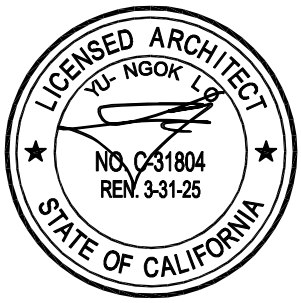
POMONA UNIFIED SCHOOL DISTRICT

BLEACHER AND GYMNASIUM FLOORING REPLACEMENT AT POMONA HIGH SCHOOL
A03-123616 File No. 19-H20

PROJECT MANUAL

ARCHITECT



STRUCTURAL ENGINEER

MEP ENGINEER

FIRE SPRINKER ENGINEER

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-123616 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 09/10/2024

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SECTION 011000
SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Work restrictions.
5. Specification and drawing conventions.
6. Misc. Requirements

1.2 PROJECT INFORMATION

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Bleacher and gymnasium flooring replacement at Pomona H.S.

1.4 ACCESS TO SITE

A. Coordinate with the construction manager for access to site. There will be not school in session during the summer break. However, such condition might change, and it is the contractor's responsibility to work around school schedule to minimize the impact to classes, including working extended hours (nights and weekends) at no additional cost to the District.

1.5 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
2. The School may be occupied during construction. Contractor shall not disturb the campus' daily operations. Coordinate with the construction manager for access.
3. Work hour: in accordance with the City's ordinance and/or as specifically instructed by the District.
4. Contractor shall clean up the work and make sure the affected areas are clean at the end of their work shift.

5. Coordinate with the District for staging area and temporary fencing locations. Contractor shall walk the jobsite with the District and submit a drawing indicating the location of temp fence / trash bins, toilet facilities, etc. for review and approval.
6. Use of the District's toilet facilities will NOT be permitted; contractor shall provide their own toilet facilities and maintain (provide weekly cleaning services) them throughout construction.
7. Contractor shall follow all Federal, State, and Local COVID-19 precautions and measures, including but not limited to, conducting routine temperature checks, providing hand sanitizer stations, filling out District standard COVID-19 questionnaires, requiring face mask at all time.

1.6 SPECIFICATION AND DRAWING CONVENTIONS

A. Division 01 General Requirements: Requirements of Sections in Division 01 apply all Work.

B. In case of conflict in the contract document, contractor shall submit RFI (Request For Information) accordingly prior to proceeding with the work.

1.7 MISC REQUIREMENTS

A. It is the contractor's responsibility to field verify existing room conditions and dimensions and conduct proper layout. Provide layout drawing indicating exact locations of toilet fixtures, toilet partitions, toilet accessories, floor drains, light fixtures, FA devices, ceiling registers, access panels, new walls, etc.. It is also the contractor's responsibility to verify the height of the existing ceiling. In case of conflict, notify the architect ASAP.

B. Contractor shall provide temporary support / shoring for demolition / new work if needed.

C. Regardless indicated on the drawings / specifications or not, all wall and floor tile and grouts shall be sealed. Submit sealer products per the tile and grout manufacturers' recommendations.

D. Regardless indicated in the contract documents or not, contractor shall provide materials, parts, accessories, and installations as needed for a complete assembly and system in compliant with DSA IRs, Policies, Bulletins, standards and all applicable codes and regulations.

E. Contractor shall patch existing roofing and wall where new penetrations are made. Maintain existing wall / floor / ceiling fire and acoustical rating. Install piping / exhaust fan roof penetrations per the manufacturer's requirement, patch roofing and obtain roofing warranty for the new work and maintain existing roofing warranty.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012500
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012600
CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

A. Architect will issue through Construction Manager supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on District's standard forms.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Construction Manager will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Construction Manager are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
e. Refer to the project General Conditions for instruction.

B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Construction Manager.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Refer to project General Conditions for instruction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012900
PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values. Refer to project General Conditions for requirements.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect through Construction Manager at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

a. Project name and location.
b. Name of Architect.
c. Architect's project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange schedule of values consistent with the District’s standards.

3. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
4. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
5. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Requests for Information (RFIs).
2. Project meetings.

B. Related Requirements:

1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

A. RFI: Request from Owner, Construction Manager, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use the District's standard form (if any) and include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

1.4 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

1.5 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect and Construction Manager.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor shall always provide suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: District’s standard form.

D. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFI, determine action required, and respond. Allow seven (or as indicated in the General Condition, whichever is longer) working days for Architect's response for each RFI. RFIs received by Architect or Construction Manager after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for coordination information already indicated in the Contract Documents.
d. Requests for adjustments in the Contract Time or the Contract Sum.
e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use CSI Log Form 13.2B.

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect and Construction Manager.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's and Construction Manager's response was received.

F. On receipt of Architect's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.6 PROJECT MEETINGS

A. General: Construction Manager will schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Construction Manager, and Architect, within three days of the meeting.

B. Preconstruction Conference: Construction Manager will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Critical work sequencing and long-lead items.
    c. Designation of key personnel and their duties.
    d. Procedures for processing field decisions and Change Orders.
    e. Procedures for RFIs.
    f. Procedures for testing and inspecting.
    g. Procedures for processing Applications for Payment.
    h. Distribution of the Contract Documents.
    i. Submittal procedures.
    j. Preparation of record documents.
    k. Use of the premises and existing building.
    l. Work restrictions.
    m. Working hours.
    n. Owner's occupancy requirements.
    o. Responsibility for temporary facilities and controls.
    p. Procedures for disruptions and shutdowns.
    q. Construction waste management and recycling.
    r. Parking availability.
    s. Office, work, and storage areas.
    t. Equipment deliveries and priorities.
    u. First aid.
    v. Security.
    w. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013200
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.
2. Daily construction reports.
3. Site condition reports.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Float: The measure of leeway in starting and completing an activity.

1. Float time belongs to Owner.

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.
3. Two paper copies.

B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

C. Daily Construction Reports: Submit at weekly intervals.

D. Site Condition Reports: Submit at time of discovery of differing conditions.

1.4 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion

D. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. CPM Schedule: Prepare Contractor's construction schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for the Notice to Proceed.

    a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Testing and commissioning.
    i. Punch list and final completion.
    j. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

    a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

D. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

E. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. Approximate count of personnel at Project site.

3. Equipment at Project site.
4. Material deliveries.
5. High and low temperatures and general weather conditions, including presence of rain or snow.
6. Accidents.
7. Meetings and significant decisions.
8. Unusual events.
9. Stoppages, delays, shortages, and losses.
10. Meter readings and similar recordings.
11. Emergency procedures.
12. Orders and requests of authorities having jurisdiction.
13. Change Orders received and implemented.
14. Construction Change Directives received and implemented.
15. Services connected and disconnected.
16. Equipment or system tests and startups.
17. Partial completions and occupancies.
18. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Distribution: Distribute copies of approved schedule to Architect, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
2. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of digital data files (CAD or BIM) of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files (PDF) of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.

a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
b. Contractor shall execute a data licensing agreement as required by the architect prior to the release of the digital files.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 30 days (or as stated in the General Condition, whichever is longer) for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal (or as stated in the General Condition, whichever is longer)

D. Paper Submittals: Not Accepted.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software electronic form acceptable to Owner**,** containing the following information:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of firm or entity that prepared submittal.
    g. Names of subcontractor, manufacturer, and supplier.
    h. Category and type of submittal.
    i. Submittal purpose and description.
    j. Specification Section number and title.
    k. Specification paragraph number or drawing designation and generic name for each of multiple items.
    l. Drawing number and detail references, as appropriate.
    m. Location(s) where product is to be installed, as appropriate.
    n. Related physical samples submitted directly.
    o. Indication of full or partial submittal.
    p. Transmittal number, numbered consecutively.
    q. Submittal and transmittal distribution record.
    r. Other necessary identification.
    s. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

    a. Project name.
    b. Number and title of appropriate Specification Section.
    c. Manufacturer name.
    d. Product name.
    e. Insert required information.

F. Options: Identify options requiring selection by Architect.

G. Deviations: Identify deviations from the Contract Documents on submittals.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and Construction Manager's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Post electronic submittals as PDF electronic files directly to Architect's FTP site or other online construction administration tool specifically established for Project.

    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. If acceptable to the construction manager and the architect, submit electronic submittals via email as PDF electronic files.

    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

3. Action Submittals: Submit electronically
4. Informational Submittals: Submit electronically
5. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.

h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

   a. Wiring diagrams showing factory-installed wiring.
   b. Printed performance curves.
   c. Operational range diagrams.
   d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

   a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
3. Submit Shop Drawings in the following format:

   a. PDF electronic file.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit sets of Samples. Architect and Construction Manager will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

        1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Submit product schedule in the following format:

    a. PDF electronic file.

F. Coordination Drawings Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures.

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

U. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."

V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN (DESIGN BUILD) SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect / District.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect and Construction Manager will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

F. Review stamp: Architect’s review stamp does not relieve the contractor’s responsibility to fully comply with the contract document.

END OF SECTION 013300

SECTION 014000
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
2. Specific test and inspection requirements are not specified in this Section.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.5 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections and distribute copies to the Architect, DSA, Project Inspector, and the District. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.

d. When testing is complete, remove test specimens, assemblies, and mockups, do not reuse products on Project.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Demonstrate the proposed range of aesthetic effects and workmanship.
2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
3. Demolish and remove mockups when directed unless otherwise indicated.

K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

1.7 QUALITY CONTROL

A. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

B. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

C. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

D. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified special inspector as required by DSA, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
3. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
4. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 014200
REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, contractor shall follow all applicable construction industry standards.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

B. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; http://dodssp.daps.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; http://eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeia; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

C. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.

2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; http://dodssp.daps.dla.mil.
3. DSA – Division of the State Architects
4. DSCC - Defense Supply Center Columbus; (See FS).
5. FED-STD - Federal Standard; (See FS).
6. FS - Federal Specification; Available from Department of Defense Single Stock Point; http://dodssp.daps.dla.mil.

    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.

7. MILSPEC - Military Specification and Standards; (See DOD).
8. USAB - United States Access Board; www.access-board.gov.
9. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

D. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. CBHF - State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR - California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS - California Department of Health Services; (See CDPH).
4. CDPH - California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC - California Public Utilities Commission; www.cpuc.ca.gov.
6. DSA – Division of the State Architects
7. SCAQMD - South Coast Air Quality Management District; www.aqmd.gov.
8. TFS - Texas Forest Service; Forest Resource Development and Sustainable Forestry; http://txforestservice.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 014523
TESTING AND INSPECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Testing and inspection services to meet requirements of the California Building Code (CBC), Title 24, Parts 1 and 2, as indicated on the Drawings and the DSA approved DSA 103

B. One or more DSA certified inspectors employed by the OWNER in accordance with the requirements of California Building Standards Administrative Code will be assigned to the Work with their duties as specifically defined in Section 4-333(b).

C. Tests of materials are required by a DSA certified testing agency as set forth in Section 4-335 of the California Building Standards Administrative Code.

1.02 RELATED SECTIONS

A. Section 011000:Summary
B. Section 012500:Substitution Procedures
C. Section 013300:Submittal Procedures
D. Section 017700:Closeout Procedures

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 TESTS

A. OWNER will select an independent testing agency to conduct tests, sampling, and testing of materials. Selection of material to be tested shall be by the agency and not by CONTRACTOR.

B. Any material shipped from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from IOR such testing and inspection is not required shall not be incorporated into the Work.

C. OWNER will select and directly reimburse testing agency the costs for all DSA and/or DSA required tests and inspections, but may be reimbursed by CONTRACTOR for such costs as noted in related sections of the Contract Documents.

D. The independent testing agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work. The agency shall not perform any duties of CONTRACTOR.

3.02 TEST REPORTS

A. Test reports shall include all tests performed, regardless of whether such tests indicate the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations as required shall also be reported. Reports shall indicate the material or materials were sampled and tested in accordance with requirements of CBC, Title 24, Parts 1 and 2, as indicated on the Drawings. Test reports shall indicate specified design strength. They shall also definitely state whether or not material or materials tested comply with the specified requirements.

3.03 VERIFICATION OF TEST REPORTS

A. Each testing agency shall submit to the Division of the State Architect a verified report in duplicate covering tests which are required to be performed by that agency during progress of the Work. Such report shall be furnished each time construction on the Work is suspended, covering tests up to that time, and prior to Final Completion of the Work, covering all tests.

3.04 INSPECTION BY OWNER

A. OWNER and its representatives shall at all times have access, for purpose of inspection, to all parts of the Work and to shops wherein the Work is in preparation, and CONTRACTOR shall at all times maintain proper facilities and provide safe access for such inspection.

B. OWNER shall have the right to reject materials and/or workmanship deemed defective Work, and to require correction. Defective workmanship shall be corrected in a satisfactory manner and defective materials shall be removed from the premises and legally disposed of, all without charge to OWNER. If CONTRACTOR does not correct such defective Work within a reasonable time, fixed by written notice and in accordance with the terms and conditions of the Contract Documents, OWNER may correct such defective Work and proceed in accordance with related Articles of the Contract Documents.

C. CONTRACTOR is responsible for compliance to all applicable local, state, and federal regulations regarding codes, regulations, ordinances, restrictions, and requirements.

3.05 INSPECTOR OF RECORD

A. Inspector of Record is employed by OWNER in accordance with requirements of Title 24 of the California Code of Regulations with their duties specifically defined therein.

B. Inspection of Work shall not relieve CONTRACTOR from any obligation to fulfill all of the terms and conditions of the Contract Documents.

C. CONTRACTOR shall be responsible for scheduling times of inspection, tests, sample taking, and similar activities of the Work.

3.06 TESTS AND INSPECTIONS

A. The following tests and inspections do not limit inspection of the Work but are required by DSA, other agencies, or are required in related Sections of the Contract Documents.

B. Excavations, Foundations and Retaining Walls - CBC, Chapter 18A

C. Concrete - CBC, Chapter 19A:

1. Materials:

a.	Test of Materials	1903A.1
b.	Portland Cement Tests	1903A.2
c.	Concrete Aggregate	1903A.3
d.	Shotcrete Aggregate	1903A.3; 1924A.3
e.	Reinforcing Bars	1903A.5.1; 1903A.5.2; 1903A.5.3; 1903A.5.4;
f.	Prestressing Steel & Anchorage	1903A.5.5;
g.	Structural Steel, Steel Pipe or tubing	1903A.5.6
h.	Admixtures	1903A.6

2. Quality:

a.	Proportions of Concrete	1905A.1; 1905A.2; 1905A.3; 1905A.4; 1905A.5; 1905A.6,
b.	Mixing and Placing	1905A.1.1; 1905A.1.2; 1905A.1.3
c.	Concrete Testing	1905A.6;
d.	Test Of Shotcrete	1905A.6; 1924A.10
e.	Composite Construction Cores	1929A.8
f.	Gypsum Concrete Strength Tests	1925A.1; 1929A.13
g.	Insulating Concrete Tests	DSA IR 27-1

3. Inspection:

	a.	Project Site Inspection	1905A.7.1
	b.	Batch Plant or Weigh-master Inspection	1929A.4, 1929A.5; 1929A.6
	c.	Pre-stressed Concrete Inspection	1929A.9
	d.	Shotcrete Inspection	1929A.10
	e.	Reinforcing Bar Welding Inspection	1929A.12, 1903A.10

F. Steel - CBC, Chapters 17A & 22A:

1. Materials:

	a.	Structural Steel	2202A.1
	b.	Material Identification	2203.A4

2. Inspection and Tests:

	a.	Test of Structural Steel	2231.A
	b.	Tests of High Strength Bolts, Nuts, and Washers	2231.A.2
	c.	Tests of End Welded Studs	2231.A.3
	d.	Shop Fabrication Inspection	2231.A.4
	e.	Welding Inspection	2231.A.5
	f.	High Strength Bolt Inspection	2231A.6
	g.	Steel Joist Load Tests	2231A.7
	h.	Spray applied fire resistance materials	1701

END OF SECTION

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service: Contractor’s responsibility.

1.3 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 TEMPORARY FENCING

A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 8 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts. Also provide green screen.

2.2 TEMPORARY FACILITIES

A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

B. Temporary toilet facilities: Contractor shall provide and maintain temporary toilet facilities throughout the entire duration of the project. Contractor and its subcontractors shall not use the District’s toilet facilities.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Temporary utility is the sole responsibility of the contractor.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Toilets: Use of Owner's existing toilet facilities will not be permitted.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Contractor’s responsibility.

H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.
2. Connect temporary service to Owner's existing power source, as directed by Owner.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Provide temporary parking areas for construction personnel.

D. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

    a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

E. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."

F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

3.7 NOISE

A. Contractor shall cease all construction activities (at no additional cost to the District) should the Construction Manager receives complaints from the District. It is the contractor’s responsibility to make sure that construction activities will not disturb any daily District activities.

END OF SECTION

SECTION 016000
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor through Construction Manager of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
    b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
    b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017300
EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
3. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.2 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

B. Certified Surveys: Submit two copies signed by land surveyor professional engineer.

C. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.

B. General: Engage a land surveyor professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Construction Manager.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

D. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements"

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION

SECTION 017419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.
4. All work shall compliant with federal, state, and local laws and regulations

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 90 percent by weight of total non-hazardous solid waste generated by the Work. Facilitate recycling and salvage of materials.

1.4 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 7 days of date established for the Notice to Proceed.

1.5 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual in tons.
5. Quantity of waste recycled, both estimated and actual in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Qualification Data: For waste management coordinator.

1.6 QUALITY ASSURANCE

A. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

1.7 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Contractor shall provide and implement a waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract. Please note that there will be no staging area available onsite. Contractor shall remove all trash and waste on a daily basis. No overnight trash / waste bins will be allowed onsite.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within 3 days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Donation: Permitted on Project site.

C. Salvaged Items for Owner's Use:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by the construction manager.
5. Protect items from damage during transport and storage.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors.

C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Grind asphalt to maximum 1-1/2-inch size.

B. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 1-1/2-inch size.

D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Pulverize masonry to maximum 3/4-inch size.
2. Clean and stack undamaged, whole masonry units on wood pallets.

E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

F. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

G. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

H. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site (on a daily basis) and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site. All trash / waste shall be removed from the jobsite on a daily basis to avoid conflict with the District's daily operations.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION

SECTION 017700
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:
1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

1.3 CLOSEOUT SUBMITTALS

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Construction Manager. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Construction Manager's signature for receipt of submittals.

5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

3. Submit list of incomplete items in the following format:

    a. MS Excel electronic file. Architect, through Construction Manager, will return annotated copy.
    b. PDF electronic file. Architect, through Construction Manager, will return annotated copy.
    c. Three Insert number paper copies unless otherwise indicated. Architect, through Construction Manager, will return two copies.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits. Power wash paving.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition. Powerwash and remove all Efflorescence from CMU wall.
f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
g. Sweep concrete floors broom clean in unoccupied spaces.
h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
j. Remove labels that are not permanent.
k. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
n. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
o. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

D. Professional cleaning: Contractor shall also employ a professional cleaning company to perform a final clean for all interior and exterior areas.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION

SECTION 017823
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.

1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

C. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.

F. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 017839
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Record data as soon as possible after obtaining it.
c. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect and Construction Manager. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
2. Format: DWG DXF DGN, Version , Microsoft Windows operating system.
3. Format: Annotated PDF electronic file with comment function enabled.
4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
5. Refer instances of uncertainty to Architect through Construction Manager for resolution.
6. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect and Construction Manager.
    e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file paper copy scanned PDF electronic file(s) of marked-up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file paper copy scanned PDF electronic file(s) of marked-up paper copy of Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file paper copy scanned PDF electronic file(s) of marked-up miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's and Construction Manager's reference during normal working hours.

END OF SECTION

SECTION 024119
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the demolition and removal of selected portions of existing wall, ceiling and wall and patching of existing surface affected by demolition as needed to match adjacent surface.

B. See Division 01 Section "Construction Waste Management and Disposal" for disposal of demolished materials.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate detailed sequence of selective demolition and removal work, with starting and ending dates for each activity, interruption of utility services, use of elevator and stairs, and locations of temporary partitions and means of egress.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1. Comply with submittal requirements in Division 01 Section "Construction Waste Management and Disposal."

1.4 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

1.5 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect/Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect/Engineer and Owner. Owner will remove hazardous materials under a separate contract.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations. Maintain fire-protection facilities in service during selective demolition operations.

1.6 PATCHING

A. Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect/Engineer.

E. Engage a professional engineer to survey condition of building to determine whether removing

any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

F. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs, preconstruction videotapes and templates.

G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off indicated utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.4 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
5. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal."B.Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect/Engineer, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally disposed of them.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

SECTION 079200
JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Other sealants as needed.

1.2 GENERAL

A. Regardless indicated on the contract drawings or not, it is the contractor's responsibility to provide joint sealants and/or caulking at locations required by the project inspector, architect and various industry standards.

B. All joint assemblies (sealants) provided for this project shall be water resistant.

C. Contractor shall provide sealant for all application of the project from one manufacturer.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product that will be used in the project. It is the contractor's responsibility to review the contractor document carefully and submit a schedule of sealants (also list the locations being used) that will be used on the project. It is also the contractor's responsibility to verify the compatibility of each product with different materials.

B. Samples: For each kind and color of joint sealant required.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

B. Preinstallation Conference: Conduct conference at Project site.

C. All products shall comply with all California codes, laws and regulations.

1.6 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

C. Stain-Test-Response Characteristics: Sealant shall be be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

E. Weatherproofing: Provide weatherproofing sealant as needed at damp or wet locations.

F. Sealant Primer: Provide primer as required per manufacturer’s requirements.

2.2 SILICONE JOINT SEALANTS

A. Mildew-Resistant Silicone Joint Sealant : ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. BASF Building Systems.
    b. Dow Corning Corporation.
    c. GE Advanced Materials - Silicones.
    d. May National Associates, Inc.
    e. Pecora Corporation.
    f. Polymeric Systems, Inc.
    g. Schnee-Morehead, Inc.
    h. Sika Corporation; Construction Products Division.
    i. Tremco Incorporated.

2. Type: Single component (S) or multicomponent (M).
3. Grade: Pourable (P) or nonsag (NS).
4. Class: 100/50.
5. Uses Related to Exposure: Traffic (T) or Nontraffic (NT).

2.3 URETHANE JOINT SEALANTS

A. Urethane Joint Sealant : ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. BASF Building Systems.
    b. Bostik, Inc.
    c. Lymtal, International, Inc.
    d. May National Associates, Inc.
    e. Pacific Polymers International, Inc.
    f. Pecora Corporation.
    g. Polymeric Systems, Inc.
    h. Schnee-Morehead, Inc.
    i. Sika Corporation; Construction Products Division.
    j. Tremco Incorporated.

2. Type: Single component (S).
3. Grade: nonsag (NS).
4. Class: 100/50.
5. Uses Related to Exposure: Nontraffic (NT).

2.4 LATEX JOINT SEALANTS

A. Latex Joint Sealant : Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. BASF Building Systems.
b. Bostik, Inc.
c. May National Associates, Inc.
d. Pecora Corporation.
e. Schnee-Morehead, Inc.
f. Tremco Incorporated.

2.5 JOINT SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Comply with manufacturer’s installation procedures.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.

2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

G. Acoustical Sealant Installation: Comply with ASTM C 919 and with manufacturer's written recommendations.

H. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.

1. Joint Locations:
   a. Isolation and contraction joints in cast-in-place concrete slabs.
   b. Tile control and expansion joints.
   c. Joints between different materials listed above.
   d. Other joints as indicated.

2. Joint Sealant: Silicone or Urethane
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

   a. Construction joints in cast-in-place concrete.
   b. Joints between plant-precast architectural concrete units.
   c. Control and expansion joints in unit masonry.
   d. Joints in dimension stone cladding.
   e. Joints in exterior insulation and finish systems.
   f. Joints between metal panels.
   g. Joints between different materials listed above.
   h. Perimeter joints between materials listed above and frames of doors windows and louvers.
   i. Control and expansion joints in ceilings and other overhead surfaces.
   j. Other joints as indicated.

2. Joint Sealant: Silicone or Urethane
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

   a. Control and expansion joints on exposed interior surfaces of exterior walls.

b. Perimeter joints of exterior openings where indicated.
c. Tile control and expansion joints.
d. Vertical joints on exposed surfaces of interior unit masonry walls and partitions.
e. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
f. Other joints as indicated.

2. Joint Sealant: Latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Sealant Location:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Tile control and expansion joints where indicated.
c. Other joints as indicated.

2. Joint Sealant: Silicone.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION

SECTION 081113
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.2 REFERENCES

1. Comply with the latest SDI (Steel Door Institute), ANSI and ASTM standards.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and framing anchor details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required.

E. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.5 WARRANTY

A. Contractor shall provide manufacturer’s extended 5-Year Warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: Steelcraft

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 HOLLOW-METAL DOORS AND FRAMES

A. Extra Heavy-Duty Doors and Frames: SDI A250.8, Level 3.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches.
    c. Faces: Metallic-coated steel sheet, minimum thickness of 16GA with minimum A60 coating.
    d. Edge Construction: Model 2, Seamless.
    e. Core: Steel Stiffened
    f. Finish: Factory primed and field painted. Factory applied primer must be applied a max 30 days prior to delivery to the jobsite.

3. Frames:

    a. Materials: Metallic-coated steel sheet, minimum thickness of 16ga with minimum A60 coating.
    b. Construction: Fully continuously welded.

4. Finish: Factory primed and field painted. Factory applied primer must be applied a max 30 days prior to delivery to the jobsite.

2.4 FRAME ANCHORS

A. General: Comply with SDI requirements.

B. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.

2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

C. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.5 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

E. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

F. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

G. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

H. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

I. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).

J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

    b. Compression Type: Not less than two anchors in each frame.
    c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

6. Door Silencers: Provide Silencers at both exterior and interior frames.
    a. Except on weather-stripped frames, drill stops to receive door silencers.
        1) Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
        2) Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow-metal work.
5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.7 STEEL FINISHES

A. Factory Finish: Factory primed and field painted.

2.8 ACCESSORIES

A. Louvers: Provide sightproof louvers for new doors, which comply with SDI 111C, with blades or baffles formed of 0.020-inch- thick, cold-rolled steel sheet set into 0.032-inch- thick steel frame. Factory primed and field painted

B. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

    a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
    c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch. Coordinate with door hardware manufacturer for doors to receive door shoes / sweeps
    d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

SECTION 099123
PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Exposed interior conduits and plumbing pipes (where occurs)
2. Hollow metal doors and frames
3. Louvers and access panel
4. Interior gypsum board
5. Other exposed (to both view and weather) items not specifically mentioned

B. Scope of work:

1. Contractor shall paint all factory primed products including but not limited to doors (all faces), frames, access panels, louvers, etc.
2. Contractor shall paint all new work that is exposed to view including but not limited to drywall, conduits, galvanized surface, etc.. Do not paint factory finished product, labels, tags, etc. See above paragraph 1.1A
3. Schedule: Contractor shall submit a paint schedule indicating all of the paint systems that will be used for the project. Contractor shall submit paint systems for substrates that are not specified in the contract document but required to complete the project. Contractor shall also verify the compatibility of the products against the substrate and each other.

1.2 SUBMITTALS

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

B. Samples: For each finish and for each color and texture required.

C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. District Standard Manufacturer: Dunn-Edwards.

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with SCAQMD and the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Flat Paints, Coatings, and Primers: VOC content of not more than 5 g/L or less.
2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 5 g/L or less.
3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 5 g/L or less.
4. Floor Coatings: VOC not more than 5 g/L or less.
5. Shellacs, Clear: VOC not more than 5 g/L or less.
6. Shellacs, Pigmented: VOC not more than 5 g/L or less.
7. Flat Topcoat Paints: VOC content of not more than 5 g/L or less.
8. Nonflat Topcoat Paints: VOC content of not more than 5 g/L or less.
9. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 5 g/L or less.
10. Floor Coatings: VOC not more than 5 g/L or less.
11. Shellacs, Clear: VOC not more than 5 g/L or less.
12. Shellacs, Pigmented: VOC not more than 5 g/L or less.
13. Primers, Sealers, and Undercoaters: VOC content of not more than 5 g/L or less.
14. Dry-Fog Coatings: VOC content of not more than 5 g/L or less.
15. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 5 g/L or less.
16. Pre-Treatment Wash Primers: VOC content of not more than 5 g/L or less.

D. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:

a. Acrolein.

b. Acrylonitrile.
c. Antimony.
d. Benzene.
e. Butyl benzyl phthalate.
f. Cadmium.
g. Di (2-ethylhexyl) phthalate.
h. Di-n-butyl phthalate.
i. Di-n-octyl phthalate.
j. 1,2-dichlorobenzene.
k. Diethyl phthalate.
l. Dimethyl phthalate.
m. Ethylbenzene.
n. Formaldehyde.
o. Hexavalent chromium.
p. Isophorone.
q. Lead.
r. Mercury.
s. Methyl ethyl ketone.
t. Methyl isobutyl ketone.
u. Methylene chloride.
v. Naphthalene.
w. Toluene (methylbenzene).
x. 1,1,1-trichloroethane.
y. Vinyl chloride.

E. Colors: As selected by the District from manufacturer's full range. Provide custom color as requested by the District

F. Low-Emitting Materials: Interior paints and coating shall comply with the testing and product requirements of the California Department of Health Services “Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers.”

G. Colorants: The use of colorants containing hazardous chemicals, such as ethylene glycol, is prohibited.

2.2 DRYWALL PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: Dunn-Edwards, VINYLASTIC PLUS

2.3 METAL PRIMERS

A. Metal primer for Ferrous and Non-Ferrous Metal: Dunn-Edwards, ENDURAPRIME

2.4 EXTERIOR FINSIH PAINT

A. Dunn-Edwards ENDURA-COAT

B. Interior sides of doors, door frames, louvers, etc. are considered “exterior” and shall be painted with ULTRASHIELD

2.5 INTERIOR FINSIH PAINT

A. Dunn-Edwards VINYLASTIC PLUS / EVER SERIES

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Gypsum Board: 12 percent.
2. Plaster: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION AND APPLICATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Comply with the Surface Preparation Standards published by the Society for Protective Coatings (SSPC).

C. Comply with manufacturer’s written instructions and recommendations.

D. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

E. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

F. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Tanks that do not have factory-applied final finishes.
e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
f. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

a. Switchgear.
b. Panelboards.
c. Electrical equipment that is indicated to have a factory-primed finish for field painting.
d. Exposed conduits and wiremolds

G. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

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

I. Coats: Provide a minimum of (1) coat of primer and (2) coats of finish paint for all substrates.

END OF SECTION 099123

SECTION 101400
SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Incorporated Documents: Contract drawings, Provisions of the Bid Documents, General and Special Conditions, General Requirements, and Division 01 apply to the Work of this Section.

