indicate this on the submittal and the District Representative shall make all reasonable effort to review the submittal and expedite response accordingly.

B. Financial impact of delays due to contractor's tardiness of submittals will be backcharged as necessary to the contractor and shall not be at the temporal or financial expense of the District.

END OF SECTION

SECTION 01 42 00

REFERENCES

PART 1 GENERAL

1.01 SUMMARY

A. This section covers abbreviations, definitions, and the general requirements for regulatory requirements pertaining to the work. This section shall be supplementary to all other abbreviations, definitions, and regulatory requirements mentioned or references elsewhere in the Contract Documents.

B. Scope of work:
   1. Reference Standards
   2. Abbreviations
   3. Definitions

C. Related sections can include, but may not be limited to the following:
   1. All applicable sections of the Specifications.

1.02 REFERENCES AND REGULATORY REQUIREMENTS

A. Refer to latest editions of the references stated herein.

B. Work shall comply with the requirements of all applicable codes, laws, rules, regulations, and standards of applicable code enforcing authorities. Nothing in the drawings or specifications shall be constructed to permit work not conforming to the applicable laws, ordinances, rules, and regulations. In case of conflicts between code requirements, the most restrictive shall apply; except that where the requirements of these Specifications exceed code requirements, the Specifications shall govern. The following codes and specifications are hereby referenced and considered part of these Contract Documents.

C. State Standard Specifications: Standard Specifications, State of California, Department of Transportation (Cal-trans) latest edition.

D. Building Standards Administrative Code (2013 Edition)

E. California Building Code (2012 International Building Code, with 2013 California Amendments)

F. California Mechanical Code (2012 Uniform Mechanical Code, with 2013 California Amendments)

G. California Plumbing Code (2012 Uniform Plumbing Code, with 2013 California Amendments)

H. California Electrical Code (2011 National Electrical Code, with 2013 California Amendments)

I. California Fire Code (2012 International Fire Code, with 2013 California Amendments)

J. California Energy Code (2013 Edition)

K. American Society for Testing and Materials.

L. American Association of State Highway and Traffic Officials.

M. National Fire Protection Association.

N. Occupational Safety and Health (ACT) Standards.

O. Other statutes, ordinances, laws, regulations, rules, orders and codes specified in other sections of the Specifications or bearing on the work.

P. State and Local Public Health Codes.

Q. State Fire Marshall.

R. Safety Orders of Division of Industrial Safety.

S. State of California Public Utilities Commission.

T. State of California Low Voltage Electrical Safety Orders (CAL/OSHA).

U. Americans with Disabilities Act (ADA).

V. Consumer Products Safety Commission Guidelines (CPSC).

1.03 ABBREVIATIONS

Abbreviations for numerous common references, terms and materials used throughout the specifications include:

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturers Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Traffic Officials.
ACI	American Concrete Institute
AEIC	Association of Edison Illuminating Companies
AFI	Air Filter Institute
AIA	American Institute of Architects
AIEEE	American Institute of Electrical and Electronic Engineers
AISC	American Institute of Steel Construction
AJCHN	American Joint Committee on Horticultural Nomenclature
AMCA	Air Moving and Conditioning Association
ANSI	American National Standard Institute
APA	American Plywood Association
APWA	American Public Works Association
ARI	American Refrigeration Institute
AHSRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASLA	American Society of Landscape Architects
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BC	Bottom of Curb
BFP	Backflow Preventer
BOC	Back of Curb
CB	Catch Basin

CL	Center Line
CONC	Concrete
COTG	Clean Out To Grade
CS	U.S. Commercial Standards
CSI	Construction Specifications Institute
DG	Decomposed Granite
DHI	Door Hardware Institute
DI	Drain Inlet
FG	Finish Grade
FGMA	Flat Glass Marketing Association
FL	Flow Line
FM	Factory Mutual
FOC	Face of Curb
FS	Finish Surface
GA	Gypsum Association
HP	High Point
INV	Invert
LP	Low Point
MH	Manhole
NAAMM	National Association of Architectural Metal Manufacturers
NAFM	National Association of Fan Manufacturers
NBS	National Bureau of Standards
NEC	National Electrical Code
NEMA	National Electric Manufacturers Association
NFC	National Fire Code
NFPA	National Fire Protection Association
NLMA	National Lumber Manufacturers Association
NSF	National Sanitation Foundations
PDI	Plumbing and Drainage Institute
PL	Property Line
PS	Product Standard, U.S. Department of Commerce
PVC	Polyvinyl Chloride
RIS	Redwood Inspection Service
SDI	Steel Deck Institute
SDI	Steel Door Institute
SFPA	Southern Forest Products Association
SMACNA	Sheet Metal & Air Conditioning Contractors National Association, Inc.
SS	Sanitary Sewer
SD	Storm Drain
TC	Top of Curb
TYP	Typical
UBC	Uniform Building Code
UL	Underwriters Laboratory, Inc.
UON	Unless Otherwise Noted
WM	Water Meter
WCLIB	West Coast Lumber Inspection Bureau
WIC	Woodwork Institute of California
WWDA	Wood Window and Door Association
WWM	Welded Wire Mesh
WWPA	Western Wood Products Association

1.04 DEFINITIONS

Reference to Drawings: Where the words "shown", "indicated", "detailed", "noted", "scheduled". or words of similar import are used, it shall be understood that reference is made to the Drawings accompanying these Specifications, unless otherwise noted.

Addendum: The word "Addendum" shall mean written and/or graphic modifications to the contract documents provided to holders of the Contract Documents prior to the opening of bids. Addenda shall be issued by the District Representative.

Alternates: The word "Alternates" shall be understood to mean alternate products, materials, equipment, systems, methods, units of work or elements of the construction, which may, at the District's option and under the terms established by the Contract Documents, be added to, or deleted from the work.

Approvals: The words "approved" and/or "accepted" reference 00 70 00 – General Conditions

Change Order: reference 00 70 00 – General Conditions

Contract Documents: reference 00 70 00 – General Conditions

Directions: The words "directed", "designated", and "selected", shall mean the directions, designations, selection, of the District Representative, unless otherwise noted.

Drawings: The word "Drawings" shall mean the official project bid or construction plans, plan details, profiles, typical cross sections, working drawings, shop drawings, supplemental drawings, and/or reproductions thereof, accepted or issued by the District Representative, which show the locations, character, dimensions, and details of work to be performed. All such documents are to be considered as a part of the Drawings.

Equals: The words "or equal", "equal to", "approved equal", "or approved equal" and "equivalent", shall mean "equal to or acceptable in the opinion of the District Representative," unless stated otherwise.

Language: Words and phrases requiring an action or performance, such as "perform", "provide", "install", "furnish", "connect", "test", "coordinate", and words and phrases of similar import, shall be understood to be preceded by the phrase "The contractor shall" unless otherwise stated.

Modifications: The word "modifications" shall mean a written amendment to the Contract signed by both parties, a Change Order, a written interpretation issued by the District Representative or a written order for a minor change in the work issued by the District Representative.

Notice To Proceed: The words "Notice to Proceed" shall mean the written notice issued by the District Representative to the contractor fixing the date on which or within which dates the contractor shall start to perform the contractor's obligations under the Contract Documents.

Perform: The word "perform" shall mean that the contractor, at his expense, shall perform all operations including necessary labor, tools, and equipment and further including the furnishing and installation of materials that are indicated, specified, and required to complete such the conditions of the Contract and Contract Documents.

Project: reference 00 70 00 – General Conditions

Provide: reference 00 70 00 – General Conditions.

Required: The word "required" shall mean "as required to properly complete the work and as required and acceptable to the District's Representative" unless otherwise noted.

Shop Drawings: reference 00 70 00 – General Conditions.

Site: reference 00 70 00 – General Conditions.

Substantial Completion: The words "substantial completion" shall mean the time and date when the work, or designated portion thereof, is sufficiently complete in accordance with the Contract Documents so that the District can occupy or utilize the work, or designated portion thereof, for the use for which it was intended, as evidenced by the District's Certificate of Substantial Completion. The Certificate of Substantial Completion shall set forth the date on which Substantial Completion is deemed by the District Representative in its sole discretion to have occurred. This shall occur only when the site improvements are 100% complete and shall exclude correction of final punch list items(s) and the execution of the Landscape Maintenance Period. The issuance of a Certificate of Substantial Completion shall signify the date on which the accounting of Contract "Working Days" or "Calendar Days" is terminated insofar as they may relate to Liquidated Damages.

Work: reference 00 70 00 – General Conditions.

PART 2 **PRODUCTS** - Not Applicable

PART 3 **EXECUTION** - Not Applicable

END OF SECTION

SECTION 01 50 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. Scope of work: Provide construction facilities and temporary controls required for the performance of the work, which may include, but are not necessarily limited to, the following:
   1. Temporary utilities
   2. Enclosures, barricades, and fences
   3. Fire protection
   4. Protection of work
   5. Bottled water

B. Related sections can include, but may not be limited to the following:
   1. All pertinent sections of the specifications

1.02 SELECTED REFERENCE AND REGULATORY REQUIREMENTS

A. National Fire Protection Association (NFPA):
   1. 10 - Portable Fire Extinguishers.
   2. 241 - Safeguarding Building Construction and Demolition Operations.

B. State of California Department of Transportation Standard Specifications, latest edition.

1.03 UTILITY SERVICES

A. Power and Lighting: Furnish, install, and maintain temporary wiring, poles, meter board, service entrance switch, lamps, and equipment as necessary to provide temporary lighting and power for the construction site.
   1. Pay all costs for temporary electrical systems required for construction.
   2. Source of power shall be at location on site acceptable to the District representative. Required temporary transmission lines shall be arranged by contractor in conjunction with the appropriate utility company.

B. Water:
   1. Install temporary piping and valves downstream from permanent (new) meter locations as acceptable to the District representative. No temporary water services shall be installed prior to meter installation without prior District review and acceptance.
   2. Temporary water facilities shall be installed with an acceptable reduced pressure backflow prevention unit furnished and installed by the contractor.
   3. Locate temporary sources of water route, and construct pipelines so that they do not create a hazard or interfere with public access, traffic, or construction operations.
   4. Design and construct such pipelines.

C. Utility Costs for Contractors:
Distribution of temporary utility services to sub-contractors shall be contractor's responsibility and cost.

1.04 SANITARY FACILITIES

A. Provide, install and maintain, through duration of the work, temporary sanitary facilities for use of construction personnel.
   1. Sanitary facilities shall be provided, maintained with supplies as required for the number of construction personnel in compliance to local regulations.

2. Locate such facilities a reasonable distance from all working areas.

B. Provide weather tight and floored structures, maintained in clean and sanitary condition acceptable to the District representative.

C. New or existing restroom facilities shall not be used by construction personnel except with written permission from the District.

1.05 STORAGE ENCLOSURES

A. Provide sheds and enclosures necessary for storing applicable materials and equipment.

B. Enclosures shall be conveniently located, substantially and neatly constructed, and weather tight.

C. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible.

D. For exterior storage of fabricated products, place on sloped supports, above ground.

E. Provide off-site storage and protection when site does not permit on-site storage or protection.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of product.

G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent contamination by foreign matter.

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

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

1.06 MAINTENANCE OF CONSTRUCTION FACILITIES

A. All facilities shall be provided and maintained by the contractor in accordance with Cal-OSHA and applicable laws and ordinances.

1.07 SECURITY

A. Employment of a watchman for non-construction hours shall be left to the discretion of the contractor, who shall be fully responsible for any theft or damage to any material, equipment or to portion of the work until Project Final Acceptance. Such security service shall be paid for by the contractor

B. All site security shall be the responsibility of the contractor.

C. Contractor is strongly encouraged to provide site security during installation and curing of the track surfacing in order to prevent damage to surfacing.

1.08 FIRE PROTECTION

A. Take precautions to prevent and eliminate fire hazards. The contractor shall be responsible for providing, maintaining, and enforcing any necessary or required fire prevention safeguards until Project Final Acceptance.

B. Provide fire extinguishers on the premises during the course of construction of the type and sizes recommended by the NFPA 10 and NFPA 241 to control fires resulting from the particular work

being performed. Instruct employees in their use. Place extinguishers in the immediate vicinity of the work being performed, ready for use.

C. Fire Inspection: The contractor's superintendent shall inspect the entire project as necessary to make certain the required precautions are being adhered to.

D. Combustible and/or flammable Building Materials: Only an appropriate working supply of flammable fuel or building materials shall be located inside of any storage facility.

E. During the use of hazardous equipment, such as acetylene torches, welding equipment, bitumen kettles, and similar devices, no work shall start or equipment used unless fire extinguishers of specified type and capacity are placed in the working area and available for use by workmen using such hazardous equipment.

1. Extinguishers shall meet standards established by Underwriter's Laboratory, and shall be inspected at regular intervals and recharged by the contractor as necessary.

F. Combustible and/or flammable Waste Materials. Oil-soaked rags, papers, and other highly combustible materials must be stored in closed metal containers with tightly-hinged lids at all times, and shall be removed from the site at the close of each day's work and more often when necessary.

1.09 BARRICADES

A. Furnish or construct fences, barricades, railing, warning lights, lights and other barricades required by law, Contract Documents, common sense or to ensure public safety.

B. Give adequate warning to the public at all times whenever a dangerous condition exists as the result of construction work. Furnish District representative with name, address, pager number and local telephone number of the superintendent responsible and at least one other person for the maintenance of barriers, signs, lights and other accident prevention devices for evenings and weekends.

1.10 PROTECTION OF WORK AND FACILITIES

A. Protect adjacent property, roads, streets, curbs, planting areas, erosion control materials and other improvements during construction operations. All damaged materials shall be replaced and/or repaired at the expense of the contractor and to the satisfaction of the District representative.

B. Protect installed work and provide special protection where applicable.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. All new turf areas shall be fenced off during turf establishment and specified Landscape Maintenance Period subject to the discretion of the District Representative.

E. Contractor shall install temporary construction fencing per contract documents and place signage on the fence stating “Construction Area – Keep Out” and “No Trespassing”. Signs shall be located along fence every 75’.

1.11 VEHICULAR SAFETY

A. All motorized and/or self-propelled construction equipment shall be equipped with a reverse signal alarm (hub-cap type).

1.12 FIRST AID

A. Provide and maintain first aid supplies as required Cal-OSHA and applicable local ordinances. Make arrangements with local emergency center and nearest hospital to receive personnel requiring medical attention, including emergencies. Such information shall be conspicuously displayed at the construction office when an office is required on the project.

1.13 ACCESS ROADS & PARKING AREAS

A. Construct, designate and maintain specific vehicular access as required for the orderly progress of the work. Engineer construction access roads and parking areas as necessary to provide suitable support during all weather conditions for anticipated loads, including municipal fire apparatus. Provide adequate surface drainage without interrupting natural flow of existing drainage.

B. Provide designated parking areas for use by construction personnel and District representative(s) such parking areas are subject to the discretion of the District representative.

C. Restore temporary vehicular access and parking areas to original or specified conditions prior to Project Final Acceptance.

1.14 HAUL ROUTES

A. Comply with any and all local governing ordinances and guidelines.

1.15 MAINTENANCE AND REMOVAL

A. Maintain temporary facilities and controls as long as needed for safe and proper completion of the work. Coordinate removal of temporary facilities with the District representative.

B. After removal of temporary facilities, restore grounds or buildings which have been damaged or disturbed back to an "as was" or better condition subject to the discretion of the District representative.

1.16 Storm Water Pollution Prevention Plan (SWPPP)

A. Contractor shall be required to adhere to the project's Erosion Control plan that is provided within these contract documents.

PART 2 **PRODUCTS -** Not Applicable

PART 3 **EXECUTION -** Not Applicable

END OF SECTION

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

FACILITIES: **Skyline College Athletic Team Room**
3300 College Dr.
San Bruno, CA 94066

REPORT DATE: December 2014

TABLE OF CONTENTS

GENERAL FACILITY INFORMATION

Name of Facility: Skyline College Athletic Team Rooms

Facility Address: 3300 College Dr. San Bruno, CA 94066

Facility Contact: Karen Pinkham – Project Manager

Title: SMCCCD – Project Manager

Telephone: (650) 358 6714 (O)

Mailing Address: 3401 CSM Dr.

San Mateo, CA 94402

District: San Mateo County Community College District

Operator: _____
(if different from District)

Permit Information:

Initial Date of Coverage: _____

Number of Storm Water Outfalls: _____

Receiving Water: _____

Emergency Contact (preferably on-site):

Name: _____

Telephone: _____

STORM WATER POLLUTION PREVENTION PLAN

SKYLINE COLLEGE ATHLETIC TEAM ROOM
Verde Design Job# 1312600
01 57 23 - 6

1.0 OVERVIEW

1.1 INTRODUCTION

This storm water pollution prevention plan (SWPPP) covers the operations at Skyline Community College Athletic Team Room. This plan was designed to meet the requirements of the California State Water Resource Control Board, Environmental Protection Agency, National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Industrial Activities (General Permit). This SWPPP describes these facilities and its operations, identifies potential sources of storm water pollution at the facility, recommends appropriate best management practices (BMPs) or pollution control measures to reduce the discharge of pollutants in storm water runoff, and provides for periodic review of this SWPPP.

1.2 OBJECTIVES

The primary goal of the storm water permit program is to improve the quality of surface waters by reducing the amount of pollutants potentially contained in the storm water runoff.

This SWPPP will:

1. identify sources of storm water and non-storm water contamination to the storm water drainage system;
2. identify and prescribe appropriate "source area control" type best management practices designed to prevent storm water contamination from occurring;
3. prescribe an implementation schedule so as to ensure that the storm water management actions prescribed in the Storm Water Pollution Prevention Plan are carried out and evaluated on a regular basis.

2.0 STORM WATER POLLUTION PREVENTION TEAM

The storm water pollution prevention team is responsible for developing, implementing, maintaining, and revising this SWPPP. The members of the team are familiar with the management and operations of Skyline College Athletic Team Room.

The member(s) of the team and their responsibilities (i.e. implementing, maintaining, record keeping, submitting reports, conducting inspections, employee training, conducting the annual compliance evaluation, testing for non-storm water discharges, signing the required certifications) are as follows:

Name & Title	Responsibility

3.0 POTENTIAL SOURCES OF POLLUTANTS

3.1 SITE MAP

Figure 1 (attached) presents a site map of Skyline Community College Athletic Team Room showing the following features as required by the permit:

- the facility property boundaries;
- a depiction of the storm drainage collection and disposal system, including all known surface and subsurface conveyances, with the conveyances named;
- any secondary or other containment structures;
- the location of all outfalls;
- the drainage area boundary for each storm water outfall;
- the surface area in acres draining to each outfall, including the percentage that is impervious such as paved, roofed, or highly compacted soil and the percentage that is pervious such as grassy areas and woods; existing structural storm water controls;
- the name and location of receiving waters, if any;
- and the location of activities and materials that have the potential to contaminate storm water shall also be depicted on the drainage base map.

3.2 INVENTORY OF POTENTIAL SOURCES OF CONTAMINATION

The following have been identified as potential sources of storm water contamination.

- Immediate access roads and rail lines;
- material handling sites (storage loading, unloading, transportation, or, conveyance of any raw material, finished product, intermediate product, by-product or waste;
- refuge sites;
- vehicle maintenance and cleaning areas;
- any other areas capable of contaminating storm water runoff.

4.0 BEST MANAGEMENT PRACTICES

Storm water management controls, or best management practices (BMPs), will be implemented to reduce the amount of pollutants in storm water discharged from Skyline College Athletic Team Room.

4.1 GENERAL REQUIREMENTS

A. The following general requirements shall be met on all projects within the District.
   1. Non-hazardous Material/Waste Management
      a. Designated Area: The Contractor shall propose designated areas of the project site, for approval by the District Representative, suitable for material delivery, storage, and waste collection that, to the maximum extent practicable, are near construction entrances and away from catch basins, gutters, drainage courses, and creeks.
      b. Granular Material
         i) The Contractor shall store granular material at least ten feet away from catch basin and curb returns.
         ii) The Contractor shall not allow granular material to enter the storm drains or creeks.
         iii) When rain is forecast within 24 hours or during wet weather, the District Representative may require the Contractor to cover granular material with a tarpaulin and to surround the material with sandbags.
      c. Dust Control: The Contractor shall use reclaimed water to control dust on a daily basis or as directed by the District Representative.
      d. Cleaning Paved Storage Areas: The Contractor shall thoroughly clean all on-site paved areas used for storage of materials or otherwise utilized or involved

during the work immediately after the materials are removed from storage. Cleaning shall be accomplished by sweeping and not with use of water.

e. Recycling
   i) The Contractor, to the extent practicable, shall recycle aggregate base material, asphalt concrete, and Portland cement concrete as described in these Specifications.
   ii) In addition, to the maximum extent practicable, the Contractor shall reuse or recycle any useful construction materials generated during the project.

f. Disposal
   i) The Contractor shall maintain the project site in a clean and orderly manner at all times. To the extent practicable, the Contractor shall collect all scrap, debris, and waste material, and dispose of such materials properly. The District Representative may require the Contractor to clean and dispose of such materials at any time should the situation, in his opinion, constitute a danger.
   ii) The Contractor shall inspect dumpsters for leaks and contact trash hauling contractors to replace or repair dumpsters that leak.
   iii) The Contractor shall not discharge water on-site from cleaning dumpsters.
   iv) The Contractor shall arrange for regular waste collection before dumpsters overflow.

2. Hazardous Material / Waste Management
   a. The Contractor shall label and store all hazardous materials, such as pesticides, paints, thinners, solvents, and fuels; and all hazardous wastes, such as waste oil and antifreeze; in accordance with the San Mateo County Hazardous Materials Storage Ordinance and all applicable State and Federal regulations.
   b. Usage
      i) When rain is forecast within 24 hours or during wet weather, the District Representative may prevent the Contractor from applying chemicals in outside areas.
      ii) The Contractor shall not over-apply pesticides or fertilizers and shall follow material manufacturers instructions regarding uses, protective equipment ventilation, flammability, and mixing of chemicals. Over-application of a pesticide constitutes a "label violation" subject to an enforcement action by the Alameda Agriculture Department.
   c. Disposal
      i) The Contractor shall arrange for regular hazardous waste collection to comply with time limits on storage of hazardous wastes.
      ii) The Contractor shall dispose of hazardous waste only at authorized and permitted Treatment, Storage, and Disposal Facilities, and use only licensed hazardous waste haulers to remove the waste off-site, unless quantities to be transported are below applicable threshold limits for transportation specified in State and Federal regulations.
      iii) If the Contractor qualifies as a "Conditionally Exempt Small Quantity Generator" as defined under State and Federal regulation and if the Contractor's business offices is located in Oakland, then the Contractor may dispose of this waste through a city-sponsored program.

3. Spill Prevention and Control
   a. The Contractor shall keep a stockpile of spill cleanup materials, such as rags, or absorbents, readily accessible on-site.
   b. The Contractor shall immediately contain and prevent leaks and spills from entering storm drains, and properly clean up and dispose of the waste and cleanup materials. If the waste is hazardous, the Contractor shall handle the waste as described in section A.2.c above.
   c. The Contractor shall not wash any spilled material into streets, gutters, storm drains, or creeks and shall not bury spilled hazardous materials.

d. The Contractor shall report any hazardous materials to the Regional Water Quality Control Board at (510) 622-2300 and to the District Representative.