B. Section Includes: Furnishing materials, labor, and equipment necessary for the completion of identifying devices as indicated on the Drawings and specified herein.

C. Geometric restrooms signs and exterior toilet room signage,

1.2 DEFINITIONS

A. Accessible Route: A continuous unobstructed path that complies with ADA, and 2022 CBC.

B. Characters: Letters, numbers, punctuation marks, and typographic symbols.

C. Circulation Path: An exterior or interior way of passage from one place to another for pedestrians, including, but not limited to, walks, hallways, courtyards, stairways, and stair landings.

D. Common Use: Interior and exterior rooms, spaces, or elements made available for the occupancy by students, staff, or others visiting or utilizing facilities.

E. Facility: Portions of buildings, structures, site improvements, complexes, equipment, roads, walks, passageways, parking lots, or other real or property located on a Project site.

F. ISA: International Symbol of Accessibility

G. Pictogram: A pictorial symbol, which is recognized as representing activities, facilities, or concepts.

H. Sign: An Architectural element composed of displayed text, symbolic, tactile or pictorial information.

I. Space: A definable area, such as a room, toilet room, hall, assembly area, entrance, storage room, alcove, courtyard or lobby.

J. Tactile: An object that can be perceived through the sense of touch.

1.3 SYSTEM DESCRIPTION

A. Comply with the most stringent requirements of 2010 ADA and 2022 CBC.

1. Tactile character type: Tactile characters on signs shall be raised 1/32 inch (0.794 mm)

minimum and shall be sans serif uppercase characters accompanied by Contracted Grade 2 Braille (see note below).

a. Tactile character size: Raised characters shall be a minimum of 5/8 inch (15.9 mm) and a maximum of 2 inches (51 mm) high.
b. Finish and contrast: Contrast between character, symbols and their background must be 70% minimum and have a non-glare finish.
c. Proportions: Characters on signs shall have a width-to-height ratio of between 3:5 and 1:1 and a stroke width-to-height ratio of between 1:5 and 1:10. CBC Section 11B-703.2. All letters measured must be uppercase. After choosing a typestyle to test, begin by printing the letters I, X, and O at 1 inch high. Place the template's 1:1 square over the X or O, whichever is narrower. If the character is not wider than 1 inch, nor narrower than the 3:5 rectangle, the proportions are correct. Use the 1:5 rectangle to determine if the stroke of the I is too broad, and the 1:10 rectangle to see if it is too narrow. If all the tests are passed, the typestyle is compliant with proportion requirement.
d. Braille: California (Contracted) Grade 2 Braille shall be used wherever Braille is required in other portions of these standards. Dots shall be 1/10 inch (2.54 mm) on center in each cell with 2/10 inch (5.08 mm) space between cells, measured from the second column of dots in the first cell to the first column of dots in the second cell. Dots shall be raised a minimum of 1/40 inch (0.635 mm) above the background. Braille dots shall be domed or rounded.
e. Mounting location shall be determined so that a person may approach within 3 inches (76 mm) of signage without encountering protruding objects or standing within the swing of the door.

B. Room Identification Signs:

1. Each permanent room and space identified by a sign shall have a sign installed adjacent to the door it identifies, with raised characters and Braille. This includes entrances to rooms and spaces, which are entered by an exterior entrance or by a door off an interior corridor or courtyard.
2. Restroom identification signs shall include a gender pictogram in a 6-inch high field (except Unisex toilet rooms). Pictogram field shall be located above the raised character and Braille text on the tactile sign, which is to be located adjacent to the latch side of the door. Restrooms shall be identified as follows:

a. WOMEN.
b. MEN.
c. UNISEX (for unisex, single person restrooms).

3. A geometric sign placed on the door shall also identify each restroom. The sign for women and girls' restrooms is a circle. The sign for men and boys' restrooms is a triangle. Unisex restrooms are identified by a triangle on and within the boundary of a circle.
4. If there is not adequate space for a sign immediately adjacent to the door, and the door opens inward, the gender pictogram, the ISA, and the raised characters and Braille can be included on the geometric sign installed on the door. In the case of restrooms with no doors, but only shielded entrances, the geometric sign can also include the required elements and be installed adjacent to the entrance.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.

B. Product Data: Include manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes for each type of sign required.

C. Shop Drawings: Provide shop drawings for fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, reinforcement, accessories, layout, and installation details.

1. Provide message list for each sign required, including large-scale details of wording and layout of lettering.
2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
3. Furnish full-size spacing templates for individually mounted dimensional letters and numbers.

D. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.

1. Samples for verification of color, pattern, and texture selected, and compliance with requirements indicated:
2. At least one actual sign for each type for review, these signs will not be returned to the contractor.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: For each separate type of sign required, obtain signs from one source from a single manufacturer.

B. Design Criteria: The drawings indicate size, profiles, and dimensional requirements of signs and are based on the specific type and model indicated. Signs by other manufacturers may be considered, provided that deviations in dimensions and profiles are minor and do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

C. Inspection: Tactile signs shall be field inspected for compliance after installation (11B-703.1.1.2).

PART 2 - PRODUCTS

2.1 BRAILLE AND RAISED-CHARACTER (TACTILE) SIGNS

A. Provide standard ¼" thick clear acrylic plastic signs. Color shall match the existing sign colors on campus (verify with District personnel).

1. Restrooms

B. Sign Plate and Lettering Sizes:

1. Room or Space Identification Signs:

MEN	7" x 1-1/2" high with 3/4" high letters (stock)
WOMEN	7" x 1-1/2" high with 3/4" high letters (stock)
Others	10" x 2" high with 3/4" high letters

(Increase or decrease length as required)

C. Installation:

1. Room Identification Signs: See details on drawing. Plates installed on the interior face of door shall be secured with four 1/8-inch diameter Cadmium plated Phillips head screws, 2 per side at each corner. Plates installed on the exterior face or both sides of doors shall be secured through the door with two nickel plate brass binding posts or sex bolts with the screw portion on the interior side.

D. Raised Characters:

1. Edges of characters beveled or rounded.
2. Minimum of 1/8 inch between the top surfaces of adjacent characters measuring between the 2 closest points.
3. Helvetica Regular typestyles with proportions that comply with CBC 11B-703.2.

E. Braille:

1. Rounded or domed dots in accordance with ANSI 703.5.
2. Specifications in accordance with CBC and ANSI 703.5, whichever is more stringent.
3. No indication of capital letters except for proper names, individual letters or acronyms, or beginnings of sentence in accordance with ANSI 703.5.

2.2 GEOMETRIC TOILET ROOM DOOR SIGNS.

A. Signs shall comply with CBC. Geometric signs shall be 1/4 inch thick, fabricated of a non-glare material which shall contrast with the restroom door (light to dark, or dark to light). Circle shall be 12 inches in diameter; stand-alone triangle shall have equal sides 12 inches in length. Triangle placed on circle shall not protrude outside of circle.

B. Signs shall be installed on the door leading into the restroom or other sanitary facility, centered on the door, and with the center of the sign 58 inches to 60 inches from the finished floor.

PART 3 - EXECUTION

3.1 GENERAL

A. Non-glare (non-reflective) materials shall be furnished for signs, which identify, direct to, or give information about facilities and their use. Parking, traffic signs, and exterior safety signs may be furnished with reflective materials. Identification sign for accessible parking spaces shall be furnished with reflective materials.

B. Characters shall have a minimum of 70 percent contrast with their backgrounds on signs which identify, direct to, or give information about facilities and their use.

C. Character styles, proportions and sizes on signs shall comply with CBC. Characters required to be tactile shall comply CBC

D. Braille translations of room and space identifications shall be Grade 2 and Braille cells and dots shall comply with ANSI 703.5 and CBC whichever is most stringent.

E. Pictograms and Symbols of Accessibility shall comply with the standards in 2022 CBC

F. Restrooms shall be identified with a geometric symbol on the door, which complies with CBC.

G. Signs required by the State Fire Marshal shall comply with CBC.

3.2 METHODS OF INSTALLATION

A. Interior Identification Signs and Interior Directional Signs:

1. Fasten to wall with 4 tamper-proof round-head screws, one at each corner of sign. Furnish plastic anchors.
2. When concealed installation is specified, install backplate to wall as above. Fasten sign to backplate with very high-bond double-faced tape.
3. For installation on glass, fasten sign to glass with very high bond double faced tape. On opposite side of glass, anchor matching backplate to glass with very high-bond double-faced tape.

B. Geometric Signs: Geometric toilet room signs shall be fastened to doors with 3 tamper-proof oval-head counter-sunk screws.

C. Exterior Post Mounted Directional Signs: Install by post mount. Size of required footing shall be as indicated.

D. Exterior Wall Mounted Identification Signs and Directional Signs:

1. Aluminum signs: Fasten to wall with 4 tamper-proof round-head screws, one at each corner of sign. Furnish lead anchors.
2. Acrylic signs: Install backplate to wall as above. Fasten sign to backplate with very high-bond double-faced tape and silicone.
3. For installation on glass, fasten sign to glass with very high bond double faced tape. On opposite side of glass, anchor matching backplate to glass with very high-bond double-faced tape.

E. Exterior Building Sign:

1. Each letter shall be furnished with a minimum of 3 cast mounting lugs on backside, drilled and tapped to receive installation bolts.
2. Letters shall be installed according to manufacturer's method. Letters shall be installed 3/4 inch away from wall surface, by an aluminum sleeve spacer.

3.3 CLEANUP

A. Remove and legally dispose of rubbish, debris, and waste materials off the Project site.

3.4 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 102800
TOILET ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Washroom accessories as scheduled in this Section and as indicated on the Drawings.

1.2 RELATED REQUIREMENTS

A. Section 093013 – Ceramic Tiles

B. Section 102113 – Toilet Partitions

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's data sheets for each product specified, including the following:
   1. Installation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Cleaning and maintenance instructions.
   4. Replacement parts information.

B. Schedule: Submit a toilet accessory schedule, indicating the type and quantity to be installed in each washroom. Use room numbers as indicated on the Drawings.

C. Country of Origin: Manufacturer must supply, with first submittal, Country of Origin information for each type of washroom accessory for this project.

1.4 QUALITY ASSURANCE

A. Manufacturer: Provide products manufactured by a company with a minimum of 10 years successful experience manufacturing similar products.

B. Single Source Requirements: To the greatest extent possible provide products from a single manufacturer.

C. Accessibility Requirements: Comply with requirements applicable in the jurisdiction of the project, including but not limited to ADA and ICC/ANSI A117.1 requirements as applicable.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations. Protect from damage.

1.6 WARRANTY

A. Manufacturer's Warranty for Washroom Accessories: Manufacturer's standard 1 year warranty for materials and workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Basis of Design:
   1. Bobrick Washroom Equipment, Inc. and Waxie Sanitary Supply.
   2. SSS Triple S

2.2 TOILET ACCESSORY SCHEDULE

A. Seat Cover Dispenser: Bobrick B-221. (1) min for each toilet
B. Hand Dryer: Bobrick B-7120
C. Grab Bar: Bobrick B-5806 (see drawings for configurations)
D. Toilet Paper Dispenser: SSS Sterling 2.0 9" Twin Jumbo Roll Tissue Dispenser. (1) min for each toilet
E. Soap Dispenser: Bobrick B-2111. (1) min for each lavatory.
F. Toilet Seat: Olsonite 95CT less cover, provide (1) for each toilet

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in strict compliance with manufacturer's written instructions and recommendations, including the following:
   1. Verify blocking has been installed properly.
   2. Verify location does not interfere with door swings or use of fixtures.
   3. Comply with manufacturer's recommendations for backing and proper support.
   4. Use fasteners and anchors suitable for substrate and project conditions
   5. Install units rigid, straight, plumb, and level, in accordance with manufacturer's installation instructions and approved shop drawings.
   6. Conceal evidence of drilling, cutting, and fitting to room finish.
   7. Test for proper operation.

3.2 CLEANING AND PROTECTION

A. Clean exposed surfaces of compartments, hardware, and fittings using methods acceptable to the manufacturer.

B. Touch-up, repair or replace damaged products until Substantial Completion.

END OF SECTION

SECTION 12760
TELESCOPIC SEATING

1. Part 1 General

1.1 Work

A. Telescoping gymnasium bleachers shown in architect's plans and specifications as manufactured by Interkal of Kalamazoo, MI, or as approved by the architect.

1.2 Related Work

A. Electrical.
B. Gymnasium flooring.

1.3 References

A. Applicable building code CBC 2022.

1.4 Description of the System

A. The bleacher system shall be comprised of multiple tiered, closed deck seating rows operating in a telescopic manner, incorporating the most economical quantity of sections while still complying with all loading requirements.
B. The first moving row shall be secured with friction or mechanical locks. Other rows shall be mechanically locked, operable only upon unlocking and cycling the first row, quantity of row locks to be determined by Interkal engineering.
C. Each bleacher row shall be comprised of risers, seat and deck components, and a complete set of supportive columns and braces.
D. The telescopic bleacher shall incorporate a locking system permitting the use of one, several, or all rows, each locked in the extended position.

1.5 Quality Assurance

A. Products and materials to be provided are to be from manufacturers regularly engaged fulltime In the manufacture or production of this and similar items, with a history of successful manufacture or production acceptable to the Owner. Additional documentation shall include:
    1. Evidence of a pre-approval (PC) by the Division of the State Architect Office of Structural safety, including Approval "A" number. Bleacher systems which have not been preapproved by DSA will not be acceptable,
    2. In addition to complying with pertinent codes and regulations, comply with industry and trade standards normally associated with this product or material, except where product or material is superior in quality to industry trade standards.

B. Engineering. It shall be mandatory that each bidder submit with their bid an affidavit signed by a Registered Professional Engineer stating that the product to be supplied has been tested by an independent testing facility and meets all applicable code requirements.

C. Deviation: It will be the responsibility of the bidder to furnish with his bid a list and clarification of deviations from this specification. Those bidders not submitting a list of deviations will be deemed to have not in accordance with these specifications.

D. Insurance Coverage: Bidder shall submit manufacturer's certification of insurance coverage for the life of the product. Product Improvements: Seating provided shall incorporate manufacturer's design improvements and materials current at time of shipment.

E. Product Improvements: Seating provided shall incorporate manufacturer's design improvements and materials current at time of shipment.

F. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.6 Guarantees

A. Provide under provisions of Division 01

B. Limited Guarantee: The manufacturer shall guarantee all work performed under these specifications to be free from defects for a period of one (1) year, plus an additional four (4) year extended warranty as follows:

1. Extended warranty for materials and labor for years 2 - 5 shall be contingent upon Owner performing annual inspections in accordance with ICC-300.
2. Annual Inspections shall be performed by a technician/installer trained and certified by the manufacturer.

B. Product Improvements

1. Seating provided shall incorporate manufacturer’s design improvements and materials current at time of shipment.

C. 10-year warranty: The manufacturer shall warranty structural components of the understructure for a period of 10 years.

5-year warranty: The manufacturer shall warranty all non-structural materials such as accessories, everything at deck level and above, and all power and electrical components for a period of 5 years.

1.7 DSA Approval

A. Telescopic bleachers specified herein and indicated on the drawings, including detailed plans, specifications and engineering calculations have been accepted and signed by the architect or engineer in charge of design and the architect or engineer who has been designated responsible to cover the work shown on a particular plan or specification, and approved by the Division of the State Architect.

B. Products of other manufacturers may be submitted for approval as equivalent provided they meet or exceed the requirements of these specifications.

1. Acceptable substitutions shall be submitted to the Division of the State Architect as a Field Change Directive and must be processed on a deferred approval basis. All associated design review; engineering and submittal costs shall be borne by the contractor. No time extensions shall be allowed for FCD/Deferred approval of this item
2. Submittal shall include complete shop drawings and structural calculations (signed and stamped) by the manufacturer's licensed professional engineer in charge of design for architectural/engineering review and processing through DSA.
3. Installation of acceptable substitute telescopic bleachers shall not be started until detailed plans, specifications and engineering calculations have been accepted and signed by the architect or engineer in charge of design and the signature of the architect or engineer who has been designated responsible to cover the work shown on a particular plan or specifications, and approved by the Division of the State Architect.

1.8 Submittals

A. Submit manufacturer’s installation instructions and descriptive literature in accordance with Section 01300.

B. Manufacturer’s operating and maintenance manuals in accordance with Section 01700.

1.9 Design Criteria

A. Telescopic bleacher design and fabrication shall conform to CBC 2022 and ADA requirements.

B. Telescopic gymnasium seating shall be designed to support a vertical live load of 100 PSF. Foot and seat boards shall be designed for a 120 PLF live load and, as a separate load case, a 300 LBS concentrated load. Seating shall also be designed to carry a horizontal sway force of 24 PLF parallel to the seating and 10 PLF perpendicular to the seating.

C. Steel components shall be cold-formed from appropriate width coil conforming to A1011 SS Grade 30, ASTM A653 - Grades 33, 40 and 50, ASTM A500 - Grade B 46 KSI as applicable.

D. Lumber components are kiln dried, finger jointed, edge glued southern pine of grade “B & B Finish” manufactured to the current SPIB glued-laminated standards for southern pine.

E. Plywood deck boards shall be fabricated from Douglas Fir Premium Underlayment with exterior glue, 5 ply minimum, solid cross band directly under face ply, species Group 1 and manufactured in accordance with APA grade trademarked PS 1.

1.10 Part 6 MANUFACTURERS

A. Products of the following manufacturer have been DSA approved and form the basis of design and standard of quality:

Interkal Telescoping Bleachers

B. Substitutions: Products of other manufacturer's may be considered equivalent provided they meet or exceed requirements of this specification Substitutions shall be in accordance with Div 01 of the contract documents. The District or District's representative shall be the sole judge of the equivalency of any proposed substitution. Where manufacturer's offer more than one model, provide the premium model. Acceptable substitutions shall be subject to part section for substitutions specifications.

C. Delivery, Storage and Handling

1. Materials delivered to the site shall be examined for concealed damage or defects in shipping. Any defects shall be noted and reported to the Owner’s Representative. Replacements, if necessary, shall be immediately re-ordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above the ground under protective cover or indoors so as to provide proper protection.

2. Part 2 Products

2.1 Manufacturer

Local Representative is H2I Group, 949-239-5145, contact is Mike Kurnik, email at mkurnik@h2igroup.com.

A. Telescopic seating as manufactured by Interkal, Kalamazoo, Michigan, is the standard of quality required and specified herein.

B. Only with the approval of the Architect will allow substitutions for materials specified; (see General Conditions for procedures).

C. The work has been designed and detailed based upon the first specified manufacturer's materials equipment, products, sizes, colors, etc. Contractors are advised that any and all modifications to be contractor's scope of work or to new or existing work resulting from the contractor's approved substitution request shall be the sole responsibility of the contractor and shall be performed by contractor at NO additional cost to the client/district.

D. Contractor shall notify architect, prior to bid time, of any items which are obsolete or will not be available for use in this project.

E. If the contractor's approved substitution request is a different size than the specified item, contractor shall adjust all supporting and surrounding construction as directed by the architect and as required for the different size item, all at NO additional cost to the client/district.

2.2 Materials

A. Model
   1. Interkal, closed deck telescopic bleacher with BLACKOUT Options #1-4 for black deck and riser construction, as required by Owner.

B. Type
   1. Wall Attached / Floor Attached, Free Standing Floor Attached, Forward Fold and Reverse Fold (as noted per DSA approved drawings).

C. Quantity
   1. Provide quantity of banks and number of rows per drawings.

D. ADA
   1. Notch outs. Provide 3'-0 1/4" wide wheelchair spaces as shown on the plans and as required to meet local code jurisdiction compliance with ADA. Notch outs to be 1 row deep, fixed.

E. Dimensions
   1. Rise per row. 10.25".
   2. Row to row spacing. 22".

F. Propulsion
   1. Friction Power. Furnish Interkal friction power, integral automatic electro-mechanical propulsion system to open and close telescopic seating system. Operation shall assure full visual control of the seating bank. The Wide Track System incorporates two friction

drive roller assemblies as an integral part of both first-row vertical column assemblies. Each section of bleacher shall have a power system that shall consist of two vertical column roller assemblies which shall include two 6" diameter by 2 ½" wide cast drive wheels for a minimum of four friction roller contact points per section of bleacher. Each roller shall have a specially formulated 45-durometer rubber covering to grip the floor as the units roll in and out. The two friction drive roller assemblies shall be installed a minimum of 7' apart per section. The two friction roller assemblies are linked together by a continuous drive shaft driven by a 1/2 H.P. 208 volt 3-phase motor that shall enable the rollers to work simultaneously, resulting in a more efficient operation with allowance for minor variations in the floor surface. All floor friction power systems shall be controlled by a dual directional, removable walk along pendant which plugs into the front of the first row to give the operator proper position for visual control. The pendant control voltage shall be 24 VAC @ less than 50 mA for the safety of all operating personnel. **The entire power system shall be U.L. Recognized.** A 208 volt 3-phase power source, including conduit, wiring, and safety disconnect must be provided by others. The electrical contractor shall perform the connections to the seating equipment at the safety disconnect. Motors, housing, and wiring shall be installed by certified personnel.

2.3 Accessories

A. Foot Level Aisles

1. Provide footrest level aisles at locations and sizes as shown on plans and approved shop drawings.
2. Center Aisle. Provide a permanently attached self-storing aisle rail which is designed to stack in place when the system is closed. The use of locking hardware requiring tools to tighten the aisle rail, and any rail system that requires any mechanical parts to rotate is not acceptable.
3. Intermediate Steps. Provide manufacturers' standard intermediate step as necessary per applicable code.
4. Aisle Covers. Provide black extruded PVC covers at the front nose beam location of all aisles. Include a grey stripe in the covers to provide a contrast as required by code.

B. Wheelchair Seating

1. Notch outs. Provide manufacturers' standard permanent handicap notch outs (3'-0 1/4" wide) located as shown on architectural plans. Notch outs must be located at section joints only to avoid interference with understructure. Fascia panels shall have

manufacturer's standard poly deck finish to match deck board surface. Notch outs to be 1 row deep.

C. Self-Storing End Rails (Back Rails as Per Drawings)
   1. Provide steel self-storing 42" high self-storing end guard rails with tubular supports and vertical intermediate members to comply with all code requirements. Rails shall be fitted to each exposed bank end from third row and above with all steel to steel connections. Finish shall be a black polyester powder coat.

D. Vinyl Curtain
   1. Provide 2 of the manufacturers standard vinyl end curtains to close off under the bleacher units in the extended position. Curtain color is to be determined.

E. Limit Switches

   1. Provide open and close limit switches at each bank location.

F. Motion Monitor

   1. Provide the manufacturers' standard audible and visible horn to warn operators prior to bleacher operation. All components shall be permanently mounted under row one.

G. Operation Controller (pendant switch)

   1. Provide 1 of the manufacturers' standard pendant controls plugged into a receptacle for extension and retraction. The receptacles shall be mounted behind the first-row kickboard.

H. Back Rails and Back Panels – as Required and Shown on Plans

2.4 Fabrication

A. Continuous Wheel Channel
   1. Wheel channels shall consist of a one piece formed steel channel welded to the base of a vertical column. Wheel channels accommodate 8 to 12 wheels per row for maximum weight distribution and operating ease. The number of wheels increases as the number of rows increase.

B. Wheels

1. 3-1/2” diameter with 1-1/8” non-marring soft rubber face with rounded edges designed to protect wood or synthetic floor. Provide 1/2” diameter axle for all wheels.

C. Columns
1. Electrically welded closed rectangular steel tube, 2” x 3” minimum size, fitted with a rear welded gusset at the wheel channel.

D. Row Interlocks
1. Join each row structure front to rear by means of two (2) interacting steel connections, plus automatic gravity row locks where Engineering determines they are required.
2. Lower track guides shall be an external superslide rod to guarantee positive engagement of vertical supports without binding and assures smooth operation over uneven floor conditions. Superslide shall be mounted to the side of the wheel channels to limit the possibility of damage.
3. Upper track guides shall completely interlock adjacent understructure support. A welded stop to ensure correct extension of bleacher unit on deck support. Use of bolt and nut stops is not acceptable, due to risk of loosening.

E. Diagonal Braces
1. Structural formed steel truss fitted to rows 4 and beyond. Bracing shall be attached to the rear riser at optimum locations to insure structural integrity. Bracing shall be designed and shaped to support a minimum load of 1000 LBS of both compression and tension forces created when the bleacher is loaded.

F. Deck Supports
1. Shall be of structural steel, 11 gauge spaced not greater than 60” on center for maximum deck stiffness. Every deck support not attached to a vertical post shall have an integral nylon roller to avoid steel to steel friction points for more efficient operation.

G. Decking
1. All deck boards shall consist of 19/32” nominal Douglas Fir C-C grade plywood with exterior glue and solid cross bands. Tongue and Groove deck boards are unacceptable. An extruded aluminum “H” connector shall be placed between plywood panels. Exposed wear surfaces shall be finished with a layer of high Density polyethylene plastic .025 - .030 thick, Light Gray in color, complimentary to the seat option. Deck finishes, such as clear coat, requiring more than simple touch up to restore it to a new appearance after wear occurs are unacceptable.

H. Welds
1. All welds shall be made at the factory by welders that are qualified in accordance with AWS D1.3 for the equipment and process used.

I. Nose Beam
1. Shall be one-piece 13-gauge galvanized steel. 13-gauge steel is utilized for the necessary structural integrity to accommodate section lengths up to 26’.

J. Rear Riser
1. Shall be one piece formed 14-gauge, grade 40, galvanized steel, with a continuous access joint to fully encapsulate footrest panel for ease of cleaning and additional structural support. 14-gauge roll formed steel is utilized for the necessary structural integrity to accommodate section lengths up to 26’.

K. Splice Plates
1. Each section joint shall be tied together with two structural steel members per row, employing a minimum of four steel to steel through bolt connections at the nose beam and a minimum of eight steel to steel through bolt connections at the lower steel rear riser. Gauge of splice plates to match the gauge of the nose beam and rear riser. Splice plates employing steel to plywood deck board attachments will not be acceptable. In order to minimize deflections and keep rows in alignment during operation, splice connections shall transfer both axial loads (tension/compression) and bending.

L. Fasteners
1. All structural connections shall be made with S.A.E. grade 5 or better stress rated bolts. The use of self-tapping bolts is not acceptable.

M. Platform Finish
1. Steel Understructure abraded, cleaned and finished with russet brown water base acrylic paint.

2.5 Seat Options

A. Excel Seat Modules (ESM)
1. 18” wide one-piece individual seating modules shall be constructed of solid injection molded high-density polyethylene. Provide in 10” depth.

2. Each module shall have three longitudinal and five transverse internal ribs to provide additional structural integrity and resistance to impact.

3. Each module shall have a full 3/8" interlock to the adjacent module both around the perimeter and along the internal ribs to eliminate pinching hazards and assure proper alignment.

4. Each module shall be equipped with an 11 gauge steel bracket for a steel-to-steel attachment of each module to a minimum 13 gauge galvanized steel nose beam for maximum rigidity. All such mounting hardware shall be concealed.

5. Each module shall have a 2 ¼" x 1" recessed area for optional seat numbering.

6. End caps shall be provided at the ends of each bank (section, if manual) of seating as well as at each aisle.

7. Each end cap shall have two recessed areas including a 3 ½" x 3 ½" area for custom logos and a 2 ¼" x 1" area for optional row letters or numbers.

8. Select from manufacturer's 15 standard solid colors. Logo lettering will be provided to owner as an option at no additional cost.

3. Part 3 Execution

3.1 Inspection

A. Areas to receive seating must be free from impediments interfering with installation.

B. Installation shall not begin until building conditions are satisfactory.

3.2 Installation

A. All seating shall be installed in accordance with manufacturer's instructions and approved submittal drawings.
B. All seating shall be adjusted for smooth and proper operation.
C. Clean seating and remove all debris resulting from installation.

END OF SECTION

SECTION 21 31 13
WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Fire-protection valves.
3. Sprinklers.
4. Alarm devices.
5. Pressure gages.

1.03 DEFINITIONS

A. High-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure higher than standard 175 psig, but not higher than 250 psig.

B. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.

1.04 SYSTEM DESCRIPTIONS

A. The Contractor shall be responsible for the Automatic Fire Sprinkler inside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite Fire system. This specification is intended to establish the required performance and quality of the work necessary to provide for a complete automatic sprinkler system above and below ceiling to serve the buildings on site as indicated on the drawings.

1.05 PERFORMANCE REQUIREMENTS

A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

B. Sprinkler system design shall be approved by authorities having jurisdiction.

1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
2. Sprinkler Occupancy Hazard Classifications:

a. Building Service Areas: Ordinary Hazard, Group 1.
b. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
c. General Storage Areas: Ordinary Hazard, Group 1.
d. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
e. Office and Public Areas: Light Hazard.

3. Minimum Density for Automatic-Sprinkler Piping Design:

a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.

b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.

4. Maximum Protection Area per Sprinkler: Per UL listing.
5. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:

a. Light-Hazard Occupancies: 100 gpm for 30 minutes.
b. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes.

C. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

1.06 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

C. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.07 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.

a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.

B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13, "Installation of Sprinkler Systems."

1.08 PROJECT CONDITIONS

A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of sprinkler service.
2. Do not proceed with interruption of sprinkler service without Construction Manager's written permission.

1.09 COORDINATION

A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

1.10 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

2.02 STEEL PIPE AND FITTINGS

A. Standard Weight, Galvanized- and Black-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.

B. Schedule 30, Galvanized- and Black-Steel Pipe: ASTM A 135; ASTM A 795/A 795M, Type E; or ASME B36.10M, wrought steel; with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.

C. Nonstandard OD, Thinwall Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, thinwall, with plain ends and wall thickness less than Schedule 10.

D. Galvanized- and Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.

E. Galvanized and Uncoated, Steel Couplings: ASTM A 865, threaded.

F. Galvanized and Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

G. Malleable- or Ductile-Iron Unions: UL 860.

H. Cast-Iron Flanges: ASME 16.1, Class 125.

I. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

J. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.

K. Grooved-Joint, Steel-Pipe Appurtenances:

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

a. Anvil International, Inc.

b. Tyco Fire & Building Products LP.
c. Victaulic Company.

2. Pressure Rating: 175 psig minimum.
3. Galvanized and Uncoated, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

L. Steel Pressure-Seal Fittings: UL 213, FM-approved, 175-psig pressure rating with steel housing, rubber O-rings, and pipe stop; for use with fitting manufacturers' pressure-seal tools.

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

a. Victaulic Company.

2.03 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free.

1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
2. Class 250, Cast-Iron Flanges and Class 300, Steel Raised-Face Flanges: Ring-type gaskets.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

D. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.04 LISTED FIRE-PROTECTION VALVES

A. General Requirements:

1. Valves shall be UL listed or FM approved.
2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig.
3. Minimum Pressure Rating for High-Pressure Piping: 250 psig.

B. Ball Valves:

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

a. Anvil International, Inc.
b. Victaulic Company.

2. Standard: UL 1091 except with ball instead of disc.
3. Valves NPS 1-1/2 and Smaller: Bronze body with threaded ends.
4. Valves NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.

5. Valves NPS 3: Ductile-iron body with grooved ends.

C. Check Valves:

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

   a. Anvil International, Inc.
   b. NIBCO INC.
   c. Tyco Fire & Building Products LP.
   d. Victaulic Company.

2. Standard: UL 312.
3. Pressure Rating: 250 psig minimum.
4. Type: Swing check.
5. Body Material: Cast iron.
6. End Connections: Flanged or grooved.

D. Indicating-Type Butterfly Valves:

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

   a. Anvil International, Inc.
   b. Tyco Fire & Building Products LP.
   c. Victaulic Company.

2. Standard: UL 1091.
3. Pressure Rating: 175 psig minimum.
4. Valves NPS 2 and Smaller:

   a. Valve Type: Ball or butterfly.
   b. Body Material: Bronze.
   c. End Connections: Threaded.

5. Valves NPS 2-1/2 and Larger:

   a. Valve Type: Butterfly.
   b. Body Material: Cast or ductile iron.
   c. End Connections: Flanged, grooved, or wafer.

6. Valve Operation: Integral electrical, 115-V ac, prewired, single-circuit, supervisory switch visual indicating device.

2.05 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating: 175 psig minimum.

B. Angle Valves:

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

   a. Fire Protection Products, Inc.
   b. United Brass Works, Inc.

C. Ball Valves:

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

    a. Anvil International, Inc.
    b. Tyco Fire & Building Products LP.
    c. Victaulic Company.

D. Globe Valves:

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

    a. Fire Protection Products, Inc.
    b. United Brass Works, Inc.

E. Plug Valves:

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

    a. Southern Manufacturing Group.

2.06 SPECIALTY VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating:

    a. Standard-Pressure Piping Specialty Valves: 175 psig minimum.
    b. High-Pressure Piping Specialty Valves: 250 psig minimum.

3. Body Material: Cast or ductile iron.
4. Size: Same as connected piping.
5. End Connections: Flanged or grooved.

B. Alarm Valves:

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

    a. Reliable Automatic Sprinkler Co., Inc.
    b. Tyco Fire & Building Products LP.
    c. Victaulic Company.

2. Standard: UL 193.
3. Design: For horizontal or vertical installation.
4. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages and fill-line attachment with strainer.

2.07 SPRINKLER SPECIALTY PIPE FITTINGS

A. Flow Detection and Test Assemblies:

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

    a. Reliable Automatic Sprinkler Co., Inc.
    b. Tyco Fire & Building Products LP.
    c. Victaulic Company.

2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

B. Sprinkler Inspector's Test Fittings:

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

   a. Tyco Fire & Building Products LP.
   b. Victaulic Company.
   c. Viking Corporation.

2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

2.08 SPRINKLERS

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

1. Reliable Automatic Sprinkler Co., Inc.
2. Tyco Fire & Building Products LP.
3. Victaulic Company.

B. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element:

1. Early-Suppression, Fast-Response Applications: UL 1767.
2. Nonresidential Applications: UL 199.
3. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler Heads: (Interior Finished Ceilings and Exterior Soffits)

1. Heads shall be Reliable Model F1FR quick response sprinkler, recessed standard spray pendent with bright chrome finish. Pendent heads shall be Reliable Model F1FR quick Heads shall be Reliable Model F1FR quick response sprinkler, recessed standard spray pendent with bright chrome finish. Pendent heads shall be Reliable Model F1FR quick response sprinkler, standard spray pendent with bright chrome finish. Escutcheons shall be Model F2. Equivalent products of Viking or Tyco are acceptable. Corrosion-resistant finish shall be installed at exterior areas; finish shall be polyester or Teflon coating with matching escutcheon. Color and finish of all corrosion-resistant sprinklers shall be as approved by Architect.

2. Student toilet rooms shall be provided with Reliable Model F4FR quick response concealed flush to ceiling style heads having a painted white cover plate.
3. Heads shall be Reliable Model F4FR quick response, concealed, flush-to-ceiling automatic sprinklers. Equivalent products of Viking or Tyco are acceptable. Corrosion-resistant finish shall be installed at exterior areas; finish shall be polyester or Teflon coating with matching escutcheon. Cover plate finish shall be per Architect's specifications. Color shall be factory finish in custom color as selected by the Architect. Up to four (4) different colors will be selected for use in varying amounts at all sprinkler head locations.
4. All areas without Suspended Ceilings, Concealed Areas, Unfinished Ceilings and Storage Areas: Heads shall be Reliable, model F1FR quick response sprinkler upright/pendent with rough brass finish. Equivalent products of Viking or Tyco are acceptable. Where required, escutcheons shall be Sweet and Donaldson #401 with chrome finish at storage, mechanical, and electrical room ceilings.
5. Concealed Areas: Heads shall be Reliable, model F1FR quick response sprinkler upright/pendent with rough brass finish. Equivalent products of Viking or Tyco are acceptable. Where required, escutcheons shall be Sweet and Donaldson #401 with chrome finish at storage, mechanical, and electrical room ceilings.
6. Sidewall Sprinklers: Sidewall sprinklers Reliable Model F1FR quick response sprinkler, and may be installed for interior and exterior applications, subject to prior approval by Architect. Heads shall be Reliable Model F1FR quick response sprinkler horizontal, with bright chrome finish. Equivalent products of Viking or Tyco are acceptable.
7. Temperature Ratings: Heads below finished ceilings, and in all other occupied areas shall have a temperature rating of Ordinary (155-165 degrees). Heads in unventilated, concealed and void spaces shall have a temperature rating of Intermediate (200-212 degrees), unless otherwise required by code.
8. Provide metal cabinet for a reserve supply of sprinkler heads, as required by N.F.P.A. 13. Include suitable head wrenches for each type of sprinkler installed. Stock shall include all types and temperature ratings installed. Locate as directed by Architect.

E. Sprinkler Finishes:

1. Color and finish of all corrosion-resistant sprinklers shall be as approved by Architect.

F. Special Coatings:

1. Wax.
2. Lead.
3. Corrosion-resistant paint.

G. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Chrome-plated steel, two piece, with 1-inch vertical adjustment.
2. Sidewall Mounting: Chrome-plated steel, one piece, flat.

H. Water-Flow Indicators:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Potter Electric Signal Company.
2. Standard: UL 346.
3. Water-Flow Detector: Electrically supervised.
4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends sig

nal if removed.
5. Type: Paddle operated.
6. Pressure Rating: 250 psig.
7. Design Installation: Horizontal or vertical.

I. Valve Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Potter Electric Signal Company.

2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.

2.09 PRESSURE GAGES

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

1. AMETEK; U.S. Gauge Division.
2. Ashcroft, Inc.
3. Brecco Corporation.
4. WIKA Instrument Corporation.

B. Standard: UL 393.

C. Dial Size: 3-1/2- to 4-1/2-inch diameter.

D. Pressure Gage Range: 0 to 250 psig minimum.

E. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.01 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

B. Report test results promptly and in writing.

3.02 SERVICE-ENTRANCE PIPING

A. Connect sprinkler piping to water-service piping for service entrance to building.

B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-service piping.

3.03 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from authori

ties having jurisdiction. File written approval with Architect before deviating from approved working plans.

B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.

C. Install seismic restraints on piping. Comply with requirements for seismic-restraint device materials and installation in NFPA 13.

D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 and smaller.

F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

H. Install sprinkler piping with drains for complete system drainage.

I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

J. Install alarm devices in piping systems.

K. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.

L. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

M. Fill sprinkler system piping with water.

N. Install sleeves for piping penetrations of walls, ceilings, and floors.

O. Install sleeve seals for piping penetrations of concrete walls and slabs.

P. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.04 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.

I. Steel-Piping, Pressure-Sealed Joints: Join lightwall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

J. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

K. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

L. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

M. Steel-Piping, Pressure-Sealed Joints: Join Schedule 5 steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

N. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.05 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

D. Specialty Valves:

1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.

2. Alarm Valves: Include bypass check valve and retarding chamber drain-line connection.

3.06 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.

3.07 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals.

3.08 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Coordinate with fire-alarm tests. Operate as required.

C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.09 CLEANING

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers with paint other than factory finish.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

3.11 PIPING SCHEDULE

A. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends; cast-iron threaded fittings; and threaded joints.

B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

C. Standard-pressure, wet-pipe sprinkler system, NPS 1 and smaller, shall be the following:

1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fit

tings; and threaded joints.

D. Standard-pressure, wet-pipe sprinkler system, NPS 1-1/4 to NPS 4, shall be one of the following:

1. Standard-weight, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
2. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.
3. Thinwall Schedule 10, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

E. Standard-pressure, wet-pipe sprinkler system, NPS 5 and larger, shall be one of the following:

1. Standard-weight, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
2. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.
3. Thinwall Schedule 10, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
4. Thinwall Schedule 10, black-steel pipe with plain ends; welding fittings; and welded joints.

3.12 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms without Ceilings: Upright sprinklers.
2. Rooms with Suspended Ceilings: Quick response recessed standard pendent.
3. Wall Mounting: Sidewall sprinklers.
4. Special Applications: Extended-coverage, flow-control, and quick-response sprinklers where indicated.

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
2. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
3. Upright Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION

SECTION 22 05 00
GENERAL PLUMBING PROVISIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Related Sections:

1. Section 22 05 10: Plumbing Systems
2. Section 22 05 20: Plumbing Equipment and Systems Tests
3. Section 22 05 40: Plumbing Demolition and Repair
4. Section 22 05 50: Basic Plumbing Materials and Methods

1.02 SYSTEM REQUIREMENTS

A. Plumbing system shall be complete, tested, and demonstrated to be in perfect operating condition.

B. In the event the District should choose to enter upon and use any portion of the work (beneficial occupancy) prior to the completion of operational testing, capacity testing and Plumbing Systems, but after the passing of the established completion date, the contractor shall adequately staff the project to operate (manually, if necessary) and maintain the equipment and systems until such time as they have been demonstrated to the District to acceptably meet all the contract requirements.

1.03 EQUIPMENT AND MATERIALS, GENERAL

A. Submittals Required:

1. Prior to the start of any work, six copies of a list of all materials and equipment covered by Division 22 shall be submitted by the Contractor in conformance with the requirements of Division 1 and reviewed by the Architect/District and Engineer. Contractor shall allow ample time for checking and processing and shall assume all responsibility for delays incurred due to rejected items. No installation of material concerned shall be made until stamped submittals have been obtained from the District. Acceptance of material and equipment submittals shall in no way obviate compliance with the plans and specifications.

2. Additionally, each item proposed shall be referenced to the section, page, and paragraph of the specifications. For each item proposed, give name of manufacturer, trade name, and the catalog performance data for all equipment, including all applicable optional items as specified. Lists shall be complete for the project and shall be submitted at one time, bound in sets in three ring loose leaf stiff covered binders, indexed, with tabs for easy reference. All sets shall be identical.

3. Additional items to be included in submittals:

a. Sterilization test reports.
b. Test data & reports.

B. Requirements of equipment which increases the scope of the work.

1. The contract plans indicate the installation of the equipment of one set of manufacturers. Other acceptable manufacturers are named in these specifications.

2. If the installation of the particular equipment the Contractor has submitted under Division 22 requires changes in material or labor from that required in the contract plans and specifications, such drawings shall be submitted as shop drawings.

3. Any changes in piping, wiring, controls, or installation procedures required by the equipment shall be made at no additional cost to the District, and with no reduction in scope.

C. Equipment Layout Shop Drawings:

1. The Contractor shall submit "Equipment Layout Drawings" for each equipment room or area containing items of equipment furnished under this section.

2. Layout drawings shall consist of a plan view of the room, to scale, showing the projected outline of all equipment, complete with indication of all required clearances including those needed for removal of service. The location of all floor drains, piping, ductwork, electrical, plumbing, supports and other equipment shall be indicated. Sectional views shall be furnished as required to show overhead clearances.

3. Submit dimensioned drawings of ductwork and related accessories and equipment with sizes and location of ducts, diffusers, grilles, registers, automatic fire dampers, access panels, etc.

4. Construction drawings or part thereof shall not be used for shop drawing submittals. Contractor shall prepare and draw their own shop drawings and submit for review and approval.

5. Contractor shall review the drawings thoroughly including construction drawings by other disciplines prior to preparation of shop drawings and coordinate equipment, ductwork and piping layout with any obstructions.

6. Request for information (RFI) generated by the contractor will not be entertained unless shop drawings are submitted.

D. Operation and Maintenance Manuals:

1. Manual shall be indexed with tabs for easy reference bound in 3 ring binders and shall include valve charts, piping diagrams, control diagrams, cleaning reports, test reports, service instructions and parts list of all machinery.

2. This manual shall be submitted for approval at least 30 days before final inspection. Failure to submit the diagram and service manual will delay final inspection and acceptance of the work.

3. Four copies of the manual shall be delivered to the Engineer on or before the date of the final inspection, and each copy of the service manual shall be identical.

4. After review by the Engineer, the control diagrams shall be mounted in a neat frame with suitable backing, under clear glass and installed where directed.

5. Where applicable, the following specified information, together with any pertinent data, shall be included in the service manual.

a. Part numbers of all replaceable items.
b. Manufacturer's cuts and rating data or curves.
c. Lubrication and other maintenance data.
d. Test reports.
e. ASME data sheets for each pressure vessel.
f. Supplier's names, addresses and phone numbers.
g. Valve chart indicating location on job.
h. Cleaning report.
i. Domestic water sterilization certification.

1.04 REFERENCES

A. References made herein, or in any of the Mechanical Sections listed above, to standards, codes specifications, or recommendations of various technical societies, trade organizations, or governmental agencies are to the edition in effect at the time of the proposal, including all addenda.

B. Furnish, for the use in the Construction field office, one copy of each field installation standard

referred to in these specifications. Government codes accepted.

C. Code changes: If code changes occur between time of proposal and date of permit issue, and the Contractor has unnecessarily delayed the acquisition of his permits, the Contractor shall hold the District free from additional expense resulting from such code changes.

1.05 RECORD DRAWINGS

A. Two complete sets of mechanical drawings will be provided as record drawings, which shall be separate, clean, blue line prints reserved for the purpose of showing a complete picture of the work as actually installed.

B. These drawings shall also serve as work progress report.

C. Sheets and the Contractor shall make any notations, neat and legible, thereon daily as the work proceeds. These drawings shall be available for inspection at all times and shall be kept at the job at a location designated by the Engineer.

D. All buried service piping and indicated future connections outside of any building shall be located both by depth and by accurate measurement from a permanently established landmark such as a building or structure. Measurements shall be verified by the Engineer prior to backfilling.

E. At completion of the work, these record drawings shall be signed by the Contractor, dated and returned to the Engineer.

1.06 SURVEY OF SITE

A. Before submitting proposals for this work, each bidder shall become familiar with plans and specifications and shall have examined the premises and understand the conditions under which he will be obliged to operate in performing his contract. No allowance will be made subsequently in this connection for any error through negligence on the part of the Contractor.

1.07 CODES

A. All work performed under this section of the specification is under the following listed jurisdictional agencies and will be so inspected for code compliance.

ADA	Americans with Disabilities Act.
ANSI	American National Standards Institute.
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers.
ASME	American Society of Mechanical Engineers.
ASTM	American Society of Testing Materials.
AWS	American Welding Society.
AWSC	American Welding Society Code.
AWWA	American Water Works Association.
CEC	California Energy Commission.
NFPA	National Fire Protection Association.
OSHA	Occupational Safety & Health Administration
SFM	State Fire Marshall
SMACNA	Sheet Metal & Air Conditioning Contractor
National Association. UL	Underwriters Laboratories, Inc.
UBC	Uniform Building Code
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
CCR	State of California Code of Regulations
ETL	Electronic Testing Laboratories

B. Materials, equipment, and their installation shall comply with the requirements of the General Safety Orders, Department of Industrial Relations, State of California.

C. All reference codes and standards shall be the latest edition.

1.08 PERMITS, LICENSES, AND INSPECTIONS

A. Refer to the "General Conditions" of these specifications regarding these items.

1.09 DRAWINGS/SPECIFICATIONS

A. For purposes of clarity and legibility, the drawings are essentially diagrammatic and although size and location or equipment is drawn to scale wherever possible, Contractor shall make use of all data in all of the contract documents and verify this information at building site. Contractor shall fully inform himself regarding the peculiarities and limitations of the spaces available for the installation of work and materials furnished under this Division.

B. Drawings indicate required size and termination of pipes and ducts and suggest proper routes of piping and duct to conform to the structure, to avoid obstructions and to preserve clearance. However, it is not the intention to indicate all necessary offsets and it shall be the responsibility under this section to install ductwork and piping in such a manner as to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear and make all equipment requiring inspection, maintenance and repair, accessible without further instructions or extra cost to the District.

C. Check with other divisions of the work so that no interferences shall occur and in order that grade lines may be established for the work. No extras will be allowed for changes made necessary by interference with the work of other trades.

D. Drawings and Specifications: Specifications are intended to cover all labor, materials, equipment and standards of mechanical workmanship to be employed in work shown on drawings, called for in these Specifications, or reasonably implied by terms of same. Drawings and specifications are intended to supplement one another and part of work that may be mentioned in one and not represented in other, shall be done the same as if it has been mentioned or represented in both. Large scale drawings shall take precedence over layouts and shall scale details. Omission from specifications or drawings of any minor details of construction, installation, materials, or essential specialties shall not relieve Contractor from furnishing same in place complete.

1.10 WARRANTY AND DAMAGE RESPONSIBILITY

A. Furnish to the District a written warranty against defects in materials and workmanship in conformance with the requirements of Division 1. The Contractor shall be responsible for damage to the grounds, buildings, or equipment, and the loss of refrigerants, fuels, or gases caused by leaks or breaks in pipes or equipment new or existing resulting from the work of this Division.

1.11 DEFINITIONS

A. Definitions: Terms used herein and in the individual mechanical sections of the specification are defined as follows:

1. This Division: The Mechanical Division of the Specifications; a portion of the specifications that includes all the Sections of the specifications listed herein under "Work of This Section".

2. Individual Mechanical Section: Any one of the sections of the specifications listed under "Work of This Section", herein.

3. Other Divisions: The portion of the specifications that does not include the Mechanical Division.

4. Similar to: An alternative item of material or equipment which, in the opinion of the Engineer, matches the named item as to arrangement, materials, function and performance. The performance shall match or exceed that scheduled or advertised for the named item.
5. Utility Services: Those existing active, functioning systems, both primary and
6. secondary, which provide a facility and its occupants with heating, cooling, ventilating and sanitary functions.
7. Concealed: Hidden from sight as in trenches, chases, hollow construction, or above furred spaces, or exposed to view in tunnels, attics, shafts, crawl spaces or other unfinished areas.
8. Accessible: Possible for a 6'-0", 180-pound person to approach adequately and with sufficient work room to service, repair or replace concealed equipment.
9. Exposed: Not concealed as defined above except machinery and fan rooms.
10. Riser: A vertical pipe or duct having a vertical length greater than one story height.
11. Drop: A vertical pipe or duct that does not penetrate a floor.
12. Up-Feed Connection: A vertical pipe or duct that penetrates a floor, but has a vertical length of less than one story height.
13. Main: A pipe or duct which branches.
14. Branch: A pipe or duct which does not re-branch.
15. Header: A pipe or duct of constant size that serves a battery of closely spaced inlet or outlet connections.
16. Piping: Includes pipe, fittings, valves, hangers, and all pipe mounted devices that make up a system.
17. Unfinished space: A room or space that is ordinarily accessible only to building maintenance personnel. A room listed in the finish schedule as having exposed and unpainted construction for walls, floors, and ceiling. A room specifically mentioned as "Unfinished".
18. Finished Space: A room or space that is not Unfinished as described above; any space ordinarily visible to a regular occupant, including exterior spaces.

1.12 CERTIFICATION OF WELDERS

A. Where welding is required by work of this Division, such work shall be performed only by welders qualified and certified by a recognized, approved agency. Such certification shall bear date not more than twelve months prior to date of starting work under this Division, unless welder has been constantly employed by Contractor since last certification.

1. Pipe welding shall comply with the latest revision of applicable code, ASME Boiler Construction Code, American Welding Society Processes, ASME Code for pressure piping, and State and Federal requirements. Before welding is performed, contractor shall submit to Engineer evidence of compliance of welding procedure and operator's qualifications according to provisions of governing codes. Standard procedure Specifications and operations qualified by National Certified Pipe Welding Bureau shall be considered as conforming to requirements of these Specifications.
2. Welders shall have State of California C-60 License.

1.13 PRODUCT DELIVERY STORAGE AND HANDLING

A. During loading, transporting and unloading, exercise care to prevent damage to materials. Use padded or strap slings as appropriate for handling materials. Lift equipment by lift points provided or recommended by manufacturer. Do not drop pipe, fittings, valves and specialties. Upon

receipt, inspect materials for defects or for compliance with Contract Documents. Tag, stencil or permanently identify materials to adequately identify specialty items. Do not allow stainless steel to contact carbon steel during delivery, storage, handling or during or after installation.

1. Store all materials on site in enclosures or under protective covering to keep clean and dry. Do not store materials directly on ground. Store stainless steel on wood.
2. Store loose materials such as fittings, gaskets, bolts, nuts, small valves, traps, and specialties in bins of sufficient number to provide proper separation. Protect ends of large fittings, valves and pipe from weather and abuse. Properly grease all machined surfaces.
3. Remove rust spots from stainless steel by brushing with stainless steel brush.

1.14 SEISMIC RESTRAINTS

A. Contractor shall be responsible for all anchors and connections of mechanical work to the building structure to prevent damage because of an earthquake, including piping, manufactured equipment, and the integrity of shop fabricated and field fabricated materials and equipment. Reference details per "Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems" as published by SMACNA and PPIC, latest edition.

PART 2 - PRODUCTS

2.01 GENERAL

A. The products, assemblies, and methods shall be as described in the pertinent Mechanical Sections of the work.

B. Materials: New and of recent manufacturer, and of quality as specified herein and consistent with building design and intent.

C. Manufacturer: Unless otherwise provided, all mechanical items shall be substantially the same as the specified item manufacturer, which on date of opening of bids, have been in successful commercial use and operation for not less than one year in projects and units of comparable size.

2.02 MANUFACTURED PRODUCTS

A. Manufacturer's names and model numbers on the drawings are to establish type and class of material and equipment and, except for "or equal" requirements of the general conditions, products shall be by one of the manufacturers named by the specifications which shall include the names on the drawings as if therein written. When no names are listed in the specifications, any manufactured product equal to the manufacturer named on the drawings and which complies with the specifications may be acceptable.

B. The scheduled capacity requirements take precedence over the listed manufacturer's equipment size.

C. Wherever possible, all materials and equipment used in the installation of this work will be of the same brand or manufacture throughout for each class of material or equipment.

D. All rotating equipment shall operate in perfect dynamic balance.

E. Each item of manufactured equipment shall bear the manufacturer's non-ferrous metal nameplate. The manufacturer's name, model number, serial number and capacity ratings shall be permanently stamped or etched thereon.

F. No item of material or equipment shall be installed for any purpose in any manner not recommended by the manufacturer in his published literature. If recommended manufacturer installation requires additional pipe, ductwork or accessories it shall be installed by the contractor without additional cost to the District.

2.03 ALTERNATE EQUIPMENT

A. Equipment layout, piping connections, etc., are based on units as scheduled on the Drawings. If alternate or approved substitution equipment is used, it is the responsibility of this Contractor to make necessary modifications to provide an operating installation, including electrical requirements, controls, all service clearances around the equipment and shall be in complete conformance with the Uniform Mechanical and Plumbing code and all specifications and recommendations of the manufacturer without any additional cost to the District.

PART 3 - EXECUTION

3.01 PROTECTION, CARE AND CLEANING

A. The premises shall be maintained as required by Division 1.

B. Materials and Equipment:

1. Effectively protect materials and equipment to be installed on the project against moisture, dirt, and damage during the construction period, to the satisfaction of the District. Special care shall be taken to provide protective covering of bearings, open connections to pumps and tanks, coils, and similar equipment that are particularly vulnerable to grit and dirt.

2. Keep interior of all ductwork free of dirt, grit, dust, insulation, and other foreign materials at all times. Do not operate air distribution equipment until building is cleaned and air filters installed in order to prevent soiling of diffusers, ducts, air handling equipment and buildings.

3. Drain and flush piping to remove grease and foreign matter. Thoroughly clean out valves, traps and strainers and demonstrate the cleanliness to the District.

3.02 EXCAVATION AND BACKFILL

A. General:

1. Do all excavation and backfill required to install the work of this Division both inside and outside.

2. Perform all excavation and backfilling in accordance with that specified under Division 2 Earthwork.

B. Excavation: Bury required piping to a depth of not less than 36" below finish grade unless noted otherwise.

C. Backfilling: Do not backfill until after final inspection and approval of the piping installation by all legally constituted authorities.

3.03 INSTALLATION OF EQUIPMENT

A. Equipment shall be secured in place using fasteners as recommended by SMACNA's "Guideline for Seismic Restraints of Mechanical Systems" latest edition. Bolt sizes as a minimum shall be per the following schedule:

Bolt Size Inches	Equipment Weight Per Bolt, Pounds
3/8	50
1/2	120
5/16	225
3/4	300
7/8	950

B. All concrete work unique to the work of this Division and not a part of the structure, shall be done

in complete. Work shall include furnishing all dimensioned drawings for bases, pads, openings, etc., and finishing and installing all anchor bolts, inserts, etc. Coordinate with General Contractor.

3.04 EXISTING UTILITIES AND SERVICES

A. Location and character of principal existing utilities, including dimensions as shown on the drawings for convenience only, are believed complete and correct, but shall be subject to verification by the Contractor, as the Engineer assumes no responsibility for their correctness.

3.05 SEISMIC RESTRAINT CODE REQUIREMENTS

A. California Code of Regulations, Title 17 and 24; SMACNA and NFPA.

3.06 ELECTRICAL WORK

A. Furnish a complete electrical interlock wiring diagram and describe sequence of operation to show all field wiring for operating the particular equipment the contractor proposes to install. The diagram shall identify the wire color and the connection terminals of each item of equipment furnished for complete operating systems.

B. Any additional line or low voltage electrical wiring and conduit required over that shown in the Electrical Division of the work as required for complete and perfectly operating systems, shall be furnished under this Division in complete conformance with the requirements of the Electrical Division.

3.07 OPERATING INSTRUCTIONS

A. After all systems have been completely installed, verified to be operating perfectly and all tests completed and accepted, arrangements shall be made to operate all systems for a period of one week. Ten (10) days advance written notification of this period shall be given the District. During this period, the Contractor may make necessary minor but not interruptive adjustments. At this time, he shall instruct the District's operating personnel in the operation and maintenance of the various items of equipment.

B. The Contractor shall furnish, without additional cost to the District the services of competent instructors who will give full instruction to the District's designated personnel in the adjustment, operation and maintenance, including pertinent safety requirements of the equipment or system specified.

C. Each instructor shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. The number of man-hours of instruction shall be a minimum of 8 hours in increments, as scheduled by the district's Representative.

3.08 EMERGENCY REPAIRS

A. The District reserves the right to make temporary repairs as necessary to keep equipment in operating condition which shall neither void the Contractor's guarantee bond nor relieve the Contractor of his responsibility during the bonding period.

3.09 INTERRUPTION OF EXISTING UTILITIES OR SERVICES

A. The Contractor shall submit to the Engineer for approval a written schedule for the shutdown, removal, installation and connection of materials. Any shutdown of utility services shall be coordinated with the District. Prior written notification of seventy-two (72) hours minimum shall be given for any such shutdowns.

3.10 INITIAL LUBRICATION, ADJUSTING AND FILLING OF SYSTEM

A. Before operating any of the mechanical systems, lubricate equipment bearings and check belts, pulleys, and other moving parts of alignment and tolerances in accordance with equipment manufacturer's operating instructions. Flush piping and liquid systems and fill with

operating fluids. After tests, adjust valves and other parts of the work for quiet operation. Clean strainers by removing and washing basket or screen. Change lubricating oil in compressors. Suppress all vibration and noise.

3.11 STARTUP

A. Startup of all major equipment and other special equipment shall be performed by manufacturer's start-up technicians. Contractor shall be responsible for procuring such service.

3.12 WATER STERILIZATION

A. The entire domestic water piping system shall be sterilized before being turned on for use by the District. The Plumbing Contractor shall request an inspection by the Board of Health Department and shall deliver certification to the District.

END OF SECTION

SECTION 22 05 10
PLUMBING SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. All labor, materials and equipment for a complete and operable plumbing system, consisting of water supply, waste and vent connections as indicated, storm drain, hot and cold water, fuel gas, and waste and vent systems for new plumbing fixtures including all fittings, valves, trenching, backfilling, saw cutting, sleeves, rough-in and final connections to equipment as specified and as indicated on the drawings and unless otherwise herein specified, shall be complete, tested and ready for use.

2. The work includes, but is not necessarily limited to the following:

a. Plumbing labor, materials and equipment and rough-in and all final connections to all equipment and fixtures requiring such connections, whether such equipment and fixtures are furnished under this section or under other sections of these specifications or not indicated on the drawings or specifications, which are required for proper operation of the systems, in accordance with the true intent and meeting of the Contract Documents, shall be provided and incorporated in the work by and at the expense of the Contractor.
b. All necessary drilling, cutting, and patching are required for the work. Repair all concrete slabs as necessary. Patching materials and finishing shall match the surrounding work.

1.02 EXAMINATION OF SITE

A. Before bidding on this Work, the Contractor shall thoroughly familiarize himself with all of the existing conditions and the requirements of the Project.

1. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and to accept all conditions presented in the Drawings, herein specified or at the site.

2. No request for additional payment will be considered as valid due to failure to allow for conditions which may exist. All openings through roofs and walls shall be acceptable to the Architect and District's representative.