4. Vehicle/Equipment Cleaning
   a. The Contractor shall not perform vehicle or equipment cleaning on-site or in the street using soaps, solvents, degreasers, steam cleaning equipment, or equivalent methods.
   b. The Contractor shall perform vehicle or equipment cleaning, with water only, in a designated, beamed area that will not allow rinse water to run off-site or into streets, gutters, storm drains, or creeks.
5. Vehicle/Equipment Maintenance and Fueling
   a. The Contractor shall perform maintenance and fueling of vehicles or equipment in a designated, bermed area or over a drip pan that will not allow run-on of storm water or runoff of spills.
   b. The Contractor shall use secondary containment such as a drip pan, to catch leaks or spills any time that vehicle or equipment fluids are dispensed, changed, or poured.
   c. The Contractor shall keep a stockpile of spill cleanup materials, such as rags or absorbents, readily accessible on-site.
   d. The Contractor shall clean up leaks and spills of vehicle or equipment fluids immediately and dispose of the waste and cleanup materials as hazardous waste, as described in section A.2.c above.
   e. The Contractor shall not wash any spilled material into streets, gutters, storm drains, or creeks and shall not bury spilled hazardous materials.
   f. The Contractor shall report any hazardous materials to the Regional Water Quality Control Board at (510) 622-2300 and to the District Representative.
   g. The Contractor shall inspect vehicles and equipment arriving on-site for leaking fluids and shall promptly repair leaking vehicles and equipment. Drip pans shall be used to catch leaks until repairs are made.
   h. The Contractor shall recycle waste oil and antifreeze, to the maximum extent practicable.
   i. The Contractor shall comply with Federal, State, and City requirements for above ground storage tanks.
6. Contractors Training and Awareness
   a. The Contractor shall train all employees/subcontractors on the storm water pollution prevention requirements contained in these Specifications.
   b. The Contractor shall inform subcontractors of the storm water pollution prevention contract requirements and include appropriate subcontract provisions to ensure that these requirements are met.
   c. The Contractor shall post warning signs in areas treated with chemicals.
   d. The Contractor shall paint new catch basins, constricted as part of the project with a "No Dumping" stencil.

4.2 ACTIVITY-SPECIFIC REQUIREMENTS

A. The following activity-specific requirements shall be met on all projects within the District that include the listed activities.

1. Paving Operations
   a. Project Site Management
      i) When rain is forecast within 24 hours during wet weather, the District Representative may prevent the Contractor from paving.
      ii) The District Representative may direct the Contractor to protect drainage courses by using control measures, such as earth dike, straw bale, and sand bags to divert runoff or trap and filter sediment.
      iii) The Contractor shall cover drip pans or absorbent material under paving equipment when not in use.
      iv) The Contractor shall cover catch basins and manholes when paving or applying seat coat, tack coat, slurry seal, or fog seal.

v) If the paving operation includes an on-site mixing plant, the Contractor shall comply with Alameda County General Industrial Activities Storm Water Permit requirements.

b. Paving Waste Management: The Contractor shall not sweep or wash down excess sand (placed as part of a sand seal or to absorb excess oil) into gutters, storm drains, or creeks. Instead, the Contractor shall either collect the sand or return it to the stockpile, or dispose of it in a trash container. The Contractor shall not use water to wash down fresh asphalt concrete pavement.

2. Saw Cutting
   a. During saw cutting, the Contractor shall cover or barricade catch basins using control measures, such as filter fabric, straw bales, sand bag, and fine gravel dams, to keep slurry out of both the sanitary and storm drain systems. When protecting a catch basin, the Contractor shall ensure that the entire opening is covered.
   b. The Contractor shall shovel, absorb, or vacuum saw cut slurry and pick up the waste before moving to the next location or at the end of each working day, which ever is sooner.
   c. If saw cut slurry enters catch basins, the Contractor shall remove the slurry from the storm drain system immediately.
3. Contaminated Soil Management
   a. On all projects involving grading or excavation, the Contractor shall look for contaminated soil as evidenced by site history, discoloration, odor, differences in soil properties, abandoned underground tanks or pipes, or buried debris. If the project is not within an area of known soil contamination and no evidence of soil contamination is found, then testing of the soil shall only be required if directed by the District Representative. The Contractor shall follow section 3.b below, if contamination is found.
   b. If the project is within an area of known soil contamination or evidence of soil contamination is found, then soil from grading or excavation operations shall be tested. The soil shall be managed as required by Regional Water Quality Control Board.
   c. If the project is found to be within an area of soil contamination not identified by the District in the project specifications, a change order shall be negotiated to cover additional work performed by the Contractor.
4. Concrete, Grout, and Mortar Waste Management
   a. Material Management: The Contractor shall store and keep covered concrete, grout, and mortar away from drainage areas and ensure that these materials do not enter the storm drain system.
   b. Concrete Truck/Equipment Wash Out:
      i) The Contractor shall not wash out concrete trucks or equipment into streets, gutters, storm drains, or creeks.
      ii) The Contractor shall perform washout of concrete trucks or equipment off-site or in a designated area on-site where the water will flow onto dirt or into a temporary pit in a dirt area. The Contractor shall let the water percolate into the soil and dispose of the hardened concrete in a trash container. If a suitable dirt area is not available, then the Contractor shall collect tie wash water and remove it off-site.
   c. Exposed Aggregate Concrete Wash Water
      i) The Contractor shall avoid creating runoff by draining water from washing of exposed aggregate concrete to a dirt area. If a suitable dirt area is not available, then the Contractor shall filter the wash water through straw bales or equivalent material before discharging to the storm drain.
      ii) The Contractor shall collect and return sweepings from exposed aggregate concrete to a stockpile or dispose of the waste in a trash container.

5. Painting
    a. Painting Cleanup
        i) Designated Area
            a) The Contractor shall conduct cleaning of painting equipment and tools in a designated area that will not allow run-on of storm water or runoff of spills.
            b) The Contractor shall not allow wash water from cleaning of painting equipment and tools into streets, gutters, storm drains, or creeks.
        ii) Water-based Paint
            a) The Contractor shall remove as much excess paint as possible from brushes, rollers, and equipment before starting cleanup.
            b) To the maximum extent practicable, the Contractor shall dispose of wash water from aqueous cleaning of equipment and tools to the sanitary sewer.
            c) Otherwise, the Contractor shall direct wash water onto dirt area and spade in.
        iii) Oil-based Paint
            a) The Contractor shall remove as much excess paint as possible from brushes, rollers, and equipment before starting cleanup.
            b) To the maximum extent practicable, the Contractor shall filter paint thinner and solvents for reuse.
            c) The Contractor shall dispose of waste thinner and solvent, and sludge from cleaning of equipment and tools as hazardous waste, as described in Section A.2.c above.
    b. Material/Waste Management
        i) The Contractor shall store paint, solvents, chemicals, and waste materials in compliance with the San Mateo County Hazardous Materials Storage Ordinances and all applicable State and Federal regulations. The Contractor shall store these materials in a designated area that will not allow run-on of storm water runoff of spills.
        ii) The Contractor shall dispose of excess thinners, solvents, oil, and water-based paint as hazardous waste.
        iii) The Contractor shall dispose of dry, empty paint cans, buckets, old brushes, rollers, rags, and drop cloths in the trash.
6. Earthwork: The Contractor shall maximize control of erosion and sediment by using the BMPs for erosion and sedimentation in the California Storm Water Best Management Practice Handbook – Construction Activity.

*See California Storm Water Best Management Practice Handbook – Construction Activity

SECTION 01 62 00

PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 GENERAL

1.01 SUMMARY

A. Scope of work:
1. Wherever in the Contract Documents a material, article, or process is indicated or specified by trade, patent, proprietary name, or name of manufacturer, such specification shall be deemed to be followed by the words, "or equal, as accepted in writing by the District representative".
2. The naming of more than one manufacturer in a section does not imply that all products produced by such manufacturers are acceptable for use on the project. Where more than one proprietary name, process, product, etc. is specified, the contractor may provide materials or equipment of any one of the manufacturers specified, only if full compliance with other portions of the Contract Documents can be provided and the product is acceptable to the District representative.

B. Related sections can include, but may not be limited to the following:
1. Section 01 33 00 – Submittals
2. All other applicable sections of the Specifications

1.02 MATERIALS

A. Unless otherwise specifically provided in the Contract Documents, all equipment, material, and articles incorporated into the work shall be new and suitable for the purposes intended.

B. Reference to any equipment, material, article or patented process, by trade name or catalog number shall not be construed as limiting competition. Specifications designating a material, product, or service by specific brand or trade name, with only one name listed is:
1. Required to be used since it is a unique product application
2. Used as a standard of quality which must be satisfied without compromise.
3. The only brand or trade name known to the District representative.

1.03 SUBSTITUTIONS

A. Materials and equipment for the work shall be the standard product of a manufacturer regularly engaged in the production of such materials and equipment. Product options or substitutions shall not be the basis for any price increase above the original bid price for the Contract.

B. Substitutions which are equal in quality, efficiency, durability and utility to those specified will be permitted, subject to the following provisions:
1. All substitutions must be favorably reviewed and accepted by the District representative in writing prior to implementation.

C. Submit to the District representative, not later than thirty five (35) working days from date of Notice To Proceed, a typewritten list containing a thorough side-by-side description of each proposed substitute item or material compared with the specified item as specified in Section 01 33 00.
1. Provide sufficient data, drawings, samples, literature and other detailed information which demonstrates to the District representative that the proposed substitute is equal in quality, operating efficiency, and durability of the material specified.

D. The District representative shall review such proposed substitutions and determine if a substitution is acceptable.

E. Favorable review shall not relieve the contractor from complying with the requirements of the Contract Documents, and the contractor shall be responsible for all expenses for any changes resulting from acceptable substitutions which affect other parts of the work.

F. Failure of the contractor to submit proposed substitutions for review in the manner specified shall be sufficient cause for rejection by the District representative of any substitutions otherwise proposed.

G. Failure to place orders for specified equipment or material sufficiently in advance of the scheduled date of installation shall not be considered a valid reason upon which the Contractor may base a request for any substitutions or for any deviations from the Contract Documents.

H. The first or only named manufacturer is the basis for the project design and the use of alternative-names, second-names, or unnamed manufacturer's products may require modifications in the project design and construction.

1. Costs incurred due to requests, changes or revisions resulting from substitutions requiring drawings or services of the District representative or project consultants to facilitate purchase, installation or erection of any portion of the work, shall be borne by the contractor. A flat hourly rate, as agreed upon, shall be paid by the contractor whether the change is accepted or not. This fee shall be deducted, and paid, from Contract moneys due to the contractor as determined by the District representative.

I. Contractor shall furnish full information concerning the material or articles being proposed for substitution.

1. Testing of a proposed substitute material to assure compliance with the Specifications may be required by the District representative at the contractor's expense.
2. Samples shall be submitted for review as specified in Section 01 33 00.
3. Equipment, material, and articles installed or used by the contractor without required review, shall be at the contractor's risk.

J. Substitutions shall comply with or exceed all requirements of size, function, structure, durability, and appearance without exception.

1. Use of accepted substitutions shall in no way relieve the contractor from responsibility for compliance with the Contract Documents after installation.
2. The contractor shall assume all extra costs caused by the use of such substitutions where they affect other work or trades.

1.04 SUBSTITUTION REQUEST FORM

A. All requests for alternate materials or substitutions shall be submitted on the attached Substitution Request Form with descriptive information outlining the equivalent characteristics of the alternate product or material.

PART 2 PRODUCTS - Not applicable.

PART 3 EXECUTION

3.01 SUBSTITUTION REQUEST FORM

A. For all proposed substitutions, the contractor shall complete the attached Substitution Request Form, attach all substantiating back-up literature and submit to the District representative within time limit specified above.

END OF SECTION

ATTACHMENT: Substitution Request Form

SUBSTITUTION REQUEST FORM

DATE:

TO: DISTRICT REPRESENTATIVE

PROJECT NAME: SKYLINE COLLEGE ATHLETIC TEAM ROOM

SPECIFIED ITEM: Section _____ Page _____ Item Number _____ Paragraph

DESCRIPTION:

The undersigned requests consideration of the following:

PROPOSED SUBSTITUTION: (put N/A where not appropriate)

Manufacturer:_____ Color:

Model Number:_____ Material:

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the requests; applicable portions of the data are clearly identified.

Attached data also includes description of changes to Contract Documents which the proposed substitution requires for proper installation.

The undersigned states that the following paragraphs, unless modified on attachments, are correct:

1. The proposed substitution does not affect dimensions shown on Drawings. If, in fact, it does affect dimensions, the contractor shall provide shop drawings, accurately showing changes to documents.
2. The undersigned shall pay for changes to the design, including engineering design, detailing, and construction costs caused by the requested substitution.
3. The proposed substitution shall not adversely affect other trades, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts are locally available for the proposed substitution.

The undersigned further states that the function, appearance, and quality of the proposed substitution are equivalent or superior to the specified item.

Submitted by:

Signature:_____Title:_____

License Category: _____ License Number: _____

Firm:_____ Phone No.: _____

Address:_____ Fax No.:_____

Telephone: _____

DISTRICT REPRESENTATIVES REVIEW:

* NO EXCEPTIONS TAKEN * EXCEPTIONS TAKEN (SEE ATTACHED COMMENTS)

* FURNISH AS CORRECTED * REVISE AND RESUBMIT

By: _____

Date:_____

Comments:

Attachments:

SECTION 01 71 23

FIELD ENGINEERING

PART 1 GENERAL

1.01 SUMMARY

A. Layout work as shown on the Drawings with the use of a California Licensed Surveyor and establish additional bench marks, monuments, lines, and levels necessary for the work covered by this Contract.

B. Scope of work:
Provide such field engineering services required for proper completion of the work which may include, but is not limited to:
1. Establishing and maintaining hubs, coordinate grid base lines and levels
2. Structural design of shores, forms, and similar items provided by the contractor as part of his means and methods of construction
3. All excavations and elevations, footings and piers required for installation of work items
4. Establishing horizontal and vertical control for site construction items

C. Related sections can include, but may not be limited to the following:
1. Section 01 33 00 - Submittals
2. Section 01 78 39 – Project Record Drawings

1.02 PROCEDURES

A. In addition to procedures directed by the District for proper performance of the work, the contractor shall:
1. Locate and protect control points before starting work on the site
2. Preserve permanent reference points during progress of the work
3. Not change or relocate reference points or items of the work without specific review and acceptance by the District Representative
4. Promptly advise the District Representative when a reference point is lost or destroyed, or requires relocation because of other changes in the work.
   a. Upon direction of the District Representative, replace reference stakes or markers according to the original or appropriate survey control.

PART 2 PRODUCTS - Not Applicable

PART 3 EXECUTION

3.01 LAYING OUT THE WORK

A. Contractor shall employ a Registered Civil Engineer or Licensed Land Surveyor (hereafter referred to as Surveyor) to lay out the entire work and set grades, lines, levels, and positions throughout the site.

B. Prior to beginning work, locate or set all general reference points, bench marks, establish monuments and take action as necessary to prevent their destruction, then layout all lines, elevations and measurements for entire work.

C. Verify figures and dimensions shown on the Drawings, notify the District Representative immediately of any discrepancies and re-direct work to avoid delay. Contractor shall accept responsibility for all errors resulting from failure to notify District Representative of known discrepancies.

D. Establish monuments on curbs, manholes or pavements with concrete embedded steel pipe with lead plug and/or brass nail with washer, as acceptable to the District Representative.

E. Show exact locations of the monuments if any are disrupted or destroyed on the Record Drawings in conformance with Section 01 78 39 – Project Record Drawings.

END OF SECTION

SECTION 01 77 00

CONTRACT CLOSE-OUT

PART 1 GENERAL

1.01 SUMMARY

A. Scope of work:

This section specifies administrative and procedural requirements for project close-out, that may include but are not necessarily limited to:

1. Inspection and/or observation procedures
2. Project record document submittal
3. Operating and maintenance manual submittal
4. Warranty submittal
5. Final cleaning

B. Related sections can include, but may not be limited to the following:

1. Section 01 33 00 - Submittals
2. All pertinent Sections of the Specifications

1.02 SUBSTANTIAL COMPLETION

A. Refer to the General Conditions as applicable, and section 01 09 00 for procedures required to establish Substantial Completion.

1. Final, regular Certificate for Payment (progress payment) shall be issued when all pertinent requirements of the achieving Substantial Completion are met. Final retention payment shall be made after project Final Acceptance and conclusion of any specified Landscape Maintenance Periods subject to the discretion of the District representative.

B. Inspection Procedures: Upon receipt of a request for inspection or observation, the District representative shall either proceed or advise the Contractor of unfilled requirements. The District representative shall prepare the Certificate of Substantial Completion following review, or advise the contractor of what must be completed or corrected by "punch-list" before the Certificate is issued. Upon receipt of "punch-list", contractor shall complete all work described in a timely manner subject to the discretion of the District Representative.

1. The District representative shall repeat inspection and/or observation when requested provided the contractor has made the request within the specified lead time and given written assurance that the "punch-list" work has been completed.
2. Results of the completed inspection and/or observation shall help form the basis of requirements for Final Acceptance and if acceptable, may signal the beginning of the specified Landscape Maintenance Period.

1.03 UNCORRECTABLE WORK

A. Should the District representative determine it is not practical or possible for the contractor to correct work that is damaged or improperly executed, an equitable deduction from the Contract sum may be made at the sole discretion of the District representative.

1.04 CLOSE-OUT SUBMITTALS

A. Submit two (2) copies of the following, where applicable, in accordance with applicable Contract Documents:

1. Project record documents (as-constructed)
2. Operation and maintenance manuals
3. Warranties, guaranties, and bonds
4. Keys and keying schedule
5. Spare parts and extra materials

6. Other items required by the Specifications
7. Binder of all manufactured items final submittal information that were installed or provided for the project.

B. Specified number of copies of above close-out submittals shall be received and accepted by the District representative before Final Acceptance shall be given.

C. In addition to those items previously mentioned in this section, the contractor shall submit to the District representative the following items before a Notice Of Completion will be filed:
1. Up-to-date sub-contractor list with names, addresses and telephone numbers.

D. Final Adjustment of Account:
1. Submit a final statement of accounting to the District representative showing all adjustments to the Contract sum.

1.05 MAINTENANCE MANUALS

A. Submit two (2) copies of proposed manual(s) to the District representative for review and acceptance. All maintenance manuals shall be received and accepted by the District representative before Final Acceptance shall be given.

B. Organize operating and maintenance data into properly indexed heavy duty 2-inch, 3-ring vinyl covered binders. Mark appropriate identification on front and spine of each binder. Manuals can include but are not limited to the following types of information:
1. Emergency instructions
2. Spare parts list
3. Copies of warranties or actual warranty cards
4. Wiring diagrams
5. Recommended "turn around" cycles
6. Inspection procedures
7. Shop drawings and product data
8. Fixture lamping schedule

C. Product submittal items (1.04-A-7) can be provided with warranty information binders.

1.06 DEMONSTRATION

A. Prior to Final Acceptance, the contractor shall fully instruct District representative's designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment, and systems installed.
1. Provide services of factory trained instructors from the manufacturers of each major item of equipment or system, if necessary or requested by the District representative.

B. Operation and maintenance manual(s) shall be fully described at this instruction meeting.
1. Review contents of manual(s) with personnel in full detail to explain all aspects of operations and maintenance such as:
a. Maintenance manuals
b. Record documents
c. Spare parts and materials
d. Tools
e. Fuels
f. Identification systems
g. Control sequences
h. Hazards
i. Cleaning
j. Warranties and bonds
k. Maintenance agreements and similar continuing commitments.
2. As part of instruction for operating equipment, demonstrate the following procedures:

a. Start-up
b. Shutdown
c. Emergency operations
d. Noise and vibration adjustment
e. Safety procedures
f. Economy and efficiency adjustments
g. Effective energy utilization

1.07 WARRANTY/GUARANTY FORMAT

A. Provide written warranties, guaranties (except manufacturers' standard printed warranties and/or guaranties), addressed to the District representative, in the format shown at the end of this section. Manufacturers' standard printed warranties and/or guaranties shall be submitted as-is.

B. Warranties and guaranties shall be submitted in duplicate, in the attached format, signed by all pertinent parties and by the contractor in every case, with modifications as accepted by the District representative to suit the conditions pertaining to the warranty or guaranty. Collect and assemble written warranties and guaranties into bound booklet form, and deliver bound books to the District representative for review.

1.08 REMOVAL OF TEMPORARY FACILITIES

A. Prior to final inspection, the contractor shall remove tools, materials, sheds, temporary power poles, temporary tree protection, and other articles from the project site. Should the contractor fail to take prompt action, the District representative may, given 30 days written notice, treat them as abandoned property.

1.09 FINAL SITE CLEANING

A. Broom clean and power wash exterior paved surfaces and adjacent public streets. Utilize appropriate cleaning methods to remove spills, stains, tire tracks, etc. from all paved surfaces. Rake clean other surfaces of the site.

B. Hose down and scrub walls and paving surfaces dirtied or stained as a result of the construction work, as directed by the District representative.

C. Remove from the site construction waste, unused materials, excess earth, and debris resulting from the work.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

ATTACHMENT: Warranty/Guaranty Form

WARRANTY/GUARANTY FORM

TO: San Mateo County Community College District
3401 Csm Drive
San Mateo, CA 94402

We, the undersigned, do hereby warranty and guaranty that the parts of the Work described above which we have furnished and/or installed for:

SKYLINE COLLEGE ATHLETIC TEAM ROOM
4200 Farm Hill Blvd
Redwood City, CA 94061

are in accordance with the Contract Documents and that all said work as installed will fulfill or exceed the Warranty and Guaranty requirements. We agree to repair or replace work installed by us, together with any adjacent work which is displaced or damaged by so doing, that proves to be defective in workmanship, material, or operation within a period of one (1) year from the date of Final Acceptance by District representative or from the date of Certificate of Substantial Completion, whichever is the earlier, at no cost to the Owner, ordinary wear and tear and unusual neglect or abuse excepted.

In the event of our failure to comply with the above-mentioned conditions within a reasonable time period determined by the District representative, after notification in writing, we, the undersigned, all collectively and separately, hereby authorize the District representative to have said defective work repaired and/or replaced and made good, and agree to pay to the Owner upon demand all moneys that the District representative may expend in making good said defective work, including all collection costs and reasonable attorney fees.

Date: _____

_____
(Sub-Contractor, Sub-subContractor, Manufacturer or Supplier)

By: _____ _____

Title: _____

State License No.: _____

Local Representative: For maintenance, repair, or replacement service, contact:

Name: _____

Address: _____

Phone Number: _____

SECTION 01 78 39

PROJECT RECORD DRAWINGS

PART 1 GENERAL

1.01 SUMMARY

A. Scope of work:
1. Prepare Project Record Drawings of as-constructed conditions as required by various sections of these Specifications and whenever work is installed differently than as shown in the Construction Documents as bid.
2. Maintain a continually updated Job Set of as-constructed Contract Documents at the job site for review by the District representative at all times.

B. Related sections can include, but may not be limited to the following:
1. Section 33 11 00 – Domestic Water System
2. Section 33 31 00 – Sanitary Sewerage

1.02 REFERENCES AND REGULATORY REQUIREMENTS

A. State of California Department of Transportation Standard Specifications, Current Edition

1.03 SUBMITTALS

A. Submit full Job Set to District representative for review and acceptance prior to preparation of final Project Record Drawings.