1.03 PERMITS AND INSPECTIONS

A. All work shall comply with the requirements of all applicable codes, laws, ordinances, regulations, and other authorities having jurisdiction.

1.04 COORDINATION

A. Coordinate this Work with the work of other trades to expedite the Project progress.

B. Work closely with all trades making certain all items are covered. No extras will be allowed for any controversies arising between the trades.

1.05 CLOSING IN WORK

A. Do not allow any of the work of this Section to be enclosed or covered up until approved by enforcing agencies. If any work is covered up before such inspection and approval, uncover it, and after it has been inspected, tested and approved, restore it to its original condition at no additional cost to the Owner.

1.06 RESPONSIBILITY

A. Be responsible for the safety and good condition of all material and equipment of the entire installation until final acceptance of work by the Owner.

1.07 VERIFICATION OF DIMENSIONS

A. All scaled and figured dimensions are approximate and are given for estimating purposes only. Before proceeding with the work of this Section, carefully check and verify all dimensions and sizes.

1.08 CUTTING AND PATCHING

A. Do all cutting and patching required for installation of Work under this Contract. Patching is to match surrounding materials and finish.

B. Holes or notches shall not be cut in structural members without written consent of the Architect/Structural Engineer.

C. Arrange for and place all necessary sleeves or openings in the structure where allowed.

1.09 MATERIALS

A. All materials, appliances and equipment shall be new and the best of their respective kind, free from all defects and of the make, brand and quality specified or as accepted by the Engineer as herein provided. This shall apply to all parts of the work whether or not this particular paragraph is referred to by number.

B. Except as otherwise specified; all materials used in the fabrication and construction of the various parts of the equipment included in this work shall be in accordance with the latest standard specifications of the American Society for Testing Materials. All articles provided for the same general purpose or use shall be of the same make except as otherwise specified.

1.10 SHOP DRAWINGS

A. Submit six copies of a typewritten list complete for all materials and equipment specified and listed which he proposes to install. These lists shall set forth the Specification page number; manufacturer's name, model number, sizes, non-standard accessories specified, and such other information required to identify all items.

1.11 CONFLICTS BETWEEN CONTRACT DOCUMENTS

A. In the event of conflicting requirements between items on the drawings, or between items in the specifications, or between items on the drawings and in the specifications, the more stringent or costly shall govern, unless decided otherwise by the Engineer, who shall be the sole judge in these matters.

1.12 CONFLICT IN SHOP DRAWINGS OR SUBMITTALS

A. Contractor agrees that shop drawing submittals processed by the Engineer do not become contract documents and are not change orders, that the purpose of the shop drawing review is to establish a reporting procedure and is intended for contractor's convenience in organizing his work and to permit the Engineer to monitor the contractor's progress and understanding of the design.

B. The process of review of the contractor's submittals is not the purpose of testing the Engineer's perception. If submittals and the contract documents are discovered either prior to or after the shop drawing submittals were processed by the Engineer, the contractor agrees that the contract documents shall control and shall be followed.

C. It is also the responsibility of the contractor to review the shop drawings or submittals to be submitted prior to submittal to the Engineer for his review. If shop drawings or submittals are received without the contractor's review stamp, the shop drawings or submittals will be returned to the contractor prior to the Engineer's review.

1.13 EXISTING UTILITY LINES

A. Location and character of principal existing utilities, including dimensions as shown on the Drawings, for convenience only, are believed complete and correct but shall be subject to verification by the Contractor, as the Owner assumes no responsibility for their correctness.

B. Adjust location or alignment of the new work as necessary to avoid or to connect to existing utilities or piping without additional cost to the Owner.

C. Make arrangements and pay for the installation of the new gas and existing water meters and provide and pay for any temporary storm drain, gas, water, and sanitary sewer connections. Verify before installation the invert elevations, locations, sizes and pressures of all existing utility lines at the new point of connections. Repair or replace all roadways, sidewalk pavements, or streets and other work incidental to these installations.

1.14 INTENT OF DRAWINGS

A. The drawings are essentially diagrammatic. The size and location of equipment and fixtures are drawn to scale wherever possible.

B. The Contract Drawings show the extent and general arrangement of the work covered under this section.

C. The work shall be followed as closely as possible; however, proper adjustments shall be made, with the Engineer's concurrence, to secure maximum headroom, a neat arrangement to keep passageways and openings clear, provide accessibility and provisions for maintenance, and meet all Code requirements, at no additional charges.

1.15 EXCAVATING, TRENCHING AND BACKFILLING

A. The mechanical work shall include all saw cutting, excavating, trenching, and backfilling required for the installation of piping, anchor blocks, and any other devices that are a part of this work.

B. Backfilling shall be performed in accordance with the applicable portions of other sections herein before.

C. Backfill shall not be placed until the mechanical work installed has been inspected, tested, and approved by the special inspector concerned.

1.16 CUTTING AND PATCHING

A. The Contractor shall do all drilling, cutting, and patching of the general construction work, rough, finish, and trim, which may be required for the installation of the work. All patching shall be of the same materials, workmanship, and finish as the original work, and shall accurately match the surrounding work. All cutting and patching shall be done under the Engineer's supervision.

1.17 QUALITY OF EQUIPMENT, MATERIALS AND WORKMANSHIP

A. Unless otherwise specified, all equipment and materials used in the installation shall be ASME, and IAPMO requirements. All workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed.

B. All materials and equipment shall be installed as recommended by the manufacturer.

1.18 ESCUTCHEON PLATES

A. Provide polished dull chrome-plated cast brass set screw flanges where pipes pass through walls, floors, ceilings, and partitions in exposed portions of the buildings. Escutcheon plates shall be provided in pipes at fixture and shall be polished chrome plated. Steel escutcheon plates are not acceptable.

1.19 DAMAGE BY LEAKS

A. The contractor shall be responsible for all damage to any part of the premises caused by leaks or breaks in piping, equipment, or fixture furnished and/or installed by him, for a period of one year from the date of acceptance of the work by the Owner.

1.20 RECORD DRAWINGS

A. Keep an up to date, on the site accurate, dimensional reproducible set of record drawings, showing all work which is installed per contract drawings or differently from that shown on the contract drawings. Record drawings shall include the location and the depth of buried or concealed piping, or equipment, etc.

B. Upon completion of the work, deliver the record drawings to the Engineer for final approval.

1.21 CLOSING-IN OF UNINSPECTED WORK:

A. Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Engineer's representative and local inspector. Should any of his work be covered up or enclosed before such inspection and test, uncover the work at no expense to owner and after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all his work and that of other trades to its original and proper condition.

1.22 PRELIMINARY OPERATION:

A. Should the Owner demand that any portion of the plant, apparatus, or equipment be operated for beneficial use prior to the final completion and acceptance of the work, the Contractor shall

consent.

B. Such operation shall be under the supervision and direction of the Contractor, but all the expense therefore will be paid by the Owner, separate and distinct from any money paid on account of the Contract. Such preliminary operation or payment therefore shall not be construed as an acceptance of any of the work of this Contract.

1.23 FINAL OPERATION

A. Upon completion of the installation of the equipment, the Contractor shall place a competent man in charge who shall operate the equipment, instructing the Owner's operators in all details of operation and maintenance of the equipment and controls for a period of 4 hours.

B. Six copies of operation and maintenance manuals for each site shall be delivered to the Engineer for approval prior to final completion of the project.

1.24 GUARANTEES:

A. As a condition precedent to the issuance of the final certificate for completion payment, the deliver to the Engineer a special written guarantee. Guarantee all workmanship, equipment and materials for a period of one year from the date of acceptance of the installation. Be responsible for all damages to premises caused by leaks or breaks in piping during this period. Should any other defects occur during this period, promptly repair or replace the defective items as directed by the District, free of charge to the Owner.

B. Warrant the complete and perfect operation of the entire system and that all apparatus will perform in accordance with the detailed drawings and Specifications.

C. Warrant that all equipment shall be supported in such a manner as to be free from objectionable vibration and noise.

D. Warrant that all licenses and royalties for use of any patented feature of the system will be paid before acceptance of the installation. Payment of such licenses and royalties shall be a part of the Contract.

1.25 SEISMIC RESTRAINT REQUIREMENTS:

A. Hangers for suspended equipment piping shall be sway braced in two directions, per "Guidelines for Seismic Restraints of Mechanical Equipment" by SMACNA.

B. All prefabricated equipment is to be designed and constructed in such a manner that all portions, elements, subassemblies, and/or parts of said equipment and the equipment as a whole, including its attachments, will resist a horizontal and vertical load equal to the operating weights of those parts multiplied by the factors indicated on the plumbing drawings.

C. Load is to be applied at the center of gravity of the part and to be in any direction horizontally and vertically. Anchorage, support, and/or attachment of said prefabricated equipment to the structure shall be in accordance with "Guidelines for Seismic restraints of Mechanical Equipment" by SMACNA.

D. Submit shop drawings and calculations for seismic restraints and anchorage of the equipment to the Engineer and Structural Engineer for review and approval. Installation of equipment or supporting elements shall not begin until shop drawings are approved by the Engineer and District’s representative.

E. Refer to seismic notes on plumbing plans.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall be new and in perfect condition; all materials for similar uses shall be of the same type, material, and manufacture for ease of future maintenance.

B. Accessibility: All equipment shall be readily accessible for maintenance and repairs. Provide all necessary staging, scaffolding, ladders, or similar facilities necessary to install work.

C. Exposed Trim: All trim, piping, and fittings allowed to remain exposed in finished parts of the building shall be chromium-plated brass, or rough piping may be covered with chromium-plated brass tubing.

D. Protection: All Materials, fixtures, and equipment shall be covered or sealed upon installation so as to be provided for safety and to ensure that operation and appearance will be maintained after subsequent construction operation.

2.02 COOPERATION WITH OTHERS

A. Organize the work so that progress will harmonize with the work of all trades, so that all work may proceed as expeditiously as possible.

B. Be responsible for the correct placing of the work and the connection thereof to the work of all related trades.

2.03 PIPING

A. Soil, waste, vent, and storm drain piping, underground inside of buildings and to points 5 feet outside of building, shall be PVC schedule 80 pipes with DWV fittings and solvent joints. Provide transition adapter to connect to different pipe materials as required.

B. Soil, waste and storm drain piping inside of building, above ground, shall be either coated service weight cast iron soil pipe with cast iron soil fittings, WW-P-401 or No-Hub joint soil pipe No. CISPI-301-78, with stainless steel couplings per CISPI-310-78, cast iron No-Hub joint soil pipe No. CISPI-301-78 with stainless steel couplings per CISPI-310-78.

C. Domestic cold and hot water piping inside the building above ground shall be type "L" copper tubing with wrought copper fittings and solder joints. Hot water piping shall be insulated. All domestic water pipes, fittings and valves shall be lead-free.

D. Domestic cold and hot water piping inside the building below ground shall be type "K" copper tubing with wrought copper fittings and solder joints. Hot water piping shall be insulated. All domestic water pipes, fittings and valves shall be lead-free.

2.04 PIPE CONNECTIONS:

A. All connections between 85% red brass pipe, type "K", “L” or type "M" copper tubing and steel pipe shall be made with Maloney, or approved equal, dielectric unions or flanges, which will prevent the flow of electrical current from one type of metal to another.

B. Sleeves shall be fire rated (3-hour fire resistance) PyroPac rubber link seal sleeve series L.S.

with galvanized link-seal sleeve series W.S., complete for fire rated wall or floors. Use standard link seal sleeves and rubber link seals for non-rated wall.

2.05 VALVES:

A. All valves shall be manufactured by Nibco (ball type), unless otherwise noted. All valves of the same type shall be of the same make. The valves shall be line size and shall be solder joint type for copper tubing. Ball valves shall be Nibco S-585-66-LF full port, two-piece bronze body, lead-free, stainless-steel ball and stem.

B. Unions in copper pipings,2 1/2 inches and smaller shall be Nibco, #733, or approved equal, 2 inches and larger shall be Nibco #740. For steel piping: Crane No. 300 AAR, galvanized malleable iron, ground joint, brass-to-iron seat.

C. Drop ear elbows, 90 degrees, shall be Nibco No.707-5, copper-to-copper or Nibco No. 707-3-5, copper to FSPS, for use at counter and wall trim connection.

D. Use stainless steel ball valves for isolating shut-off valves whenever possible.

NOTE: Check valves installed in vertical piping and in discharge piping from pumps shall be non-slam check valves, Miller No. 162 or Stockham No. WG-970 or approved equal.

2.06 ROOF FLASHING:

A. Flash all vents and other piping stubbed up through roof with a waterproof flashing constructed of 18- gauge galvanized sheet metal or aluminum not less than .040 inches thick. Extend base of flashing on the roof not less than 18 inches from the pipe. Extend flashing up the pipe not less than 6 inches and in contact with the pipe for 1 inch at top.

2.07 PIPE ISOLATORS:

A. Isolate all pipe hangers or piping supports from hot and cold-water piping with "ACOUSTO PLUM" system, Semco Series 100 for IPS piping, and series 500 for tubing, or Potter-Roemer PR- Isolators, Series 100 for IPS piping, and Series 300 for tubing. Where pipes pass through openings or touch any part of the structure, wrap with 1/4 inch thick waterproofed felt wrap.

2.08 CLEANOUTS:

A. Provide and install cleanouts where indicated on drawings and at all bends, angles, upper terminals, and not over 100-foot intervals in any horizontal piping, as required by the local Plumbing Code.

B. All cleanouts shall have an extra heavy cast iron body and extra heavy bronze plug. All flush with floor cleanouts shall have adjustable watertight covers. When waterproofing membrane is used, the cleanout body shall have integral anchoring flange and heavy clamping collar. All cleanouts shall be as follows:

1. INTERIOR FINISHED ROOM FLOORS: Cleanouts to have nonskid nickel-bronze top, and be Smith No. 4043, Josam No. 58350, Zurn No. Zn-1324, or approved equal.

2. INTERIOR FINISHED ROOM WALLS: Cleanouts shall have bonderized prime coated steel cover, and be Smith No. 4532 P.C., Josam No. YL-1590-B, Zurn No. Z-1320, Wade No. W-8460-R or approved equal. Install 26-gauge galvanized sleeve from tee through opening to finished wall surface.

3. Exposed cast iron lines, above ground, wall, shall be Smith No.4405, Josam No. Y-30, Zurn No. Z-1305, Wade W-8550-R or approved equal.

4. Interior finished room floors shall have nickel bronze top, Smith No. 4043, Josam No. Y-670-FB, Wade No. W-7000 Series Zurn No. ZN-1400-2, or approved equal.

2.09 FLOOR DRAINS

a. Provide new floor drains in compliance with ANSI – ASME A112.6.3 with heavy duty square stainless-steel strainer and membrane clamp as Manufactured by MIFAB # F1000 -C -S A1 body, Strainer size as required, Membrane clamp A1- C1, Hardware set HS-1 with variations and accessories as applicable to the application & location of floor drain.

2.10 PIPE HANGERS AND SUPPORTS:

A. Tolco, Michigan Co., or approved equal. Provide lateral bracing where hangers exceed 18 inches long. Isolate hangers and supports from water piping with Semco Trisolators. Insulate at openings, of structure with 1/2 inch felt wrap.

2.11 PIPING IDENTIFICATION:

A. Secure "Brady" pipe identification system at eight feet on center, classifying the material carried, to each pipeline. All line valves shall be identified with "Brady" valve tags.

2.12 ACCESS DOORS, BOXES AND COVERS:

A. Provide and install where indicated on-drawings and adjacent to all concealed valves and equipment requiring service. Doors shall be metal hinged, adequately sized, and fire rated to match construction. Minimum access door size shall be 12” x 12”.

2.13 PLUMBING FIXTURES REQUIREMENTS:

A. Verify all fixture and equipment locations with the Architectural plans and shall furnish and connect all fixtures and equipment shown thereon.

2.14 PLUMBING FIXTURE:

A. Refer to Plumbing Fixture Schedule on Drawings.

B. Protective Shielding Pipe Covers: All accessible lavatories and sinks shall be provided with protective shielding pipe covers. Provide product by Truebro, Inc. or equal. Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

PART 3 - EXECUTION

3.01 WORKMANSHIP:

A. All workmanship shall be performed by skilled mechanics using the best standard practices of the trade.

3.02 GENERAL PIPING INSTALLATION:

A. Thoroughly clean all piping before installation. Cap all openings during construction.

B. All above ground piping shall be concealed wherever possible. Underground piping shall have a minimum cover of 24 inches.

C. Provide a union on one side of all valves at equipment connections and in other locations as required for ease of servicing of equipment.

D. Make suitable provisions for maximum expansion and contraction of piping. Provide swing joints and anchors as necessary.

E. No bullhead tees, close nipples, or bushings will be allowed in piping.

F. All connections between 85% red brass, type "K" underground or type "L" copper tubing and steel pipe, shall be made with dielectric unions or flanges which will prevent the flow of electrical current from one type of metal to another.

G. Arrange piping to maintain headroom and keep passageways and access openings clear and offset as required to coincide with structural features of building. Do not spring, bend, or force pipe into place. Use fittings for all offset or changes in alignment of piping. Except for water piping below floor, use long sweep bends. Run piping to drain at low points, free of traps, sags, and bends. Provide ample space between pipes for proper thickness of covering.

H. Horizontal sanitary and storm drain piping shall be installed to a uniform grade of not less than 1/4 inch per foot, unless shown or directed otherwise. Vent piping shall be installed to provide proper ventilation of the plumbing and graded to provide for its drainage. Buried sewer, waste, and storm drain piping shall be continuously supported along the full length of the pipe.

I. Openings in pipes, drains, fittings, apparatus, and equipment shall be kept covered or plugged to prevent accumulating obstructions in the piping.

J. Water piping shall be run free of traps, sags, and bends, and graded and valved to provide for the complete drainage and control of the system.

K. All threaded piping shall be made up with an approved pipe dope, applied to male thread only, covering the entire thread.

L. At all exterior locations, install all yard boxes, and clean out to grade in the center of a concrete collar surrounding the yard box or clean out. The collar shall be full depth and a minimum 3" wide around the object but a minimum size of 12" x 12" x 12" deep. The concrete collar shall be square with the building, level and true with grade.

3.03 PLUMBING FIXTURE INSTALLATION:

A. Traps and trap arms shall be set at right angles to walls, in line with fixture outlets, without any offsets, angles, or bends. Fixture connections shall be properly aligned to prevent any undue strain on equipment or fixture.

B. Each fixture shall be set level and in continues contract with floor or wall.

C. Exposed plated, polished, or enameled connections from fixtures shall be put up with special care showing no tool marks or threads.

D. Trap installations, exposed above the floor, shall have chromium-plated brass escutcheon plates, casings, and uniform code pattern traps.

E. Trim shall be polished chromium-plated brass, by the same manufacture for each type. Where stop valves are required in exposed piping, they shall be short stem polished chromium-plated type. Flush valves shall all be by the same manufacturer.

F. Plumbing fixtures, equipment, faucets, and trim shall be identical in each category.

G. All fixtures installed in floors with waterproof membranes shall be provided with approved membrane clamps.

3.04 VENT PIPING AND FLASHINGS:

A. Sanitary plumbing vents shall terminate 12 inches above the roof and be flashed as per specification under Roof Flashing.

B. The tops of flashing shall be sealed, and counter flashed.

3.05 VALVES:

A. Valves shall be arranged and located to give complete control of all apparatus and plumbing fixtures, and as indicated, to isolate batteries of fixtures or sections of water systems. All valves shall be easily accessible.

B. In no case will exposed valves be allowed in finished portions of buildings. Provide access plates over valves in finished walls and valve boxes for valves in ground outside of building.

3.06 EXPANSION:

A. Expansion of piping shall be provided for by swings, offsets, and anchors where required for a satisfactory installation. Anchors shall be constructed of structural shapes of sufficient strength for purpose intended.

3.07 ACCESS DOORS:

A. Access openings for valves and cleanouts shall be fitted with not less than 18-gauge metal frames, 16-gauge doors with concealed hinges, locks operated with Allen head wrench, and anchor straps. Access doors shall be prime coated for painted walls, and polished chromium for tile walls, Karp # 214-P-AKL, 12" x 12", or approved equal.

B. Each access door shall be securely fastened into place and protected from construction damage.

3.08 HANGERS AND SUPPORTS:

A. Piping shall be firmly held in place by adjustable split ring malleable iron hangers, supports and pipe rests, located adjacent to fittings, at each offset or change of direction, at the ends of branch over 5 feet long, at riser pipes, and along piping where necessary to prevent sags, bends, or vibrations.

B. Maximum spacing for supports of horizontal piping shall be as follows: steel or brass pipe: 1 1/4-inch or large, 10 feet steel or brass pipe: 1-inch, 8-feet steel or brass pipe: 3/4-inch, 6 feet

copper tubing: 1 1/4-inch, 8 feet copper tubing: 1-inch or smaller, 6 feet.

C. Hanger rods shall be solid mild steel in accordance with the following schedule: 2 inches and smaller: 3/8-inch diameter rod 2 1/2 inches to 3 1/4 inches: 1/2-inch diameter rod 4 inches to 5 inches: 5/8-inch diameter rod.

D. Piping on roofs shall be supported and secured on redwood blocks anchored to roof and set in mastic.

3.09 UNION, FLANGES, AND PIPING CONNECTIONS:

A. Connections between copper tubing and valves, 2 inches and smaller, shall be made with brass, copper tubing to pipe threaded adapters. Connections between copper tubing and other types of piping having threaded openings shall be made with fitting adapters.

B. Provide dielectric couplings or unions at points where copper tubing or piping joins steel piping, or equipment made of a material containing iron.

C. Unions are required on the inlet and outlet sides of all apparatus or equipment having screwed connections, 2 inches and smaller and also on the outlet side of all screwed valves, 2 inches and smaller, to facilitate easy removal for repair and replacement.

D. Unions are not required where valves are underground or are accessible only through hand size access plates.

E. Connections between copper tubing and other types of piping having threaded openings shall be made of brass, copper, to IPS ground joint unions.

3.10 TESTING AND ADJUSTING OF PLUMBING EQUIPMENT:

A. No piping work, fixtures, or equipment shall be concealed or covered until they have been inspected and approved by the Mechanical Engineer who shall be notified by the contractor when the work is ready for inspection.

B. Should any work be enclosed or covered up before such inspection and test, the contractor shall, at his own expense, uncover the work, and after it has been inspected, tested and approved, make all repairs with such materials as may be necessary to restore all his work and that of other sections to their original and proper conditions.

C. All work shall be completely installed, tested as required by this section and the local ordinances, and shall be leak tight before inspection is requested. All tests shall be repeated to the satisfaction of those making the inspection.

D. Plumbing fixtures shall be filled with water and checked for leaks or retarded flow.

E. Each piece of plumbing equipment and the entire plumbing system shall be adjusted and readjusted as required to ensure proper functioning and left in first-class operating condition.

F. After soil, waste and storm pipe have been tested at the cleanout plugs shall be removed, heavily flushed with graphite impregnated grease, replaced, and screwed up snugly. Nylon plugs shall not be coated.

G. All soil, waste, storm drain, and vent piping shall be filled with water to the highest point in each system with all air removed. The lines shall be flushed by removing the test plug. Piping may

be tested in sections, providing all portions to be concealed shall be subjected to not less than a 10-foot head. The standpipe installed for head test shall be 1-inch minimum diameter.

H. Sewer and storm drain piping shall be filled with water to its highest point, but at not less than 5 PSIG pressure.

I. All test shall be maintained without leaks or pressure loss for not less than six hours, with allowance for temperature changes, except for transit pipe.

END OF SECTION

SECTION 22 05 20
PLUMBING EQUIPMENT AND SYSTEMS TESTS

PART 1 - GENERAL

1.01 SUMMARY

A. Related Sections

1. Section 15400 Plumbing Systems

1.02 QUALITY ASSURANCE

A. Qualifications of Agency and Personnel: Obtain the services of a qualified independent testing organization, acceptable to the Engineer, to perform the testing and balancing work as herein specified. The testing organization shall submit proof that it meets the technical standards for membership in the AABC as published in the AABC; or the organization is a member of the Associated Air Balance Council; or, certified by the National Environmental Balancing Bureau (NEBB). The testing organization shall not be affiliated with the installing mechanical contractor.

B. Performance Criteria: Work shall be performed in accordance with the approved Testing, Adjusting and Balancing (TAB) Agenda.

C. Test Equipment Criteria: The basic instrumentation requirements and accuracy/calibration required by AABC Section II or the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.

1.03 THE TESTING, ADJUSTING AND BALANCING AGENDA:

A. Definition: The proposed procedures and proposed forms, diagrams, and reports for documenting the testing, adjusting and balancing work.

B. Preparation: By the testing, adjusting and balancing agency for review and approval by the Engineer.

C. The Agenda shall include one complete set of the AABC or NEBB publications listed in Paragraph 1.05 C, applicable publications.

D. The agenda shall also include the following detailed narrative procedures, system diagrams and forms for test results.

1. Specific standard procedures required and proposed for each system.

2. Specified test forms for recording each procedure and for recording sound and vibration measurements.

1.04 SUBMITTAL DATA

A. Requirements: In addition to the requirements of Section 15010, GENERAL PROVISIONS, the submittal material shall include six copies of descriptive data for all products and materials including, but not limited to, the following:

1. Descriptive Data:

a. Statement of qualifications of independent testing agency.
b. Air flow measuring devices.
c. Pressure gauges.
d. Thermometers.
e. Other testing instruments.
f. Certificates of calibration of test instruments.

2. Sample Forms:

a. Complete forms proposed for use in compiling and recording test data.

B. Work Certification: Submit the name of the organization proposed to perform the work described in the Section for review within 35 days after contract award. Include in the submittal the certified qualifications of all persons responsible for supervising and performing the actual work.

C. Upon approval of the testing, adjusting and balancing agency, submit agenda for approval.

D. After completion of tests submit complete test reports for approval. Where test results differ from specified design conditions, indicating a contract deficiency, include explanatory comments in report. Contractor shall submit final reports prior to requesting the final inspection for the project.

1.05 APPLICABLE PUBLICATIONS

A. The following publications form a part of this specification to the extent indicated by the reference thereto. In text the publications are referred to by the initials of the organization.

B. American Society of Heating Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE) Latest Edition.

C. Associated Air Balance Council (AABC): National Standards for Field Measurement and Instrumentation Total System Balance, Fourth Edition.

D. American Society of Mechanical Engineers (ASME):

E. Underwriters Laboratories (UL)

F. National Environmental Balancing Bureau (NEBB)

1.06 PRODUCT HANDLING

A. Protection: Protect installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately do all repairs and replacements at no additional cost to the District.

1.07 COORDINATION

A. Coordinate all activities in accordance with provisions of Section 15010.

PART 2 - PRODUCTS

2.01 PRODUCTS

A. General: Products and materials shall be described in the pertinent Sections of the Mechanical Specifications.

PART 3 - EXECUTION

3.01 REQUIREMENTS

A. General

1. The contractor shall notify the Engineer at least 7 working days in advance of the time when any test is to be performed.

2. As required hereinafter, the Contractor will arrange and pay for special testing agencies. The Contractor shall provide, install and remove on completion of tests all special fittings, openings.

3. and other devices as needed to perform the tests. Furnish all labor as necessary to start, operate, adjust and modify all equipment and systems for both testing and the verification of tests.

4. For tests not requiring a testing agency, provide all equipment and instruments required for testing, including fittings for additional openings.

5. Verification. All test shall either be observed by or the tests rerun and the results verified in the

presence of, and approved by a representative of the Engineer, at their option as required herein.

6. Prepare a formal report as required herein.

B. At least fourteen (7) days before specified occupancy or date of completion of overall contract, the Contractor shall put all heating, ventilating, and air conditioning equipment and plumbing system into operation and shall continue the operation of same during each work day, for not less than 5 - eight- hour periods, until all adjusting, balancing, testing, demonstrations, and instructions on the systems have been completed. Final instructions and demonstrations and preparation of reports shall be done during the two-week period. When an individual building is ready for occupancy, all the above equipment relative to that portion of the work shall be put into service, tested and adjusted.

C. Coordinate testing, adjusting and balancing procedures with any phased construction requirements for the project so that usable increments of finished work may be accepted for beneficial occupancy. Systems serving partially occupied phases of the project may require balancing for each phase prior to final balancing.

D. Conduct final procedures after the system has been completed and is in full work order. Put all HVAC systems into full operation and continue operation of the systems during each working day. Accomplish testing, adjusting and balancing procedures in accordance with the agenda approved by Engineer.

3.02 PIPING PRESSURE TEST

A. Perform engineering tests required to demonstrate that the operation of the mechanical systems and their parts are in accordance with the Specifications covering each item or system, and furnish materials, instruments, and equipment necessary to conduct such tests. Tests shall be made in the presence of the IOR, the Engineer and the representatives of the district. Work shall not be concealed or covered until required approvals are obtained.

B. Pressure gages used in testing shall have one-pound graduations; vacuum gages shall have one inch mercury graduations. Air shall be bled from lines requiring hydrostatic or water tests.

C. Systems shall be pressure tested in accordance with the Pipe Test Schedule below. The pipe test shall show no loss in pressure after a minimum duration of four hours at the test pressures indicated. Where local codes require higher test pressures than specified herein for Fire Sprinkler Systems, the local codes shall be followed.

D. Piping systems may be tested as a unit or in sections as directed by the Engineer, but the entire system shall successfully meet the requirements specified herein, before acceptance by the Engineer.

E. Repair of damage to the pipes and their appurtenances, or to any other structures resulting from or caused by these tests, shall be performed by the Contractor.

F. Provide a pressure gauge located at the highest point of the system being tested with a shut-off valve and bleeder valve so arranged to check gauge operation.

G. The test welded joint on piping under 100 psi air pressure with soap suds prior to hydrostatic test.

H. Subject all welded joints on high pressure systems to hammer test while under hydrostatic pressure.

3.03 PIPE TESTING SCHEDULE

System Tested	Test Pressure (psig)	Medium, Duration
Waste, vent and storm drain, condensate drain from air	Fill with water to top of highest vent, allow to stand Two hours, or longer, as	Water

vent, allow to stand conditioning equipment.	directed by Inspector. Minimum head required for any joint shall be 10-feet in building. Extend stack. 15-feet above the highest horizontal line to be tested.	
Domestic Water Piping	150 Water,	5 hours

3.04 PROJECT COMPLETION TEST

A. Upon completion of the mechanical work, or such a time prior to completion as may be determined by the District, all mechanical equipment and systems shall be operated and tested for a period of at least five consecutive 8-hour days to demonstrate the satisfactory overall operation of the building or project as a completed unit.