B. After acceptance, prepare and submit final Project Record Drawings to District representative at Contract Close-Out. Final Record Drawings shall be received prior to Final Acceptance.

1.04 QUALITY ASSURANCE

A. Job Set maintenance shall be delegated to one person on contractor's staff who will be present at all meetings.

B. Final Record Drawings shall be clearly drafted by a competent draftsperson on reverse-reading erasable sepia mylar sheets

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store Job Set separate from Construction Document sets in a safe fire-resistant location.

B. Protect Job Set and completed final Record Drawings from damage at all times.

C. Maintain all documents in neat, legible condition.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 MAINTENANCE OF JOB SET

A. Clearly mark the designated Contract Documents as "Job Set."

B. Record all deviations from the "as-bid" Contract Documents onto Job Set daily prior to covering of all work that has deviated.

C. Convert schematic lay-outs to portray precise physical lay-out (including depths) of all exposed and concealed work.

D. Clearly identify deviations by drawing a "cloud" around affected area and make sufficient notations to describe the change.

E. Contractor shall solely bear any cost of uncovering, recording and re-covering work not recorded on Job Set.

3.02 FINAL RECORD DOCUMENTS

A. Submit Job Set for review and acceptance by the District representative prior to preparing final Record Drawings.

B. After acceptance by District representative, the contractor shall cleanly and clearly draft, on the non-erasable side of the sheet, all information contained in the accepted Job Set. The final Record Drawing sheet material shall be as specified above in 1.04 - Quality Assurance. One set of reproducible Drawings shall be provided for the contractor by the District representative at no cost.

C. Deliver the Job Set and mylar final Record Drawings, plus one set of prints of final Record Drawings to the District representative prior to Final Acceptance.

END OF SECTION

SECTION 02 41 00

SITE CLEARING AND DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, equipment, facilities, transportation and services to complete all site clearing and demolition work plus all related activities as shown on the Drawings and/or specified herein.

B. Scope of work: The general extent of the site clearing and demolition work is shown on the Drawings and can include, but is not necessarily limited to the following:
1. Demolition, removal and disposal of designated items
2. Careful removal, protection and re-installation of designated items
3. Disconnection and capping of existing utility and/or irrigation lines
4. Incidental demolition of abandoned utility and irrigation lines
5. Protection of existing plant material

C. Related sections can include, but may not be limited to:
1. Section 33 11 00 – Domestic Water System
2. Section 33 31 00 – Sanitary Sewerage

1.02 REFERENCES AND REGULATORY REQUIREMENTS

A. State of California Department of Transportation Standard Specifications, Current Edition

1.03 SUBMITTALS

A. Conform to requirements of Section 01 33 00 Submittals and/or applicable General Conditions and Special Provisions.

B. Indicate the proposed time line for site clearing and demolition work including all required shut off times and capping of utility services on the project schedule.

C. Provide product information on herbicides to be used for approval prior to use.

1.04 QUALITY ASSURANCE

A. The District shall obtain and pay for all permits required in connection with this work. Fees for the dumping of debris shall be paid for by the Contractor.

1.05 PROJECT CONDITIONS

A. Dust Control:
1. The contractor shall, at all times, prevent the formation of airborne dust on and around the project site with the use of sprinkled water or other means acceptable to the District representative. Non-compliance with proper dust control measures shall be grounds for issuance of "stop work" orders by the District representative until such time as satisfactory measures are implemented.

B. Utility Services:
1. Issue written notices of planned demolition operations to utility companies and coordinate

site clearing and demolition improvements as requested by said utility companies.

2. Existing power poles and lines serving existing occupied buildings shall remain. Arrange all necessary work in order to maintain utilities not designated for removal.
3. Coordinate work in order to maintain utilities to any applicable temporary on-site facilities.

PART 2 PRODUCTS

2.01 Herbicides

A. All herbicides shall conform to District approved chemicals list.

B. Herbicide shall be non-selective broad spectrum systemic herbicide for perennial vegetation and straight contact herbicide for annual vegetation in accordance with a licensed pest control advisor or herbicide manufacturer's recommendations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Conform to Section 01 45 00 - Quality Control (as applicable).

B. Carefully identify limits of demolition.

C. Mark project areas as directed by the District representative and as necessary to clearly identify the interface of items to be removed and items to be left in place intact.

3.02 PREPARATION

A. Protection:
1. Make provisions and take necessary precautions to protect all existing items not designated for removal. Any existing item or area damaged during construction operations shall be replaced or repaired to an "as-was" or better condition at no additional cost to the project and subject to the acceptance of the District representative.
2. Erect barriers, fences, guard rails, enclosures, chutes, and shoring as necessary to protect personnel, structures, and utilities remaining intact.
3. Provide warning signs and lighting as necessary for vehicular and personnel protection. Maintain warning signs during construction as required by applicable safety ordinances and as reasonably prudent.
4. Coordinate arrangements for items to be salvaged and turned over to the District.
5. Notify Underground Service Alert (USA), (800) 642-2444, and local utility companies to verify locations of existing utilities a minimum of 48 hours prior to beginning work.
6. Provide tree protection fencing prior to any demolition work.

B. Traffic Access:
1. Ensure minimum interference with roads, streets, driveways, sidewalk and adjacent facilities.
2. Do not close or obstruct streets, sidewalk, alleys or passageways without acceptance from the District representative.
3. Provide approved alternate routes around closed or obstructed traffic ways as required by the District representative.
4. Maintain access to adjacent existing buildings to ensure uninterrupted operations during demolition work.

3.03 DEMOLITION

A. General:
   1. Refer to drawings for extent of demolition work.

B. Paving:
   1. Demolish paving in accordance with local noise ordinance regulations and as acceptable to the District representative.

C. Filling:
   1. Completely fill below-grade areas and voids resulting from demolition work. Install appropriate, acceptable fill material consisting of soil, gravel or sand, free of trash and debris, stones over 6" diameter, roots or other organic matter. Meet compaction requirements as specified.

D. Other:
   1. If unanticipated mechanical, electrical or structural elements which conflict with intended function or design are encountered, investigate and measure both the nature and extent of the conflict. Submit report to District representative in written, accurate detail. Pending receipt of directive from District representative, rearrange selective demolition schedule as necessary to continue overall job progress without delay.

E. Utilities and Related Equipment:
   1. The locations of existing utilities, as may be shown on the Drawings, are approximate. Should existing utilities not shown on the Drawings be encountered during construction operations, notify the District representative immediately, and re-direct work to avoid delay. The District representative shall then determine what action, if any, is required.
   2. Remove all abandoned utilities as indicated and as uncovered by the work, and terminate in a manner conforming to code.
   3. Remove and salvage designated items and related equipment and deliver to a location acceptable to the District representative.

F. Underground Piping:
   1. Existing storm drain and irrigation systems, as may be shown on the Drawings, may be modified to allow for construction of new items as a part of this project. Caution shall be exercised so as not to damage underground piping not scheduled for removal.
   2. Remove underground piping as indicated, or as necessary, and backfill to designated compaction density.
   3. Manholes and lines scheduled for removal which connect to active systems shall have their active remaining portions capped, plugged, or blind-flanged as appropriate.
   4. Materials used for pipe terminations and temporary connections shall be the same as the existing lines. Fittings and flanges shall be of weight and class suitable for the service in which used.

3.04 SALVAGE

A. Demolition:
   1. Materials or equipment to be demolished shall become the property of the Contractor except for items specified to be salvaged for the District.
   2. Carefully remove items to be salvaged to avoid damage.
   3. Irrigation heads, valves and existing controller shall be salvaged and provided to District. Contractor shall clean and box items. Items shall be returned to District corporation yard.

B. Replacement:

1. In the event items not scheduled to be demolished are damaged, promptly replace or repair such items to an as-was or better condition per the discretion of the District representative at no additional cost.

C. Materials scheduled for removal shall not be placed on view to prospective purchasers or sold on site.

3.05 CLEANING

A. Debris and Rubbish:

1. Remove and transport debris and rubbish as it accumulates and dispose in a legal manner via recognized haul routes per Section 01 50 00, in a manner that will prevent spillage on streets or adjacent areas.
2. Remove all tools, equipment and appliances used for demolition from the site upon completion of the work.
3. Clean entire project area, adjacent streets, and pavements to a broom-clean, "stain-free" condition per the discretion of the District representative.

END OF SECTION

SECTION 22 11 16

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes domestic water piping from locations indicated to fixtures and equipment inside the building and site water utility distribution piping.

1.3 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing domestic water piping systems with the following minimum working-pressure ratings, unless otherwise indicated:

1. Domestic Water Service Piping: 160 psig
2. Domestic Water Distribution Piping: 125 psig

1.4 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Water Samples: Specified in "Cleaning" Article in Part 3.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

B. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.2 COPPER TUBING

A. Hard Copper Tube: ASTM B 88, Types K and L (ASTM B 88M, Types A and B), water tube, annealed temper.
   1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
   2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
   3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

B. Hard Copper Tube: ASTM B 88, Types L and M (ASTM B 88M, Types B and C), water tube, drawn temper.
   1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought- copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
   2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
   3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
   4. Copper, Grooved-End Fittings: ASTM B 75 (ASTM B 75M) copper tube or ASTM B 584 bronze castings.
      a. Copper-Tubing, Keyed Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.

2.3 VALVES

A. Two-piece, full port, bronze ball valves with stainless steel trim

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 31 Section "Utility Trenching" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground piping, unless otherwise indicated.

C. Grooved joints may be used on aboveground grooved-end piping.

D. Fitting Option: Mechanically formed tee-branch outlets and brazed joints may be used on aboveground copper tubing.

E. Underground Domestic Water Service Piping: Use the following piping materials for each size range:

1. NPS 2 (DN 50) and Smaller: Hard copper tube, Type K; copper pressure fittings; and soldered joints.
2. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): Hard copper tube, Type K; copper pressure fittings; and soldered joints.

F. Aboveground Domestic Water Piping: Use the following piping materials for each size range:
1. NPS 1-1/2 (DN 40) and Smaller: Hard copper tube, Type L; copper pressure fittings; and soldered joints.
2. NPS 2 (DN 50): Hard copper tube, Type L; copper pressure fittings; and soldered joints.
3. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): Hard copper tube, Type L; copper pressure fittings; and soldered joints.

G. Underground Domestic Water Piping NPS 4 (DN 100) and Smaller: Hard copper tube, Type K; copper pressure fittings; and soldered joints.

3.3 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
1. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 (DN 50) and smaller.

3. 4 PIPING INSTALLATION

A. Extend domestic water service piping to exterior water distribution piping in sizes and locations indicated.

B. Install shutoff valve and hose-end drain valve at each domestic water service.

C. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.

D. Perform the following steps before operation:
1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
5. Remove and clean strainer screens. Close drain valves and replace drain plugs.
6. Remove filter cartridges from housings, and verify that cartridges are as specified for application where used and that cartridges are clean and ready for use.

3.5 JOINT CONSTRUCTION

A. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.6 VALVE INSTALLATION

A. Install sectional valve close to water main on each branch and riser serving plumbing fixtures or equipment. Use ball or gate valves for piping NPS 2 (DN 50) and smaller.

B. Install shutoff valve on each water supply to equipment and on each water supply to plumbing fixtures without supply stops. Use ball or gate valves for piping NPS 2 (DN 50) and smaller.

3.7 HANGER AND SUPPORT INSTALLATION

A. Refer to Smacna seismic restraint manual guidelines.

3.8 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect domestic water piping to exterior water service piping. Use transition fitting to join dissimilar piping materials.

3.9 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:
   1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
   2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
      a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
      b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
   3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
   4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test domestic water piping as follows:
   1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
   2. Leave uncovered and unconcealed new, altered, extended, or replaced domestic water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   3. Cap and subject piping to static water pressure of 100 psig Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
   4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
   5. Prepare reports for tests and required corrective action.

3.10 CLEANING

A. Clean and disinfect domestic water piping including all existing site domestic water system as follows:
   1. Purge new piping and parts of existing domestic water piping that have been altered, extended, installed or repaired before using.
   2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:
      a. Flush piping system with clean, potable water until dirty water does not appear at outlets.

B. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 22 11 16

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SECTION 22 13 16

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes soil and waste, sanitary drainage and vent piping inside and outside the building and to locations indicated.

1.3 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
   1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa).

1.4 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

PART 2 - PRODUCTS

2.1 CAST-IRON SOIL PIPING

A. Hubless Pipe and Fittings: ASTM A 888 or CISPI 301.
   1. Couplings: ASTM C 1277 assembly of metal housing, corrosion-resistant fasteners, and ASTM C 564 rubber sleeve with integral, center pipe stop.
      a. Heavy-Duty, Type 304, Stainless-Steel Couplings: ASTM A 666, Type 304, stainless-steel shield; stainless-steel bands; and sleeve.
         (1) NPS 1-1/2 to NPS 4 (DN 40 to DN 100): 3-inch- (76-mm-) wide shield with 4 bands.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Aboveground, Soil, Waste, and Vent Piping: Use the following piping materials for each size range:
   1. NPS 1-1/4 and NPS 1-1/2 (DN 32 and DN 40): Use NPS 1-1/2 (DN 40) hubless, cast-iron soil piping and one of the following:
      a. Couplings: Heavy-duty, Type 304, stainless steel.
   2. NPS 2 to NPS 4 (DN 50 to DN 100): Hubless, cast-iron soil piping and one of the following:
      a. Couplings: Heavy-duty, Type 304, stainless steel.

B. Underground, Soil, Waste, and Vent Piping: Use the following piping materials for each size range:
   1. NPS 1-1/2 (DN 40): Hubless, cast-iron soil piping and one of the following:
      a. Couplings: Heavy-duty, Type 304, stainless steel.
   2. NPS 2 to NPS 4 (DN 50 to DN 100): Hubless, cast-iron soil piping and one of the following:
      a. Couplings: Heavy-duty, Type 304, stainless steel.

3.2 PIPING INSTALLATION

A. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

B. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

C. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

D. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
   1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
   2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
   3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

E. Install engineered soil and waste drainage and vent piping systems in locations indicated and as follows:
   1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.

F. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.

G. Do not install cleanouts at flooring transitions.

H. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.3 JOINT CONSTRUCTION

A. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

   1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
   2. Hubless Joints: Make with rubber gasket and sleeve or clamp.

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to portable plumbing utilities stub-outs. Use transition fitting to join dissimilar piping materials.

3.7 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

   1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.

1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

3.8 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 22 13 16

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SECTION 26 00 00
ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 CONDITIONS AND REQUIREMENTS

A. Refer to the General Conditions, Supplementary Conditions and Division I - General Requirements, and the drawings. The Contractor, shall read the conditions and be responsible for, and governed by, all requirements thereunder. This Condition applies to all Sections of Specification Division 26.

1.2 REGULATIONS

A. The Contractor shall give required notices to the building inspectors, the Engineer and the Owner and comply with laws, ordinances, rules and regulations applicable to the work and safety. Authorities include, but are not limited to:

1. The latest revision of the State of California Electrical Code.
2. The applicable Rules and Regulations of the National Fire Protection Association.
3. State Fire Marshal.
4. Underwriters Laboratories.
5. Any other applicable Federal, State, County or City Codes or Regulations, including O.S.H.A.

B. Nothing in these Drawings or Specifications shall be construed to permit work not conforming to the above Regulations and Codes.

1.3 DRAWINGS AND SPECIFICATIONS

A. Drawings are diagrammatic and indicate the general arrangement of equipment and wiring. Exact requirements shall be governed by architectural, structural and mechanical conditions of the job. Consult other drawings in preparation of the bid.

B. Extra lengths of wiring or pull boxes or junction boxes, etc., necessitated by conditions shall be included in the bid. Report any apparent discrepancies before submitting bid.

C. Right is reserved by the Owner to make changes of up to ten feet in location of any outlet or equipment prior to roughing-in without increasing contract cost.

1.4 EXAMINATION OF SITE

A. The Contractor shall examine the site and the existing conditions and make allowances for them in preparing his proposal. In the event of discrepancies between existing conditions and the Drawings, the Contractor shall report such discrepancies prior to bid and bid the conditions necessary to complete the job and to provide a fully operable and acceptable systems.

B. Extra charges will not be allowed for work that must be provided when it was apparent from a pre-bid inspection of the premises, even though the work is not shown on the drawings or called for in the Specification.

1.5 RECORD DRAWINGS AND SYSTEM OPERATION AND MAINTENANCE

A. Refer to Division 1 Sections "Closeout Procedures", "Operation and Maintenance Data", "Project Record Documentation" and "Demonstration and Training".

1.6 SHOP DRAWING AND MATERIAL LIST

A. Refer to Division 1 Sections "Submitall Procedures".

1.7 OPERATING AND MAINTENANCE MANUALS

A. Refer to Division 1 Sections "Operation and Maintenance Data".

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Receive, store and handle materials in a manner to prevent damage. Costs of damage shall be borne by the Contractor.

B. Protect equipment from weather (rain, sunshine, winds), water vapors, theft, and vehicular traffic.

PART 2 - PRODUCTS

2.1 MATERIAL APPROVAL

A. The design, manufacture and testing of electrical equipment and materials shall conform to or exceed latest applicable NEMA, IEEE, ANSI, and U.L. Standards.

B. Materials shall be new and bear Underwriters Laboratories (UL) label or other accepted testing laboratory certification. Materials that are not labeled by U.L. shall be tested and approved by an independent testing laboratory or a governmental agency acceptable to the Engineer, Owner and code enforcing authority.

PART 3 - EXECUTION

3.1 WORKMANSHIP AND CONTRACTOR'S QUALIFICATIONS

A. Installation of parts and connection of parts into systems shall be completed by skilled electrical journeymen. Material assemblies and installation work shall be securely fastened to structure, attractive in appearance and safe to operate. Provide code required clearance about electrical equipment. Assembly work or installations that are improper, unsafe or unattractive shall be removed and replaced with satisfactory work at no additional cost to the Owner.

B. Provide a foreman or superintendent in charge of this work at all times.

3.2 COORDINATION

A. Coordinate work with other trades to avoid conflict and to provide correct rough-in and connection for equipment furnished by other trades. Inform other trades Sub-contractors of the required access to, and clearances around, electrical equipment to maintain serviceability and code compliance.

B. Verify equipment dimensions and requirements. Check actual job conditions before installing work. Report necessary changes in design to Construction Manager in time to prevent needless work. Changes,

or additions subject to additional compensation, which are made without written authorization and an agreed price, shall be at Contractor's risk and expense.

3.3 MANUFACTURER'S INSTRUCTIONS

A. Where the specifications call for an installation to be made in accordance with Manufacturer's recommendations, a copy of such recommendations shall at all times be kept in the job superintendent's office and shall be available to the Owner's representative.

B. Follow manufacturer's instructions where they cover points not specifically indicated on drawings and specifications. If instructions are in conflict with the drawings and specifications, obtain clarification from the Engineer before starting work.

3.4 QUALITY ASSURANCE

A. Provide a Quality Assurance program. These specifications set forth the minimum acceptable requirements. The specifications do not prohibit the Contractor from executing other Quality Assurance measures which can improve the operating facility, improve the construction schedule, and conserve energy within the scope of this project.

B. The Contractor shall insure that workmen's practices, materials employed, equipment and methods of installation conform to accepted construction and engineering practices, and that each piece of equipment can satisfactorily perform its functional operation.

3.5 CLOSING IN UNINSPECTED WORK

A. The Contractor shall not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested and/or approved. Field observations made by the architect or engineer do not waive the inspections required by the contract documents.

B. Should a portion of the work be enclosed or covered up prior to inspection and testing, the contractor shall uncover the work at his own expense, and after it has been tested, inspected and approved, make repairs with such materials as may be necessary to restore the uncovered work to its intended condition.

3.6 PRELIMINARY OPERATION

A. Should the Owner request that a portion of the plant, apparatus or equipment be operated prior to final completion and acceptance of the work, the Contractor shall consent, and such operation shall be under the supervision and direction of the Contractor, but expense thereof shall be paid by the Owner, separate and distinct from money paid on account of the Contract. Such preliminary operation and payment thereof shall not be construed as an acceptance of that portion of the work in this Contract.

3.7 ACCEPTANCE DEMONSTRATION

A. Refer to Division 1 Section "Demonstration and Training".

B. The system demonstrations shall be made by this Contractor in the presence of the District's facilities manager or his designated representative and the manufacturer's representative.

C. Demonstrate the function (in the structure) of each system and indicate its relationship to the single line diagrams and drawings.

D. Demonstrate by "start-stop operation", the controls, how to reset protective devices, how to replace fuses and what to do in case of emergency.

E. Demonstrate how maintenance and spare parts manuals are related to the equipment and systems installed.

3.8 TESTS

A. Where the Contract Documents, laws, ordinances or any public authority requires any work to be tested specifically or reviewed by another authority, the Contractor shall give the Engineer/Owner timely notice of readiness therefor. The Contractor shall give the Engineer/Owner the test results for review. If any work to be tested is covered up without written approval or consent of the Architect, it must, if directed by the Architect, be uncovered for examination at the Contractor's expense.

B. The cost of all such tests shall be borne by the Contractor.

C. Any work which fails to meet the requirements of any test or any work which does not meet the requirements of the Contract Documents shall be considered defective and may be rejected. Rejected work shall be corrected promptly by the Contractor or removed from the site.

D. Provide written test reports for each test to the Engineer for review.

END OF SECTION 26 00 00

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SECTION 26 05 00
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Supporting devices for electrical components.
2. Cutting and patching for electrical construction.
3. Touchup painting.

1.3 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

C. Coordinate electrical service connections to components furnished by utility companies.

1. Coordinate installation and connection of exterior underground services, including provision for electricity-metering components.
2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.

D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 SUPPORTING DEVICES

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch diameter slotted holes at a maximum of 2 inches o.c., in webs.

1. Channel Thickness: Selected to suit structural loading.
2. Fittings and Accessories: Products of the same manufacturer as channel supports.

D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

E. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

F. Expansion Anchors: Carbon-steel wedge or sleeve type.

G. Toggle Bolts: All-steel springhead type.

2.2 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

E. Coordination: Coordinate with work of other trades, especially other utilities routes and clearances required to properly provide work.

3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations and Outdoors: Hot-dip galvanized materials, U-channel system components.

B. Dry Locations: Steel materials.

C. Support Clamps for PVC Raceways: Click-type clamp system.

D. Selection of Supports: Comply with manufacturer's written instructions.

E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four (4); minimum of 200-lb design load.

3.3 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze or bracket-type hangers.

D. Size supports for multiple raceway installations, so capacity can be increased by a 25 percent minimum in the future.

E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

F. Install 1/4-inch diameter or larger threaded steel hanger rods, unless otherwise indicated.

G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.

H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

I. Simultaneously install vertical conductor supports with conductors.

J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceways with an approved fastener not more than 24-inches from the box.

K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.

L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

1. Wood: Fasten with wood screws or screw-type nails.
2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
3. New Concrete: Concrete inserts with machine screws and bolts.
4. Existing Concrete: Expansion bolts.
5. Steel: Welded threaded studs or spring-tension clamps on steel.
    a. Field Welding: Comply with AWS D1.1.
6. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
7. Light Steel: Sheet-metal screws.

8. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.4 FIRESTOPPING

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping."

3.5 CUTTING AND PATCHING

A. Refer to Division 1 Sections “Cutting and Patching” and “Through-Penetration Firestop Systems”.

B. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

C. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new firepstopping where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.6 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Supporting devices for electrical components.
2. Electrical demolition.
3. Cutting and patching for electrical construction.
4. Touchup painting.

3.8 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touchup paint. Paint materials and application requirements are specified in Division 9 Section "Painting."

1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

B. Remove and replace with new items damaged beyond repair or refinishing.

3.9 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations, and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 26 05 00

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SECTION 26 05 23
CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field Quality-Control Test Reports: From a qualified testing and inspecting agency engaged by Contractor.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the International Electrical Testing Association and that is acceptable to authorities having jurisdiction.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

1. American Insulated Wire Corp.; a Leviton Company.
2. General Cable Corporation.
3. Okonite Wire & Cable Company.
4. Southwire Company.

B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

C. Conductor Material: Copper complying with NEMA WC 5; stranded conductor.

D. Conductor Insulation Types: Type THHN-THWN complying with NEMA WC 5.

2.3 CONNECTORS AND SPLICES

A. Manufacturers:

1. AFC Cable Systems, Inc.
2. AMP Incorporated/Tyco International.
3. Hubbell/Anderson.
4. O-Z/Gedney; EGS Electrical Group LLC.
5. 3M Company; Electrical Products Division.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

A. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

B. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

C. Feeders Concealed in Concrete and Below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.

D. Exposed Branch Circuits: Type THHN-THWN, single conductors in raceway.

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

F. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.

G. Fire Alarm Circuits: Refer to Section 28 31 00 – Fire Alarm Sysrtem.

3.2 INSTALLATION

A. All conductors and cables shall be installed in raceways.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Seal around conduits penetrating fire-rated elements according to Division 7 Section "Through-Penetration Firestop Systems."

E. Open cable installed above accessible ceiling space shall be supported by metallic J-hooks. No stapling is allowed. Staples used shall be removed and cable conductivity shall be tested by contractor at contractor's cost.

3.3 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

B. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.4 FIELD QUALITY CONTROL

A. Testing: Engage a qualified testing agency to perform the following field quality-control testing:

1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

B. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 26 05 23

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SECTION 26 05 26
GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Ground rods and ground rod well.
2. Fittings.

B. Field Test Reports: Submit written test reports to include the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the InterNational Electrical Testing Association and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1. Comply with UL 467.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Grounding Conductors, Cables, Connectors, and Rods:

a. Apache Grounding/Erico Inc.
b. Chance/Hubbell.
c. Copperweld Corp.
d. Erico Inc.; Electrical Products Group.
e. Framatome Connectors/Burndy Electrical.
f. Galvan Industries, Inc.
g. Ideal Industries, Inc.
h. ILSCO.
i. Kearney/Cooper Power Systems.
j. Korns: C. C. Korns Co.; Division of Robroy Industries.
k. O-Z/Gedney Co.; a business of the EGS Electrical Group.
l. Raco, Inc.; Division of Hubbell.
m. Superior Grounding Systems, Inc.
n. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 26 Section "Conductors and Cables."

B. Equipment Grounding Conductors: Insulated with green-colored insulation.

C. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.

D. Grounding Electrode Conductors: Stranded cable.

E. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

F. Bare Copper Conductors: Comply with the following:

1. Solid Conductors: ASTM B 3.
2. Assembly of Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.

G. Copper Bonding Conductors: As follows:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.
2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.

3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

H. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulators.

2.3 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel.

1. Size: 5/8 inch in diameter and 96 inches in length.

B. Test Wells: Provide handholes "Christy" G5 or equal, with cast iron traffic lid and hold down screws.

PART 3 - EXECUTION

3.1 APPLICATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.

D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

E. Ground Rod Clamps at Test Wells: Use bolted pressure clamps with at least two bolts.

F. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Use insulated spacer; space 1 inch from wall and support from wall 6 inches above finished floor, unless otherwise indicated.

3.2 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment grounding conductors in all feeders and branch circuits.

C. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.

D. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch grounding bus.
2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

3.3 INSTALLATION

A. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.

1. Drive ground rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.
2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.

B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.

F. Install one test well for each service at the ground rod electrically closest to the service entrance. Set top of well flush with finished grade or floor.

G. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70, Paragraph 250-81(c), using a minimum of 20 feet of bare copper conductor not smaller than

No. 4 AWG. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor to the main ground bus in the electrical room.

3.4 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and ground rods.

F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

G. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

H. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 UNDERGROUND DISTRIBUTION SYSTEM GROUNDING

A. Manholes and Handholes: Install a driven ground rod close to wall and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide a No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through

concrete floor with a double wrapping of pressure-sensitive tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, nonshrink grout.

B. Connections to Manhole Components: Connect exposed-metal parts, such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields as recommended by manufacturer of splicing and termination kits.

3.6 FIELD QUALITY CONTROL

A. Testing: Engage a qualified testing agency to perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.
3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

    a. Equipment Rated 500 kVA and Less: 10 ohms.
    b. Equipment Rated 500 to 1000 kVA: 5 ohms.
    c. Manhole Grounds: 10 ohms.

4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect and Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

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SECTION 26 05 33
RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. Related Sections include the following:

1. Divisions 26, 27 and 28 Section "Basic Electrical Materials and Methods", "Security System", "Fire Alarm System", "Paging and Clock System" and "Data / Telephone System for supports, anchors, and identification products.
2. Division 26 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. LFMC: Liquidtight flexible metal conduit.

E. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Product Data: For conduit, fittings, surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with existing conditions and work of other trades.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 METAL CONDUIT AND TUBING

A. Available Manufacturers:

1. AFC Cable Systems, Inc.
2. Alflex Inc.
3. Anamet Electrical, Inc.; Anaconda Metal Hose.
4. Electri-Flex Co.
5. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
6. LTV Steel Tubular Products Company.
7. Manhattan/CDT/Cole-Flex.
8. O-Z Gedney; Unit of General Signal.
9. Wheatland Tube Co.

B. Rigid Steel Conduit: ANSI C80.1.

C. IMC: ANSI C80.6.

D. EMT and Fittings: ANSI C80.3.

1. Fittings: Compression type.

E. FMC: Aluminum.

F. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

A. Available Manufacturers:

1. American International.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. Arnco Corp.
4. Cantex Inc.
5. Carlon.
6. Certainteed Corp.; Pipe & Plastics Group.
7. Condux International.
8. ElecSYS, Inc.
9. Electri-Flex Co.
10. Lamson & Sessions; Carlon Electrical Products.

11. Manhattan/CDT/Cole-Flex.
12. RACO; Division of Hubbell, Inc.
13. Thomas & Betts Corporation.

B. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.

C. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

2.4 METAL WIREWAYS

A. Available Manufacturers:

1. Hoffman.
2. Square D.

B. Material and Construction: Sheet metal sized and shaped as indicated, NEMA 1.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

E. Wireway Covers: Screw-cover type.

F. Finish: Manufacturer's standard enamel finish.

2.5 SURFACE RACEWAYS

A. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC compound with matte texture and manufacturer's standard bright white color.

1. Manufacturers:

a. Walker Systems, Inc.; Wiremold Company (The).
b. Wiremold Company (The); Electrical Sales Division.

B. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.

2.6 BOXES, ENCLOSURES, AND CABINETS

A. Available Manufacturers:

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. Emerson/General Signal; Appleton Electric Company.
3. Erickson Electrical Equipment Co.
4. Hoffman.
5. Hubbell, Inc.; Killark Electric Manufacturing Co.
6. O-Z/Gedney; Unit of General Signal.

7. RACO; Division of Hubbell, Inc.
8. Robroy Industries, Inc.; Enclosure Division.
9. Scott Fetzer Co.; Adalet-PLM Division.
10. Spring City Electrical Manufacturing Co.
11. Thomas & Betts Corporation.
12. Walker Systems, Inc.; Wiremold Company (The).
13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.

D. Floor Boxes: Cast metal, fully adjustable, rectangular. Walker Omni box, RFB 4 or equal as indicated.

E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

F. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

G. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

2.7 FACTORY FINISHES

A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard prime-coat finish ready for field painting.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors:

1. Exposed: Rigid steel or IMC.
2. Concealed: Rigid steel or IMC.
3. Underground, Single Run: RNC.
4. Underground, Grouped: RNC.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R.

B. Indoors:

1. Exposed: EMT.
2. Concealed: EMT.

3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations.
4. Damp or Wet Locations: Rigid steel conduit.
5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:

    a. Damp or Wet Locations: NEMA 250, Type 4.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

A. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

B. Complete raceway installation before starting conductor installation.

C. Support raceways as specified in Division 26 Section "Basic Electrical Materials and Methods."

D. Install temporary closures to prevent foreign matter from entering raceways.

E. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.

F. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

1. Install concealed raceways with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.

H. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least 2 inches of concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
2. Space raceways laterally to prevent voids in concrete.
3. Run conduit larger than 1-inch trade size parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
4. Change from rigid nonmetallic conduit to rigid steel conduit or IMC before rising above the floor.

I. Raceways below Slabs: Install in base rock below slab where practical and leave at least 2 inches of base rock cover.

J. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.

1. Run parallel or banked raceways together on common supports.
2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

K. Join raceways with fittings designed and approved for that purpose and make joints tight.

1. Use insulating bushings to protect conductors.

L. Terminations:

1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

M. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 18 inches of slack at each end of pull wire.

N. Telephone and Signal System Raceways, 2 Inch Trade Size and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

O. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.

P. Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and semi recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.

Q. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.

R. Set floor boxes level and flush with finished floor surface.

S. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.3 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

B. Remove and replace with new any item damaged beyond repair or refinishing.

3.4 CLEANING

A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION 26 05 33

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SECTION 26 05 53
ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes electrical identification materials and devices required to comply with ANSI C2, NFPA 70, OSHA standards, and authorities having jurisdiction.

1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Schedule of Nomenclature: An index of electrical equipment and system components used in identification signs and labels.

PART 2 - PRODUCTS

2.1 RACEWAY AND CABLE LABELS

A. Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

1. Color: Black letters on orange field.
2. Legend: Indicates voltage and service.

B. Adhesive Labels: Preprinted, flexible, self-adhesive vinyl with legend overlaminated with a clear, weather- and chemical-resistant coating.

C. Pretensioned, Wraparound Plastic Sleeves: Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the line it identifies and arranged to stay in place by pretensioned gripping action when placed in position.

D. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

E. Underground-Line Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape.

1. Not less than 6 inches wide by 4 mils thick.
2. Compounded for permanent direct-burial service.
3. Embedded continuous metallic strip or core.
4. Printed legend indicating type of underground line.

F. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

G. Brass or Aluminum Tags: 2 by 2 by 0.05 inch metal tags with stamped legend, punched for fastener.

2.2 NAMEPLATES AND SIGNS

A. Safety Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.

B. Engraved Plastic Nameplates and Signs: Engraving stock, melamine plastic laminate, minimum 1/16 inch thick for signs up to 20 sq. in. and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.

C. Baked-Enamel Signs for Interior Use: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for the application. 1/4-inch grommets in corners for mounting.

D. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for the application. 1/4-inch grommets in corners for mounting.

E. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32, stainless-steel machine screws with nuts and flat and lock washers.

2.3 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon cable ties.

1 Minimum Width: 3/16 inch.
2. Tensile Strength: 50 lb minimum.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: According to color-coding.

B. Paint: Formulated for the type of surface and intended use.

1. Primer for Galvanized Metal: Single-component acrylic vehicle formulated for galvanized surfaces.
2. Primer for Concrete Masonry Units: Heavy-duty-resin block filler.
3. Primer for Concrete: Clear, alkali-resistant, binder-type sealer.
4. Enamel: Silicone-alkyd or alkyd urethane as recommended by primer manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Identification Materials and Devices: Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations with corresponding designations in the Contract Documents or with those required by codes and standards. Use consistent designations throughout Project.

C. Sequence of Work: If identification is applied to surfaces that require finish, install identification after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before applying.

E. Install painted identification according to manufacturer's written instructions and as follows:

1. Clean surfaces of dust, loose material, and oily films before painting.
2. Prime surfaces using type of primer specified for surface.
3. Apply one intermediate and one finish coat of enamel.

F. Caution Labels for Indoor Boxes and Enclosures for Power and Lighting: Install pressure-sensitive, self-adhesive labels identifying system voltage with black letters on orange background. Install on exterior of door or cover.

G. Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communication lines, install continuous underground plastic line marker located directly above line at 12 inches below finished grade. Where width of multiple lines installed in a common trench does not exceed 16 inches overall, use a single line marker.

H. Color-Coding of Secondary Phase Conductors: Use the following colors for phase conductors:

1. 208/120-V Conductors:

a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.
d. Neutral: White
e. Ground: Green.

2. 480/277-V Conductors:

a. Phase A: Brown.
b. Phase B: Orange.
c. Phase C: Yellow.
d. Neutral: Grey
e. Ground: Green.

3. Factory apply color the entire length of conductors, except the following field-applied, color-coding methods may be used instead of factory-coded wire for sizes larger than No. 10 AWG.

a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Use 1-inch wide tape in colors specified. Adjust tape bands to avoid obscuring cable identification markings.

b. Colored cable ties applied in groups of three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten to a snug fit, and cut off excess length.

I. Power-Circuit Identification: Metal tags or aluminum, wraparound marker bands for cables, feeders, and power circuits in vaults, pull and junction boxes, manholes, and switchboard rooms.

1. Legend: 1/4 inch steel letter and number stamping or embossing with legend corresponding to indicated circuit designations.
2. Tag Fasteners: Nylon cable ties.
3. Band Fasteners: Integral ears.

J. Apply identification to conductors as follows:

1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.
2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color-coding to identify circuits' voltage and phase.
3. Multiple Control and Communication Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.

K. Apply warning, caution, and instruction signs as follows:

1. Warnings, Cautions, and Instructions: Install to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

L. Device Identification Labels: Adhesive Labels: Preprinted, flexible, self-adhesive vinyl with legend overlaminated with a clear, weather- and chemical-resistant coating. Install on each device cover of power receptacles, switches and tele/data outlets with feeder source (i.e. panelboard, MDF, IDF) and circuit number information.

M. Equipment Identification Labels: Engraved plastic laminate. Install on each unit of equipment, including central or master unit of each system. This includes power, lighting, communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Unless otherwise indicated, provide a single line of text with 1/2-inch high lettering on 1-1/2-inch high label; where two lines of text are required, use labels 2 inches high. Use white lettering on black field. Apply labels for each unit of the following categories of equipment using mechanical fasteners:

1. Switchboard, distribution panel, branch circuit panelboards, electrical cabinets, and enclosures.
2. Branch feeder breakers at switchboard and distribution panel.
3. Access doors and panels for concealed electrical items.
4. Disconnect switches.
5. Enclosed circuit breakers.
6. Motor starters.

7. Push-button stations.
8. Contactors.
9. Remote-controlled switches.
10. Dimmers.
11. Control devices.
12. Telephone switching equipment.
13. Paging and clock master equipment.
14. TV master station.
15. Fire alarm master station or control panel.
16. Security-monitoring master station or control panel.

END OF SECTION 26 05 53

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SECTION 26 22 00
DRY-TYPE TRANSFORMERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes dry-type distribution and specialty transformers rated 1000 V and less.

1.3 SUBMITTALS

A. Product Data: Include data on features, components, ratings, and performance for each type of transformer specified. Include dimensioned plans, sections, and elevation views. Show minimum clearances and installed devices and features.

B. Wiring Diagrams: Detail wiring and identify terminals for tap changing and connecting field-installed wiring.

C. Product Certificates: Signed by manufacturers of transformers certifying that the products furnished comply with requirements.

D. Factory Test Reports: Certified copies of manufacturer's design and routine factory tests required by referenced standards.

E. Field Test Reports: Indicate and interpret test results for tests specified in Part 3.

F. Maintenance Data: For transformers to include in the maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: In addition to requirements specified in Division 1 Section "Quality Requirements," an independent testing agency shall meet OSHA criteria for accreditation of testing laboratories, Title 29, Part 1907; or shall be a full-member company of the InterNational Electrical Testing Association.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies, to supervise on-site testing specified in Part 3.

B. Listing and Labeling: Provide transformers specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.

C. Comply with IEEE C2.

D. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit throughout periods during which equipment is not energized and is not in a space that is continuously under normal control of temperature and humidity.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide transformers by one the following:

1. Acme Electric Corp.; Transformer Division.
2. Bryant Electric.
3. Cutler-Hammer/Eaton Corp.
4. Federal Pacific Co.; Line Power Mfg. Corp. Subsidiary.
5. GE Electrical Distribution & Control.
6. Hammond Co.; Matra Electric, Inc.
7. MagneTek Inc.
8. Micron Industries Corp.
9. Sola/Hevi-Duty Electric.
10. Square D; Groupe Schneider.

2.2 TRANSFORMERS, GENERAL

A. Description: Factory-assembled and -tested, air-cooled units of types specified, designed for 60-Hz service.

B. Cores: Grain-oriented, nonaging silicon steel.

C. Coils: Electrical grade aluminum. Continuous windings without splices, except for taps.

D. Internal Coil Connections: Brazed or pressure type.

E. Enclosure: Class complies with NEMA 250 for the environment in which installed.

2.3 GENERAL-PURPOSE DISTRIBUTION AND POWER TRANSFORMERS

A. Comply with NEMA TP-1 and ST-20 and list and label as complying with UL 1561.

B. Cores: One leg per phase.

C. Windings: One coil per phase in primary and secondary.

D. Enclosure: Indoor, ventilated, dripproof.

E. Insulation Class: 220 deg C.

1. Rated Temperature Rise: 150 deg C maximum rise above 40 deg C, for 220 deg C class insulation.

F. Taps: For transformers 3 kVA and larger, full-capacity taps in high-voltage windings are as follows:

1. Taps, 25 kVA and Above: Four 2.5-percent taps, 2 above and 2 below rated high voltage.

G. K-Factor Rating: Transformers indicated to be K-factor rated are listed to comply with UL 1561 requirements for nonsinusoidal load current handling capability to the degree defined by the designated K-factor.

1. Transformer design prevents overheating when carrying full load with harmonic content corresponding to the designated K-factor.
2. Nameplate states the designated K-factor of the transformer.

2.4 CONTROL AND SIGNAL TRANSFORMERS

A. Units comply with NEMA ST 1 and are listed and labeled as complying with UL 506.

B. Ratings: Continuous duty. If rating is not indicated, provide capacity exceeding peak load by 50 percent minimum.

C. Description: Self-cooled, 2 windings.

2.5 FINISHES

A. Indoor Units: Manufacturer's standard paint over corrosion-resistant pretreatment and primer.

2.6 SOURCE QUALITY CONTROL

A. Factory Tests: Design and routine tests comply with referenced standards.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with safety requirements of IEEE C2.

B. Arrange equipment to provide adequate spacing for access and for circulation of cooling air.

C. Identify transformers and install warning signs according to Division 26 Section "Electrical Identification."

D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.2 GROUNDING

A. Separately Derived Systems: Comply with NFPA 70 requirements for connecting to grounding electrodes.

B. Comply with Division 26 Section "Grounding and Bonding" for materials and installation requirements.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing agency to perform field quality-control testing.

B. Test Objectives: To ensure transformer is operational within industry and manufacturer's tolerances, is installed according to the Contract Documents, and is suitable for energizing.

C. Test Labeling: On satisfactory completion of tests for each transformer, attach a dated and signed "Satisfactory Test" label to tested component.

D. Schedule tests and provide notification at least 7 days in advance of test commencement.

E. Report: Submit a written report of observations and tests. Report defective materials and installation.

F. Tests: Include the following minimum inspections and tests according to manufacturer's written instructions. Comply with IEEE C57.12.91 for test methods and data correction factors.

1. Inspect accessible components for cleanliness, mechanical and electrical integrity, and damage or deterioration. Verify that temporary shipping bracing has been removed. Include internal inspection through access panels and covers.
2. Inspect bolted electrical connections for tightness according to manufacturer's published torque values or, if not available, those specified in UL 486A.
3. Insulation Resistance: Perform megohmmeter tests of primary and secondary winding to winding and winding to ground.

    a. Minimum Test Voltage: 1000 V, dc.
    b. Minimum Insulation Resistance: 500 megohms.
    c. Duration of Each Test: 10 minutes.
    d. Temperature Correction: Correct results for test temperature deviation from 20 deg C standard.

G. Test Failures: Compare test results with specified performance or manufacturer's data. Correct deficiencies identified by tests and retest. Verify that transformers meet specified requirements.

3.4 CLEANING

A. On completion of installation, inspect components. Remove paint splatters and other spots, dirt, and debris. Repair scratches and mars on finish to match original finish. Clean components internally using methods and materials recommended by manufacturer.

3.5 ADJUSTING

A. After installing and cleaning, touch up scratches and mars on finish to match original finish.

B. Adjust transformer taps to provide optimum voltage conditions at utilization equipment throughout normal operating cycle of facility. Record primary and secondary voltages and tap settings and submit with test results.

END OF SECTION 26 22 00

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SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes load centers and panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for the following types:

1. Lighting and appliance branch-circuit panelboards.
2. Distribution panelboards.

1.3 SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details for types other than NEMA 250, Type 1.
b. Bus configuration, current, and voltage ratings.
c. Short-circuit current rating of panelboards and overcurrent protective devices.
d. UL listing for series rating of installed devices.
e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

C. Qualification Data: Submit data for testing agencies indicating that they comply with qualifications specified in "Quality Assurance" Article.

D. Field Test Reports: Submit written test reports and include the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

E. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

F. Maintenance Data: For panelboards and components to include in maintenance manuals specified in Division 1.

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency that is a member company of the InterNational Electrical Testing Association and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NEMA PB 1.

D. Comply with NFPA 70.

1.5 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:

a. Eaton Corp.; Cutler-Hammer Products.
b. General Electric Co.; Electrical Distribution & Control Div.
c. Industrial Electric Manufacturing (IEM).
d. Square D Co.

2.2 FABRICATION AND FEATURES

A. Enclosures: Flush and surface mounted cabinets. NEMA PB 1, Type 1, to meet environmental conditions at installed location.

B. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

C. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.

D. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.

E. Bus: Hard-drawn copper, 98 percent conductivity.

F. Main and Neutral Lugs: Mechanical type suitable for use with conductor material.

G. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.

H. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

I. Isolated Equipment Ground Bus Where Indicated: Adequate for branch-circuit equipment ground conductors; insulated from box.

J. Extra-Capacity Neutral Bus Where Indicated: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.

K. Feed-through Lugs: Mechanical type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

2.3 PANELBOARD SHORT-CIRCUIT RATING

A. UL label indicating series-connected rating with integral or remote upstream devices. Include size and type of upstream device allowable, branch devices allowable, and UL series-connected short-circuit rating.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

B. Doors: Front mounted with concealed hinges; secured with flush latch with tumbler lock; keyed alike to Owner's standard.

2.5 DISTRIBUTION PANELBOARDS

A. Main Overcurrent Protective Devices: Circuit breaker.

B. Branch overcurrent protective devices shall be bolt-on type.

2.6 OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

B. Molded-Case Circuit-Breaker Features and Accessories. Standard frame sizes, trip ratings, and number of poles.

1. Lugs: Mechanical style, suitable for number, size, trip ratings, and material of conductors.
2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
3. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Mounting Heights: Top of trim 74 inches above finished floor, unless otherwise indicated.