B. The tests shall commence after preliminary balancing and adjustments to equipment and systems have been completed, and all running equipment have been checked and thoroughly lubricated.

C. Welding done on this project may be subject to radiographic inspections at random in accordance with requirements specified in Section 15050.

3.05 OPERATIONAL TEST

A. Before starting or operating any equipment systems, make a thorough check to determine that all systems have been flushed and cleaned as required and that all equipment has been properly installed, lubricated and serviced.

B. Replace or revise any equipment, systems or work found deficient during tests as required, to the entire satisfaction of the District.

C. Make any final adjustments or balancing found necessary to be made to the equipment or systems, to place them in acceptable operating condition and to the specified performance during any or all of the tests.

D. Provide, maintain, and pay all costs for equipment, instruments, and operating personnel as required for all tests.

3.06 REPORT

A. After tests have been approved on the entire system or any portion thereof, the Contractor or the testing agency, as applicable, shall certify in writing the time, data, name and title of the person approving the test. This rough field data shall also include the description and what portion of the system has been approved. The person making the inspection shall sign the certification.

B. Maintain a complete record of the rough field data of all testing that has been approved and make it available at the job site to all authorities concerned.

C. The testing company or contractor shall prepare a formal typewritten report, indexed, with stiff covers to contain all the required test data.

D. The report shall reference all readings to locations on a schematic sketch of the piping systems.

E. Deliver a copy to the District for review.

F. After review, verification, and acceptance, one copy of each of these test reports will be furnished to the Contractor for inclusion in each operating instruction manual.

END OF SECTION

SECTION 22 05 40
PLUMBING DEMOLITION AND REPAIR

PART 1 - GENERAL

1.01 SUMMARY

A. Principal work in this section:

1. Work included:

a. Removal and disposal.
b. Protection of existing work to remain.
c. Removal and disposal of items as shown.
d. Removal and disposal of existing items as necessary.
e. Debris removal.

1.02 GENERAL PROVISION

A. Field conditions: Take into consideration as necessary all obvious existing conditions and installations on the site as though they were completely shown or described. Accept the site of the work as it exists and clear obstructions to the work shown.

B. Examine the site and all conditions and limitations thereon and thereabouts. Take into account all such existing conditions and limitations whether or not the same are specifically shown or mentioned on the Drawings. Include whatever in needed to complete the work in every part as shown, described, required or implied to attain the completed condition contemplated by the Contract.

C. Include the reworking of abutting surface as required to make new work join and match existing surfaces to remain.

D. Protection of personnel: Erect signs, barricades and such other forms of warning as may be required to prevent personnel from putting themselves in the way of injury.

E. Existing work to remain: Provide such forms of protection as may be necessary to prevent damage to existing work and equipment to remain.

F. Existing operating equipment: Existing equipment in operation shall remain operating unless otherwise instructed by the District's Representative.

G. Prior to the demolition, Contractor shall inspect the area to be demolished with the District's Representative to ascertain the equipment ductwork; piping and accessories to be demolished are accounted for.

1.03 PROJECT PHASING

A. Removal or demolition, of existing equipment shall be performed in phases as indicated on the drawings or as directed by the District's Representative.

B. All ductwork, piping and other items that will remain and reused shall be secured and protected accordingly.

PART 2 - PRODUCTS

2.01 PRODUCTS AND MATERIALS

A. As necessary for the completion of this work.

B. Temporary barriers: All barriers shall be flame resistant fabrics.

PART 3 - EXECUTION

3.01 REQUIREMENTS

A. Check Drawings and site conditions carefully and thoroughly investigate existing construction.

B. Items of existing work indicated to remain upon completion of the Contract, but which require removal to complete the work, shall be carefully removed and replaced upon completion. The replaced work shall match its condition at the start of the work.

C. Unless otherwise shown, patch and finish surfaces as necessary to match existing, and in accordance with the requirements of the various Specification Sections. Paint the entire wall area (not just affected portion) to match condition of adjacent wall.

D. Prepare surfaces as necessary to provide proper condition to receive subsequent schedule finishes.

E. All removed materials not otherwise designated, and all debris from work of this Section becomes the property of the Contractor, who shall remove it from the Site and dispose of it as required by the authorities having jurisdiction.

F. Do not allow materials and debris designated by demolition activities accumulate. Remove daily and dispose off site in a legal manner. Transport removed materials and debris in sealed bags and containers.

G. No debris from the demolition shall be disposed of on school grounds; all debris and rubbish shall be hauled from the site.

H. All openings shall be in a sealed condition at the end of each working day.

END OF SECTION

SECTION 22 05 50
BASIC PLUMBING MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

A. Related Sections:

1. All other sections in Division 22.

1.02 QUALITY ASSURANCE

A. Standards: Comply with applicable national, state, and local codes and Industry standards.

B. Qualifications of Manufacturer: Products used in the work of this section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a 5-year history of successful production acceptable to the Industry standards and Architect/district.

1.03 SUBMITTAL DATA

A. Requirements: In addition to the requirements of Section 22 05 00 GENERAL PROVISIONS, the submittal material shall include six copies of descriptive data for all products and materials including, but not limited to, the following:

1. Complete material list of all items proposed to be furnished and installed under this section.

2. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.

3. Shop Drawings Showing:

a. Complete system layout and description of components and all piping work.
b. Schedule and description of pipes, fittings, and valves.
c. Special valves of all types.
d. Specialty fittings.

4. Manufacturer's Recommended Installation Procedures: The manufacturer's recommended installation procedures, when accepted by the Engineer, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the work.

1.04 COORDINATION

A. Coordinate all activities in accordance with the provisions of Division 22 specifications.

PART 2 - PRODUCTS

2.01 VALVES GENERAL

A. Each valve shall have the manufacturer's name or brand, the figure or list number and the rated working pressure cast or stamped on the body or bonnet or other equivalent means of easy identification.

B. Valves without specified materials or working pressure shall be selected to match materials

and pressure ratings of the fittings as a minimum.

C. Ball valves shall be Nibco S-585-66-LF full port, two-piece bronze body, lead-free, stainless steel ball and stem.

D. All gate and globe valves shall be back seating type suitable for repacking under pressure.

1. The minimum working pressure is 200 PSI. See class rating for each application.

2. Globe valves shall have composition discs suitable for the temperature and pressure of the service.

3. Ball and butterfly valves on insulated piping shall have the neck extended two inches above the outside diameter of the flange to accommodate the full thickness of the insulation. Extension shall be of same valve manufacturer.

4. Automatic Valves.

a. Solenoid valves:

1) Solenoid valves shall be 125 lb. WOG, brass bodied, screwed, stainless steel trim, resilient seated, normally closed 2-way, and 120 volts, 60 hertz, ADSCO Bulletin 8210 for sizes 3/8" to 3"; Bulletin 8222 for 125 lb. steam, sizes 3/8" to 3", General Controls, ALCO, Magnetrol or equal.

2.02 STRAINERS

A. Strainers shall have machined and gasketed caps either straight threaded or bolted.

B. Strainer open area of screen shall be at least three times the cross-sectional area of the pipe in which installed based on iron pipe size (IPS) and may be either woven wire or perforated with equivalent openings as specified in pipe schedules.

2.03 YARD BOXES

A. For service shut-off valves on gas and domestic water and for cleanouts, shall be Brooks Product with vandal-proof cast iron cover and name of service clearly marked on cover. Box shall be of size to permit easy removal of valve.

1. Cleanouts: All site cleanouts in grass, planter, and asphalt paving areas shall be terminated at grade in Brooks No. 1-RT concrete box with galvanized cast iron cover marked “SEWER”.

2.04 DIELECTRIC ISOLATORS

A. General.

Isolators shall be so constructed that the two pipes being connected are completely insulated from each other with no metal-to-metal contact, and suitable for service on which used. Insulating couplings are not acceptable.

B. Unions.

For piping 2" and smaller, unions shall be brass solder sweat with ground-joint and micarta

sleeving.

C. Flanges.

1. For piping 2-1/2" and larger, flanges shall be flanged sets with neoprene gasket for flat face flanges with bolt hole punches to receive bolt sleeves of 1/32" micarta with 1/8" thick micarta washers.

2. All others: Insulating flanges or unions, suitable for 125 psig WSP.

D. Manufacturer.

1. Dielectric isolator shall be as manufactured by F.H. Maloney, EPCO, Cathodic Protection Service, Corro Ban Products, W.C. Vallett, or equal.

2.05 FLEXIBLE PIPING CONNECTIONS

A. Flexible connections for copper piping; corrugated seamless bronze flexible hose with bronze wire braid.

B. Flexible connections for steel piping: Corrugated stainless steel with stainless steel wire braid.

C. Designation and length as recommended by manufacturer for system's test and operating pressures and temperatures.

D. Recommended Manufacturers: (or equal)

E. Metraflex, U.S. Flex, Anaconda.

2.06 INSTRUMENTS

A. General.

1. Pipe mounted thermometers and pressure gauges shall be as scheduled herein and shown on the plans.

B. Instruments.

1. Liquid sensing thermometers.

a. Red reading mercury column type or magnified mercury column type with wide angle of vision and high magnifications of mercury column.
b. Thermometers shall have one piece heavy extruded or cast aluminum or brass case with glass front. Thermometers mounted over 8 ft. high shall have multi-angle hinge with a positive locking device.
c. Scale shall be black numerals and divisions of light color background accurate to plus or minus one of the smallest scale divisions throughout the entire range. Scale shall have maximum of two degrees between graduations and 20 degrees between figures.
d. Minimum scale length shall be nine inches.
e. Provide extended necks for insulated pipes, tanks and equipment. Provide a steel bulb chamber and brass separable socket for each thermometer. Fill the void between bulb chamber and bulb with conductive grease.
f. Thermometers shall be Marsh Instrument Co., Trerice or equal.

2. Pressure gauges.

   a. Gauges shall be of the Bourdon tube type, Marsh Instrument Co., Trerice or equal.
   b. Gauges shall have 3-1/2" minimum dial face, white with black numbers and graduations, steel or aluminum case with double strength glass, nickel plated ring and built in or add on pulsation dampeners.
   c. Movement shall be of the phosphor bronze seamless Bourdon tube type with recalibrating bushed rotary gear movement and link fitted with a black aluminum pointer with means for face calibration.
   d. Accuracy in the middle third of dial range shall be plus or minus 1% of total dial range.

2.07 PIPE SUPPORTS

A. General.

1. Supports shall be defined as hangers, brackets, framing, guides, and anchors.

2. Supports shall be factory fabricated units with published load limits.

3. Supports fabricated of steel shapes and installed in weather exposed locations, in equipment rooms or regularly occupied areas shall be hot dip galvanized after fabrication.

4. Supports for fire protection installation shall be in accordance with NFPA Standard No. 13.

B. Horizontal piping.

1. Hangers shall be of the following types:

   a. For piping 4" and smaller adjustable malleable iron split ring type, Grinnell Fig. No. 104, or Fig. 174, B-line Fig. B3171, Super Strut, or equal.
   b. Rod lengths shall be adjustable.
   c. Trapeze hangers may be used for parallel piping arrangements. Submit detail drawings and calculations for approval. For four or less pipes 2-inches and smaller, framing manufactured by Unistrut selected to accept five times the weight or thrust of the pipe per manufacturer's ratings, are acceptable. Framing finish shall be a light-colored polyester paint. Submit calculations.
   d. Hang rods for both single and trapeze hangers from suitable clips, beam clamps or self-drilling expansion type or from 3/8" diameter rods and percussive driven studs. Verify with Structural Engineer.

2. Brackets shall be Grinnell 194 or 195, B-Line Fig. B3063 or B3066, Super Strut or equal.

3. Roll stands shall be Grinnell Fig. 271, B-Line Fig. B3117SL or equal.

C. Vertical piping.

1. Clamps shall be Grinnell Fig. No. 261, B-Line Fig. B3373, Super Strut or equal.

D. Rods.

1. Solid mild steel minimum size as follows:

PIPE SIZE	ROD SIZE
2" and smaller pipe	3/8" diam. rod

2-1/2" to 3-1/2" pipe	1/2" diam. rod
4" to 5" pipe	5/8" diam. rod
6" pipe	3/4" diam. rod

E. Insulated piping.

1. Provide shields between supports and the pipe insulation.

2. Shields shall be 16-gauge galvanized steel for all piping and shall be performed to proper radius, and shall extend up to the centerline of the pipe. Lengths shall be 4" for pipe sizes 2- 1/2" and smaller, and 7" for larger pipes. Pipes 4" and larger at rollers, guides and supports shall have 14 gage shields. All shields at rollers, guides, and supports shall be securely strapped in place.

3. Insert sections of insulation shall be Type P-4 at each support as specified in Section 15180: Insulation.

F. Vibration isolation.

1. Vibration isolation shall be as specified in Section 15160: Vibration Isolation and Seismic Restraints.

2. Where isolation elements are required on hangers provide 2-piece rods.

3. Pipe Isolators:

a. Manufactured hair felt pad enclosed in corrosion resistant metal shield with end flanges to assure the pads proper retention between the support and the pipe, Trisolators S-100 or equal.
b. Provide plastic isolating suspension clamp on all water piping to prevent contact between the pipe and the structural framing. "Flexi-Fin" isolating suspension clamp or equal.

G. Concrete fasteners.

1. Percussion driven studs shall be Ramset No. 2049, Drivet Remington, or equal.

2. Self-drilling anchors shall be Rawl Philips Red Head, Wej-it or equal.

H. Floor Supports: Grinnell Figure 264, B-Line Fig. B3093 or equal.

I. Wall Supports: Grinnell Figure 168, 195, B-Line Fig. B3153 or equal.

J. Riser clamps for copper piping: Super Strut CT-720-F copper plated, plastic coated, B-Line Fig. B3373CT or B3373CTC or equal.

K. Riser clamps for other piping: Super Strut C-720, B-Line Fig. B3373 or equal.

L. Beam clamps: Super Strut U-520, B-Line Fig B318 or Fig. B3050 or equal.

2.08 SLEEVES, CORE DRILLING AND ESCUTCHEONS

A. General.

1. Sleeves shall be permanently installed type where waterproofing is required cast-in-place or dry-packed in core drilled hole.

2. Escutcheons shall be prime coated steel type except for escutcheons specified in Section 15470 - Plumbing Fixtures.

B. Sleeves shall be as follows:

1. Exterior walls below grade and floor slabs on grade: Concrete pipe dry-packed in place with annular space caulked watertight.

2. Floor slabs inside partitions, furred spaces and interior concrete walls: Core drill as necessary.

3. Floor slab with waterproof membrane: Cast iron sleeve with integral flashing clamp, Smith No. 1722 or equal by Josam, Zurn or Wade.

C. Escutcheons shall be as follows:

1. 6" and smaller: Prime coated steel with set screw, Beacor No. 13 or equal by F & S Manufacturing Co.

2. Larger than 6": Prime coated brass with set screw, Beacor No. 3 or equal by F & S Manufacturing, Fig. 605 or equal.

3. Raised sleeves in floor slabs: Deep drawn prime coated steel or brass, F & S Manufacturing Fig 605, or equal by Beacor.

D. Caulking shall be as follows:

1. Watertight: Projects Research Co. "Rubber Caulk" No. 150 heavy type DAP, Dow Corning, General Electric, or equal.

2. Fireproofing: Caulked glass fibrous rope.

3. Sound attenuating: Caulk with a compressible polyurethane foam strip saturated with polybutylene, Poly-Tite Compriband, or equal.

2.09 FLASHING

A. General.

1. Flashing shall be with 24-gauge galvanized steel base, fitted with elastomer collar.

2. Manufacturer: Flashing assembly shall be Water-Tite by IPS Corporation.

2.10 ACCESS PANELS

A. General.

1. These specifications cover prefabricated wall and ceiling access panels normally required to provide access to equipment requiring servicing and adjustment.

2. The types of wall access panels required are similar to Milcor Styles UFR (fire rated) or M (non-rated), for the appropriate locations and with hinge, metal gauge, latch, optional cylinder locks, and other modifications necessary to conform to requirements specified hereinafter. Panels shall be U.L. labeled to match wall rating requirements.

3. The types of ceiling access panels required are similar to Milcor Styles UFR (fire rated) only, for both rated and non-rated conditions, for the appropriate locations with hinge, metal gauge, latch, optional mortise, cylinder locks keyed to building keyway as approved by District, and other modifications necessary to conform to requirements specified hereinafter. Panels shall be U.L. labeled to match ceiling rating requirements.

B. Location.

1. Furnish for installation by the pertinent trade, access panels wherever fans, air handlers, air filters, valves, balance valves, damper operating mechanisms, fire damper access doors and similar items normally requiring adjustment or servicing are installed in concealed spaces.

2. Where furred ceilings are of the removable panel type of construction, the removable panels will be used for access to small equipment such as valves, dampers and controls.

C. Sizes.

1. Access panels shall be of a size to permit removal of equipment for servicing, but not less than 12" x 12" minimum opening.

2. Where proper servicing of the equipment requires the entrance of a serviceman, the access opening shall be sized accordingly with minimum opening not less than 18" x 24".

D. Construction.

1. Access panels shall be neatly constructed and substantially made of steel complete with frame and with necessary components for attaching to walls, ceilings or other construction, as required. Hinges shall be of concealed type. Minimum door and frame gauges for Type M panels shall be USS No. 16 and for Type UFR panels shall be 20 gauge and 16 gauge, respectively, with thermal insulation. Panels and frames shall be furnished with a factory-applied prime coat, except panels in tile walls shall be chrome plated and polished or satin finish Type 304 stainless steel.

2. Panels to be installed in acoustical tile ceilings shall be as specified in paragraph one above except that the door panels shall be recessed and faced with acoustical tile to match the ceiling tile so the frame will be concealed. The depth of the door recess shall be such that door facing tile are flush with ceiling tile.

E. Exceptions.

Normally, access doors to large attic spaces and large pipe spaces behind toilet batteries will be furnished under another section, and when so furnished will be shown on the architectural plans. Examine all plans carefully and furnish any access panels or doors to equipment in these spaces where they are not to be furnished under the other section.

2.11 CHANNEL FRAMING

A. General.

1. Channel combinations and accessories shall be of compatible design in arrangements and combinations as shown on the drawings. Channels and accessories shall have a hot dipped galvanized finish.

2. Manufacturer: Channel framing shall be as manufactured Superior Strut and Hanger Company, Unistrut, B-Line Systems Inc. or equal.

2.12 PIPE WRAPPING

A. Buried piping.

1. Underground copper or steel piping buried directly in the soil shall be coated and machine wrap as follows:

a. Primer shall be a blend of petrolatums, plasticizers, and corrosion inhibitors having a paste-like consistency. Primer shall be Trenton Wax Tape Primer, Denso Paste Primer, or equal and shall have the following properties:

Color	Brown
Pour Point	100°F to 110°F
Flash Point	350°F
Coverage	1 gallon/100 square feet

b. Wax tape shall consist of a synthetic fiber felt, saturated with a blend of microcrystalline wax, petrolatums, plasticizers and corrosion inhibitors, forming a tape coating that is easily formable over irregular surfaces. Wax tape shall be Trenton No. 1 Wax Tape, Denso “Densyl Tape” or equal and shall have the following properties:

Color	Brown
Saturant Pour Point	115°F to 120°F
Thickness	40 mils minimum
Tape Width	Various
Dielectric	100 volts/mil

c. Wrapper shall be polyvinylidene chloride plastic with three 50-gauge piles wound together as a single sheet. Plastic wrapper shall be Trenton Poly-Ply, Denso Tape PVC Self-Adhesive, or equal and shall have the following properties:

Color	Clear
Thickness	1.5 mils
Tape Width	6 inches

2. Wax Tape Coating application

a. Surface shall be clean and free of all dirt, grease, water and other foreign material prior to the application of the primer and wax tape.
b. Apply primer by hand or brush to all surfaces to be wrapped, including, overlapping adjacent dielectric and cement mortar coatings by 4 inches minimum. Work the primer into all crevices and completely cover all exposed metal surfaces.
c. Apply the wax tape immediately after the primer application. Work the tape into the crevices around fittings. Wrap the wax tape spirally around the pipe and fittings. Use a

minimum overlap of 55% of the tape width. Apply wax tape were shown on drawings and to buried mechanical and restrained joints, joint bolts, grooved-end couplings, flexible couplings, joint harnesses, and valves. Apply per Manufacturer's recommendations.

d. Work the tape into the crevices and contours of irregularly shaped surfaces and smooth out so that there is a continuous protective layer with no voids or spaces under the tape.

e. Wrap the completed wax tape installation with plastic wrapper. Wrap spirally around the pipe and fittings. Use a minimum overlap of 55% of the wrapper. Secure plastic wrapper to pipe with adhesive tape.

3. Application of Polyethylene Sheet Coating

a. Wrap completed wax tape coating system with polyethylene film and secure around the adjacent pipe circumference with adhesive tape per AWWA C105.

PART 3 - EXECUTION

3.01 INSTALLATION OF PIPING

A. General.

1. Furnish and install all piping, equipment trim, etc., including all work necessary to make complete and properly operating systems, whether all details are mentioned in these specifications or indicated on the drawings.

2. Rough-in work: Pipe sizes shown on the drawings are nominal inside diameter except copper tubing for refrigerant service which is outside diameter. Wherever five-inch size pipe is shown, six inch may be substituted. Unless noted otherwise, make all pipes trim full line size.

3. Proceed as rapidly as the building construction will permit, so as to be completed, tested and approved before being enclosed.

4. Carefully inspect each piece of pipe and each fitting to see that there is no defective workmanship on the pipe or obstructions or dirt in the pipes and fittings. Material having burrs, slag intrusions, cracks, eccentricity, excessive roughness, damage due to rough handling, etc., will be rejected and shall be removed from the job site.

5. Whenever work is not in progress and at the end of each workday, cap or plug all openings in completed piping to prevent the entrance of materials that would obstruct the pipes. Leave in place until removal is necessary for completion of installation.

6. No piping shall be permanently closed up, furred in, or covered over before it has been tested and inspected as specified herein and is accepted by the Architect.

7. Install piping parallel to walls and to present a neat appearance both as to workmanship and grouping.

8. Piping shall clear all obstructions, preserve headroom and keep openings and passageways clear whether shown on the plans or not.

9. Should structural difficulties prevent the running of pipes or the setting of equipment at the point indicated by drawings, the necessary minor deviations there from, as determined by the Architect will be allowed, but must be made without additional cost.

10. Locate piping to clear steel reinforcing bars in beams. Offset reinforcing bars in walls to clear piping and sleeves. Get approval from Structural Engineers.

11. Joists, girders, beams, columns or reinforcing steel shall not be cut or weakened.

12. Conceal all piping within the building wherever possible, unless otherwise noted on drawings. Exposed piping, wherever necessary, shall if possible be run in unfinished rooms.

13. Do not use couplings except where required pipe runs between fittings that are longer than a standard length of the type of pipe being used and except where their use is specifically approved by the Architect.

14. Copper, bronze, and brass solder type fittings, including unions and flanges, shall have sockets of proper diameters to suit outside diameters of copper and brass pipe and copper tubing with which they are being used. The expanding or swaging of tubing to fit IPS fitting sockets will not be permitted.

15. Cut pipe accurately to measurements established at the site. Work into place without springing or forcing. Properly clear all windows, doors and other openings. Excessive cutting or other weakening of the building structure to facilitate piping installation will not be permitted.

16. Pipe damage: Show no tool marks or threads on exposed plated, polished or enameled connections to fixtures. Tape finished surfaces to prevent damage during plastering. Brass and copper piping shall have no tool marks wherever installed.

17. Make all changes in direction with fittings and changes in main size with reducing fittings. Unless otherwise noted, for pipe size change on all horizontal pump circulated water supply and return piping, use eccentric couplings flat on top.

18. Dielectric insulation.

    a. Provide dielectric insulation at all points where copper water piping including brass nipples in same, is connected to ferrous metal such as steel piping, tanks, water heaters, etc.

19. Pitch pipe lines to be free of sags, traps or unnecessary bends as required for proper drainage. Provide a gate valve of same size as line but 3/8" minimum and 3/4" maximum size at each low point.

20. Unions and Flanges.

    a. Provide unions or flanges suitably located to facilitate maintenance and removal of all equipment or automatic pipe mounted apparatus.
    b. Faces of flanges to be connected shall, in all cases, be alike.
    c. Provide two unions at threaded three way mixing valves.

21. Shop or field fabricated fittings, bushings, street ells, and long screw nipples are not acceptable and shall not be used. Reducer couplings, tees or ells shall not be used.

22. Equipment by others: For rough-ins and final connections to equipment furnished by others, ascertain exact sizes, type, services and locations before starting work.

23. Springing, bending or forcing of pipe into place shall not be allowed. Use fittings for all off-sets or changes in alignment of piping.

24. Flexible Pipe Connections.

    a. Provide flexible piping connection on each pipe connection to equipment mounted on or suspended from isolators with one half inch or more static deflection or where such connections are shown on plans.

25. Install piping outside of building at not less than 18" below finish grade in landscaped, unpaved areas or finished sub-grade surface in paved areas. Natural gas piping outside of buildings shall have 24" of cover or as recommended by Gas Company.

26. Isolate all domestic and industrial water piping with approved isolating suspension clamps. Piping shall not meet building structure.

27. Excavation, Trenching and Backfill: Do all necessary trench excavation, shoring, backfilling and compaction required for the proper laying of the pipelines.

    a. Backfill shall be clean soil free from rocks and debris. Compact to ninety percent (90%) of surrounding soil. All piping shall be installed in sand bed and covered with six inches (6") of sand prior to backfill.
    b. Gas piping shall have minimum twenty-four inches (24") of cover and all other piping shall have not less than eighteen inches (18") of cover, unless otherwise noted on the drawings or as required to connect into existing utility lines. Offset gas and water piping as required to permit crossover of piping systems.
    c. Bottoms of Trenches: Cut to grade and excavate bell holes to ensure the pipes bearing for their entire length upon the outside periphery of the lower third of the pipe.
    d. Water piping shall not be run in the same trench with sewer or drainage piping, except when separated per codes.
    e. Horizontal sanitary and drain piping shall be installed to a uniform grade of not less than one-fourth inch (1/4") per foot, unless otherwise indicated or directed.
    f. Before laying of any pipe of digging of any trenches, Contractor shall determine by actual excavation and measurement exact locations and depth of existing utility and service lines to which he is going to connect. In event depth of existing sewer main is not sufficient to permit installation of piping as detailed on drawings or to make connection in manner indicated, Contractor shall confer with the Architect and District's representative before proceeding with this work.
    g. Trenches used for multiple utilities shall be wide enough to allow access to each separate utility from the ground above. Using normal tools for trenching. No utility may be placed directly above of below another, except that utilities may cross one another at no less than 45 degrees.
    h. All underground water piping 3" and larger shall be provided with thrust blocks, for both solvent joint and mechanical joint piping, in accordance with IAPMO IS 8-95.
    i. Tracer wire: Install along all underground plastic piping runs a Type HMW, 30 mil PE Insulated, 12 ga solid copper tracer wire, per ASTM B3, B8, and ANSI.C8.35.

28. Install sewer piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and coupling in accordance with manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed. Use proper size increasers, reducers, and coupling, where different size or material of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.

29. Tap Connections at Sewer Piping: Make connections to existing piping and underground structures so that finished work will conform as nearly as practicable to the requirements specified for new work. Make branch connections from side into existing 4- to 21- inch piping

by removing section of existing pipe and installing wye fitting, into existing piping. Encase entire wye with not less than 6 inches of 3000-psi 28-day compressive-strength concrete. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris, concrete, or other extraneous material that may accumulate.

3.02 INSTALLATION OF VALVES

A. General.

1. Valves shall be full line size. Automatic valves are excepted.

2. All valves shall have proper clearances for handle operation and shall close tight at the specified test pressure.

3. On 3-piece construction ball valves, remove center section of the valve prior to soldering to prevent any damage to the Teflon seats. Reinstall center section after soldering.

B. Arrangement.

1. Install valves in the systems so located, arranged and operated as to give complete regulation of all apparatus, equipment, and fixtures.

2. Install valves for accessibility and easy maintenance.

3. Install valves with stems horizontal or vertically upright.

4. Wrenches: Plug valves (cocks): Provide 12" wrench for valves 2" and smaller, 18" wrench for 4" valves, and 36" wrench for valves 6" and larger.

5. Provide valve box at each valve or cock in ground. Set cover flush with finished grade except in planted areas set 1" above ground.

6. Balance valves. Install balance valves where shown and on each circulating return branch where two or more branches occur on domestic hot water system.

7. Provide readily accessible lubricated gas shut-off valve in gas supply to each gas burning appliance ahead of union connection thereto, and in addition to any valve on appliance.

8. Hose bibbs. Mount with outlet 18" above floor or finished grade, unless shown otherwise.

C. Location.

1. In all branches and headers of water piping serving a group of two or more plumbing fixtures.

2. On both inlet and outlet of all apparatus and equipment.

3. For shutoff of branch mains.

4. For flushing and sterilizing the systems.

5. Where shown on the drawings.

6. Ahead of each automatic valve for water service.

3.03 PIPE SUPPORTS

A. Installation.

1. Securely support all piping from building construction with manufactured iron hangers, brackets, trapezes, guides, anchors and sway braces to maintain pipe alignment and prevent sagging, noise and excessive strain due to uncontrolled movement under operating conditions.

2. Relocate any hangers as necessary to correct unsatisfactory conditions that may become evident when system is put into operation.

3. Supporting of pipe by wire, rope, wood or other makeshift devices will not be permitted.

4. Burning of holes in beam flanges or narrow members will not be permitted.

5. Where calculated maximum travel exceeds one inch, provide rollers at all non-suspended type supports and on all but one of the largest pipes on trapeze supports.

6. Where rods exceed 12" in length for pipes 2" and larger and all trapezes, provide lateral sway bracing at every third hanger. Equip each with a longitudinal sway brace. Sway brace rods shall either be two hanger rods set at 45 degrees on both sides without a vertical hanger or 1- 1/2" x 1-1/2" x 1/8" angle iron to 2" pipe size and 2"x 2" x 1/4" for larger pipe, set on 45 degrees. Secure bracing to pipe an structure as for hangers. Fit all hanger rods not sway braced at the top with a swivel.

7. Fasten hanger rods to structural steel members with beam clamps with retaining clips; to concrete with steel or malleable iron inserts.

8. Sheet lead, lead wool or wood plugs will not be accepted as a substitute for cinch anchors as a means of attaching materials and equipment to concrete.

9. Support cast iron, plastic and glass drainage pipe at each floor.

10. Supports for insulated pipe shall be outside the insulation. Protect pipe insulation at every hanger, support or guide with inserts and shields. The galvanized steel shield shall be applied between the hanger or support and the pipe insulation. Provide saddles at all rollers for insulated pipe not equipped with inserts and shields.