C. Mounting: Plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.

D. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Provide temporary panel schedule during construction, handwritten directories are acceptable. Use a computer or typewriter to create the permanent directory at each panel.

E. Install filler plates in unused spaces.

F. Provision for Future Circuits at Flush Panelboards: Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future.

G. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Electrical Identification".

B. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.3 CONNECTIONS

A. Safe off power source prior to connection of power panel.

B. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.4 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Testing Agency: Engage a qualified independent testing agency to perform specified testing.

C. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:

1. Measure as directed during period of normal system loading.
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data-processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

E. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove panel fronts so joints and connections are accessible to portable scanner.

1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
2. Record of Infrared Scanning: Prepare a certified report that identifies panelboards checked and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges according to the coordination report per Division 26 Section "Overcurrent Protective Device Coordination".

3.6 CLEANING

A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

B. Remove and replace with new any item damaged beyond repair or refinishing.

END OF SECTION 26 24 16

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SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes receptacles, connectors, switches, and finish plates.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

1.4 SUBMITTALS

A. Product Data: For each product specified.

B. Maintenance Data: For materials and products to include in maintenance manuals specified in Division 1.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

B. Comply with NEMA WD 1.

C. Comply with NFPA 70.

1.6 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Wiring Devices:

a. Bryant Electric, Inc.
b. GE Company; GE Wiring Devices.
c. Hubbell, Inc.; Wiring Devices Div.

d. Leviton Manufacturing Co., Inc.
e. Pass & Seymour/Legrand; Wiring Devices Div.
f. Pyle-National, Inc.; an Amphenol Co.

2.2 RECEPTACLES

A. Straight-Blade and Locking Receptacles: General-Duty grade.

B. GFCI Receptacles: Feed-through type, with integral NEMA WD 6, Configuration 5-20R duplex receptacle arranged to protect connected downstream receptacles on same circuit. Design units for installation in a 2-3/4 inch deep outlet box without an adapter.

2.3 SWITCHES

A. Snap Switches: Heavy-duty, quiet type.

B. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.

1. Switch: 20 A, 120/277-V ac.
2. Receptacle: NEMA WD 6, Configuration 5-20R.

C. Key Switches: double prong type for restrooms.

2.4 WALL PLATES

A. Single and combination types match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Unfinished Spaces: 0.04 inch thick, Type 302, satin-finished stainless steel.
3. Material for Finished Spaces: Smooth plastic.

2.5 FINISHES

A. Color: Bright white, unless otherwise indicated or required by Code.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies plumb and secure.

B. Install wall plates when painting is complete.

C. Install wall dimmers to achieve indicated rating after derating for ganging as instructed by manufacturer.

D. Do not share neutral conductor on load side of dimmers.

E. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on bottom. Group adjacent switches under single, multigang wall plates.

F. Protect devices and assemblies during painting.

G. Adjust locations at which floor service outlets are installed to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with Division 26 Section "Electrical Identification."

B. Comply with Division 26 Section "Basic Electrical Materials and Methods."

1. Switches: Where three or more switches are ganged, and elsewhere as indicated, identify each switch with approved legend engraved on wall plate.
2. Receptacles: Identify panelboard and circuit number from which served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on face of plate and durable wire markers or tags within outlet boxes.

3.3 CONNECTIONS

A. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor.

B. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A.

3.4 FIELD QUALITY CONTROL

A. Test wiring devices for proper polarity and ground continuity. Operate each device at least six times.

B. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

C. Replace damaged or defective components.

3.5 CLEANING

A. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION 26 27 26

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SECTION 26 28 16
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes individually mounted enclosed switches and circuit breakers used for the following:

1. Motor and equipment disconnecting means.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. RMS: Root mean square.

C. SPDT: Single pole, double throw.

1.4 SUBMITTALS

A. Product Data: For each type of switch, circuit breaker, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Maintenance Data: For enclosed switches and circuit breakers and for components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Closeout Procedures," include the following:

1. Routine maintenance requirements for components.
2. Manufacturer's written instructions for testing and adjusting switches and circuit breakers.
3. Time-current curves, including selectable ranges for each type of circuit breaker.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency that is a member company of the InterNational Electrical Testing Association and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NEMA AB 1 and NEMA KS 1.

D. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Fusible Switches:

   a. Eaton Corp.; Cutler-Hammer Products.
   b. General Electric Co.; Electrical Distribution & Control Division.
   c. Square D Co.

2. Molded-Case Circuit Breakers:

   a. Eaton Corp.; Cutler-Hammer Products.
   b. General Electric Co.; Electrical Distribution & Control Division.
   c. Square D Co.

3. Combination Circuit Breaker and Ground-Fault Trip:

   a. Eaton Corp.; Cutler-Hammer Products.
   b. General Electric Co.; Electrical Distribution & Control Division.
   c. Square D Co.

4. Molded-Case, Current-Limiting Circuit Breakers:

   a. Eaton Corp.; Cutler-Hammer Products.
   b. General Electric Co.; Electrical Distribution & Control Division.
   c. Square D Co.

5. Integrally Fused, Molded-Case Circuit Breakers:

   a. Eaton Corp.; Cutler-Hammer Products.
   b. General Electric Co.; Electrical Distribution & Control Division.
   c. Square D Co.

2.2 ENCLOSED SWITCHES

A. Enclosed, Nonfusible Switch: NEMA KS 1, Type HD, with lockable handle.

B. Enclosed, Fusible Switch, 800 A and Smaller: NEMA KS 1, Type HD, with clips to accommodate specified fuses, lockable handle with two padlocks, and interlocked with cover in closed position.

2.3 ENCLOSED CIRCUIT BREAKERS

A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:

    a. Instantaneous trip.
    b. Long- and short-time pickup levels.
    c. Long- and short-time time adjustments.
    d. Ground-fault pickup level, time delay, and I^2t response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
6. GFCI Circuit Breakers: Single- and two-pole configurations with 5mA trip sensitivity.
7. Molded-Case Switch: Molded-case circuit breaker without trip units.

B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.

1. Lugs: Mechanical style suitable for number, size, trip ratings, and material of conductors.
2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
3. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
4. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
5. Auxiliary Switch: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b"contacts operate in reverse of circuit-breaker contacts.
6. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
7. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.

2.4 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2.5 FACTORY FINISHES

A. Manufacturer's standard prime-coat finish ready for field painting.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Electrical Identification".

B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.4 CONNECTIONS

A. Install equipment grounding connections for switches and circuit breakers with ground continuity to main electrical ground bus.

B. Install power wiring. Install wiring between switches and circuit breakers, and control and indication devices.

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.5 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each enclosed switch, circuit breaker, component, and control circuit.

2. Test continuity of each line- and load-side circuit.

B. Testing Agency: Engage a qualified independent testing agency to perform specified testing.

C. Testing: After installing enclosed switches and circuit breakers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.6 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.7 CLEANING

A. On completion of installation, inspect interior and exterior of enclosures. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 26 28 16

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SECTION 27 00 00
DATA/TELEPHONE CABLING SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide all labor, materials, tools and equipment required for the complete installation of a complete Category 6 UTP structured cabling system, single-mode optical fiber and copper backbone system, and work called for in the Construction Documents. This shall include but is not limited to all UTP copper cabling, racks, cabinets, patch panels, modular connectors, optical fiber cable, cable management and accessories for a complete system.

B. The purpose of this document is to describe the minimum requirements and establish the design guidelines for the Communications Horizontal Cabling that shall support data, video and voice signals throughout the network from designated Telecommunications Rooms (TR) to Work Area Outlets (WAO) located at various desks, workstation, under floor, conference room table and other locations as indicated on the contract drawings and described herein.

C. All copper cable terminations shall comply with, and be tested to ANSI/TIA/EIA 568-B.2 Commercial Building Telecommunications Cabling Standard Part: 2 Balanced Twisted Pair Cabling Components. ANSI/TIA/EIA 568-B.2-1 Commercial Building Telecommunications Cabling Standard Part: 2 Balanced Twisted Pair Cabling Components – Addendum 1 – Transmission Performance for 4 Pair 100ohm Category 6 Cabling. ANSI/TIA/EIA 568-B.2-6 Commercial Building Telecommunications Cabling Standard Part: 2 Balanced Twisted Pair Cabling Components – Addendum 6 – Category 6 Related Component Test Procedures.

D. The electrical contractor is responsible for the provision and installation of all data/telephone raceways, including all boxes and wiremold in classrooms. The low voltage cabling contractor shall provide and install all cabling and provide terminations per the specifications the Owner will supply and install the telephone system and all electronic data equipment.

E. Perform all work in compliance with local, state, and federal codes and regulations that may affect this described work.

F. Inspection of work provided by other trades is required by contractor. Commencement of work described herein will serve as evidence that the contractor has accepted all prior and or ongoing work performed by other trades for the structured cabling system. All necessary changes done without prior written authorization shall be done at the contractors own risk and expense.

G. It is the contractors' responsibility to verify the capacity of the structured cabling pathways, and that they are sufficient for the designed structured cabling system. Any discrepancy between site conditions and the construction drawings must be brought to the attention of the Project Manager, Architect and Owner in writing. Commencement of work implies acceptance of the site conditions by the contractor.

H. It is the contractors' responsibility to field verify all pathways, routes and dimensions necessary for the structured cabling system, and that all pathways and spaces are installed prior to cable installation. Commencement of work implies acceptance of the pathways by contractor.

I. The construction documents do not necessarily describe all the required work to satisfy their intention. On the basis of work described herein, and or indicated in the Drawings, the contractor shall furnish all items and provide all labor required providing a complete, standards based structured cabling system.

J. The contractor shall be responsible for damage to any surfaces or work disrupted as a result of there work. Repair of surfaces, including painting, shall be included as necessary.

1.2 SUBMITTALS

A. Provide a contractor-generated detailed bill of materials required for installation based on the construction documents. Clearly indicate manufacturer, part number, and quantity to be provided to complete the scope of work.

B. The communications contractor shall be certain that all correct parts are ordered per Products Section of this document and installed in accordance with manufacturers design and installation guidelines. Vendor shall submit complete parts and part numbers prior to installation of equipment, failure to do so is done at the risk of the contractor.

C. It is the contractors' responsibility to verify all part numbers in this specification and to make aware the customer of any changes that the manufacturer may have made to part numbers or product.

D. The communications contractor shall guarantee at the time of the bid that all Category 6, and fiber optic cabling and components meet or exceed specifications (including installation) of ANSI/TIA/EIA-568-B.1, 568-B.2, 568-B.3 and 569.

E. Warranty shall be a twenty-five (25) year manufacturer supported extended warranty issued to the customer upon completion of the project. The warranty shall be an applications assurance warranty guaranteeing that the installed system shall support any application present and future that is designed to run on the installed infrastructure. The warranty shall cover 100% material and labor for the installed system.

F. Documentation from the manufacturer that the contractor has authority to provide the warranty on behalf of the manufacturer.

G. Complete documentation regarding the manufacturer's warranty shall be submitted as part of the proposal. This shall include, but is not limited to: a sample of the warranty that would be provided to the customer when the installation is complete and documentation of the support procedure for warranty issues.

1.3 REFERENCES AD STANDARDS INCORPORATED

A. Published specifications, standards, tests, or recommended methods of trade, industry, or government organizations apply to work of this section where cited by abbreviation noted below.

1. ANSI American National Standards Institute
2. EIA Electrical Industries Association of America
3. ISO International Standards Organization
4. ITU International Telecommunications Union

5. IEEE Institute of Electrical and Electronic Engineers
6. NEC National Electric Code
7. NEMA National Electrical Manufacturer's Association
8. UL Underwriters' Laboratories, Inc.
9. TIA Telecommunications Industry Association

B. Nothing in drawings, details, or specifications shall be construed to permit work not conforming to applicable laws, ordinances, rules, regulations, or industry standards. It is contractor's responsibility to field verify all conditions, including footages between and within buildings.

C. It is not the intent of the drawings, details, or specifications to repeat requirements of codes or standards except where necessary for completeness or clarity.

D. Contractor is expected to adhere to and follow the most recent standards, codes and publications.

E. ANSI/TIA/EIA 568-B.1 - Commercial Building Telecommunications Cabling Standard – Part 1: General requirements, April 1, 2001.

F. ANSI/TIA/EIA 568-B.2 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components, April 1, 2001.

G. ANSI/TIA/EIA 568-B.2-1 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Components - Addendum 1 - Transmission Performance Specifications for 4-Pair 100 Ohm Category 6 Cabling, June 1, 2002.

H. ANSI/TIA/EIA 568-B.2-2 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted-Pair Cabling Components - Addendum 2, December 1, 2001.

I. ANSI/TIA/EIA 568-B.2-3 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted-Pair Cabling - Addendum 3 - Additional Considerations for Insertion Loss and Return Loss Pass/Fail Determination, March 1, 2001.

J. ANSI/TIA/EIA 568-B.2-3 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted-Pair Cabling – Addendum 4 – Solderless Connection Reliability Requirements for Copper Connecting Hardware, June 2002.

K. ANSI/TIA/EIA 568-B.2-3 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted-Pair Cabling – Addendum 5 – Corrections to TIA/EIA 568-B.2, January 2003.

L. ANSI/TIA/EIA 568-B.2-3 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted-Pair Cabling – Addendum 6 – Category 6 Related Component Test Procedures, December 2003.

M. ANSI/TIA/EIA 568-3 - Optical Fiber Cabling Components Standard, April, 2002.

N. ANSI/TIA/EIA-568-3-1 - Optical Fiber Cabling Components Standard - Addendum 1 - Additional Transmission Performance Specifications for 50/125 um Optical Fiber Cables, April 1, 2002.

O. Compliance to industry standards and codes is mandatory. Do not proceed with work that is in conflict with codes and or standards without written direction from the Project Manager, Designer and Owner. Proceeding with work that is not compliant with codes and standards is done so at the contractors own risk and expense.

1.4 QUALITY ASSURANCE

A. Equipment and accessories to be the product of a vendor regularly engaged in its manufacture.

B. Supply cable, equipment, and accessories which are new, free from defects.

C. Equipment and accessories in compliance with the applicable standards listed in "References and Standards" of this Section and with applicable national, state, and local codes.

D. Items of a given type shall be of the same manufacturer.

1.5 DESIGN METHODOLOGY

A. One (1) 12-strand single mode optical fiber shall be installed from designated MDF to IDF as indicated on the drawing. The 12-strands of fiber will be terminated with LC connectors and put into a rack-mounted LIU.

B. One (1) 25/12-pair Category 3 cables shall be installed from designated MDF to IDF as indicated on the drawing. The Category 3 cables shall terminate on a wall mounted100 pair terminal protection block, installed at each end and will be extended to a rack mounted patch panel mounted in the IDF.

C. Provide Category 6 cable to each WAO location. Each of the WAO's shall be configured per the construction documents. Cables shall be installed from the corresponding IDF to each WAO location. Contractor shall terminate WAO cables onto Uniprise Category 6 RJ45 modular connectors. At the IDF locations, WAO cables shall be terminated on rack-mounted 48-port Category 6 RJ45 modular patch panels.

D. Refer to construction documents for location, quantity and configuration of each WAO needed and cable requirement at non-classroom area.

E. Cables must not be attached to ceiling grid or lighting fixture wires.

F. Pair untwist at termination shall not exceed 3.18mm (0.125").

G. Bend radius of cable in termination area shall be no less than 4 times the outside diameter of the cable.

H. All cable and connectors shall be installed and terminated to the manufacturers' guidelines, recommendations and best industry practices.

I. Cable shall be installed in continuous lengths from point of origin to termination point, no splices allowed.

J. Communications contractor shall be responsible for providing and installing the appropriate sized j-hooks where cable tray is not used.

K. Cable bundles of up to 50 cables may be supported by 2" j-hooks. Cable bundles of up to fifty 150 cables must be supported using 4" j-hooks.

L. J-hooks are to be placed at 48 to 60 inch intervals. At no point shall the cables rest on the acoustical ceiling.

M. Contractor shall use appropriate sized j-hooks for the cable bundle size the j-hooks are to support. No more than 50 UTP cables per 2" and no more than 150 UTP cables shall be placed per 4" j-hook.

1.6 PRE-INSTALLATION CONFERENCE

A. Contractor shall attend a Pre-Installation Meeting to be conducted by the construction manager. Attendance shall be at the direction of the construction manager and may include the contractor's project manager, superintendent, subcontractors for the work of this specification section and subcontractors for work affected by this section; vendors, district technology and construction representatives and other parties affected by the work.

PART 2 - PRODUCTS

2.1 GENERAL

A. Quality of Products: Material and equipment specified herein have been selected as the basis of acceptable and desired quality of performance and have been coordinated to function as components of the specified system. Where a particular material, device, piece of equipment, or system is specified directly, the current manufacturer's specification for the same shall be considered to be part of these specifications, as if completely contained herein in every detail. Each material, device, or piece of equipment provided there under shall comply with all of the manufacturer's published specifications for that item.

B. Provide Complete: Provide all auxiliary and incidental materials and equipment necessary for the operation and protection of the work of this section as if specified in full herein.

C. Provide New: All materials provided under the work of this section shall be of the manufacturer's latest design/model and shall be permanently labeled with the manufacturer's name, model number, and serial number.

D. Similar: Similar devices shall be of the same manufacturer unless specifically noted otherwise in these specifications.

E. Continuous Use: all active circuitry shall be solid state and shall be rated for continuous use. All circuit components shall be operated in full compliance with the manufacturer's recommendations and shall contain sufficient permanent identification to facilitate replacement.

2.2 DROP CABLE WIRING CLOSET HARDWARE

A. All wiring closet data connecting hardware shall be EIA/TIA TSB-40 Category 6 compliant.

B. All station cabling in the wiring closet for data connecting hardware shall be 48-port modular panels with RJ45 modular jacks.

C. The cabling in the wiring closet for voice connecting hardware that ties from the Category 3 cabling terminated on the 110 protection block in the IDF/MDF, to the equipment rack, shall have RJ45 jacks on the front and 110 style insulation displacement connectors (IDC) for termination of drop cable on the back.

D. All modular jacks shall be eight position jacks with pin/pair assignments utilizing EIA/TIA T568B.

2.3 DROP CABLE OUTLET HARDWARE

A. All data drop outlet/station outlet connecting hardware shall be EIA/TIA TSB-40 Category 6 compliant.

B. All drop outlet/station outlet hardware shall be modular jack outlets with Category 6 RJ45 modular jacks. Data inserts will be orange for cable number one and ivory for cable number two. Faceplate color will be ivory unless otherwise specified.

C. All modular jacks shall be eight (8) position jacks with pin/pair assignments utilizing EIA/TIA T568B.

D. All modular jacks will be placed into quadplex Uniprise faceplates with any unused openings supplied with blank inserts.

2.4 FIBER OPTIC PATCH PANELS

A. The fiber patch panels for IDF locations shall be rack mountable with applicable number of port connector outlets for termination of fiber run from MDF.

B. The fiber patch panels for MDF location shall be rack mountable with applicable number of port connector outlets for termination of fiber runs from all IDFs.

C. The fiber patch panels for all locations shall be complete with all necessary interconnection sleeves/bulkheads to support all fiber optic cables at the given location.

D. The fiber optic interconnection sleeves/bulkheads shall be Uniprise LC.

2.5 FIBER OPTIC PATCH CABLES

A. The Contractor shall supply all fiber patch cables.

B. Fiber patch cables for Single-mode applications shall be Uniprise RFJ-02ZC-29-LC-8W-SCU-05-LCU of 5 meters long in yellow color.

6 SYSTEM ELECTRONIC EQUIPMENT

A. No LAN switches, concentrators, or other electronic equipment are contained within this project.

2.7 MISCELLANEOUS EQUIPMENT

A. Contractor will provide all racks, patch panels, wire management and equipment necessary to support data interconnect and hub/concentrator equipment at all MDF and IDF locations.

Provide wall-mounted, double hinged, swing out cabinets, height determined by quantity of patch panels at each IDF location. Provide all locks of the same key code.

B. All associated connectors, wire management components, patch cords, cable, wire management and all miscellaneous materials required for a complete installation of the system shall be included in the package. All equipment shall be compatible with other equipment.

2.8 PARTS LIST SPECIFICATION

A. The LAN UTP cabling run inside buildings shall be 4-pair, Category 6 Uniprise CAT 6e 75N4 for non-plenum installation in gray color for voice and blue color for data., 7504 for plenum installation in gray color for voice and blue color for data, 6NF4+ for outside plant installation in black color.

B. The LAN and voice UTP cabling run between buildings shall be 4-pair, Category 3, jell filled cable, Uniprise.

C. Drop cable wiring closet hardware shall be Uniprise.

D. Drop cable outlet hardware shall be Uniprise (faceplate) and Uniprise Category 6.

E. Fiber optic rack-mounted interconnect center equipment shall be Systimax.

F. Outside plant fiber optic cabling between buildings shall be 50 micron LazerCore 300 multimode and 8.3 micron single mode rated for outdoor installation or approved equivalent.

G. Outside plant voice cabling between buildings shall be wet rated, voice grade, Category 3 PE89, Uniprise. All OSP cabling shall be terminated on 110 protection blocks.

H. Wall-mounted brackets, patch panels, and wire management equipment shall be Panduit, Chatsworth, or approved equivalent.

I. Data patch panels will be Uniprise #UNP610-48P 48-port with modular Category 6 RJ45 connectors. Provide panduit wire manager above and below patch panels.

J. Vertical cable managers shall be Panduit #WMPV545 (for side), #WMPV545 (for single rack, #WMPVC45 (for center) and #WMPHF2 (for front only), black finish.

L. 25"wide, 22.85" deep, 25.8" high wall mounted enclosed rack shall be Panduit PZC12P wall mounted cabinet with two (2) PZCFK fan kits at two sides of the cabinet, threaded hold vertical mounting rail per district standard.

M. Provide and install junction splice kit as necessary, Chastworth Products, Inc. #11302-001.

N. Provide and install protective end-caps, as necessary, Chastworth Products, Inc. #10642-001.

O. Provide and install 3" channel rack to runway, as necessary, Chastworth Products, Inc. #10595-112.

P. Provide and install wall angle support kits, as necessary, Chastworth Products, Inc. #11421-112.

Q. Provide and install universal ladder rack, as necessary, Chastworth Products, Inc. #10250-712.

R. Voice / data patch cable shall be Uniprise UNC6 of 5' or 7' in length, gray color for voice and blue color for data.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All wire and cable shall be continuous and splice free for the entire length of run between designated IDF and station termination locations.

B. Terminate cable in designated terminal cabinets and/or on designated equipment backboards.

C. Provide service loop of cables at all junction and termination cabinets or boxes.

D. Maintain consistent absolute signal polarity at all connectors, patch points, and connection points accessible in the system.

E. Land all fiber optic cables on LC style patch panels.

F. All fiber strands will be terminated using permanent bonding techniques, as opposed to crimp-type connectors, using LC style connectors.

G. Dress or harness all wire and cable to prevent mechanical stress of electrical connectors. No wire or cable shall be supported by a connection point. Provide service loops where harnesses of different classes cross or where hinged panels are to be interconnected.

H. All equipment and wiring shall be guaranteed against defects in materials and workmanship for a one (1) year period from the startup and beneficial use of the system.

I. Provide complete record drawings showing all equipment, location, and cable routing.

3.2 LABELING/TESTING

A. The contractor will label all outlets using permanent/legibly typed or machine engraved labels approved by the District. The labeling information for patch panels located in the IDFs will include the IDF number, patch panel number, sequential port number, and station number. Outlets shall be labeled to match the corresponding label in the IDF. All copper/fiber terminations for riser/backbone cables in the IDF(s) shall be labeled with the IDF number, patch panel number, and sequential port number.

1. A floor plan clearly labeled with all outlet jack numbers shall be included in the as-built plans.
2. All labels shall correspond to as-built drawings and to final test reports.
3. Each fiber will be identified at the MDF and/or IDF with:

    a. Fiber number.
    b. IDF number.
    c. MDF port number.
    d. IDF port number.

B. All field testing will be done with a Microtest PentaScanner or verified comparable TDR for UTP cable, and Laser Precision (or equivalent) OTDR for fiber optic cable. Each cable segment shall be verified to pass all specifications for installation and performance as specified by the cable and connector manufacturers.

Final system acceptance will not occur prior to delivery of test results in a printed format provided by the TDR and OTDR. Contractor will provide documentation to ensure that all fiber and UTP test results are within acceptable tolerances provided by cable and connector manufacturers published standards and performance specifications. For all fiber runs, test documentation submitted will include continuity, attenuation, and length of each installed fiber strand. All UTP and fiber cables will be tested from end to end.

C. As-Builts: Contractor shall be responsible for marking-up, manually red-lined, district provided infrastructure and building plans. These as-builts shall clearly indicate detailed inter-building fiber and copper cabling routes, fiber strand and copper pairs counts, termination locations, and voice/data station locations including numerical station/drop designations. Receipt and acceptance of as-built drawings by the district is a prerequisite prior to authorization of final payment.

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SECTION 28 31 00
FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section shall include guidelines for the furnishing of all labor, equipment, materials, and performance of all operations associated with the installation of the fire alarm and smoke detection system as indicated in Drawings and specified herein.

B. The intent of drawings and specifications is to result in a complete functional fire alarm and smoke detection system as described herein.

C. The complete installation shall conform to the applicable sections of NFPA 72, NFPA 71, local code requirements, and the California Electrical Code with particular attention to Article 760.

D. The work covered by this section of the specifications shall be coordinated with the related work as specified elsewhere under project specifications.

1.3 RELATED SECTIONS

A. Division 26 Section “Electrical General Requirements”.

B. Division 26 Section “Conductors and Cables”.

1.4 QUALITY ASSURANCE

A. Each and all components of the fire alarm system shall be listed as a product of a single fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "UL" label. All control equipment shall be listed under UL category UOJZ as a single control unit. Partial listing shall not be acceptable.

B. All control equipment shall have transient protection to comply with UL 864.

C. Where fire alarm circuits leave the building, additional transient protection shall be provided for each circuit.

D. Devices shall be UL listed under Standard #497B.

E. System control shall be UL listed for Power Limited Applications and all circuits shall be marked in accordance with NEC Article 760-23.

1.5 FIRE ALARM SYSTEM

A. System as indicated on drawings and specified herein has been pre-approved by the Division of the State Architect.

1.6 GENERAL SYSTEM DESCRIPTION

A. System Requirements

B. The contractor shall furnish and install a complete fire alarm and smoke detection system as described herein and drawn.

C. The contractor shall wire, connect, and make operational each and all components of the system.

D. The system shall include:

1. Sufficient fire alarm control panels (FACPs).
2. Annunciators.
3. Manual stations.
4. Smoke detectors.
5. Alarm indicating appliances.
6. Miscellaneous components.
7. Wiring.
8. Terminations.
9. Raceway system.
10. All other necessary material for a complete operating system.

E. The system shall meet all national and local codes.

1.7 FIRE ALARM SYSTEM SUPPLIER

A. The fire alarm shall be supplied by a distributor authorized by the fire alarm system manufacturer. The supplier's personnel shall be factory trained.

B. The fire alarm system supplier shall provide point to point wiring diagrams and equipment data sheets for submittal to the local authority. Where required, the fire alarm system supplier shall obtain all permits required for the installation of the system from the local authority.

1.8 SYSTEM MANUFACTURER

A. The system and components shall be supplied by one (1) manufacturer who shall have produced similar systems for a period of at least three (3) years.

B. The manufacturer shall be able to refer to similar installations rendering satisfactory service.

1.9 SYSTEM SOFTWARE

A. The system shall be capable of self-programming upon initialization.

B. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation.

C. All software operations shall be stored in a non-volatile programmable memory within the FACP.

D. Loss of primary and secondary power shall not erase the instructions stored in memory.

E. System programming shall be password protected and shall include full upload and download capability.

F. The system shall feature flexibility for selective input/output control functions based on ANDing, ORing; NOTing, timing, and special coded operations shall also be incorporated in the resident software programming of the system.

G. Resident software shall allow for full configuration of initiating circuits. The system shall require no additional hardware to change from sensing normally open contact devices to sensing normally closed contacted devices or vice versa. Nor shall the system require additional hardware to change from sensing normally open contact devices to sensing and distinguishing between a combination of current limited and non-current limited devices on the same circuit. Nor shall the system require additional hardware for changing from a non-verification circuit to a verification circuit or vice-versa.

H. There shall be no limit, other than maximum system capacity, to the number of intelligent/analog devices which may be in alarm simultaneously.

I. The system shall have the capability of recalling alarm and trouble conditions in chronological order for the purpose of recreating an event history.

1.10 SUBMITTALS

A. Shop Drawings: Include sufficient information, clearly presented, to determine compliance with drawings and specifications.

1. Include manufacturer's name, model numbers, California State Fire Marshal's listing numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
2. Show remote annunciator layout, configurations, and terminations.

B. Certifications: Submit certification from major equipment manufacturer that proposed installer of installation and proposed performer of maintenance are authorized representatives of the manufacturer. Include names and address in certification.

1.11 OPERATION AND MAINTENANCE DATA

A. Refer to Division 1 Section "Operation and Maintenance Data".

B. Submit complete operating and maintenance manual listing manufacturer's name and including technical data sheets along with as-built shop drawings.

C. Wiring diagrams shall indicate internal wiring for each item of equipment and the interconnections between items of equipment.

D. Provide clear and concise description of operation that gives detailed information required to properly operate equipment and system.

1.12 QUALITY ASSURANCE

A. System shall have listing and/or approval for the following :

1. Underwriters' Laboratories, Inc.
2. California State Fire Marshal.

1.13 QUALIFICATIONS

A. Manufacture: Company specializing in the manufacture of fire alarm systems with minimum five (5) years documented experience, whose installations have rendered satisfactory service for minimum two (2) years, and who shall provide factory trained technical support.

B. Installer: Company specializing in the installation of fire alarm systems with minimum two (2) years documented experience and meeting the following criteria:

1. NICET Level 2 or greater.
2. Located within 60 mile radius of project site.
3. Authorized dealer of specified manufacturer employing factory trained personnel.
4. All parts of system stocked within offices.
5. Capable of providing service response within 24 hours or less.

C. Criminal Background Investigation Certification:

1. Contractor must comply with the fingerprinting and criminal background investigation requirements of California Education Code Section 45125.1 with respect to all contractor's employees who may have contact with District pupils in the course of providing services pursuant to the contract, and that the California Department of Justice has determined that none of those employees has been convicted of a felony, as that term is defined in Education Codes Section 45122.1.
2. A complete and accurate list of contractor's employees who may come in contact with District pupils during the course and scope of the contract must be provided to the District prior to contractor working on project.

1.14 REGULATORY REQUIREMENTS

A. The specifications and standards listed below form a part of this specification. The system shall fully comply with these standards.

B. Applicable codes:

2013 Building Standards' Administrative Code, Part 1, Title 24, C.C.R.

2013 California Building Code (CBC), Part 2, Title 24, C.C.R.
(2012 International Building Code and 2013 California Amendments)

2013 California Electrical Code (CEC), Part 3, Title 24, C.C.R.
(2011 National Electrical Code and 2013 California Amendments)

2013 California Mechanical Code (CMC), Part 4, Title 24, C.C.R.
(2012 Uniform Mechanical Code and 2013 California Amendments)

2013 California Plumbing Code (CPC), Part 5, Title 24, C.C.R.
(2012 Uniform Plumbing Code and 2013 California Amendments)

2013 California Energy Code, Part 6, Title 24, C.C.R.

2013 California Fire Code, Part 9, Title 24, C.C.R.
(2012 International Fire Code and 2013 California Amendments)

Title 19 C.C.R. Public Safety, State Fire Marshal Regulations.

Partial list of applicable standards:

NFPA 13	Automatic Sprinkler Systems	2013 Edition
NFPA 14	Standpipe Systems (CA Amended)	2013 Edition
NFPA 17a	Wet Chemical Systems	2009 Edition
NFPA 24	Private Fire Mains (CA Amended)	2013 Edition
NFPA 72	National Fire Alarm Code (CA Amended)	2013 Edition

Reference code section for NFPA Standards, 2013 CBC (SFM) Chapter 35.C. Underwriters' Laboratories, Inc. (UL) - USA.

C. Underwriters' Laboratories, Inc. (UL) - USA.

D. Local and State Building Codes.

E. All requirements of the Authority Having Jurisdiction (AHJ).

1.15 PROJECT/SITE CONDITIONS

A. Detectors must be protected from dust due to construction.

1. Detectors installed and not protected from dust shall be removed and replaced at contractors expense.
2. Detectors subjected to construction debris will not be accepted.

B. Mounting devices on walls prior to final painting is not acceptable.

1.16 WARRANTY

A. Fire alarm panel shall have a five (5) year manufacturer's warranty from date of system acceptance.

B. Signaling devices shall have a two (2) year manufacturer's warranty from date of system acceptance.

C. Installation labor shall have a two (2) year warranty on all fire alarm equipment.

D. Warranties shall not begin until the fire alarm system has been completely tested and inspected by the authority having jurisdiction and the fire alarm system accepted by the school district.

E. The full cost of maintenance, labor, and materials that is required to correct any defect during the warranty period shall be included.

F. System inspections per NFPA-72 2010 shall be included for the two (2) year warranty period.

1.17 OWNER'S INSTRUCTIONS AND TRAINING

A. Refer to Division 1 Section "Demonstration and Training".

B. Installing contractor shall provide training on fire alarm system by factory-trained personnel.

1. Provide as a minimum two (2) on-site training sessions for school staff.
2. Provide as a minimum one (1) on-site training session for school district maintenance personnel.

C. Training sessions shall provide:

1. Instruction for operating the fire alarm system.
2. "Hands-on" demonstrations of the operation of all system components.
3. Instruct District maintenance personnel the process of changing program and functions.

C. Provide typewritten Sequence of Operation to school district and school staff.

D. Permanently attach laminated Sequence of Operation for fire alarm panel on wall next to fire alarm panel.

1.18 MAINTENANCE

A. Maintenance and testing shall be per NFPA-72 or as required by the authority having jurisdiction.

B. A preventive maintenance schedule shall be provided by the fire alarm contractor. The schedule shall include:

1. Systematic examination, adjustment and cleaning of all detectors, manual fire alarm stations, control panels, power supplies, relays, water flow switches, and all accessories of the fire alarm system.
2. Each circuit in the fire alarm system shall be tested minimum of semi-annually.
3. Each smoke detector shall be tested in accordance with the requirements of NFPA-72.

PART 2 - MATERIALS

2.1 CONDUIT, WIRE AND BOXES

A. Conduit:

1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.

2. All wiring shall be installed in conduit or raceway in non-accessible area. Conduit fill shall not exceed 40 percent or interior cross sectional area where three or more cables are contained within a single conduit. Conduit shall be ¾" minimum.
3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box, or raceway containing these conductors, as per NEC Article 760-29.
4. Wiring for 24 volt control, alarm notification, emergency communication and similar power limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or back boxes, except where conduit entry is specified by the FACP manufacturer.
6. Fire rated open cables shall be installed above accessible ceiling space, J-hooks shall be provided for cable support. No staples shall be allowed.

B. Wire:

1. All fire alarm system wiring shall be new.
2. Wiring shall be in accordance with local, state, and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 14 AWG (stranded) for initiating device circuits and signaling line circuits, and 12 AWG (stranded) for notification appliance circuits.
3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR). Wires shall be supported by J-hooks. No staples shall be allowed.
5. Wiring used for the multiplex communication loop shall be twisted pair and a data grade cable meeting FPL ratings. Cable is to be that which is recommended by the fire alarm equipment manufacturer. The system shall permit use of IDC and NAC wiring in the same conduit with the communication loop.

C. Terminal Boxes, Junction Boxes, and Cabinets:

1. All boxes and cabinets shall be UL listed for their use and purpose. All boxes shall be painted red.
2. Notification circuits shall be arranged to serve like categories (manual, smoke, and water flow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to addressable reporting devices.
3. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod.
4. Provide back boxes as listed below:
   a. Flush strobe, Horn/Strobes: 4" square box flush to finished wall.
   b. Exterior horns: Wheelock WBBR supplied by Sound and Signal and installed by electrical contractor.

c. Smoke detectors/heat detectors: 4"sqaure box with 3 "O" ring.
d. Pull stations: 4" square box with single gang ring flush to finished wall.
e. Surface strobe, horn/strobe: Wheelock ESB-R supplied by Sound and Signal and installed by electrical contractor.

2.2 OPERATION

A. Alarm Operation:

1. The actuation of any approved alarm initiating device shall automatically initiate the following operations where furnished as part of the system.
2. All audible alarm indicating appliances within corresponding building shall sound a fire alarm signal until the system acknowledge key or the signal silence key is depressed. The alarm must sound five (5) minutes before it can be silenced.
3. All visible alarm indicating appliances shall flash continuously until the system acknowledge key or the signal silence key is depressed.
4. The off-site central monitoring station shall be notified automatically until the system acknowledge key or the signal silence key is depressed.
5. Shutdown of the corresponding HVAC system equipment shall occur until the system acknowledge key or the signal silence key is depressed.
6. Activation of all programmed outputs assigned to the initiating device shall occur until the system acknowledge key or the signal silence key is depressed.
7. Any subsequent zone alarm shall reactivate the alarm indicating appliances.

2.3 ALARM VERIFICATION

A. The activation of any system smoke detector or sensor shall initiate an alarm verification operation whereby the panel will reset the activated detector and wait for a second alarm activation.

B. The alarm verification shall operate only on smoke detector alarms. Other activated initiating devices shall be processed immediately.

D. The alarm verification operation shall be selectable by zone.

2.4 ALARM INDICATION

A. The alarm shall be displayed on a 160 character (4x40) LCD display on the local fire alarm control panel, and where applicable, the remote annunciator. The top line of 40 characters shall be the point label and the second line shall be the device type identifier.

B. The system alarm LED shall flash on the control panel and the remote annunciator until the alarm has been acknowledged. Once acknowledged, this same LED shall latch on.

C. A subsequent alarm received from another zone shall flash the system alarm LED on the control panel and remote annunciator. The LCD display shall indicate the new alarm information.

D. A pulsing alarm tone shall occur within the local building control panel and, where applicable, the remote annunciator until the event has been acknowledged.

E. A manual evacuation (drill) switch shall be provided to operate the alarm indicating appliances without causing other control circuits to be activated. However, should a true alarm occur, all alarm functions would occur as described previously.

F. The system shall have a single key that will allow the operator to display all alarms, troubles, and supervisory service conditions including the time of each occurrence.

G. Any momentary opening of an initiating or indicating appliance circuit wiring shall cause an audible signal to sound at the building fire alarm panel and, where applicable, the remote annunciator for four (4) seconds indicating a trouble condition.

2.5 ALARM WALK TEST

A. The actuation of the "enable walk test" program at the control panel shall activate the "Walk Test" mode of the system, which shall initiate the following events:

1. The off-site central monitoring station connection shall be bypassed.
2. Control relay functions shall be bypassed.
3. Walk test shall be selectable by circuit.
4. Alarms received on normal circuits shall cause the control panel to go into alarm and override the walk test mode.
5. The control panel shall show a trouble condition.
6. The alarm activation of any initiation device shall cause the audible signals to activate for two (2) seconds.
7. The panel shall automatically reset itself after signaling is complete.
8. The control panel shall automatically return to normal condition if there is no activity on a walk test circuit for a period of 30 minutes.

2.6 SUPERVISION

A. The system shall contain Class "A" or "B" independently supervised initiating device circuits. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of any other initiation circuit.

B. Each independently supervised circuit shall include a discrete LED readout to indicate disarrangement conditions per circuit.

C. The incoming power to the system shall be supervised so that any power failure must be audible and visually indicated at the control panel and the remote annunciator. A green "power on" LED shall be displayed continuously while incoming power is present.

D. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the control panel and the remote annunciator.

E. The system shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes.

2.7 POWER REQUIREMENTS

A. Each control panel or console shall receive 120V AC power (as noted on the plans) via a dedicated circuit.

2.8 PRODUCTS

A. Fire Alarm Control Panel: Firelite MS-9050UD (E).

1. Panel Function:

   a. The fire alarm control panel shall provide power, annunciation, supervision, and control for the detection and alarm system, as well as alarm signaling to alert occupants of a fire or other emergency situations.
   b. Control panel construction shall be modular with solid state microprocessor based electronics.
   c. Operation shall be guided via LEDs to simplify operation under any condition.

2. Local Audible Device:

   a. A local audible device shall sound during alarm, trouble, or supervisory conditions.
   b. This audible device shall sound differently during each condition to distinguish one condition from another without having to view the panel.
   c. This audible device also shall sound during each "key-press" to provide an audible feedback to ensure that the key has been pressed properly.

3. Primary Controls:

   a. The following primary controls shall be visible through a front access panel:

      (1) 160 character liquid crystal display.
      (2) Individual red system alarm LED.
      (3) Individual red pre-alarm LED.
      (4) Individual yellow supervisory service LED.
      (5) Individual yellow trouble LED.
      (6) Individual yellow security LED.
      (7) Green "power on" LED.
      (8) Alarm acknowledge touch switch.
      (9) Supervisory acknowledge touch switch.
      (10) Trouble acknowledge touch switch.
      (11) Alarm silence touch switch.
      (12) Reset touch switch.
      (13) Manual evacuation (drill).

4. Interface Function:

   a. The control panel interface shall provide the following:

      (1) Setting of time and date.
      (2) LED testing.
      (3) Alarm, trouble, and abnormal condition listing.
      (4) Enabling and disabling of each monitor point separately.
      (5) Activation and deactivation of each control point separately.
      (6) Changing operator access levels.
      (7) Walk test enable.

(8) Running diagnostic functions.
(9) Displaying software revision level.
(10) Displaying historical logs.
(11) Displaying card status.
(12) Point listing.

5. Point Lists Menu:

a. For maintenance purposes, the following lists shall be available from the point lists menu:

(1) All points list by address.
(2) Monitor point list.
(3) Signal/speaker list.
(4) Auxiliary control list.
(5) Feedback point list.
(6) Utility point list.
(7) LED/switch status list.

6. Menu Lists:

a. Scrolling through the menu options or lists shall be accomplished in a self-directing manner in which prompting messages shall direct the user.
b. Menu lists shall be password protected.
c. 'Acknowledgment for each abnormal condition shall be provided in accordance with NFPA 72 requirements.

7. Condition Display Order:

a. The system shall display the first unacknowledged condition.

8. Acknowledge Password Protection:

a. Acknowledge functions shall feature password protection if the user has insufficient privilege to acknowledge such conditions.
b. A message shall indicate insufficient privilege but shall allow the user to view the points without acknowledging them.
c. Should the user have sufficient privilege to acknowledge, a message will be displayed informing the user that the condition has been acknowledged.

9. Acknowledgment:

a. After all points have been acknowledged, the LEDs shall glow without blinking and the audible signal shall be silenced.
b. The total number of alarms supervisory and trouble conditions shall be displayed along with a prompt to review each list chronologically. The end of the list shall be clearly defined.

10. Alarm Silencing:

a. When the "Alarm Silence" button is pressed, all alarm signals shall cease operation, except during alarm silence inhibit mode.
b. It shall be possible to selectively program signal circuits as non-silenceable.

11. System Reset:

a. The system reset button shall be used to return the system to its normal state after an alarm condition has been remedied.
b. The LCD display shall step the user through the reset process with simple English language messages including a final message indicating the system has been returned to the normal condition.

12. Function Keys:

a. Additional function touch switches shall be provided to access status data for the following points:

(1) Initiating device circuits.
(2) Indicating appliance circuits.
(3) Auxiliary relays.
(4) Feedback points.
(5) All other input/output points.

13. Available Status Data:

a. The following status data shall be available:

(1) Primary state of point.
(2) Zone, point address and card type information.
(3) Circuit status.
(4) Current priority of outputs.
(5) Disable/enable status.
(6) Automatic/manual control status of output points (Hand-Off/Auto switches).
(7) Relay status.

14. Utility Points:

a. Each control panel shall have dedicated utility point supervisory and acknowledge buttons. Activation of a utility point shall activate the system supervisory service audible signal and illuminate the appropriate utility point LED on the control panel, at the master control console, and at the guard shack network control panel.
b. Pressing the appropriate acknowledge button shall silence the audible alarm, while maintaining the LED "ON" indicating the OFF-normal condition.
c. Restoring the condition to its normal position, or locally resetting the acknowledge switch shall extinguish the LED, indicating normal conditions.

15. Alarm History Log:

a. The system shall be capable of logging and storing up to 1,000 events in the History Log. These events shall be stored in a battery protected random access

memory. Each recorded event shall include the time and date of that event's occurrence.

b. The following alarm history events shall be stored:

(1) Alarms.
(2) Alarm acknowledgment.
(3) Alarm silence.
(4) System reset.
(5) Alarm historical log cleared.

16. Trouble History Log:

a. The following Trouble History events shall be stored:

(1) Trouble conditions.
(2) Supervisory alarms.
(3) Trouble acknowledgment.
(4) Supervisory acknowledgment.
(5) Walk test results.
(6) Trouble Historical Log cleared.

17. Access Levels:

a. There shall be four (4) access levels with level 4 being the most secure level.
b. Level 1 actions shall not require a passcode.
c. Passcodes shall be numerical and shall consist of up to six (6) digits. Changes to passcodes shall be made only by authorized personnel.

18. Printer/CRT Interface Card:

a. The control panel shall include an output port (RS-232) capable of operating remote CRTs and/or printers from a central processing unit.

19. Remote Station Interface:

a. A digital alarm communicator transmitter, remote station transmitter, or municipal tie shall provide interface with a remote control station for monitoring alarm and trouble conditions. Communication to central station shall be by way of two (2) supervised telephone lines.

20. Addressable Interface Module:

a. The system must provide communication with initiating and control devices individually. All of these devices will be individually annunciated at the control panel. Annunciation shall include the following conditions for each point:

(1) Alarm.
(2) Trouble.
(3) Open.
(4) Short.
(5) Device missing/failed.

21. All Addressable Devices:

    a. All addressable devices shall have the capability of being disabled or enabled individually.
    b. Up to 126 addressable devices may be multi-dropped from a single pair of wires. Systems that require factory re-programming to add or delete devices are unacceptable.
    c. The communication format must allow T-tapping of the circuit wiring.