B. Manifolding:

1. Parallel runs of piping, except for fire protection, may be supported on trapeze hangers, spaced as required for the smallest pipe carried.

2. Support piping in chases on channel framing.

3. For piping over 2" construct framing of welded assemblies of steel shapes. Provide calculations that the design will carry five times the weight of thrust of the pipe.

C. Support spacing:

1. Maximum spacing for horizontal piping supports shall be as follows:

Material	Size	Spacing

Steel or Brass pipe	3/4" and smaller	6 ft.
Steel or Brass pipe	1" and 1-1/4"	8 ft.
Steel or Brass pipe	1-1/2" to 3"	10 ft.
Steel or Brass pipe	4" and larger	14 ft.
Copper tubing	1" and smaller	6 ft.
Copper tubing	1-1/4" and larger	8 ft.
C.I. Soil Pipe	All sizes	5 ft. ea.joint

2. Where building structure does not permit the specified spacing, provide additional adequate struts or blocking. Location and details shall be submitted to the Architect for approval.

3. Support piping at each change of direction, at ends of branches, at base and top of riser pipes and drips, and wherever necessary to prevent sag, bending, or vibration, in addition to above listed hanger spacing.

3.04 PIPE ANCHORS

A. Shot driven anchors.

1. Supports may be secured to the concrete structure by shore anchors as long as the pin does not penetrate the concrete more than 3/4 inch and it is rated for the load it will carry, if approved by the Structural Engineer. Submit calculations.

2. For loads that exceed the shore anchor rating, use drilled anchors.

B. Drilled anchors.

1. Drilled anchors shall be of the self-drilling expansion type with self-cutting annular broaching grooves, or they may be of the non-drilled type with expansion tip.

2. Anchors shall have a recommended load with a minimum of safety factor of four. Submit calculations.

3.05 PIPE JOINTS

A. General.

1. Remake any leaky joints with new materials. The use of thread cement, caulking or patch welding to make the old joint tight is absolutely prohibited.

B. Solder and brazed joints.

1. Cut square; remove burrs and clean both the pipe or tubing and inside of female fitting to a bright finish with steel wool, wire brush, sandpaper or emery cloth. Apply solder flux with brush to tubing. Remove internal part of solder-end valves prior to soldering.

2. Joining for copper tubing and brass pipe shall be as follows:

a. Domestic piping 3" and smaller: 95-5 Tin-Antimony Grade 5A.
b. Drainage piping: 95-5 Tin Antimony.
c. For all reinforced non-ferrous piping connections, water piping larger than 3", steam condensate, all chilled water and heating hot water using type "L" copper, or type "K" copper, and all refrigerant piping: Use over 1100 DEG F brazing alloy, ASTM B250, Class BCUP-5. Sil-FOS 15% silver brazing alloy, Harris Stay-Silv 15 or equal.

C. Screwed Piping.

1. Cut square and clean with machine cutter, hack saw or carborundum pipe wheel. Wheel cutters are not acceptable. Deburr with file or pipe reamer. Do not ream to exceed I.D. of pipe and thread to ANSI B2.1 requirement.

2. Use Teflon tape, Armite #250, "Tyte-Unite" or Enterprise "Threadseal" sealing compound on outside threads for joining all services, except refrigerant piping, and Acorn #3500 for cleanouts.

3. Litharge and glycerin may be used for sealing threads of compressed air piping and shall be used for refrigerant piping.

4. No more than two full threads shall remain exposed after making up joints.

5. Do not wrap pipe threads and slip joints with string, paper, putty or similar fillers. Threaded joints must be made tight with tongs or wrenches. Piping in finished areas shall bear no tool marks. Caulking of any kind will not be permitted.

D. Welded Piping.

1. Oxyacetylene or electrical arc process.

2. Weld in accordance with and by welders who have qualified under the latest Edition, American National Standard Code for pressure piping ANSI/ASME B31.1, Chapter 5, and subsequent Addenda. Welder qualifications shall be issued by an independent testing laboratory or by the by the authorities having jurisdiction approved by the District.

3. Remove foreign matter from pipe ends before tacking or welding.

4. Align ends concentric and tack weld.

5. Weld and reinforce to full thickness of pipe. Welds shall be continuously fused to pipe and to prior pass weld, shall have full penetration without slag inclusions or porosity. Fillet type welds for flanges and socket fittings shall have a throat dimension not less than the pipe wall thickness.

6. Welding rods: Oxwall No. 1-HT Class EG010, or equal.

7. Fabricated fittings are not acceptable.

8. Connections:

   a. Slip-on flanges shall be both face and back welded.

9. Hammer each pass clean of slag and scale.

10. The Owner reserves the right to inspect and to x-ray test any welds per latest Edition, American National Standard Code for Pressure Piping ANSI/ASME 3.1 Chapter 6, and subsequent Addenda.

3.06 ACCESS TO EQUIPMENT

A. General.

1. Install all piping, equipment and accessories to permit access for maintenance.

2. Any relocation of piping, equipment and accessories required to provide maintenance access shall be accomplished at no additional cost to the Owner.

B. Access.

1. Provide access doors where any valves, motors and equipment requiring access for servicing, repairs, or replacement are located in walls, chases or above ceilings.

2. The location of access doors shall be coordinated with and installed by the applicable trade installing walls or ceiling.

3. Contractor shall arrange for the necessary openings in the building to allow for admittance of all apparatus.

3.07 SLEEVES, CORE DRILLING AND ESCUTCHEONS

A. Sleeves.

1. General.

a. Provide pipe sleeves where each pipe or prefabricated pipe conduit passes through floors, walls, or ceilings, whatever the construction.
b. Provide minimum of 1/2" clearance around all sides of pipe and extend full thickness of the construction. Where piping is to be insulated, allow for full thickness of insulation, plus 1/2" clearance all around.
c. Cast iron sleeves: Secure waterproofing membrane under flashing clamp. Caulk annular space watertight.
d. Steel or concrete sleeves: Dry pack in place and caulk annular space.
e. Extend sleeves in equipment room floors 2" above finish floor with annular space caulked watertight.
f. Extend sleeves in waterproofed floors 1 inch above floor. Use fire retardant material in sleeves through fire separations.

2. Locations and types.

a. For floor slabs on grade, provide permanent sleeves of clay pipe, concrete pipe or cement asbestos pipe. Where sleeves cannot be installed, such as at connections to floor drains, take necessary precautions to assure that drains or pipes are not in contact with reinforcing steel. Caulk space between pipes and pipe sleeves with oakum and mastic and make watertight.
b. Provide sleeves through all other (non-concrete) construction of the same materials as pipe of size and length as hereinbefore required.

B. Core Drilling.

1. Size core drilling holes adequately to allow for dry packing sleeves in place; to allow for insulation to extend through holes; to allow for fireproof caulking of clearance around pipes to prevent direct contact between pipes and structures.

2. Locations of core drilling shall be approved by the Architect prior to drilling.

C. Escutcheons.

1. Provide chromium plated escutcheons with screw or spring clamping device on all piping that penetrates floors, walls and ceilings where exposed to view. Escutcheons shall completely cover opening.

3.08 STRAINERS

A. General.

1. Strainers shall be full line size.

2. Valve blow-down connection with a gate or ball valve sized same as the connection. Plug valves not piped to drain.

B. Location.

1. Ahead of each automatic control valve for water service.

2. Where shown on the drawings.

3.09 FLASHING

A. Furnish and install roof vent flashing with 24-gauge galvanized steel base, fitted with elastomer collar. Unit shall be Water-Tight manufactured by IPS Corporation as per corresponding dimensional characteristics, or equivalent.

3.10 PIPE WRAPPING

A. Cleaning and wrapping all underground steel piping.

1. Piping shall be machine coated and wrapped as follows:

a. Clean.
b. Prime
c. Coal tar enamel
d. Fiberglass inter wrap .020"
e. Coal tar enamel.
f. Kraft paper

END OF SECTION

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes general administrative and procedural requirements for Division 26 that supplements the requirements specified in Division 01.

B. This section supplements all Sections of this Division and shall apply to all phases of Work specified, indicated in the Contract Documents, and as required to provide for a complete installation of electrical systems for the Project. Review all sections of the Specifications and drawings for related work and coordinate the work of this Section with all other Sections.

C. Should there be any direct conflict in the specifications and drawings the most stringent requirement shall govern.

D. The scope of work shall include but not be limited to the following:

1. Perform all incidental work required to provide a complete properly operating system. Provide the type and quantity of electrical materials and equipment necessary to complete Work and all systems in operation, tested and ready for use.
2. Provide all incidental items that belong to the Work described and which are required for complete systems.
3. Provide construction power and lighting.
4. Provide power for testing of equipment and systems through final acceptance tests.
5. Provide Electric power primary and secondary conduits and cables, (low voltage 600 volts & below) cables and communication conduits and cables for Vape Sensors, conduit and pull boxes from their respective locations where service for the designated system are provided. Where conduits or ducts are stubbed out and capped for future extension, concrete markers with utility pull boxes shall be provided at the finished grade to indicate the ends of the stubs.
6. Provide outlet, junction and pull boxes, plaster rings, plates, pull lines, and conduit for communication systems.
7. Provide and coordinate the installation of the following items per applicable codes and manufacturer's recommended performance criteria:
    a. Support and seismic restraint for all suspended or floor mounted equipment, raceways, etc.
    b. Vibration isolators and seismic anchorage for all floor mounted equipment.
8. Provide testing described in individual sections.
9. Provide assistance to district's team in collection of data for Pre-Functional and Functional tests.

E. Related work: Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable installation.

1. General and supplementary conditions: Drawings and general provisions of Contract and Division 01 of the Specifications, apply to all Division 26 Sections.
2. Earthwork: Include trenching, backfilling, boring and soil compaction as required for the installation of underground conduit, in-grade pull boxes, vaults, manholes etc.
3. Concrete work: Include forming, steel bar reinforcing, cast-in- place concrete, finishing and grouting as required for underground conduit encasement, pull box slabs, vaults,

housekeeping pads, etc.

4. Moisture protection and smoke barrier penetrations: Include membrane clamps, sheet metal flashing, counter flashing, caulking and sealant as required for waterproofing of conduit penetrations and sealing penetrations in or through fire walls, floors, ceiling slabs and foundation walls. All penetrations through vapor barriers at slabs on grade shall be taped and made vapor tight.
5. Firestopping: Include firestopping and through-penetration protection system materials and accessories; firestopping tops of fire rated walls; and smoke sealing at joints between floor slabs and exterior walls.
6. Access panels and doors: fire rated as required, in the ceilings, walls and walls where necessary for access to electrical equipment, devices, junction boxes, pull boxes, conduit stubs, etc., located in the walls, floors or furred and T-Bar ceiling spaces. All access panel locations shall be coordinated with Architect.
7. Painting: Include surface preparation, priming and finish coating as required for electrical cabinets, exposed conduit, pull and junction boxes, etc. where indicated as field painted in this Division.
8. Miscellaneous metal work: Include fittings, brackets, backing, supports, rods, welding and pipe as required for support and bracing of raceways, lighting fixtures, panel boards, distribution boards, motor control centers, switchboards, switchgear, transformers, etc.
9. General installation: Provide all sleeves, hangers, supports, inserts, anchors, bolts, etc., required for the installation of this work.

F. Construction Documents Drawings and Data

1. The drawings show the general arrangement of all piping, ductwork, conduit, and equipment. Examine drawings and specifications very carefully and notify the District's Representative of any discrepancies so these can be rectified at an early date.
2. Should conditions necessitate any rearrangements, the Contractor shall prepare and submit drawings showing the changes before proceeding with the work. If such changes are approved, they shall become a part of this contract after their approval.
3. The drawings are diagrammatic and are a graphic representation of the Contract Requirements, produced according to the best available standards to an optimum scale. Dimensions of work as indicated on plans are not to be used as as-built dimensions. No measurements shall be scaled from the Drawings for use as a definite dimension for layout or fitting equipment and devices in place. The dimensions of all equipment and devices shall be based on the approved shop drawing submittals used on the project. The Contractor is solely responsible for dimensional control and coordination of the work to be installed.
4. The layout of equipment, as shown on the plans, shall be verified and exact location determined by dimensions of equipment accepted for installation. Consult the Architectural, Structural drawings and other contract documents for all dimensions, locations of partitions, sizes of structural members, foundations, etc.
5. The Contractor shall be responsible for the coordination of the electrical installation with ducts, pipes, fire sprinklers, raceways, cable trays, structural members, ceiling support and all other systems and other applicable trades within the project.

G. Minor Deviations from Construction Documents

1. Where the equipment furnished requires redesign of layouts, connections, or configuration, and such deviations are acceptable to the District’s Representative and Architect, the contractor shall provide dimensioned engineered layouts for review and approval.
2. Certified Reports and Calculations: Where the equipment size, dimensions and weight are different than indicated on drawings, submit certified report including seismic calculations for anchorage or support to the Architect for review/approval.

1.02 REFERENCES

A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Such codes or standards shall be considered a part of this Specification as though fully repeated herein.

B. When codes, standards, regulations, etc. allow work of lesser quality or extent than is specified under this Division, nothing in said codes shall be construed or inferred authority for reducing the quality, requirements or extent of the Drawings and Specifications. The contract documents address the minimum requirements for construction.

C. Before bidding, be familiar with rulings of the building and inspection departments and comply with such requirement. Rulings and interpretations of authorities shall be considered as part of the regulations.

D. It is not the intent of Drawings and Specifications to repeat requirements of codes except where necessary for completeness or clarity. Nothing in the Drawings or Specifications is to be construed to permit work not conforming to the applicable codes and regulations adopted by the Division of State Architect. Should there be any direct conflict between Contract Documents and applicable codes and regulations the codes and regulations shall govern.

E. Work shall be performed in accordance with all applicable requirements of the listed edition of all governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:

F. LIST OF CALIFORNIA CODE OF REGULATIONS (C.C.R.) as Listed on the drawings.

A. ADA - Americans with Disabilities Act

B. CAC – California Administrative Code, Title 24

G. U.L. Standards

The system shall comply with the applicable provisions of the following U.L. Standards and Classifications:

1. UL 268, Smoke Detectors for Fire Alarm Signaling Systems
2. UL 464, Audible Signal Appliances
3. UL 521, Heat Detectors for Fire Protective Signaling Systems
4. UL 864, Control Units for Fire Protective Signaling Systems
5. UL 1481 Power Supplies for Fire Alarm Systems
6. UL 1971, Emergency Devices for the Hearing Impaired
7. UOJZ, Control Units, System
8. SYZV Control Units, Releasing Device
9. UOXX, Control Unit Accessories, System
10. SYSW Accessories, Releasing Device Service

1.03 SUBMITTALS

A. Submittals for each section shall conform to the general guidelines and procedures of Division 01 and this section.

B. Submittal Schedule:

1. Provide a submittal schedule in accordance with Division 01 requirements.
2. The submittal schedule shall be a complete list of all submittals to be made with projected dates of all submittals.
3. The submittal schedule shall assume at least one “Revise and Resubmit” cycle. Delays to schedule associated with submittals’ “Revise and Resubmit” designation are ineligible for change orders, as timely and correct work is a requirement of this contract.

C. General Organization of Submittals:

1. Submittals shall be neatly bound in an 8-1/2" x 11" folder or binder for each Specification Section with a table of contents listing materials by Section and paragraph number.
2. Submittals shall consist of detailed shop drawings, specifications, block wiring diagrams, "catalog cuts" and data sheets containing physical and dimensional information, performance data, electrical characteristics, materials used in fabrication, and material finish. Clearly indicate by arrows or brackets precisely what is being submitted on and those optional accessories which are included and those which are excluded.
3. Organize submittals in the same sequence as they appear in specification sections, articles, or paragraphs.
4. Each submission shall be made under the Specification Section Number it has been specified under. Submittals including equipment specified under a different specification section will be rejected and returned without review. Each section is required to be tracked separately for status designation, even if multiple sections are physically collated into a single binder.
5. Identify each item with each submittal by reference to Specification Section paragraph in which the item is specified or Drawing and Detail number. Annotate the submittal sheets with the equipment identification numbers appearing on the equipment schedule.
6. Include all information requested by the Specification Section in a single submittal. With the exception of shop drawings, incomplete submittals or phased submittals under the same specification section are not acceptable and will be returned without review.
7. Submit pertinent catalog and performance data sheets only. Annotate pages to clearly identify which specific product is submitted and for what tag number or application. Contractors shall not submit entire catalogs.
8. Submission shall be made in the form of a tab-indexed brochure. Index sheets shall be required for all material and equipment.
9. Each submittal shall be accompanied by a cover letter or shall bear a stamp stating that the submittal has been thoroughly reviewed by the Contractor and is in full compliance with the requirements of the Contract Documents. Cover letters shall list in full the items and data submitted. Failure to comply with this requirement shall constitute grounds for rejection of data.

D. Equipment Submittals:

1. Identify each item by manufacturer, brand, trade name, number, size, rating, or whatever other data is necessary to properly identify and check materials and equipment. Words "as specified" are not sufficient identification.
2. Mark the exact equipment item and data on each sheet. Where multiple product model types are listed on a single sheet, the contractor shall clearly indicate which specific items are submitted. If different model numbers of a single product line are submitted for different uses, this should be clearly annotated, identifying each individual use cross-referenced by the requirement it intends to fulfill. Submittals without annotation will be rejected and returned without review.
3. Submittal literature, drawings and wiring diagrams shall be specifically applicable to this project and shall not contain extraneous material or optional choices. Clearly mark literature to indicate the proposed item and its relevant features or options. Submittals shall include all those items listed in each individual Section.
4. As part of the equipment submittals, the manufacturer shall submit documentation to

indicate that the entire assembly is suitable and certified to meet all applicable seismic requirements. In addition, the manufacturer shall recommend the method of anchoring the equipment to the mounting surface, including the assembly dimensions, weights and approximate centers of gravity.

E. Shop Drawings:

1. Provide shop drawings for all systems as required per individual Division 01 & 26 specification sections, drawings or Construction Documents.
2. All equipment shall be shown to scale and shall match the required dimensions from the equipment submittals. All equipment access clearances shall be marked explicitly on the Shop Drawings with manufacturer and code required distances dimensioned and annotated as such.
3. The drawings shall be minimum 1/4" = 1'-0" scale.
4. Independent structural support and structural pad drawings shall be submitted for review by Structural Engineer.
5. All equipment shall be labeled to match the drawings.
6. The Contractor shall assure that each trade has coordinated work with other trades, prior to submittal. Division 26 shop drawings shall be issued after the coordination drawings are signed off by all other trades. Any conflicts that occur with other trades shall be brought to the attention of the District's Representative prior to issuance of the shop drawings.
7. Provide detailed drawings of all electrical equipment rooms, yards and utility areas. Revised electrical equipment layouts must be reviewed and approved prior to release of order for equipment and prior to installation.

F. Substitutions:

1. All requests for substitutions shall conform to the general requirements and procedure outlined in Division 01.
2. Where items are noted as "or equal," a product of equal design, construction and performance will be considered. Contractor must submit all pertinent test data, catalog cuts and product information required substantiating that the product is in fact equal to that specified. Only one substitution will be considered for each product specified.
3. Manufacturers' names and model numbers used in conjunction with materials, processes or equipment included in the Contract Documents are used to establish standards of quality, utility and appearance. Materials, processes or equipment, which, in the opinion of the District’s Representative, is equal in quality, utility and appearance, will be approved as substitutions to that specified.
4. Whenever any material, process or equipment is specified in accordance with a Federal specification, ASTM standard, ANSI specification, UL listing or other association standard, the Contractor shall present an affidavit from the manufacturer certifying that the product complies with the particular standard specification. When requested by the District’s Representative, support test data to substantiate compliance shall be submitted by the Contractor at no additional cost.
5. Substitutions shall be equal, in the opinion of the District’s Representative, to the specified product. The burden of proof of such shall rest with the Contractor. When the District’s Representative, in writing, accepts a substitution, it is with the understanding that the Contractor guaranteed the substituted article or material to be equal to the one specified and dimensioned to fit within the construction. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the work, or from any provisions of the Specifications.
6. The Contractor shall be responsible for all expenses in connection with the substitution materials, processes and equipment, including the effect of his substitution on him, his subcontractor's or other Contractor's work. No substitution of material, processes or equipment shall be permitted without written authorization of the District’s

Representative. Any assumptions on the acceptability of a proposed substitution prior to acceptance by the District's Representative are at the sole risk of the Contractor.

G. Resubmittals:

1. All re-submittals shall include a cover letter that lists the action taken and revisions made to every drawing and equipment data sheet in response to Submittal Review Comments. Re-submittal packages will not be reviewed unless accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the re-submittal package.
2. Resubmittals shall be complete and shall be explicitly annotated to note all changes. Contractor shall not just include specific responses to review comments but shall show how the resubmittal data has been corrected and how all consequences of the change have been accommodated.
3. Changes made in the resubmittal which are not directly a response to an earlier review comment shall be clearly identified on the letter of transmittal provided with the re-submittal and annotated within the body of the submittal. The reason for the change shall be included.
4. Non-compliant items which were not noticed in an earlier submittal but are noticed in a resubmittal shall be noted as non-compliant and the resubmittal tagged for corrective action. The fact that the District's Representative may have overlooked the defect shall not constitute total or partial acceptance of it. The contractor remains responsible for delivering an installation that meets the design intent. All corrective action shall be performed at no additional cost or delay to the project.

1.04 QUALITY ASSURANCE

A. Nothing in these plans or specifications is to be construed to permit work not conforming to the prevailing codes and regulations. Should there be any direct conflict between any referenced standard and the governing code, the mandatory code language shall govern to set only the minimum requirements and the most stringent requirement shall govern.

B. Factory and Field Testing

1. See each Section for the required testing and procedures.
2. Test reports shall include:

   a. Description of equipment tested
   b. Description of test procedures
   c. Test results
   d. Names and signatures of witnesses of tests.

3. Notify the District's Representative 14 days in advance of when tests will be performed.

C. Electrical Acceptance Testing

1. Contractor shall engage the services of a qualified testing technicians who are trained and certified by the manufacturer for the purpose of performing inspections and tests of installed Work as herein specified and specified in other Sections of Division 26 & 27 of these Specifications.
2. The Contractor shall provide all material, equipment, labor and technical supervision to perform such tests and inspections.
3. All tests shall be performed in compliance with the recommendations and requirements of the NETA and applicable codes and standards and manufacturer's instructions.
4. Upon completion of the tests and inspections noted in these specifications, a label shall be attached to all tested devices and equipment. These labels shall indicate date tested and the testing company/technician responsible.
5. The tests and inspections shall determine suitability for continued reliable operation.

6. All tests shall be conducted in the presence of District's Representative and Inspector of Record (IOR).
7. Test reports: All test forms, results and reports shall be typed in their final form.

D. Materials and Standards

1. The label of listing by UL shall appear on all materials and equipment for which standards have been established by the agency.
2. Where codes listed in Division 01, establish label or approval requirements, furnish all materials and equipment with either the required labels affixed or the necessary written approval.
3. All base material shall be per ASTM and/or ANSI standards.

E. Materials and Workmanship

1. All materials shall be new, meet the requirements of the contract document and be identifiable as being specified or substitute products.
2. Materials that do not conform to the requirements of the contract documents, are not equal to approved samples or are unsatisfactory or unsuited to the purpose for which they are intended, will be rejected and shall not be installed.
3. All equipment shall be installed in accordance with the recommendations of the manufacturers.
4. Work performed under this Division shall be installed by craftsmen skilled in the trade involved, and apprentices as indicated in General Conditions.
5. Provide all control equipment for electrically operated equipment except when equipment is furnished with control equipment.
6. Provide all electrical work required for the service and connection of electrically operated and controlled equipment specified in other Divisions of the Specification.
7. All electrical power, signal, alarm, notification, and communication systems shall be complete, tested and ready for use.
8. Defective work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or other cause shall be removed within ten (10) days after written notice is given by the District's Representative, and the work shall be re-executed by the Contractor. The fact that the District's Representative may have previously overlooked such defective work shall not constitute total or partial acceptance of it.
9. The Contractor recognizes that the design is based upon the equipment and material specified by name or construction and the Contractor accepts full responsibility for assuring that the quality, utility and performance of a substitution equals or exceeds that of the specified item.
10. In no case shall a Bidder base his bid on a class of material or workmanship less than that required by the contract documents nor the governing codes and ordinances.

F. Checking and Testing Equipment by Contractors and Manufacturer's Representative:

1. All equipment shall be installed per the manufacturer's instructions. During construction contractor shall request supervisory assistance from equipment manufacturer's representatives so the equipment will be correctly installed. After installation, request the District's Representative to observe and see the equipment is in proper working order.
2. Manufacturer's representative shall review the overall system design relative to the proper application of his equipment in the particular system. He shall note conduit, wiring, control, location, and other relevant relationships, and furnish appurtenances necessary for satisfactory operation.
3. Before equipment start up, the manufacturer's representative shall submit to the District's Representative, a signed statement certifying to their inspection and noting that the equipment is properly installed and ready for operation.

1.05 PROJECT RECORD DOCUMENTS

A. Record documents shall conform to the Closeout Procedures of Division 01 and this section.

B. Keep up to date during the progress of the job through, one set of drawings indicating the Record installation. In addition to changes made during course of Work, show following by dimensions from readily obtained base line reference points:

1. Show exact layout of the equipment, pads, overhead or underground conduits, riser conduits and bus ducts in electrical rooms.
2. Show exact layout of the equipment, pads, overhead or underground conduits in outdoor equipment yards.
3. Show exact layout of the equipment, pads, feeder conduits and bus ducts in mechanical and utility rooms.
4. Show exact layout of the equipment, pads, and feeder conduits on the roof or outdoor areas.

C. Underground utility services, both inside and outside of buildings, shall be dimensioned from permanent structures, benchmarks or property lines. Utility services outside of buildings shall also show depth of burial with reference to the finished ground floor elevation.

D. This set of drawings shall always be kept on the project site and shall be available for inspection by District's Representative or Construction Manager.

E. Submit completed Drawings to District's Representative for approval prior to authorization for final payment.

F. Record drawings shall be certified as to their correctness by the signature of the Contractor and shall be stamped or otherwise identified as record drawings.

G. At the completion of the project the Contractor shall submit record as-built drawings as specified in Division 01 and their electronic CAD files. Drawings shall incorporate all the District's and Architect's comments and represent completed as-built conditions.

1.06 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Instructions and Manuals: In accordance with requirements of Division 01 and as follows:

1. Prior to project closeout, furnish to the District's Representative hard back 3-ring binders containing all bulletins, operation and maintenance instructions, parts' lists, service telephone numbers and other pertinent information as noted in each Section for equipment furnished under Division 26. Binders shall be indexed into Division Sections and labeled for easy reference. Bulletins containing more information than the equipment concerned shall be properly stripped and assembled.
2. O&M manuals shall be in both hard copy format and electronic format. Electronic files must have searchable text for ease in locating specific information, i.e. no scanning of paper documents.
3. O&M's shall include the copy of approved submittal information so that the specific details and applications of each device for this project are available.
4. One month prior to request for final inspection, submit Operating and Maintenance manuals or as stated in Division 01.
5. Manuals shall be prepared to include the following:

a. Section 1: A comprehensive table of contents and guide to the manuals contents and layout. This section shall enable the reader to comprehend the scope and

purpose of the document and to identify readily where specific information can be obtained.

b. Section 2: Contractual and Legal records including:
c. Name and Address of the installation

1) Details of IOR, District, Architect & Engineer's approvals
2) Name and Contact details of the Design Team and Installing Contractors and associated sub- contractors
3) Dates for Start of Installation, Substantial Completion, and Expiry of Warrantee period
4) Copies of maintenance service contracts and contact details for local service company
5) Copies of warrantees and bonds

d. Subsequent Sections:

1) Startup and Shutdown Procedures: Provide a step-by-step write-up of all major equipment. When manufacturer's printed start-up, troubleshooting and shut-down procedures are available, they shall be incorporated into the operating manual for reference.
2) Operating Instructions: Written operating instructions shall be included for the efficient and safe operation of all equipment.
3) Service Instructions: Provide the following information for all pieces of equipment:

i) Recommended spare parts, including catalog number and the name, manufacturer's name and contact information, address and telephone number of local suppliers of factory representative.
ii) Maintenance instructions and recommended service maintenance schedule for all equipment. Provide sample maintenance record forms for each equipment type.
iii) Data sheets to show complete internal wiring, mechanical and electrical ratings and characteristics, catalog data on component parts whether furnished by equipment manufacturer or others, names, addresses and telephone numbers of source of supply for parts subject to wear or electrical failure, and description of operating, test, adjustment, and maintenance procedures.
iv) Where data sheets included in manual cover equipment, options, or other features not part of equipment actually furnished, line out these references or otherwise clearly mark so remaining text, diagrams, drawings, schedules, and similar information shall apply specifically to equipment furnished.
v) Final submittals for equipment shall have final corrections included in the prints used for the manual.

1.07 TEMPORARY FACILITIES

A. Temporary Light and Power: Provided under requirements of Division 01.

B. All temporary facilities shall be removed at completion of project, with permanent facilities returned to proper working order.

1.08 REGULATIONS, CODES, PERMITS AND FEES

A. Conform to all rules, regulations, laws, and ordinances governing the area in which this construction occurs.

B. Provide local authorities with all notices relating to this Division.

C. Provide District, District's Representative and local Inspectors access to work at all times.

D. Contractor shall be responsible for all law violations caused by the work under this Division. Notify the District's Representative in writing when a discrepancy occurs between code requirements and work shown on drawings and resolve matter before proceeding with work.

E. Make application and pay for all certificates of inspection, taxes and permits required by Local, State or Federal Government agencies, public utilities, or other authorities having lawful jurisdiction. Deliver to the District's Representative any and all certificates of inspections, permits, and approvals that may be required by such authorities.

1.09 COORDINATION

A. Coordination activities shall conform to the Administrative Requirements of Division 01 and this section.

B. Cooperate with all other Divisions performing work on this project as necessary to achieve a complete neatly fitted installation for each condition. Consult the Drawings and Specifications to determine the nature and extent of work specified in other Divisions that adjoins, shares space with, or attaches to the work of this Division. Confer with other Divisions at the site to coordinate this work with theirs in view of job conditions to the end that interferences may be eliminated, and that maximum headroom and clearance may be obtained. In the event that interferences develop, the District's Representative's decision will be final as to which Division shall relocate its work, and no additional compensation will be allowed for the moving of piping, ductwork, conduit or equipment to clear such interferences.