22. Alarm Signaling:

    a. The fire alarm control panel shall provide sufficient power and signal circuit capability to meet the requirements of the plans and specifications and to comply with ADA (Americans with Disabilities Act) requirements.
    b. The fire alarm control panel and power supplies shall be designed to accommodate all signaling circuits and 20% spare capacity.
    c. The fire alarm control panel shall allow for field programming operation of the signal circuits (i.e. march time, zone coded, zone-signal linking, etc.). This capability shall be included in the system firmware with no additional cost to the Owner.

23. Annunciator Panel:

    a. The fire alarm control panel shall provide an LCD annunciator where drawings indicate remote area annunciation of the corresponding fire alarm signals.
    b. The annunciator shall indicate alarm, supervisory and trouble conditions by dedicated LEDs and an audible signal.
    c. The annunciator shall feature an acknowledge button which, when depressed, shall silence the audible signal.
    d. A 160 character LCD display shall provide the same message as displayed on the corresponding fire alarm control panel. The annunciator panel shall be capable of alarm silence and system reset functions.
    e. The annunciator shall be panel mounted with controls visible through a front access panel and operable only by activating an enable key switch.
    f. The annunciator panel shall be Gamewell SAN or approved equal.

24. Cabinets and Consoles:

    a. The fire alarm control panel and annunciator cabinets shall be sized to accommodate all components and modules specified and required for a complete system.
    b. Additional space for future expansion shall be provided in the cabinet including, as a minimum, space for:

        (1) Two (2) addressable interface modules.
        (2) Conventional interface modules (CIM-4 or CIM-8)
        (3) Building control modules (BC-4 or BC-8).
        (4) Relay modules (RM-4 or RM-8).
        (5) Universal signaling modules (USM-4 or USM-8).

(6) System will have space for auxiliary power supply (APS-8) as required to provide 8 amps @ 24V DC for additional signal circuits and other functions.
(7) Cabinets shall be capable of surface or flush mounting as indicated.
(8) Sheet steel cabinets shall be completely primed and finish painted.
(9) The control consoles shall accommodate, in one section, power supply, modules and components required for fire alarm control, and system network control and annunciator.

c. Fire alarm control panel shall be Gamewell IdentiFlex 602.

B. Alarm Initiating Devices:

1. Addressable/Analog Detectors:

a. All addressable/analog detectors.
b. All addressable/analog smoke and heat detectors as specified below shall be pluggable into their bases.
c. The detector unit shall contain electronics that communicate the detector chamber analog value to determine (normal, alarm, trouble) to the control panel over two (2) wires. The same two (2) wires shall also provide power.
d. Upon removal of the head, the base shall transmit a trouble signal to the control panel.
e. It shall be possible to change out detector heads without having to reprogram or address the unit.
f. The detector's address shall be stored in the base. Detectors that store address information in the head shall not be allowed.
g. Addressable/analog detectors shall be UL listed.

2. Photoelectric Type Detectors:

a. Addressable/analog photoelectric smoke detectors shall sense the presence of smoke particles between a light source and a receiver within the detector.
b. Sensitivity shall be set by the manufacturer and provisions shall be included to check the sensitivity at the control panel without generating smoke.
c. The unit shall be equipped with a visible LED for alarm indication.
d. The detector screen and cover shall be easily removable for field cleaning.
e. Addressable/analog photoelectric detectors shall be Gamewell Model XP95-P or approved equal.

3. Addressable Manual Stations:

a. The addressable manual station shall be capable of field programming of its "address" location on an addressable initiating circuit.
b. The manual station shall be fitted with screw terminals for field wire attachment.
c. The manual station shall be non-coded, semi-recessed, and restorable.
d. The addressable manual station shall be UL listed.
e. The addressable manual station shall be Gamewell Model No. MS-95 or approved equal.
f. Supervised fire suppression system flow switches, pressure switches and other components provided by others shall be wired to meet the requirements of Division 26.

g. Conduit and wire shall comply with the requirements in other Division 26 sections.

C. Alarm Indicating Devices:

1. Visual Alarm Signals:

a. Visual units with flush trims and backboxes shall be provided for all locations as shown on the plans (office areas, etc.). Visual units shall provide 100 candela/second Xenon flash visible at all angles, and shall meet the requirements of the Americans with Disabilities Act (ADA).

b. Visual alarm signals shall be UL listed for fire protection service and shall produce a minimum intensity of 100 candela at all angles with a flash rate of 1 Hz minimum to 3 Hz maximum with continuously applied voltage. The xenon flash tube shall be enclosed in clear or nominal white (i.e., unfiltered or clear filtered white light) lens. The maximum pulse duration shall be two-tenths of one second (0.2 sec) with a maximum duty cycle of 40 percent. The pulse duration is defined as the time interval between initial and final points of 10 percent of maximum signal.

2. Audible Alarm Signals:

a. Alarm horns shall be 4" vibrating type and shall include backboxes, flush mounted baffle and ceiling tile bridge.
b. Where indicted on the plan, provide a Wheelock HS horn/strobe combination with backbox.
c. Audible alarms shall not exceed sound levels of 120 dbA.
d. The visual alarm shall be mounted with the alarm horn where shown.

D. Printers:

1. Printers shall be provided and installed as shown.
2. All printed information shall include time and date.
3. A desktop 80 column printer shall provide a hard copy record of system events. The printer shall support the following features:

a. 120V AC input power.
b. 180 characters per second.
c. Kilobytes buffer capacity.
d. UL listed.

E. Graphic Chart:

1. CAD generated graphics charts shall be installed in each building indicating building floor plan(s) and initiating devices with circuit numbers.
2. Charts shall be 11 x 17 floor plans reduced from manufacturer's approved floor plan shop drawings, framed beneath non-glare glass for wall hanging.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The contractor shall provide and install the system in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations.

B. Detector Installation:

1. Detector locations shall be no closer than 4 feet from air supply outlets, nor in beam pockets deeper than 12". No detector shall be purposely recessed in a ceiling.
2. Duct type smoke detectors shall be provided under this section of the specification for mounting by other trades.

C. Programming:

1. The contractor shall perform all programming of system including local panel programming and network programming.
2. The contractor shall perform the necessary assigning of system points.

D. Wiring:

1. The contractor shall furnish and install, in accordance with manufacturer's instruction, all wiring, conduit, and outlet boxes for installation of a complete system as described herein and drawn.
2. All wiring shall meet NEC 760 for fire alarm system wiring. All wiring shall be tagged at junction points and shall test free of grounds and shorted between conductors. All additional labor costs, incurred by the fire alarm system technician to clear wiring faults, shall be charged to the installing contractor.
3. All final terminations of the field wiring shall be made by or under the direct supervision of the fire alarm system manufacturer's representative. Any damage to the panel as a result of the contractor terminating wires or powering up the panel without the supervision of an authorized representative of the fire alarm panel manufacturer shall be charged to the installing contractor.

E. Miscellaneous:

1. All junction boxes shall be painted red and labeled "Fire Alarm". Color coded wiring shall be maintained throughout the installation.
2. Installation of equipment and devices relevant to other work in the contract shall be closely coordinated with the appropriate subcontractors.
3. The contractor shall clean all dirt and debris from the interior and exterior of the fire alarm equipment after completion of the installation.
4. The manufacturer's authorized representative shall provide on-site supervision of installation.

3.2 ON-SITE START-UP

A. System Check: Prior to energizing any part of this system, the factory authorized representative shall check thoroughly the installation and perform pre-start checks. This representative shall check all points, fire alarm panels and complete network to ensure proper operation and make

any needed repairs and/or replacements required. Sufficient time shall be included in the project bid to cover all required start-up assistance and testing.

B. Testing:

1. The contractor shall test fully the completed fire alarm system in accordance with NFPA-72 in the presence of the Owner's representative and under the direction of the factory authorized representative.
2. Testing shall be provided as required by the local fire marshal.
3. Upon successful completion of tests, the contractor shall so certify in writing to the Owner's representative.
4. Alarm horn sound levels shall be tested during Owner's normal operating conditions to ensure emergency signaling is of an approved sound level over normal ambient noise. The test shall be performed during a 90 day period following the above "Fire Marshal" test on a date to be selected by the Owner.

3.3 TRAINING

A. Refer to Division 1 Section "Demonstration and Training".

B. Demonstration:

1. A factory authorized representative shall demonstrate the fire alarm system.
2. The demonstration shall simulate possible operating conditions and alarms.

C. Scope of Training: Training shall include documentation and hands-on exercise necessary to enable the Owner's representative to assume full programming and operating responsibility.

D. Project Bid: The project bid shall include sufficient time for required initial training and follow-up assistance.

E. Technical Support: Technical support and service by factory-trained personnel shall be available from the manufacturer's representative.

3.4 CENTRAL STATION

A. Provide general alarm supervisory and trouble relays for connection to external communicator (provided by Owner) low voltage contractor to provide one (1) four-conductor FPL rated cable between the security control panel and the FACP for remote monitoring.

3.5 GUARANTEE

A. The installing contractor shall guarantee all wiring to be free from inherent mechanical and electrical defects for a period of one (1) year from installation.

B. The manufacturer's representative shall provide the Owner's representative and Certification of Installation for the entire system certifying that the system was installed and is operating properly and in accordance with these specifications.

C. The manufacturer's representative shall provide the Owner with a three (3) year maintenance proposal upon completion of the project.

3.6 COMMISSIONING

A. Commission system in full conformance to the manufacturer's written instructions. Owner's designated representative shall witness commissioning.

END OF SECTION 28 31 00

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SECTION 31 23 00

EXCAVATION, BACKFILLING, AND COMPACTING

PART 1 GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, equipment, facilities, transportation, and services to complete all excavation, trenching, backfilling, compaction, and related work as shown on the Drawings and/or specified herein.

B. Scope of work: The general extent of all trenching, backfilling, and compaction is shown on the Drawings and may include, but is not necessarily limited to, the following:
1. Sanitary Sewer Line Installation
2. Potable Water LIne Installation

C. Related sections can include, but may not be limited to:
1. Section 01 71 23 - Field Engineering
2. Section 01 78 39 - Project Record Drawings
3. Section 32 12 16 - Asphalt Concrete Paving
4. Section 33 11 00 - Domestic Water Systems
5. Section 33 31 00 - Sanitary Sewerage

1.02 REFERENCES AND REGULATORY REQUIREMENTS

A. State of California Department of Transportation Standard Specifications, Current Edition.

1.03 SUBMITTALS

A. Project Record Drawings:
1. Conform to requirements of Section 01 78 39 and/or applicable General Conditions and Special Provisions.
2. Accurately record locations of utilities remaining, re-routed utilities, new utilities, and newly discovered utilities by horizontal dimensions, elevations, inverts and slope gradients as practical.

1.04 QUALITY ASSURANCE

A. Control of Work: Comply with Section 5 of the Standard Specifications.

B. Control of Materials: Comply with Section 6 of the Standard Specifications.

C. Trench Safety: Comply with applicable portions of Sections 5 and 7 of the Standard Specifications and requirements of other agencies having jurisdiction (OSHA etc.).

1.05 PROJECT/SITE CONDITIONS

A. Wet Conditions: No trenching shall occur when excessively wet conditions exist in the opinion of the District Representative.

B. Dry Conditions: Contractor shall provide dust control in conformance with Section 10 of Standard Specifications and shall provide water to work as necessary to achieve compaction goals.

1.06 SEQUENCING AND SCHEDULING

A. Refer to all other Contract Documents, determine the extent and character of related work, and properly coordinate work specified herein with that described elsewhere to produce a complete, operational installation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide materials as described below free of debris, roots, wood, scrap material, vegetative matter, refuse, soft unsound particles, or other deleterious and objectionable materials.

B. Select Backfill: Select backfill material shall be sand conforming to Section Section 19-3.02E(2) of the Standard Specifications.

C. Native Backfill: Native backfill shall be acceptable soil material excavated from the project site. This material will be considered unclassified and no testing other than for compaction will be required. Additional material required for backfill shall be acceptable to the District Representative.

D. Permeable Material: Permeable material shall be Caltrans Class II permeable rock material.

E. Aggregate Base: Refer to Section 32 11 00 – Base Courses.

PART 3 EXECUTION

3.01 PREPARATION

A. General:
1. Prior to trenching, the contractor shall pothole existing utilities at locations indicated or implied on the plans, where new piping or utilities will cross existing utilities of uncertain depth to determine the elevation of the utility in question and ensure that the new line will clear the potential obstruction.
2. The Contractor shall mark out all construction areas in white, non-permanent paint and contact Underground Service Alert (U.S.A.) (800-642-2444) to locate all known utilities a minimum 48 working hours prior to any excavation.
3. Should an existing crossing utility present an obstruction, the proposed line shall be adjusted as acceptable to the District Representative to clear the existing utility.

3.02 TRENCH EXCAVATION

A. General:
1. Excavation shall include removal of all water and materials that interfere with construction. Remove any water which may be encountered in the trench by pumping or other methods prior to pipe laying, bedding and backfill operations. Trenches shall be sufficiently dry to permit proper jointing and compaction.
2. It shall be the contractor's responsibility to direct vehicular and pedestrian traffic safely through or around the work area at all times.
3. The contractor shall relocate, replace, reconstruct or repair, to an "as-was" or better condition, all surface or subsurface improvements which are in the line of construction or which may be damaged, removed, disrupted or otherwise disturbed by the construction activities. Except as specified in other Sections or shown in the Drawings, this provision applies to all surface improvements of whatever nature such as walls, fences, above-grade utilities, landscaping, paving, structures, or other physical features whether shown in the Drawings or not and to all subsurface improvements such as utilities which may be indicated in the Drawings or marked in

the field. The contractor shall connect such utilities to existing systems and leave all in a workable and operating condition. The cost of this work shall be considered as included in other items of work and no additional compensation will be allowed.

4. The maximum allowable trench width at the top of pipe shall be 18 inches greater than the pipe diameter.
5. New utility trenches extending deeper than 2 feet below finish grade should be located a minimum of five feet away from foundations.

B. Existing Paving Areas:

1. Existing asphalt concrete paving over new trenches shall be sawcut, removed, and legally disposed. Existing asphalt concrete paving shall be neatly sawcut one foot (1') greater on each side than the trench width. If a longitudinal pavement joint or edge of pavement is located within three feet of the limit of excavation, all intervening pavement shall be removed and replaced after completion of backfilling. If concrete curb and/or gutter are to be replaced, the adjacent existing asphalt concrete paving shall be sawcut two feet (2') from the edge of concrete curb and/or gutter.
2. Existing Portland cement concrete paving over new trenches shall be sawcut to a minimum depth of 1-1/2 inches in straight lines either parallel to the curb or at 90 degree angles to the alignment of the sidewalk prior to being broken out. No section to be replaced shall be smaller than 30 inches in either length or width. If the sawcut would fall within 30 inches of a construction joint, expansion joint, or edge, or within 12 inches of a score mark, the concrete shall be removed to the joint, edge, or mark.

C. Walkway Areas:

Backfill for trenches or other excavations within walkway areas should be compacted in six inch (6") maximum layers, unless otherwise noted, with hand-held tampers to assure adequate subgrade support.

D. Compacted Fill Areas:

Where trenches must be excavated in compacted fill, these trenches shall be backfilled with the fill materials excavated and re-compacted in the layers and to the density specified for the particular area.

E. Open Trench:

1. No trench shall be left in an open un-protected condition at the end of the day. At the end of the day any open trench shall be protected in a manner acceptable to the District Representative.
2. Provisions for trench crossings and access shall be made at all street crossings, driveways, water gate valves, and fire hydrants unless otherwise acceptable to the District Representative.

F. Excavated Material:

1. All excavated material not required for backfill or of value to the District shall be removed and legally disposed of by the contractor at no additional cost.
2. Material excavated in streets and roadways shall be laid alongside the trench no closer than two feet from the trench edge and kept trimmed to minimize inconvenience to public traffic.
3. Provisions shall be made whereby all storm and waste water can flow uninterrupted in gutters or drainage channels to drainage structures.
4. Excavated material shall not be stored on existing landscaping or paving without provisions being made to protect the surface below from being stained or otherwise adversely affected.

G. Shoring

1. Should excavations extend more than 4 feet below existing ground surface, shoring will be required.

2. Excavations can be sloped back to an inclination of 1.5 horizontal to 1 vertical as an option for shoring in these conditions.
3. Utility trenches shall be excavated according to accepted engineering practices following OSHA.

3.03 PIPE BEDDING

A. Stabilization of Trench Bottom:
When the trench bottom is unstable due to wet or spongy foundation, trench bottom shall be de-watered as necessary. The District Representative shall determine the suitability of the trench bottom and the amount of sand, gravel, or crushed rock needed to stabilize the soft foundation.

3.04 TRENCH BACKFILL AND COMPACTION

A. General:
1. Construct backfill in two operations (initial and final).
2. Do not backfill where the foundation material in trench is already saturated, except as acceptable to the District Representative. Provide a minimum cover as may be specified.
3. Where settling greater than the tolerance allowed for grading occurs in trenches and pits due to un-stable subgrade material, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation.
4. For utilities under roads, streets, concrete slabs or other areas to be paved, place final backfill in 6-inch maximum loose lifts. Compact all backfill surrounding ducts, conduits, pipes and other structures, including the top 12-inches of subgrade to 95 percent of ASTM D1557 maximum density. Backfill to permit the rolling and compacting of the completed excavation with the adjoining material providing the specified density necessary to enable rock placement of paving of the area immediately after backfilling has been completed.

B. Initial Backfill:
1. Prior to trench backfill, the condition of the trench and laying of pipe shall be acceptable to the District Representative.
2. Select backfill material shall be used as initial backfill for all utilities except irrigation piping, unless otherwise noted. After the pipe has been properly laid and accepted by the District Representative, select backfill material shall be placed on both sides of the pipe and compacted to the depth shown in the Drawings.
3. Compaction: The initial backfill material shall be hand tamped in layers not exceeding four inches (4") in uncompacted depth and shall be brought up uniformly on both sides of the pipe to avoid bending or distortional stress. After handtamping, the relative compaction of the initial backfill material shall be at least 95% relative compaction.

C. Final Backfill:
1. Native backfill material shall be used for final backfill, unless otherwise noted.
2. Compaction: Final backfill compaction shall be by mechanical means with backfill material placed in layers not exceeding eight inches (8") in loose depth. Each layer shall be thoroughly compacted before succeeding layers are placed. The use of machine tampers, except manually held types, shall not be permitted. Final backfill shall be compacted to a relative compaction of 95% for paving areas. In planting areas, provide acceptable topsoil to required depth compacted to 85% to 89% maximum relative compaction.

D. Jetting: No jetting shall be allowed.

3.05 TRENCH SURFACING

A. General:
   1. In unimproved areas, the trench surface shall be restored to its original condition. No mounds of earth shall be left along the trench.
   2. All backfill shall be flush with adjoining grade in a firm, unyielding position with no visible settling for a period of one year after Final Acceptance.

B. Paved Areas:
   1. Temporary surfacing acceptable to the District Representative shall be laid within one day after backfilling (except where the contractor elects to place permanent surfacing within this time period) until permanent paving is installed.

END OF SECTION

SECTION 32 12 16

ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, equipment, facilities, transportation, and services to complete all asphalt paving, and related work as shown on the Drawings and/or specified herein.

B. Scope of Work: The general extent of the asphalt paving is shown on the Drawings and may include, but is not necessarily limited to, the following:
1. Asphalt Concrete installation

C. Related sections can include, but may not be limited to the following:
1. Section 01 33 00 - Submittals

1.02 REFERENCES AND REGULATORY REQUIREMENTS

A. State of California Department of Transportation Standard Specifications, Current Edition

1.03 PROTECTION OF WORK

A. Curbs and other work shall be covered with suitable material and protected from staining or injury by equipment and contact with oil, emulsion, and asphalt. All manholes, catch basins, and other gratings shall be covered with suitable material so that no asphalt or emulsion will come in contact with the inside walls or floors of the structures. Any damage to such work shall be repaired and/or replaced at the contractor's expense.

1.04 SUBMITTALS

A. Conform to requirements of Section 01 33 00 Submittals and/or applicable Division One and Division Two specifications, General Conditions and Special Provisions.

B. Submit cut-sheets, mill certificates, certificates of compliance etc. for all products proposed for use on the project.

1.05 QUALITY ASSURANCE

A. Control of Work: Conform to Section 5 of Standard Specifications.

C. Control of Materials: Conform to Section 6 of Standard Specifications.

1.06 SEQUENCING AND SCHEDULING

A. Time delay between placement and compaction of base material and installation of asphaltic concrete shall not be more than 5 calendar days. Base material left unpaved longer than this time period shall be subject to testing and re-compaction at the expense of the contractor.

1.07 GENERAL REQUIREMENTS

A. Asphalt paving surfaces shall have positive drainage as indicated on the Drawings. Upon completion of the work, paved areas included in this section shall be subject to a water drainage test. Areas that fail to drain properly, as determined by the District's Representative, shall be corrected and repaired at no additional cost. If repaired, the entire surface shall have a seal coat applied at contractor's cost. Type of seal coat will be determined by the District's Representative.

B. Asphalt concrete paving shall be free from excessive segregation (gaps between aggregate visible at 3/16" or larger), cracking, potholes, raveling, slippage, depressions, corrugations, or other defects at the date of completion and acceptance of the project.

C. All repairs shall be made within fifteen calendar days of notification at the expense of the contractor.

PART 2 PRODUCTS

2.01 ASPHALT CONCRETE PAVING

A. Paving Asphalt Binder: Shall be PG 64-10, conforming to Section 92 of the Standard Specifications.

B. Prime Coat: Liquid asphalt to conform to the requirements for SC-70 liquid asphalt as per Section 93 of the Standard Specifications.

C. Tack Coat: Asphaltic emulsion to be penetration type conforming to the RS-1 (or SS-1, if seal coat is specified) requirements of Section 94 of the Standard Specifications.

2.03 AGGREGATE BASE

A. Aggregate base shall conform to Section 32 11 00 Base Courses.

PART 3 EXECUTION

3.01 INSTALLATION

A. Conform to Sections 37 and 39 of Standard Specifications.

B. Prime Coat: Apply specified material to compacted base at a rate of 0.25 gallons per square yard.

C. Tack Coat: Apply specified material to all vertical surfaces of existing pavement, curbs, and header boards.

D. Asphaltic Concrete:
1. Place and compact in accordance with Section 39 of the Standard Specifications.
2. Base lifts shall not exceed 2 inches.
3. Surface lift shall not exceed 2 inches.

D. Asphalt concrete shall be compacted to a minimum of 96 percent of the maximum laboratory compacted (Hveem) unit weight.

3.02 EQUIPMENT

A. Spreading and rolling equipment shall be in accordance with Section 39-3.03 of the Standard Specifications.

B. Spreading and compaction shall be in accordance with Section 39-3.04 of the Standard Specifications.

END OF SECTION

SECTION 33 11 00

DOMESTIC WATER SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, equipment, facilities, transportation and services to complete all domestic water systems and related work shown on the Drawings and/or specified herein.

B. Scope of work:
The general extent of the domestic water system work is shown on the Drawings and can include, but is not necessarily limited to the following:
1. Water supply and distribution system(s):
   a. Domestic water system, including all pipes, fittings, valves, valve boxes, connections, and fire hydrants
   b. Compliance with AWWA C-600-87
   c. Intermediate staking and layout for domestic water system

C. Related sections can include, but may not be limited to:
1. Section 31 23 00 - Excavation, Backfilling, and Compaction

1.02 REFERENCES AND REGULATORY REQUIREMENTS

A. AWWA - current edition

B. California Plumbing Code - current edition

C. State of California Department of Transportation Standard Specifications, current edition.

1.03 SUBMITTALS

A. Submit copies of product data or "cut-sheets" for all products proposed for use.

1.04 RECORD DOCUMENTS

A. Project Record Drawings:
1. Contractor shall provide accurately record locations of utilities remaining, re-routed utilities, new utilities, and newly discovered utilities by horizontal dimensions, elevations, inverts, and slope gradients.

1.05 QUALITY ASSURANCE

A. Unless otherwise specified, install all materials in accordance with manufacturer's recommendations. Contractor shall make all necessary repairs to the domestic water system as well as to other work affected by defects in the system through project Final Acceptance and specified warranty period. All repairs shall be made at the contractor's sole expense.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store pipe in a neat and orderly manner fully supported and protected from sunlight.

B. Do not dump pipe off truck. Pipes are to be delivered, unloaded and handled so as to prevent damaging the material.

1.07 PROJECT/SITE CONDITIONS

A. PVC pipe shall not be cemented during wet conditions as determined by the District's Representative.

B. Trench excavation and backfilling shall not be executed during excessively wet conditions as determined by the District's Representative.

1.08 SEQUENCE AND SCHEDULING

A. Refer to all other Contract Documents, determine the extent and character of related work, and properly coordinate work specified herein with that described else where to produce a complete, operational installation.

B. Contractor shall be solely responsible for coordinating, sequencing, and scheduling all work with all applicable trades and/or sub-contractors so as to insure proper and timely performance.

1.09 GUARANTY

Contractor shall provide a written guarantee covering entire system against defects in installation, workmanship, and equipment for a period of one year from date of final acceptance.

B. Contractor shall make necessary repairs to the system as well as to other work affected by defects in the system during warranty period. Repairs shall be made at the Contractor's sole expense.

1.10 MAINTENANCE

A. Service: Contractor shall service and maintain domestic water system as necessary until project Final Acceptance.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

A. General:
1. Pipe materials for domestic water line shall be in conformance with the Uniform Plumbing Code and local agencies.
2. Plans and details, if shown, are schematic in nature and do not necessarily identify all fittings and appurtenances required to provide a complete installation. The contractor is responsible for providing complete and functional systems.
3. Materials and procedures not specifically addressed herein shall comply with the appropriate AWWA standard.
4. All materials proposed for use shall be in a new, "first class" condition unless otherwise noted.

B. Water Lines 3 Inches and Greater Diameter:
1. Ductile Iron Pipe (DIP): Pipe shall conform to AWWA C151, minimum Class 52. All ductile iron pipe shall be cement mortar lined in conformance with AWWA C104. Pipe shall be of domestic manufacture; U.s. Pipe Tyton joint, Pacific States; or acceptable equal. Buried ductile iron pipe and fittings shall be wrapped in an 8-mil. thick polyethylene film sleeve. The Contractor shall furnish certification that all pipe supplied for this project has been manufactured in compliance with all requirements of AWWA C151.
2. Polyvinyl Chloride Pipe (PVC): Pipe shall conform to AWWA C900, Class 200, cast iron O.D. sizes. Pipe shall be of domestic manufacture; JM Mfg. Co., PW Pipe, Certain teed Fluid-Tite; or acceptable equal. Pipe shall be furnished with integral bells. Spigot end pipe with separate double hub couplings is not acceptable. The Contractor shall furnish certification that all pipe supplied for this project has been manufactured in compliance with all requirements of AWWA C900.

C. Water Lines 2 (two) Inches and Smaller Diameter: Shall be one of the following:

1. Pipe shall be annealed (soft) Type "K" copper (Cu).

2. Polyvinyl Chloride Pipe (PVC): Pipe shall conform to AWWA C900, Class 200, cast iron O.D. sizes. Pipe shall be of domestic manufacture; JM Mfg. Co., PW Pipe, Certain teed Fluid-Tite; or acceptable equal. Pipe shall be furnished with integral bells. Spigot end pipe with separate double hub couplings is not acceptable. The Contractor shall furnish certification that all pipe supplied for this project has been manufactured in compliance with all

D. Couplings and Sleeves:

1. General: Couplings and Sleeves shall be a minimum of 200-psi working pressure-rated unless otherwise noted. Couplings and sleeves shall be mechanical joint type.
2. For DIP and PVC Pipe 3" thru 12":
   a. Unless otherwise noted, couplings and sleeves for DIP and PVC shall be ductile iron conforming to AWWA C153, and shall be 350 psi working pressure rated. Couplings, sleeves, and accessories shall be of domestic manufacture; U.S. Pipe Trim Tyte, Union Foundry, Tyler; or acceptable equal.
   b. Unless otherwise noted, flanges on all DIP spools shall conform to AWWA C115.
3. For PVC Pipe 2 1/2" and smaller:
   a. Schedule 40, solvent-weld PVC socket couplings.
4. For Copper Tubing:
   a. Couplings for copper tubing shall be Mueller 110 compression connections or acceptable equal.

E. Valves:

1. Gate valves:
   a. Use gate valves designed for a working pressure of not less than 150 psi.
   b. Provide connections as required for the piping in which they are installed.
   c. Provide an arrow on the operating nut or wheel, cast in metal, indicating direction of opening.

2. Thrust Blocks:
   a. Thrust blocks shall be constructed of Class "A" concrete. Thrust block dimensions shall conform to the California Plumbing Code.

F. Valve Boxes

1. Shall be 10" round boxes for gate valves.
2. Valves shall be labeled with "water" on lid.
3. Boxes located in landscape areas shall be plastic. Valve boxes shall be round model equivalent to Carson Model 910-10 with 910-4 lid.
4. Boxes located in paving shall be concrete with concrete lid.
5. Valve boxes shall have a bolt down lid.

G. Pipe Detection Tape: "Sentry Line" three (3) inch wide, detectable, "Caution Water Line Buried Below" tape as available from Terra Tape Inc. Houston, Texas (800)-231-6074 or acceptable equal.

G. Reinforced Tracer Wire: Copperhead Reinforced Tracer Wire available at Copperhead Industries, LLC. 877-726-5644.

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to starting work, test and verity that water pressure levels meet the domestic water system requirements. Notify the District's Representative immediately of any discrepancies and re-direct work to avoid delay.

B. The utility plan and the piping details are diagrammatic. Pipe lines shown parallel in the Drawings may be placed in a common trench, provided that a minimum horizontal distance of six (6) inches is maintained between buried lines, except for sanitary sewer lines, which require ten feet (10')

horizontal clearance.

3.02 HANDLING

A. Handle pipe accessories so as to ensure delivery to the trench in sound, undamaged condition.

B. Use pinch bars or tongs for aligning or turning the pipe only on the bare end of the pipe.

C. Thoroughly clean interior of pipe and accessories before lowering pipe into trench. Keep clean during laying operations by plugging or other acceptable method.

D. Before installation, inspect each piece of pipe and each fitting for defects:

E. Replace all material found to be defective (before or after laying) with sound material meeting the specified requirements, without additional cost to the District.

F. Rubber gaskets: Store in a cool dark place until just prior to time of installation.

3.03 PIPE CUTTING

A. Cut pipe neatly and without damage to the pipe.

B. Unless otherwise recommended by the pipe manufacturer, cut pipe with mechanical cutter only.

C. Use wheel cutters when practicable.

D. Cut pipe square, and remove all burrs prior to use.

3.04 TRENCHING

A. Conform with Section 31 23 00.

B. Excavate trenches with vertical sides uniform bottom, free of deleterious materials, and wide enough for pipes to lay side by side, fully supported on bottom.
1. No lines shall be installed parallel to and directly over another line.
2. When lines must cross, the angle shall be forty-five to ninety degree (45-90°), and a minimum of six (6) inch vertical clearance shall be maintained.

C. Provide minimum coverage as follows:
1. Pressurized service: 24" in landscape areas, 30" under pavement.

3.05 PLACING AND LAYING

A. General:
1. Lower pipe and accessories into trench by means recommended by the manufacturer.
2. Except where necessary in making connections to other lines, lay pipe with the wide bell end opening facing source.
3. Rest the full length of each section of pipe solidly on the pipe bed, with recesses excavated to accommodate wells, couplings, and joints.
4. Replace pipe that has been disturbed after laying.
5. Do not lay pipe in water, or when trench conditions are unsuitable for the work. De-water trench until jointing is completed.
6. Securely close open ends of pipe and valves when work is not in progress.
7. Where any part of coating or lining is damaged, repair at no additional cost to the District.
8. Follow manufacturer's detailed instructions in installing and assembling pipe.

B. Plastic Pipe:
1. Position pipe and fittings in trench in a manner that identifying markings will be readily visible for inspection.
2. Cutting and joining:

a. Protect against abrasion from serrated holding devices.
b. Remove burrs and glosses from surfaces to be jointed; use abrasive paper, file, or steel wool.
c. Remove dirt, dust, and moisture by wiping clean with dry cloth.

3. Align pipe system components without strain.
4. Support plastic pipe in trenches with a two (2) inch min. layer of bedding Provide a min. three (3) inch bedding sand cover. Allow no rocks, debris, or potentially damaging substances within six (6) inches of plastic pipe in trenches.

C. Connections:
1. Use appropriate fittings to suit the actual condition where connections are made between new work and service points.

3.06 JOINTING

A. Other joints:
1. Mechanical joints and push-on type joints: Install in accordance with AWWA C600, modified as necessary by the recommendation of the manufacturer to provide for special requirements of specified pipe.
2. Make connections between different types of pipe and accessories with transition fittings.
3. Rubber gaskets: Handle and install in strict accordance with the recommendations of the manufacturer. Lubricants for gaskets shall be manufactured by or approved by the pipe manufacturer for use under the conditions found in the field.

3.07 SETTING VALVES AND VALVE BOXES

A. General:
1. Center valve boxes on the valves, setting plumb.
2. Tamp earth fill around each valve box to a distance of four feet on all sides, or to be undisturbed trench face if less than four feet.
3. Tighten mechanical joints, and fully open and close each valve to assure that all parts are in working condition.

3.08 THRUST BLOCKS

A. General:
1. Provide and install thrust blocks in accordance with California Building Code requirements and installation guidelines.

3.09 TESTING, INSPECTING, AND DISINFECTION

A. Closing uninspected work: Do not allow or cause any of the work of this Section to be covered up or enclosed until after it has been completely inspected and tested, and has been accepted.

B. Time for making test:
1. Except for joint material setting, or where concrete reaction backing necessitates a five day delay, pipelines joints, or couplings may be subjected to hydrostatic pressure, inspected, and tested for leakage at any time after partial completion of backfill. All testing of water service shall be in accordance with the requirements of AWWA C600 for hydrostatic testing. Contractor to keep records of each piping test, including date and time of test, name of witnessing District representative, test pressure, description of piping tested, and remarks (i.e. leaks and repairs made). All tests shall last 4 hours and be tested at 200 psi.

C. Disinfection:
1. Before acceptance of the potable water system, disinfect each unit of completed service line in accordance with AWWA C601 and criteria of the local governing jurisdiction.
a. Proposed method shall be submitted to the District's Representative for review and acceptance.

b. Perform all tests and disinfection in a manner acceptable to governmental agencies

having jurisdiction.

2. Furnish two copies of a Certificate of Compliance to the District.

3.10 BACKFILLING

A. General:

1. Backfill only after specified tests have been performed and accepted.
2. Clean trenches of all debris and deleterious material before backfilling.
3. Backfill, as specified or shown in Drawings free from deleterious material.
4. Compact trenching to 95% relative compaction under pavement and 85% relative compaction within planting areas.
5. Trench surfaces shall be flush with finish grade. All trench settling shall be corrected by the contractor at no additional cost to the District.
6. Install pipe detection tape and reinforced tracer wire above all pressurized lines.

3.11 DEMONSTRATION

A. Instruct District's personnel in complete and proper operation of domestic water system per Section 01 77 00 Contract Closeout.

3.12 FINAL REVIEW

A. Provide District's Representative with all Guaranty and record drawing requirements prior to Final Review.

END OF SECTION

SECTION 33 31 00

SANITARY SEWERAGE

PART 1 GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, equipment, facilities, transportation and services to complete all sanitary sewerage and related work as shown on the Drawings and/or specified herein.

B. Scope of work: The general extent of the sewerage work is shown on the Drawings and includes, but is necessarily limited to, the following:
1. Sanitary sewerage system installation

C. Related sections can include, but may not be limited to:
1. Section 31 23 00 - Excavation, Backfilling and Compaction
2. Section 32 12 16 - Asphalt Concrete Paving
3. Section 33 11 00 - Domestic Water Systems

1.02 REGULATORY REQUIREMENTS AND REFERENCES

A. California Plumbing Code, current edition

B. State of California Department of Transportation Standard Specifications, current edition.

1.03 QUALITY ASSURANCE

A. Control of Work: Conform to Section 5 of the Standard Specifications.

B. Control of Materials: Conform to Section 6 of the Standard Specifications.

1.04 PROTECTION OF PROJECT SITE

A. Make provisions to take the necessary precautions to protect existing work from damage during execution of this work.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store pipe neat and orderly stacked and blocked to prevent damage. Cracked, checked, spalled or otherwise damaged pipe shall be removed from site.

B. Use of chain slings shall not be permitted.

C. Pipe, fittings, precast sections, cast iron fittings, covers and all other materials shall be carefully handled at all times.

C. All pipelines and fittings shall be kept clean and closed during construction.

1.06 PROJECT/SITE CONDITIONS

A. Work of this Section shall not be executed when site conditions are detrimental to quality of work as determined by the District's Representative.

B. PVC pipe shall not be solvent welded during wet conditions.

1.07 SEQUENCING AND SCHEDULING

A. Refer to all other Contract Documents, determine the extent and character of related work, and properly coordinate work specified herein with that described else where to produce a complete, operational installation.

B. Contractor shall be solely responsible for coordinating, sequencing, and scheduling all work with all applicable trades and/or sub-contractors so as to insure proper and timely performance.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

A. All pipe and fittings shall be clearly and permanently marked to identify manufacturer, type, class, or schedule and NSF approval as applicable.

B. Polyvinyl Chloride Pipe (P.V.C.) and fittings: Polyvinyl chloride pipe shall be SDR 26 Bell and Spigot, Type I P.V.C 1120, NSF approved. Comply with ASTM D-3034.

C. Ductile Iron Pipe (DIP) joints and fittings: Shall be Class 50, rubber gasket push-on type, in compliance with AWWA C-151, C-111 and C-110.

D. Vitrified Clay Pipe (VCP), and fittings: Shall be extra strength in compliance with ASTM C700, unglazed for socket and spigot joint.

2.02 STRUCTURES

A. Clean Outs: Shall be as detailed on Drawings. Christy "F8" clean out boxes are acceptable in non-vehicular travel areas. For vehicular travel areas, Christy "G5" clean out boxes shall be used.

2.03 MISCELLANEOUS MATERIALS

A. Crushed Rock: Shall be ¾" bedding rock as conforming to Section 200.1.2 of the "Standard Specification for Public Works Construction", commonly referred to as the "Greenbook."

B. Mortar: Conform to all applicable sections of the Standard Specifications. Mixture shall be a 1:2 Portland Cement to sand mixture with a minimum of water.

C. P.V.C. Solvent Cement: Conform to pipe manufacturer's recommendations.

D. P.V.C. Primer: Conform to pipe and solvent cement manufacturer's recommendations.

E. Reinforcing Bars: Refer to Section 32 13 13.

F. Minor concrete shall conform with Section 32 13 13 and all applicable sections of the Standard Specifications.

PART 3 EXECUTION

3.01 PIPE LAYING

A. General: The District's Representative shall review and accept all pipe prior to installation. Pipe shall

be installed in conformance with Section 31 23 00 of these Specifications. All sanitary sewer installations shall be reviewed and accepted by the District's Representative prior to backfilling.

B. Pipe:
   1. Pipe shall be laid in trench to specified lines and grades fully and evenly supported layer of bedding material as specified and identified on the Drawings. Excavate bedding as required so bell fittings are clear from soil six inches (6") on each side of joint and to a depth sufficient to avoid contamination of joint. Refer to Drawings for additional information.
   2. Pipe shall be laid beginning at the outlet and proceeding with each bell end opening facing upgrade.
   3. Cut pipe square and ream to remove burrs prior to use.
   4. Connections:
      a. Thoroughly clean and dry all components to be joined.
      b. Apply primer and sufficient cement to coat joint surfaces of both components and fill gaps but not in excess.
      c. Join pipe, wipe off excess cement, and fully support pipe until joint has cured.

C. Provide sleeving where shown or needed and wherever pipes run through walls using schedule 40 PVC pipe (min. one quarter [1/4] inch diameter larger than pipe) or other acceptable method.

3.02 STRUCTURES AT GRADE

A. General: Set rim or cover elevations to specified grades. Adjust as required to set flush with proposed grades and/or pavement sections.

B. Clean Outs:
   1. Excavate as required.
   2. Set on firm unyielding base. Set on compacted select backfill material unless noted otherwise.

3.03 SANITARY SEWER CONNECTIONS

A. Sanitary sewer connections to existing sewer mains shall be made water tight, straight and true to line, grade and "crown to crown" unless noted otherwise.

3.04 FIELD QUALITY CONTROL

A. The District's Representative shall review and accept work at the following stages:
   1. Excavated trench with bedding in place prior to any pipe being laid
   2. Pipe laid prior to backfilling. Any pipe covered prior to acceptance shall be uncovered for review and re-backfilled at contractor's expense.

B. The Contractor shall furnish the necessary labor, equipment and materials necessary to perform air tests of the completed sewerage project before the system is placed in operation or connected to other lines.

C. In no case shall the Contractor place the newly constructed sewer in operation without acceptance by the District's Representative.

3.05 PIPELINE TESTING & FLUSHING

A. New sections of sanitary sewer main shall be air tested using the following procedures:
   1. Test is conducted between two (2) consecutive manholes, or as directed by the District's Representative.
   2. The test section of the sewer line is plugged at each end. One of the plugs used at the manhole must be tapped and equipped for the air inlet connection for filling the line from the air compressor.

3. Service laterals, stubs and fittings into the sewer test section should be properly capped or plugged and carefully braced against the internal pressure to prevent air leakage by slippage and blowouts.
4. Connect air hose to tapped plug selected for the air inlet. Then connect the other end of the air hose to the portable air control equipment which consists of valves and pressure gauges used to control the air entry rate to the sewer test section, and to monitor the air pressure in the pipe line. More specifically, the air control equipment includes a shut-off valve, pressure regulating valve, pressure reduction valve and a monitoring pressure gage having a pressure range from 0-5 psi. The gage shall have minimum divisions of .10 psi and an accuracy of .40 psi.
5. Connect another air hose between the air compressor (or other source of compressed air) and the air control equipment. This completes the test equipment set-up. Test operations may commence.
6. Supply air to the test section slowly, filling the pipe line until a constant pressure of 3.5 psi is maintained. The air pressure must be regulated to prevent the pressure inside the pipe from exceeding 5.0 psi.
7. When constant pressure of 3.5 psi is reached, throttle the air supply to maintain the internal pressure above 3.0 psi for at least 5 minutes. This time permits the temperature of the entering air to equalize with the temperature of the pipe wall. During this stabilization period it is advisable to check all capped and plugged fittings with a soap solution to detect any leakage at these connections. If leakage is detected at any cap or plug, release the pressure in the line and tighten all leaky caps and plugs. Then start the test operation again by supplying air. When it is necessary to bleed off the air to tighten or repair a faulty plug, a new five-minute interval must be allowed after the pipe line has been refilled.
8. After the stabilization period, adjust the air pressure to 3.5 psi and shut-off or disconnect the air supply. Observe the gage until the air pressure reaches 3.0 psi. At 3.0 psi commence timing with a stop watch which is allowed to run until the line pressure drops to 2.5 psi at which time the stop watch is stopped. The time required, as shown on the stop watch, for a pressure loss of 0.5 psi is used to compute the air loss.
9. If the time, in minutes and seconds, for the air pressure drop from 3.0 to 2.5 psi is greater than that shown in the following table for the designated pipe size, the section undergoing test shall have passed and shall be presumed to be free of defects. The test may be discontinued at that time.
10. If the time, in minutes and seconds, for the 0.5 psi drop is less than that shown in the following table for the designated pipe size, the section of the pipe shall not have passed the test; therefore, adequate repairs must be made and the line retested.

Requirements for Air Testing:

Pipe size (In inches)	Time Min.	Sec.
4	2	32
6	3	50
8	5	06
10	6	22
12	7	39
14	8	56
15	9	35
16	10	12
18	11	34
20	12	45
21	13	30

(For larger diameter pipe use the following: Minimum time in seconds = 462 x pipe diameter in feet).

11. For eight (8) inch and smaller pipe, only: If, during the five minute saturation period pressure drops less than 0.5 psi after the initial pressurization and air is not added, the pipe section undergoing test shall have passed.

12. Multi-pipe sizes: When the sewer line undergoing test is 8" or large diameter pipe and includes 4" or 6" laterals, the figures in the table for uniform sewer main sizes will not give reliable or accurate criteria for the test. Where multi-pipe sizes are to undergo the air test, compute the average size in inches which is then multiplied by 38.2 seconds. The results will give the minimum time in seconds acceptable for a pressure drop of 0.5 psi for the averaged diameter pipe.

13. Adjustment Required for Groundwater:

    a. An air pressure correction is required when the ground water table is above the sewer line being tested. Under this condition, the air test pressure must be increased .433 psi for each foot the ground water level is above the invert of the pipe.

    b. Where ground water is encountered or is anticipated to be above the sewer pipe before the air testing will be conducted, the following procedure shall be implemented at the time the sewer main and manholes are constructed.

        1) Install a pipe nipple (threaded one or both ends, approximately 10" long) through the manhole wall directly on top of one of the sewer pipes entering the manhole with threaded end of nipple extending inside the manhole.

        2) Seal pipe nipple with a threaded cap.

        3) Immediately before air testing, determine the ground water level by removing the threaded cap from the nipple, blowing air through the pipe nipple to remove any obstructions, and then connecting a clear plastic tube to the pipe nipple.

        4) Hold plastic tube vertically permitting water to rise in it to the groundwater level.

        5) After water level has stabilized in plastic tube, measure vertical height of water, in feet, above invert of sewer pipe.

        6) Determine air pressure correction, which must be added to the 3.0 psi normal starting pressure of test, by dividing the vertical height in feet by 2.31. The result gives the air pressure correction in pounds per square inch to be added.

        Example: If the vertical height of water from the sewer invert to the top of the water column measures 11.55 feet, the additional air pressure required would be:

        $$(11.55) / (2.31) = 5.0 \text{ psi}$$

        Therefore, the starting pressure of the test would be 3.0 plus 5 or 8.0 psi, and the 0.5 lb. drop becomes 7.5 psi. There is no change in the allowable drop (0.5 psi) or in the time requirements established for the basic air test.

B. After the line has passed the air test, it shall be balled and flushed with water to clean. A metal screen shall be used downstream at the point of connection to the existing system to collect and remove any rock or other debris that is flushed out during cleaning.

END OF SECTION