C. Identify congested conditions. Congested areas typically include ductwork, piping, electrical work, ceiling work, etc. Include all mechanical and utility rooms and congested areas in corridors, tunnels and similar spaces. Shop Drawings for Work in "tight" areas shall clearly indicate the solutions to space problems in coordination with Work in other Sections. Identification of space problems without solutions is not acceptable. Solutions to problems may include relocation or rerouting of existing equipment, pull box, conduit, piping, and etc. to allow installation of new work.

D. Arrange for raceway spaces, chases, slots, and openings in building structure during progress of construction, to allow for electrical installations.

E. Coordinate installation of required supporting devices in form work and set sleeves in poured-in-place concrete and other structural components as they are constructed.

F. Coordinate requirements for access panels and doors for electrical items requiring access that are concealed behind finished surfaces.

G. Cutting and Patching

1. The Contractor shall do all cutting of building materials, conduit, etc., as required for the installation of work.
2. No structural members shall be cut without the prior approval of the District's Representative. To gain approval to cut concrete, Ferro scan the affected area and submit scan results to Structural Engineer for review. Submit to District’s Representative, drawings and details for the support of structure around the opening. If the standard structural details are to be used, then submit a plan that cross-references all penetrations against detail numbers for review. Otherwise, submit drawings, design, and calculations stamped

by a Registered Professional Structural Engineer in the state of California. Any cutting and remedial support shall be done in a manner satisfactory to the District's Representative.

3. Patching of building structure, walls, floors, etc. during normal work progress shall be consistent with the Requirements of Division 01.
4. All patching of or repair of damage to completed work in place shall be done to meet with the approval of the District's Representative.
5. All cutting shall be performed with machine saw. Holes for pipes in concrete walls or floors shall be drilled with core drilling equipment.
6. Work in place that is subsequently cut is seen as evidence of the contractor's lack of field coordination during the shop drawing production phase. Because field coordination is a requirement of the contract, the contractor must bear all costs of cutting, patching and repair for corrective work.

1.10 LOCATION AND ROUTING

A. The Drawings are for reference only and indicate diagrammatically the desired location or arrangement of equipment, devices, lights, outlets, pull boxes, vaults/manholes, raceways, and etc. are to be followed as closely as possible. Judgment must be exercised in executing the Work so as to secure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference with structural and existing conditions. Exact locations necessary to secure proper conditions and results shall be determined at Project Site and shall be approved by the District's Representative.

B. Verify dimensions, correct location and electrical requirements of all equipment specified in other Divisions before proceeding with the roughing-in of connection.

C. Locations shown on architectural drawings or on wall elevations shall take precedence over electrical drawing locations.

D. Access to Equipment: Locate all electrical equipment and pull boxes to provide easy access for operation, repair, and maintenance. All code required clearances shall be maintained for accessing the equipment and its disconnecting means.

E. Locations of Openings: Locate all chases, shafts and openings required for the installation of the electrical Work during framing of the structure. Do any cutting and patching required due to improperly located or omitted openings with the approval of the district's Representative, who must also approve any additional changes resulting from relocation or omission of openings. Cutting or drilling in any structural member is prohibited without prior written approval of the District's Representative.

1.11 SEISMIC PROTECTION

A. Electrical equipment installation in any Seismic Design Category shall be protected from earthquakes per all applicable local and state Building Codes.

1. Protection criteria for equipment shall be a Horizontal Force Factor as prescribed by the CBC multiplied by the equipment weight considered passing through the equipment center of gravity in any horizontal direction.
2. Equipment shall be protected from earthquakes by rigid structurally sound attachment to the load supporting structure unless vibration isolators are required to eliminate the unacceptable structure transmitted noise and/or vibration.
3. The force factor and anchorage shall be determined by calculations performed by a professional Structural engineer registered in the state whether the isolators are present or not and shall be verified by the seismic restraint vendor.

4. Equipment requiring vibration isolators shall be furnished with protected spring isolators or separate seismic restraints as required. Seismic snubbers and protected spring isolators shall be seismically rated in three principal axes by independent testing laboratory or analysis by an independent professional Structural engineer.

B. Contractor shall be responsible to provide seismic restraint systems and supporting concrete pads for the entire project.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver equipment, fixtures, devices and conduits with factory-fabricated containers and protective means. Maintain containers and protective means through shipping, storage, and handling to prevent damage and to prevent exposure to dirt, debris, and moisture.

1. Perform all handling and shipping in accordance with manufacturer's instructions.
2. Do not deliver equipment/materials to the jobsite before they are ready for installation, unless properly secured and safe storage areas are provided.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect equipment from dirt, water, construction debris, and traffic.

C. Handling: Handle in accordance with manufacturer’s written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed and shall be replaced with new units.

1.13 DEFENITIONS

A. “Approved Equal” means any equipment or material which in the opinion of the architect, is equal in quality, durability, appearance, strength, design and performance to the equipment or material specified and will function adequately in accordance with the general design.

B. “Authority Having Jurisdiction” or “AHJ” shall mean the building department, fire department, Inspector of Record (IOR), Division of State Architect (DSA) or other authority having legal jurisdiction relevant to the specific work being described in the City or State where the project is located.

C. “Concealed, Interior Installations” Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in wall conduits.

D. “Concealed, Exterior Installations” Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

E. "Connect": Shall mean make final electrical connections for a complete operating piece of equipment.

F. “Contract Documents” or “Documents” shall mean the latest version of all drawings and specifications prepared by the Architect, Engineers and Consultants.

G. “Equal”: Shall be of the same quality, appearance and utility to that specified, as determined by the District’s Representative. Contractor bears the burden of proof of equality.

H. “Exposed, Exterior Installations” Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include equipment yards or rooftop

locations.

I. “Exposed, Interior Installations” Exposed to view indoors. Examples include finished occupied spaces and electrical equipment rooms.

J. “Finished Spaces” Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

K. “Furnish” means purchase, store and deliver the specified material, equipment or other items to project site or the person and party indicated.

L. "Install": means to physically install the equipment or other items in-place and in readiness for regular operation.

M. “Provide” means to supply, erect, install and connect up completely, in readiness for regular operation, the particular work referred to.

1.14 TRAINING

A. Furnish a period of sixteen (16) hours (4 – 4-hour sessions) for the necessary training programs and instructions to District’s personnel, unless indicated otherwise in individual specification sections.

1.15 WARRANTY

A. Conform to the requirements of “Warranties” as stated in Division 01 specifications.

B. Unless otherwise noted within a section, under special warranty each complete system shall be warranted by the Contractor for the period referenced in Division 01. Each system shall be free of defects of materials and workmanship and shall perform satisfactorily under all conditions of load or service.

1. The warranties shall provide that all additional controls, protective devices or equipment provided as necessary to make the system or equipment operate satisfactorily and any faulty materials or workmanship shall be replaced or repaired.
2. On failure of the warrantor to do the above after written notice from District, the District shall have the Work done at the cost of the warrantor.

C. Provide new materials, equipment, apparatus and labor to replace that determined by District to be defective or faulty within the warranty period.

D. Unless otherwise noted, warranties shall commence upon the District’s final acceptance of the project.

1.16 COMMISSIONING

A. Commissioning requires the participation of Division 26 work to ensure that all systems are operating in a manner consistent with the Design Intent. The general commissioning requirements and coordination are detailed in Division 01 and Division 26. This Division shall be familiar with all parts of Division 01 and Division 26 and the commissioning plan issued by the Commissioning Authority and shall execute all commissioning responsibilities assigned to them in the Contract Documents.

B. The contractor is responsible for assisting the district throughout the entire commissioning

process.

C. The work is not complete until the commissioning and District's Representative have signed off on the commissioned systems.

PART 2 - PRODUCTS

2.01 GENERAL

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

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified. A prior written approval is required for all items including any substitutions allowed for use on the project.
2. Whenever possible, all materials and equipment used in the installation of the work shall be of the same brand or manufacturer for each class of material or equipment.

B. Construction of all electrical equipment such as panel board, transformer and similar equipment shall meet local seismic code requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to bidding visit the site and determine all existing conditions affecting work of this Division. The Contractor shall thoroughly review the locale, working conditions, conflicting utilities and the conditions in which the electrical work will take place. Verify all existing conditions in the field. No allowances will be made subsequently for any costs that may be incurred because of any error or omission due to failure to examine the site and to notify the District's Representative of any discrepancies between Drawings and Specifications and actual site conditions.

B. The location and elevation of the utilities, existing ductwork, piping, conduit, or equipment are that which can be determined from available information and its accuracy cannot be guaranteed. Exact location and elevation of these items shall be verified by the Contractor prior to excavation, demolition, or installation of any portion of the work indicated. Exercise special care when excavating at or near the general location of underground utilities to avoid damage to the utility services, as well as to ensure worker safety.

C. Any connections to or relocation of any existing utility line requiring temporary discontinuance of utility services which are in active use shall be scheduled and coordinated with the utility company and the District's Representative. In no case shall the services be left disconnected at the end of a working day or weekend unless authorized by representatives of the utility company and the District. Any existing utility service damaged shall be repaired to the satisfaction of the District's Representative.

D. Examine all Drawings and Specifications to familiarize with the type of construction to be used, and the nature and extent of work of other trades.

E. Observe the conditions under which deliveries of materials and equipment shall be made and under which such materials and equipment can be stored and shall include adequate provision in the bid proposal.

3.02 FIELD VERIFICATION

A. All dimensions, locations of equipment and connections to utilities or pre-existing equipment shall be verified in field prior to construction and installation.

B. All roughing in construction dimensions shall be made from architectural plans where discrepancies may exist.

C. Architectural plans will hold precedence over electrical plans as to location of partitions, devices and equipment locations.

D. Measurements in existing buildings shall take precedence over all other plans with regards to identifying location of existing installations.

3.03 PROVISIONS FOR FUTURE INSTALLATIONS

A. At the start of the project, meet with the District's Representative to obtain information regarding allowable sleeve or penetration spacing and size. Provide all sleeves, inserts, and openings necessary for the installation of the Electrical and communications Work.

B. Where any Electrical work cannot be installed as the work progresses, the Contractor shall provide and arrange for the pads, sleeves, inserts, and any provisions as necessary to permit installation of the omitted work during later phases of construction. This field coordination work shall be completed prior to structural shop drawings and shall follow the principles set forth in the meeting referenced above. Arrange for and lay out any chases, holes, or other openings that must be provided in masonry, concrete or other work.

C. The Contractor shall be responsible for being aware of the nature and arrangement of the materials and construction to which the work attaches or passes through, and shall propose support and penetration details that are consistent with maintaining the integrity and performance of the construction such as, but not limited to, fire- resistive construction, acoustically rated construction, vibration isolated construction, water tight construction, fire proofed construction, and isolated construction.

D. This work shall be incorporated into the initial shop drawing review of the construction (wall, floor, roof, etc.) that is affected so that the District's Representative may review the impact of the holes.

E. The contractor shall bear the cost of time and materials for the District's Representative to re-analyze the construction if the original spacing principles are not adhered to, for whatever reason.

F. Once the structural shop drawings are returned with no exception taken, the contractor shall bear the cost of time and materials for the District's Representative to review the appropriateness of cutting or drilled holes in planned or existing construction.

3.04 INSTALLATION

A. Install electrical equipment as specified in individual specification sections, and in accordance with the manufacturer's instructions, code requirements, and required access clearances.

B. No material, device or equipment shall be shipped to site unless shop drawings have been approved for such, prior to shipment.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install raceways, boxes and lights to allow maximum possible headroom where specific mounting heights are not indicated.

E. Rough-in locations for fixtures and equipment shall be determined from the unit itself or from the approved shop drawings.

F. Arrange for necessary openings to allow for admittance of equipment. Where equipment cannot be installed as structure is being erected, provide and arrange for building-in of boxes, sleeves, or other devices to allow later installation.

G. Install equipment to permit easy access for normal maintenance.

1. Maintain easy access to switches, motors, drives, pull boxes, receptacles, etc.
2. Notify the District's Representative in writing of relocation items which interfere with access.

H. Suspended raceways and equipment shall be installed in accordance with the Applicable local, state and national Building Codes.

I. Hangers, Inserts, Supports and bases:

1. Provide all necessary anchoring devices and supports as required and stated elsewhere:

   a. Use structural supports suitable for equipment, or as indicated.
   b. Check loadings and dimensions of equipment with shop drawings.
   c. Do not cut or weld to building structural members.

2. Provide required structural members, hangers, supports and inserts to keep cable trays and conduits in proper alignment and prevent transmission of injurious thrusts and vibrations. Where supported from concrete construction, do not weaken concrete or post-tension strands or penetrate waterproofing. Hangers and supports shall be finally adjusted in vertical and horizontal direction under operating conditions.
3. Metal deck roof systems shall not be used for the support of hangers, inserts, etc.
4. Provide all metal bases and supports, not part of the building structure as required. Materials and equipment furnished or provided under this Division shall be as described for similar work under other Divisions.
5. Coordinate the location of inserts with Division 03 prior to pouring of concrete.

3.05 PROTECTION AND STORAGE

A. All stock-piled material shall be placed on pallets and protected from weather and from entry of foreign material and construction dust by plastic. All stored materials and equipment shall be carefully inspected and cleaned prior to installation and replaced with new material or equipment if found to be damaged, corroded, etc.

B. Equipment which is observed to be exposed to the weather, dirt or construction debris can be interpreted by the District's Representative as defective equipment under this clause.

3.06 TOOLS AND EQUIPMENT

A. Furnish all tools and equipment necessary for the proper installation, protection and upkeep of the work.

3.07 EXCAVATION, TRENCHING AND BACKFILL

A. Do all excavation, trenching and backfill required to install the work in this Division.

B. Coordinate trenching and backfill required for the installation of this Division as detailed in relevant sections of Division 31. Repair or replace all roadway, sidewalk, pavements, parking lots, Asphalt & Concrete surfaces, gutters, curbs and other work incidental thereto. Dispose of excavation material per Division 31.

C. Provide barricades, signs, lanterns, shoring, sheeting and pumping as part of Work in this Division as required to insure safe conditions. Comply with OSHA requirements.

D. Shore all trenches and excavations as necessary to maintain the banks of excavations and to prevent any sloughing, caving-in or damage of any kind.

E. Trenching: Subject to the requirements of the civil engineer, dig trenches straight, true to line and grade with sides and bottoms smoothed of any rock points. All trenches shall be sloping away from the building. All trenching required for utility company shall comply with individual utility company requirements.

F. Excavation: All excavations shall be inspected by the District's Representative, IOR and approved before placing of any conduit or pull box. Bury conduits outside the building to a depth of not less than 24 inches below finish grade unless otherwise noted.

G. Backfilling: Do not backfill until final inspection and approval for the conduit installation by the District's Representative. Any imported backfill material required shall be approved by the Architect responsible for certification of compaction.

3.08 DEMOLITION

A. General:

1. The work involves demolition of existing conduit, conductors and equipment.
2. Refer to contract documents for any demolition, relocation, removal or rerouting of existing conduits and equipment.
3. All demolished or Contractor removed materials become the property of the Contractor, unless otherwise indicated. Contractor shall be responsible for removing such materials from the job site.

B. Equipment: All the existing equipment to be removed from site & building shall be disassembled or cut into pieces to allow removal through available existing openings.

C. Conduits (feeder and branch): Conduits shall be capped, and wires/cables removed for all abandoned installations.

3.09 PROTECTION AND CLEANING

A. Protection: Fully protect all finished parts of the materials and equipment against physical damage from whatever cause during the progress of the work and until completion.

B. During construction, cap all conduits so as to prevent the entrance of sand and dirt.

C. Clean premises of all excess construction material and debris caused by work, in accordance with Division 01.

D. Surfaces shall be left clean, debris shall be removed, and equipment shall be furnished in prime coat finish unless otherwise specified.

E. Clean exterior of conduit and equipment exposed in complete structure. Remove rust, paint overspray, fireproofing overspray, plaster, and dirt by wire brushing; remove grease, oil and similar materials by wiping with clean rags and suitable solvents.

F. Equipment, devices and Other Items with Factory Finish: Remove grease, oil, paint overspray, fireproofing overspray, gypsum board muds platters and leave surfaces clean.

3.10 SEISMIC RESTRAINTS

A. Provide seismic restraints and supports for equipment and work as required in other specification sections, and as shown on drawings.

1. Seismic restraints and supports shall be installed directly after installation of any work requiring them, to avoid concealment or difficulty of access.
2. Contractor shall be responsible for any costs and delays associated with gaining access to any installation needing restraints or supports.

3.11 PENETRATIONS

A. Acoustical: All penetrations through acoustically treated walls shall be sealed with non-hardening resilient acoustic sealant.

B. Waterproofing:

1. All penetrations through exterior walls and beneath slabs-on-grade shall be sealed with weatherproofing material.
2. All below grade conduit penetrations through the walls shall be individually sealed with Link-Seal or equal.
3. Provide flashings at exterior wall and roof penetrations. Caulk watertight penetrations of above grade walls, roofs and floors.

3.12 FIRE STOPPING

A. Provide sealing or stuffing material or assembly in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat and hot gases through fire rated construction.

B. Materials and Products:

1. Provide material listed in the UL Fire Resistance Directory for the UL system involved to achieve fire ratings of adjacent construction.
2. Materials shall have been tested to provide fire rating at least equal to that of the construction.
3. All fire stopping products shall be from a single manufacturer.

C. Environmental Requirements:

1. Comply with manufacturer’s recommendations for temperature and humidity conditions before, during and after installation of firestopping.
2. Provide masking and drop cloths to prevent contamination of adjacent surfaces by firestopping materials.
3. Provide ventilation in areas to receive solvent cured materials and as required by manufacturer.

3.13 IDENTIFICATION

A. The Contractor shall identify all conduit, cabling, devices, and equipment in accordance with SECTION 26 05 53 – IDENTIFICATION for ELECTRICAL SYSTEMS.

B. The Contractor shall submit a schedule for equipment identification.

3.14 SETTING OF PROTECTIVE DEVICES

A. Prior to final completion of the Project, set all protective device relays and internal settings to provide adjustment between upstream and downstream protective devices. Settings shall be based on the accepted coordination study.

3.15 OPERATIONAL TESTS

A. Before acceptance tests are performed, demonstrate to the District's Representative that all systems and components are complete and fully operational.

B. Perform operational tests on all equipment to determine compliance with Specifications.

3.16 FINAL INSPECTION

A. As the work nears completion, review the requirements of the Contract Documents, inspect the work and inform all parties involved in work to be corrected or completed before the project can be deemed substantially complete.

B. When the project is substantially complete, notify the District's Representative in writing of this fact, listing those items of work remaining incomplete, the reason for incompleteness, and the anticipated date that all remaining work will be completed. Carry out own final inspection and be satisfied that the work is complete. Final inspection of the project will then be scheduled by the District's Representative.

C. The District's Representative reserves the right to cancel and reschedule the inspection in the event considerably more work remains to be completed or corrected than indicated in the written request for inspection.

D. All items not completed or found not complying with drawings or specifications by the District's Representative will be identified in an inspection report by District's Representative.

E. Correct all items on inspection report. Make the correction and initial and date each item on the report after corrections have been completed.

3.17 PROJECT CLOSE-OUT

A. Prior to requesting District's Representative's inspection for certification of substantial completion, complete the following and list known exceptions in request:

1. Obtain final inspections and approvals from all governmental jurisdictions that are required for the project.
2. Submit record drawings, maintenance manuals, warranties, and similar final record information.
3. Deliver tools, spare parts, extra stocks of materials, and similar physical items to the District.
4. Complete start-up, testing and demonstration of systems to the satisfaction of the District's Representative that the entire installation is complete, properly adjusted and is in

proper operating condition.

5. Complete final cleaning requirements.

END OF SECTION

SECTION 26 05 13
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Boxes, enclosures, keys and locks.
2. Receptacles and switches.
3. Identifications and signs.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Division 26 – Electrical.
3. Division 27 - Communications

PART 2 - PRODUCTS

2.01 BOXES, ENCLOSURES, KEYS AND LOCKS

A. Outlet Boxes and Fittings:

1. Outlet boxes installed in concealed Work shall be galvanized steel, pressed, or welded type, with knockouts.
2. In exposed Work, where conduit runs change direction or size, outlet boxes and conduit fittings shall be cast metal with threaded hubs cast integral with box or fitting.
3. Fittings shall be cast metal and non-corrosive. Ferrous metal fittings shall be cadmium-plated, or zinc galvanized. Castings shall be true to pattern, smooth, straight, with even edges and corners, of uniform thickness of metal, and shall be free of cracks, gas holes, flaws, excessive shrinkage, and burnt-out sand.
4. Covers for fittings shall be galvanized steel or non-corrosive aluminum and shall be designed for fittings installed.
5. Light fixture outlets shall be 4-inch octagon, 4-inch square, 2 1/8-inch deep or larger, depending upon number of conductors or conduits therein. Plaster rings shall be furnished with round opening with two ears drilled 2 23/32 inches center to center.
6. For local device outlets provide 4-inch square 2 1/8-inch deep, boxes for single gang, 5-inch square boxes for two-gang, and special solid gang boxes with gang plaster ring for more than two switches.
7. Plaster rings shall be provided on flush-mounted outlet boxes except where otherwise indicated or specified. Plaster rings shall be same depth as finished surface. Install approved ring extension to obtain depth to finish surface.
8. In existing plywood wall or drywall construction, and where flexible steel conduit is fished into walls, single-gang and 2-gang outlets for wiring devices may be sectional steel boxes with plaster ears. Boxes shall be fastened to plywood with flat-head screws in each plaster ear screw hole. Boxes fastened to gypsum board shall be Raco, Appleton, Cooper, Bowers, or equal.
9. Factory made knockout seals shall be installed to seal box knockouts, which are not intact.
10. Where flexible conduit is extended from flush outlet boxes, provide and install weatherproof universal box extension adapters.

B. Junction and Pull boxes:

1. Junction and pull boxes, in addition to those indicated, shall only be used in compliance with codes, recognized standards, and Contract Documents.

2. Interior and non-weatherproof boxes shall be constructed of blue or galvanized steel with ample laps, spot welded, and shall be rigid under torsion and deflecting forces. Boxes shall be furnished with auxiliary angle iron framing where necessary to ensure rigidity.

3. Covers shall be fastened to box with a sufficient number of machine screws to ensure continuous contact all around. Flush type boxes shall be drilled and tapped for cover screws if boxes are not installed plumb. Surfaces of pull and junction boxes and covers shall be labeled in black marker ink designating system, panelboard and circuit designation contained in box. In exposed Work, designation shall be installed on inside of pull-box or junction box cover.

4. Weatherproof NEMA 3R pull and junction boxes shall conform to foregoing for interior boxes with following modifications:

   a. The cover of flush mounting boxes shall be furnished with a weather-tight gasket cemented to, and trimmed even with, cover all around.
   b. Surface or semi-flush mounting pull and junction boxes shall be UL, or another Nationally Recognized Testing Laboratory (NRTL) listed as rain-tight and shall be furnished complete with threaded conduit hubs.
   c. Exposed portions of boxes shall be galvanized and finished with one prime coat and one coat of baked-on gray enamel, unless already furnished with factory baked-on finish.

5. Junction and pull boxes shall be rigidly fastened to structure and shall not depend on conduits for support.

C. Keys and Locks:

1. Provide two keys with furnished door locks, including cabinet door locks and switchboard locks, two keys for lock switches on switchboards or control panels, and two keys with interlocks or other furnished lock switches. Deliver keys to District.

2. Locks shall be keyed to Corbin No. 60 keys for access to operating equipment and Corbin 70 keys for service access. Special keys and locks shall only be provided where specified.

2.02 RECEPTACLES AND SWITCHES (District Standard – Leviton – No alternates)

A. Receptacles:

1. Duplex receptacles shall be heavy-duty specification grade, grounding type. Terminal screws shall be back, and side wired with internal screw pressure plates. The mounting strap shall feature heavy-duty brass construction. Receptacle back body shall be PVC. The receptacle face shall be ivory, impact resistant nylon. Receptacles shall have triple wipe brass power contacts.

NEMA #	Leviton
(20 amps) NEMA 5-20	5362-I
(15 amps) NEMA 5-15	5262-I

2. Duplex receptacles on circuits supplied by panel boards with integral surge suppression shall be Leviton 5262-SBU, 15 amps, 120 volts, or equal.

3. Single receptacles shall be heavy-duty specification grade, grounding type. Terminal screws shall be back and side wire with internal screw pressure plates. The mounting strap shall feature heavy-duty brass construction. Receptacle back body shall be thermoplastic. The receptacle face shall be ivory, impact resistant nylon. Receptacles shall have triple wipe brass power contacts. For circuits consisting of one single receptacle only, ampere

rating of receptacle shall be same as circuit breaker or fuse.

NEMA #	Leviton
(20 amps) NEMA 5-20R	5361-I
(15 amps) NEMA 5-15R	5261-I

4. Provide specification grade ground-fault circuit interrupter (GFCI) type receptacles in accordance with 2010 UL standards. GFCI receptacles shall have a trip indication light. Receptacle terminal screws shall be back and side wire with internal screw pressure plates. Test and reset buttons shall match device body and shall be ivory. GFCI receptacles shall be manufactured in standard configuration for installation with stainless steel smooth plates. Exterior mounted receptacles shall be mounted inside weatherproof enclosure.

NEMA #	Leviton
NEMA 5-20R	7899-I
NEMA 5-15R	8598-I

5. Provide weatherproof receptacles, except where otherwise indicated or specified, consisting of GFCI receptacles, as specified herein, and metal plates with die-cast lockable hinged lids and weatherproof mats.

6. Receptacles within 6 feet of water fountains, counter tops, or any sources of water shall be GFCI type.

B. Switches:

1. Local Switches:

a. Provide local switches, high strength thermoplastic toggle, specification industrial grade, rated 20 amps at 120-277 volts AC only, with plaster ears, external screw pressure plate back and side wired, and standard size composition cups which fully enclose mechanism. Switches shall be approved for installation at currents up to full rating on resistive, inductive, tungsten filament lamp and fluorescent lamp loads, and for up to 80 percent of rating for motor loads. Switches shall have oversized silver alloy contacts for long life and better heat dissipation. Provide switches as single pole, double pole, 3-way, 4-way, non-lock type. Provide non-lock type switches with ivory handles.

	Leviton
Single pole	1221-2I
Double pole	1222-2I
Three-way	1223-2I
Four-way	1224-2I

b. Provide lock type switches, as manufactured by Leviton 1221-2L specification industrial grade, 20 amp, 120-277 volts with metal or nylon key guides with on/off indication, and operable by same key. Key shall be District standardized vertically oriented, tamper resistant, forked key with two each 5/16-inch-long forks, 5/32-inch spacing between forks and 5/16-inch width overall.

2.03 COVER PLATES

a. All cover plates shall be 302 stainless steel to match device installed.

2.04 IDENTIFICATION AND SIGNS

A. Identification Plates:

1. Provide identification plates for the following unless otherwise specified, for switchboards, control panels, push-button stations, time switches, contactors, motor starters, motor switches, panelboards, and terminal cabinets.

2. Identification plates shall be of plastic stock and shall adequately describe function, voltage and phase of identified equipment. Where identification plates are detailed or described on Drawings, inscription and size of letters shall be as indicated. For lighting and power panels, identification plates shall indicate panel designation, voltage, and phase of panel. For terminal cabinets, identification plates shall indicate system contained in terminal cabinet.

3. Identification plates shall be black-and-white nameplate stock of Bakelite with characters cut through black exposing white. Plates shall be furnished with beveled edges and shall be securely fastened in place with No. 4 Phillips-head, cadmium-plated steel, self-tapping screws. Characters shall be 3/16 inch high, unless otherwise indicated.

B. Markings:

1. Install identification markings to surface-mounted starters, switches, disconnect switches, contactors, and other devices controlling motors and appliances. Provide abbreviations required along with an identifying number. Markings to be provided with locking type stencils using paint of a contrasting color. Figures shall be 3/8 inch high unless otherwise indicated. Dymo Industries Inc., self-sticking plastic labels, with embossed characters made with a typewriter may be installed instead of stencils and paint; p-touch self-adhesive plastic, or Brother P-Touch self-sticking laminated plastic labels may be installed.

PART 3 - EXECUTION

3.01 INSTALLATION AND SUPPORT OF BOXES

A. Install outlet boxes flush with finished surface of wall or ceiling. Install plumb and securely fastened to structure, independent of conduit. Except where otherwise indicated, provide factory-fabricated adjustable attachment bar hangers between studs to support outlet boxes. When installation is performed in fire rated walls, maintain the wall's rating integrity by means of approved fire stop methods.

B. Outlet boxes installed in suspended or furred ceilings with steel runner or furring channels shall be supported, except where otherwise indicated, by a Unistrut P-4000 Tessco A1200HS-10, Cooper B-Line B22s-HG, or equal channel spanning main ceiling runner channels. Each box shall be supported from its channel by a 3/8-inch 16 threaded steel rod with a Unistrut P-4008, Fastenal #48604, Copper B-Line 78101140346 or equal nut and a Tomic No. 711-B Adapta-Stud, or equal. Rod shall be tightened to a jamb fit with channel and its nut. Box shall be locked to rod by means of a 1/2-inch locknut on stud and a 3/8-inch 16 hex nut locking stud to rod.

C. Heights of outlets and equipment indicated on Drawings shall govern. In absence of such indications, following heights shall be maintained with heights measured to centerline unless otherwise noted:

1. Install wall-mounted telephones, light switches, and other switches, 48 inches above the finished floor. Refer to other Division 26, 27 and 28 Sections.

2. Outlet boxes for fire alarm pull stations shall be mounted at 45 inches above finished floor to ensure that the operating handle of the initiating device is no higher than 48 inches at finished floor. Under no circumstances shall the operating handle of the device exceed 48 inches above finished floor regardless of indicated height on drawing.

3. Wall mounted fire alarm strobe or horn/strobe devices shall be mounted such that the entire lens is not less than 80 inches above finished floor. If ceiling heights allow, wall mounted appliances shall have bottom of lens a minimum of 80 inches but not more than 96 inches to the top of lens.

4. Install outdoor fire alarm audible devices or fire alarm sprinkler flow bells at least 10 feet but not more than 12 feet above finished floor to center. Provide STI or equal protective covers for devices when required.

5. Voice evacuation speakers mounted indoors shall be mounted in ceiling space or if mounted on wall shall not be less than 10 feet to center above finished floor.
6. Install fire alarm strobe lights 80 inches to bottom of light above finished floor.
7. Install panelboards and terminal cabinets 6 feet 6 inches from finish floor to top of cabinet.
8. The use of extension boxes shall be limited to not more than 1 times the original depth of the junction box.

3.02 COVER PLATES

A. Provide a plate on each switch, plug, pilot light, data and on existing and reset outlets where so indicated or required. Plates shall be of stainless steel unless otherwise specified.

B. Flush wiring device and signal system outlets indicated to be blank covered, shall be covered with blank stainless-steel plates. Flush lighting outlets to be blanked shall be covered with Wiremold 5736 steel covers, or equal, painted to match surrounding finish. Provide stainless steel covers to blank indicated or required surface-mounted outlets.

C. In the following cases, and at required locations. Switch and receptacle plates shall be engraved with the device(s), or fixtures being controlled, or as indicated:

1. Three-gang and larger gang switches in locations other than classrooms.
2. Lock switches.
3. Pilot switches.
4. Switches so located that operator cannot see fixtures, or items of equipment controlled while his hand is on the switch.
5. Switches not in the same room with fixtures or items of unit heaters, air curtains, fly fans, etcetera.
6. Receptacles operating at other than 120 V shall be identified with the operating voltage.
7. Where indicated on Drawings.

D. Designations shall be as indicated on Drawings or as specified by Architect.

E. Standard GFI cover plates shall be Leviton, Raco 5028-0, or equal. GFI cover plates shall be provided with a CAM lock mechanism with two keys or a padlock hasp that does not protrude through the face of the cover and will allow the shank of locks keyed Corbin No. 60 keys.

3.03 IDENTIFICATION OF CIRCUITS AND EQUIPMENT

A. Provide descriptive nameplates or tags permanently attached to switchboards, motor control centers, transformers, panelboards, circuit breakers, disconnect switches, starters, pushbutton control stations and other apparatus installed for operation or control of circuits, appliances, fire alarm control panel(s), fire alarm annunciator(s), power supplies, terminal cabinets, energy management control units, and Information technology system backbone and distribution equipment points.

B. Provide nameplates of engraved laminated plastic, or etched metal. Submit Shop Drawings denoting dimensions and format to Architect before installation. Fasten equipment with escutcheon pins, rivets, self-tapping screws, or machine screws. Self-adhering or adhesive backed nameplates are not permitted.

C. Fasten tags to feeder wiring in conduits at every point where runs are broken or terminated, including pull wires in empty conduits. Indicate circuit, phase, and function. Tag branch circuits in panel boards and motor control centers. Tags may be manufactured of pressure-sensitive plastic or embossed self-attached stainless steel or brass ribbon.

D. Provide circuit identification cards and cardholders in all panel boards. Cardholders shall

consist of a metal frame retaining a clear plastic cover permanently attached to the inside of panel door. A list of circuits shall be typewritten on a card. Circuit description shall include name or number of circuit, area and connected load.

E. Junction and pull boxes shall have covers stenciled with box number when indicated on Drawings, or circuit numbers according to panel schedules. Data shall be lettered in a conspicuous manner with a color contrasting with finish.

F. Name shall be correctly engraved, with a legend indicating function or areas, when required by codes or indicated on Drawings.

3.04 PROTECTION

A. Protect Work of this section until Substantial Completion.

3.05 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

END OF SECTION

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Connectors, splices, and terminations rated 600 V and less.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.03 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.01 COPPER BUILDING WIRE

A. Description: Flexible, insulated, and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

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

1. Cerro Wire LLC.
2. General Cable Technologies Corporation.
3. Southwire Company.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 AND ASTM B 496 for stranded conductors.

E. Conductor Insulation:

1. Type THHN and Type THWN-2: Comply with UL 83.
2. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
3. Type XHHW-2: Comply with UL 44.

2.02 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

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

1. 3M Electrical Products.
2. AFC Cable Systems; a part of Atkore International.
3. Ideal Industries, Inc.
4. ILSCO.
5. O-Z/Gedney; a brand of Emerson Industrial Automation.

C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc diecast with set screws, designed to connect conductors specified in this Section.

D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper.
2. Type: One/Two hole with standard]/long barrels.
3. Termination: Compression/Crimp.

PART 3 - EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Feeders: THHN/THWN Copper for feeders. Conductors shall be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

C. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

D. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN/THWN-2, single conductors in raceway; Type XHHW-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway; Type XHHW-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway; Type XHHW-2, single conductors in raceway.

E. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. 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.

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

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.04 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-486B.

B. It is the intent of the District and the Engineer that no splices shall be made in the run and shall be terminated only at equipment terminals, if this is impractical it will be reviewed and approved on a case-by-case basis.

C. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.

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

3.05 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

3.06 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and

Cabling."

3.07 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to UL Listing.

END OF SECTION

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. For fabrication and installation details for electrical hangers and support systems.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.

1.03 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Provide details, drawn to scale, and coordinated with each other, using input from installers of the items involved.

B. Seismic Qualification Data: Certificates, for hangers and supports for electrical equipment and systems, accessories, and components, from manufacturer.

1.04 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M/ AWS D1.2/D1.2M.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the supported equipment and systems will remain in place without separation of any parts when subjected to the seismic forces specified and the supported equipment and systems will be fully operational after the seismic event."
2. Component Importance Factor: 1.5.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame Rating: Class 1.
2. Self-extinguishing according to ASTM D 635.

2.02 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch- diameter holes at a maximum of 8 inches o.c. in at least one surface.

1. Manufacturers: Subject to compliance with requirements, available manufacturers

offering products that may be incorporated into the Work include, but are not limited to the following:

a. Unistrut; Part of Atkore International.

2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Material for Channel, Fittings, and Accessories: Galvanized steel.
4. Channel Width: Select for applicable load criteria 1-5/8 inches minimum.
5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

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

      1) Hilti, Inc.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened Portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

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

      1) Hilti, Inc.

3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F 3125/F 3125M, Grade A325 (Grade A325M).
5. Hanger Rods: Threaded steel.

2.03 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.01 APPLICATION

A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1. NECA 1.
2. NECA 101
3. NECA 102.
4. NECA 105.
5. NECA 111.

B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as [required by] [scheduled in NECA 1, where its Table 1 lists maximum spacings that are less than those stated in] NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.02 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT/GRC/IMC may be supported by openings through structure members, according to NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Mini

mum static design load used for strength determination shall be weight of supported components plus 200 lbs.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69, Spring-tension clamps].
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Panel Board Directories.
5. Engraved Device cover plates
6. Miscellaneous identification products.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1and IEEE C2. for minimum size of letters for legend and for minimum length

B. of color field for each raceway size.

C. Comply with NFPA 70.

D. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

E. Comply with ANSI Z535.4 for safety signs and labels.

F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

2.02 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

B. Warning labels and signs shall include, but are not limited to, the following legends:

1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES
2. Provide warning signs or labels for arc flash, and voltages, and others.

2.03 LABELS

A. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible labels laminated

with a clear, weather- and chemical-resistant coating and matching wraparound clear

adhesive tape for securing label ends.

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

    a. Brady Corporation.
    b. Champion America.
    c. emedco.
    d. LEM Products Inc.
    e. Panduit Corp.

B. Self-Adhesive Labels:

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

    a. Brady Corporation.
    b. emedco.
    c. Ideal Industries, Inc.
    d. LEM Products Inc.
    e. Panduit Corp.

2. Preprinted, 3-mil- thick, polyester/vinyl flexible label with acrylic pressure-sensitive adhesive.

3. Polyester/Vinyl, thermal, transfer-printed, 3-mil- thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

    a. Nominal Size: 3.5-by-5-inch.

2.04 TAPES AND STENCILS:

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

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

    a. Carlton Industries, LP.
    b. Champion America.
    c. Ideal Industries, Inc.
    d. Panduit Corp.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.

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

    a. Brady Corporation.
    b. Carlton Industries, LP.
    c. Emedco.

C. Floor Marking Tape: 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

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

    a. Carlton Industries, LP.
    b. Seton Identification Products.

D. Underground-Line Warning Tape

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

    a. Brady Corporation.
    b. Ideal Industries, Inc.
    c. LEM Products Inc.
    d. Marking Services, Inc.
    e. Seton Identification Products.

2. Tape:

    a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
    b. Printing on tape shall be permanent and shall not be damaged by burial operations.
    c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

3. Color and Printing:

    a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
    b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
    c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, , COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".

4. Tag: Type I:

    a. Pigmented polyolefin, bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
    b. Width: 3 inches.
    c. Thickness: 4 mils. Weight: 18.5 lb/1000 sq. ft..
    d. Tensile according to ASTM D 882: 30 lbf and 2500 psi.

5. Tag: Type ID:

    a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
    b. Width: 3 inches.
    c. Overall Thickness: 5 mils.
    d. Foil Core Thickness: 0.35 mil.
    e. Weight: 28 lb/1000 sq. ft.
    f. Tensile according to ASTM D 882: 70 lbf and 4600 psi.

6. Tag: Type IID:

    a. Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
    b. Width: 3 inches
    c. Overall Thickness: 8 mils.
    d. Foil Core Thickness: 0.35 mil
    e. Weight: 34 lb/1000 sq. ft.
    f. Tensile according to ASTM D 882: 300 lbf and 12,500 psi.

2.05 Tags

A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

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

a. Brady Corporation.
b. Carlton Industries, LP.
c. Emedco.
d. Seton Identification Products.

B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.023 inch thick, color-coded for phase and voltage level, with factory screened permanent designations; punched for use with self-locking cable tie fastener.

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

a. Brady Corporation.
b. Carlton Industries, LP.
c. Emedco.
d. LEM Products Inc.
e. Panduit Corp.

C. Write-On Tags:

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

a. Carlton Industries, LP.
b. LEM Products Inc.
c. Seton Identification Products.

2. Polyester Tags: 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to raceway, conductor, or cable.

3. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

4. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.06 Signs

A. Baked-Enamel Signs:

1. Preprinted aluminum signs punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal Size: 7 by 10 inches.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlton Industries, LP.
b. Champion America.
c. Emedco.

B. Metal-Backed Butyrate Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal Size: 10 by 14 inches.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Brady Corporation.
    b. Champion America.
    c. Emedco.

C. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.
2. Thickness:

    a. For signs up to 20 sq. inches, minimum 1/16-inch-.
    b. For signs larger than 20 sq. inches, 1/8 inch thick.
    c. Engraved legend with black letters on white face.
    d. Punched or drilled for mechanical fasteners.
    e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

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

    a. Brady Corporation.
    b. Carlton Industries, LP.
    c. Emedco.

2.07 CABLE TIES

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

1. Ideal Industries, Inc.
2. Marking Services, Inc.
3. Panduit Corp.

B. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch
2. Tensile Strength at 73 deg F according to ASTM D 638: 12,000 psi
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

C. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F according to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F
4. Color: Black.

D. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, self-locking.

1. Minimum Width: 3/16 inch.

2. Tensile Strength at 73 deg F according to ASTM D 638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F
5. Color: Black.

2.08 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Apply identification devices to surfaces that require finish after completing finish work.

C. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

D. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

E. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

F. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

3.02 IDENTIFICATION SCHEDULE

A. Accessible Raceways, 600 V or Less, for Service, Feeder, and Branch Circuits, more 120 V to Ground: Identify with self-adhesive vinyl tape applied in bands. Install labels at 10-foot maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels containing the wiring system legend and system voltage. System legends shall be as follows:

1. "POWER."

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and hand holes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase- and Voltage-Level identification, 600 V or Less: Use industry standard colors for ungrounded service feeders and branch-circuit conductors.

a. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum 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. Locate bands to avoid obscuring factory cable markings.

D. Nameplate Installation:

1. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.
2. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
3. Secure nameplate to equipment as recommended by the manufacturer.
4. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
5. Install nameplates for the following with source, end destination, feeder #, voltage, ampacity, feeder wire size for all low voltage (600 volts & below) equipment, locate equipment labels where accessible and visible:
   a. Panelboards & Distribution boards.
   b. All other equipment installed as part of this project.

E. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, pull boxes and handholes, use self-adhesive, self-laminating polyester labels/self-adhesive vinyl labels with the conductor or cable designation, origin, and destination.

F. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive, self-laminating polyester labels/self-adhesive vinyl labels with the conductor designation.

G. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.

H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker-tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

I. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

1. Limit use of underground-line warning tape to direct-buried cables.
2. Install underground-line warning tape for direct-buried cables and cables in raceways.

J. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
   a. Power-transfer switches.
   b. Controls with external control power connections.

L. Arc Flash Warning Labeling: Self-adhesive thermal transfer vinyl labels.

1. Comply with NFPA 70E and ANSI Z535.4.
2. Comply with Section 260574.19 "Overcurrent Protective Device Arc-Flash Study" requirements for arc-flash warning labels.

M. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

N. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for emergency operations.

O. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.

1. Labeling Instructions:

a. Indoor Equipment: Engraved, laminated acrylic or melamine plastic label, punched or drilled for mechanical fasteners. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label 4 inches high.
c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
d. Unless labels are provided with self-adhesive means of attachment, fasten them with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION

SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Lighting and appliance branch-circuit panel boards.

1.02 SCOPE

1. Replace existing recessed obsolete Zinsco Panels with new as specified and indicated on panel schedules. Re connect all existing feeders and branch circuit wiring including contactors & time clocks. All reconnected feeder & branch circuit wiring shall be tested and verified per 2017 NETA standards (ANSI/NETA ATS) requirements. Maintain work space clearances per CEC and DIR sub chapter 5 – Electrical Safety Orders and Article 4 – Requirements for electrical Installations OSHA 1910.303 All walls shall be patched and restored to original conditions including painting, panel anchorages as required.

1.03 DEFINITIONS

A. MCCB: Molded-case circuit breaker.

1.04 REFERENCES

The panelboard(s) and circuit breaker(s) referenced herein are designed and manufactured according to the latest revision of the following specifications.

A. NEMA PB 1 - Panelboards
B. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
C. NEMA AB 1 - Molded Case Circuit Breakers
D. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
E. UL 50 - Enclosures for Electrical Equipment
F. UL 67 - Panelboards
G. UL 98 - Enclosed and Dead-front Switches
H. UL 489 - Molded-Case Circuit Breakers and Circuit Breaker Enclosures
I. Federal Specification W-P-115C - Type I Class 1
J. Federal Specification W-C-375B/Gen - Circuit Breakers, Molded Case, Branch Circuit And Service.
K. NFPA 70 - National Electrical Code (NEC)
L. 2019 California Electrical Code (CFC)
M. ASTM - American Society of Testing Materials
N. IBC – International Building Code – Seismic compliance requirements
O. NFPA 5000 – NFPA Building Code – Seismic compliance requirements.
P. ASCE 7 – American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures – Seismic compliance requirements
Q. ICC ES AC156 – International Code Council Evaluation Services Acceptance Criteria for Seismic Qualification by Shake-Table Testing of Nonstructural Components and Systems – seismic testing protocol.
R. Manufacturer’s Instruction Bulletin and installation Manual

1.05 ACTION SUBMITTALS

A. Product Data: For each type of panel board.

B. Shop Drawings: For each panel board and related equipment.

1. Include dimensioned plans, elevations, sections, and details.

2. Detail enclosure types include mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.

3. Detail bus configuration, current, and voltage ratings.

4. Short-circuit current rating of panel boards and overcurrent protective devices.

5. Include evidence of NRTL listing for series rating of installed devices.

6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

7. Provide rating of overcurrent protective device included in panel boards to match existing.

1.06 INFORMATIONAL SUBMITTALS

A. Panel board schedules for installation in panel boards.

1.07 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.08 FIELD CONDITIONS

A. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures not exceeding 104º F

2. Altitude not exceeding 3300 feet.

1.09 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panel boards that fail in materials or workmanship within specified warranty period.

1. The manufacturer shall warrant specified equipment to be free from defects in materials and workmanship for Thirty-six (36) months of service from the date of completion.

PART 2 - PRODUCTS

2.01 PANELBOARDS COMMON REQUIREMENTS

A. Fabricate and test panel boards according to IEEE 344 to withstand seismic forces defined in 2022 CBC."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70,

by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA PB 1.

D. Comply with NFPA 70.

E. Enclosures: Flush and Surface - mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.

b. Outdoor Locations: NEMA 250, Type 3R.
c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2. Height: 84 inches maximum with operating device height of 6'7" maximum.

3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.

4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.

F. Incoming Mains Location: Convertible between top and bottom.

G. Phase, Neutral, and Ground Buses Hard-drawn copper, 98 percent conductivity.

H. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.

2. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panel board.

3. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panel board.

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

5. Sub feed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

I. NRTL Label: Panel boards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panel boards shall have meter enclosures, wiring, connections, and other provisions for digital metering. Coordinate with utility company for exact requirements.

J. Future Devices: Panel boards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

K. Panel board Short-Circuit Current Rating: Series and Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

2.02 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panel boards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and 2019 CBC.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

2.03 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

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

1. Square D - by Schneider Electric NF & NQOD Type or approved equal by Eaton.

a. Interior

1) Shall be type NQ or NQOD panelboard rated for 240 Vac maximum. Continuous main current ratings, as indicated on associated schedules on drawings, not to exceed 225 amperes maximum.
2) Minimum short circuit current rating: As indicated on the drawings and or match existing system in rms symmetrical amperes at 240 Vac.& 600 Vac
3) Provide one (1) continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors suitable for plug-on or bolt-on branch circuit breakers. The bussing shall be fully rated. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67. Bussing shall be plated copper as standard construction. Bus bar plating shall run the entire length of the bus bar. Panelboards shall be suitable for use as Service Equipment when application requirements comply with UL 67 and NEC Articles 230-F and -G.
4) All current-carrying parts shall be insulated from ground and phase-to-phase by high dielectric strength thermoplastic.
5) A solidly bonded copper equipment ground bar shall be provided.
6) Split solid neutral shall be plated and located in the mains compartment up to 225 amperes so all incoming neutral cable may be of the same length.
7) Interior trim shall be of dead-front construction to shield user from energized parts. Dead-front trim shall have filler plates covering unused mounting spaces.
8) Nameplates shall contain system information and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label and short circuit current rating shall be displayed on the interior or in a booklet format.
9) Interiors shall be field convertible for top or bottom incoming feed. Main circuit breakers in 100A interiors shall be horizontally/vertically mounted. Main circuit breakers over 100A shall be vertically mounted. Sub-feed circuit breakers shall be vertically mounted. Main lug interiors up to 400 amperes shall be field convertible to main breaker. Interior leveling provisions shall be provided for flush mounted applications.
10) Interior phase bus shall be pre-drilled to accommodate field installable options (NQ only), i.e., Sub-Feed Lugs, Sub-Feed Breakers, Thru-Feed Lugs.

2. Main Circuit Breaker:

a. Shall be Square D type circuit breakers or equal by Eaton.
b. Main circuit breakers shall have an over center, trip-free, toggle mechanism which

will provide quick-make, quick-break contact action. Circuit breakers shall have a permanent trip unit with thermal and magnetic trip elements in each pole. Each thermal element shall be true rms sensing and be factory calibrated to operate in a 40° C ambient environment. Thermal elements shall be ambient compensating above 40° C.

c. Two- and three-pole circuit breakers shall have common tripping of all poles. Circuit breaker frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker that allows the user to simultaneously select the desired trip level of all poles. Circuit breakers shall have a push-to-trip button for maintenance and testing purposes.
d. The breaker handle and faceplate shall indicate rated ampacity. Standard construction circuit breakers shall be UL Listed for reverse connection without restrictive line or load markings.
e. Circuit breaker escutcheon shall have international I/O markings, in addition to standard ON/OFF markings. Circuit breaker handle accessories shall provide provisions for locking handle in the ON or OFF position.
f. Lugs shall be CSA and UL Listed to accept solid or stranded copper and aluminum conductors. Lugs shall be suitable for 90° C rated wire, sized according to the 75° C temperature rating per NEC Table 310-16. The lug body shall be bolted in place; snap-in designs are not acceptable.
g. The circuit breakers shall be CSA and UL Listed for use with the Mechanical Lug Kits.

3. Branch Circuit Breakers

a. Shall be Square D type circuit breakers. Circuit breakers shall be UL Listed with amperage ratings, interrupting ratings, and number of poles as indicated on the associated schedules on drawings.
b. Molded case branch circuit breakers shall have bolt-on type bus connectors.
c. Circuit breakers shall have an over center toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have thermal and magnetic trip elements in each pole. Two- and three-pole circuit breakers shall have common tripping of all poles.
d. There shall be two forms of visible trip indication. The breaker handle shall reside in a position between ON and OFF. In addition, there shall be a red VISI-TRIP® indicator appearing in the clear window of the circuit breaker housing.
e. The exposed faceplates of all branch circuit breakers shall be flush with one another.
f. Lugs shall be UL Listed to accept solid or stranded [copper and aluminum conductors] [copper conductors only. The legs shall be suitable for 90° C rated wire, sized according to the 75° C temperature rating per CEC Table 310-16. Branch circuit breakers rated 30 amperes and below shall be UL Listed to accept 60° C rated wire.
g. Breakers shall be UL Listed.

4. Enclosures

a. Type 1 Boxes

1) Boxes shall be hot zinc dipped galvanized steel constructed in accordance with UL 50 requirements. Unpainted galvannealed steel is not acceptable.
2) Boxes shall have removable end walls with knockouts located on one end. Boxes shall have welded interior mounting studs. Interior mounting brackets are not required.
3) Box width shall be 20” wide maximum.

b. Type 1 Fronts

1) Front shall meet strength and rigidity requirements per UL 50 standards. Front shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
2) Fronts shall be hinged 1-piece with door. Mounting shall be flush/surface as indicated on associated schedules and drawings.
3) Panelboards shall have MONO-FLAT fronts with concealed door hinges and mounted with trim screws. Front shall not be removable with the door locked. Doors on front shall have rounded corners and edges shall be free of burrs.
4) The front shall have cylindrical tumbler type lock with catch and spring-loaded stainless-steel door pull. All lock assemblies shall be keyed alike. One (1) key shall be provided with each lock. A clear plastic directory cardholder shall be mounted on the inside of door.

2.04 IDENTIFICATION

A. Panel board Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panel board door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panel board door, mounted in metal frame with transparent protective cover.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with NECA 1.

B. Install panel boards and accessories according to NECA 407/NEMA PB 1.1.

C. Comply with mounting and anchoring requirements specified in 2019 CBC.

D. Mount top of trim 90 inches above finished floor unless otherwise indicated.

E. Mount panel board cabinet plumb and rigid without distortion of box.

F. Mount recessed panel boards with fronts uniformly flush with wall finish and mating with back box.

G. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

H. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

I. Install filler plates in unused spaces.

J. Stub four 1-inch empty conduits from panel board into accessible ceiling space or space designated to be ceiling space in the future. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.02 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements per standard codes.

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panel board door.

C. Panel board Nameplates: Label each panel board with a nameplate complying with requirements for identification.

D. Device Nameplates: Label each branch circuit device in power panel boards with a nameplate complying with requirements for identification.

E. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.03 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panel board bus, component, connecting supply, feeder, and control circuit.

2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace them with new units and retest.

D. Panel boards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panel boards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.04 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, maintain and to use.

END OF SECTION

SECTION 26 72 20
ASSISTIVE LISTENING SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. The work includes the provision of Assistive Listening Systems (ALS) for the existing Gymnasium Building

1.02 SCOPE OF WORK

A. The work shall consist of the provision, testing, and documentation of a complete and fully functional ALS. The instructions in this section are specific to the ALS installations and should be read in conjunction with other contract documents as applicable. The system provided shall be provided in compliance with CBC 11B.219 and 11B.706.

1.03 Approvals

A. The system shall maintain the following listings and/or approvals from the following agencies:

1. (UL) Underwriter's Laboratories
2. FCC Federal Communications Commission

1.04 DELIVERABLES

A. Prior to ordering materials or commencing any construction activities, the contractor shall provide the Owner with a complete bill of materials, including all quantities of components, devices, equipment, and wiring required to complete this work.

PART 2 - PRODUCTS

2.01 ASSISTIVE LISTENING SYSTEM

A. Furnish an FM wireless assistive listening system for use by the hearing-impaired. The assistive listening system (ALS) shall be capable of broadcasting on 57 channels and be frequency agile. The ALS system shall have 80dB SNR or greater, end-to-end. Receivers shall be frequency agile and frequency set with a "seek" button. The receiver will incorporate a stereo headset jack that allows the user to plug in either a mono or stereo headset and listen to audio normally. The portable receivers and transmitters shall incorporate automatic battery charging circuitry for recharging of Ni-MH batteries. Sound Mate Telex products with system carrying case are specified.

B. Refer to CA Building Code as quoted below;

1. 2-202 ASSEMBLY AREA. [DSA-AC] A building or facility, or portion thereof, used for the purpose of entertainment, educational or civic gatherings, or similar purposes. For the purposes of these requirements, assembly areas include, but are not limited to, classrooms, lecture halls, courtrooms, public meeting rooms, public hearing rooms, legislative chambers, motion picture houses, auditoria, theaters, playhouses, dinner theaters, concert halls, centers for the performing arts, amphitheaters, arenas, stadiums, grandstands or convention centers.
2. 2-202 Assistive Listening System (ALS). An amplification system utilizing transmitters, receivers, and coupling devices to bypass the acoustical space between a sound source and a listener by means of induction loop, radio frequency, infrared, or direct-wired equipment.
3. 11B-216.10 Assistive listening systems. Each assembly area required by Section 11B-219 to provide assistive listening systems shall provide signs informing patrons of the availability of the assistive listening system. The sign shall include wording that states "Assistive -Listening System Available" and shall be posted in a prominent place at or near the assembly area entrance. Assistive listening signs shall comply with Section 11B-

703.5 and shall include the international Symbol of Access for Hearing Loss complying with Section 11B-703.7.2.4. Refer to plans for locations.

4. 11B-219.2 Required systems. An assistive listening system shall be provided in assembly areas, including conference and meeting rooms. Refer to plans for locations.
5. 11B-219.3 Receivers. The minimum number of receivers to be provided shall be equal to 4 percent of the total number of seals, but in no case less than two. Twenty-five percent minimum of receivers provided, but no fewer than two, shall be hearing-aid compatible in accordance with Section 11B-706.3.
6. 11B-219.5 Portable systems. Portable assistive-listening systems are used for conference or meeting rooms, the system may serve more than one room. An adequate number of electrical outlets or other supplementary wiring necessary to support a portable assistive-listening system shall be provided.
7. 11B-703.7.2.4 Assistive listening systems. Assistive listening systems shall be identified by the International Symbol of Access for Hearing Loss complying with Figure II B-703.7.2.4.
8. 11B-706 Assistive listening systems
9. 11B-706.1 General. Assistive listening systems required in assembly areas. conference and meeting rooms shall comply with Section 11B-706. Refer to plans for locations.
10. 11B-706.2 Receiver jacks. Receivers required for use with an assistive listening system shall include a 1/8 inch (3.2 mm) standard mono jack.
11. 11B-706.3 Receiver hearing-aid compatibility. Receivers required to be hearing aid compatible shall interface with telecoils in hearing aids through the provision of neck loops.
12. 11B-706.4 Sound pressure level. Assistive listening systems shall be capable of providing a sound pressure level of 110dB minimum and 118 dB maximum with a dynamic range on the volume control of 50 dB.
13. 11B-706.5 Signal-to-noise ratio. The signal-to-.noise ratio for internally generated noise in assistive listening systems shall be 18 dB minimum.
14. 11B-706.6 Peak clipping level. Peak clipping shall not exceed 18 dB of clipping relative to the peaks of speech.

C. Furnish and install the following with system carrying case and user manual:

1. Telex PST 170 – 17 channel transmitters with OLM -10 Microphone, Portable belt Pack Transmitter (Qty: 4)
2. Telex SR 400 17 channel portable receivers with backlit LCD display (Qty: 35 each). Multi-purpose room with 50 or more seats shall receive a quantity of ALS receivers that equals at least 4% of the number of seats in the room (rounding up to the nearest integer), Required quantities indicated is per Occupant load of the room.
3. Telex HED-2 Collapsible Light weight Headphones (Qty: 35)
4. Telex HM-2 Head worn Microphone (Qty: 35)
5. NiMH rechargeable AA batteries. (Qty: 35)
6. Telex BC-100 –Battery Charger for SR 400 & PST-170 (Qty 10)
7. ADA Access/Compliance signage kit. (See plans and details for locations.)

PART 3 - EXECUTION

3.01 General

A. All Work described in this specifying document and on the Project, drawings shall be performed in accordance with the acknowledged Professional and Industry standards and practices. All installed equipment shall meet and/or exceed the specified manufacture's regulations.

B. Furnish and install all materials, devices, components and equipment required for a complete and operational system.

C. It is the contractor's obligation to inform the Architect and/or the District's Representative of

any and all conflict's, between the project documents and the onsite conditions.

D. It is the Contractor's responsibility and obligation to coordinate with all necessary trades to ensure the integrity and compliance of the Manufacture and Industry standards are met during the duration of the installation.

3.02 Equipment Installation

A. Portable Assistive Listening receivers shall be provided to the district with all components:

B. Equipment to be installed in accordance with manufacturer's instructions and demonstrate use of equipment to District personnel.

3.03 Programming

A. The contractor shall provide all necessary programming to provide a complete operating system.

3.04 Testing

A. The completed systems shall be physically inspected by the District's representative to assure that all equipment is installed in a neat and professional manner, and in accordance with these Specifications.

B. The final system testing and commissioning shall be performed after all installation and initial testing has been completed by the Installer, but prior to any use of the systems.

C. The Contractor, prior to requesting systems testing and demonstration to the District's representative, shall ensure that all systems are in first-class working condition and free of short circuits, ground loops, parasitic oscillations, excessive hum and noise, RF interference, or instability of any form.

3.05 Training

A. The contractor shall provide no less than one (1) two (2) hour training sessions.

1. The first training session will be "Train the Trainer". The District will appoint their representative to be provided extensive training so that he/she will be able to provide additional support once the project has been completed.
2. The additional training session will be provided as a general overview of the system operation for large groups, or several smaller groups as designated by the owner. Usually, these additional training events will coincide with a school function when the sound system will be used.
3. Provide sign-in sheets for all training events. Deliver to architect in the close out documents.

3.06 Warranty

A. Contractor will provide a minimum of a 3-year Workmanship Warranty that includes Parts and Labor.

B. All equipment provided under this specification shall be warranted to be free from defects in materials and workmanship for a period of 36 months from the notice of completion.

3.07 System Documentation

A. Upon completion of the installation, the contractor shall provide four copies (one hardcopy and three electronic copies) of Project Close-Out Documents to the Owner. Documentation shall include the items detailed in the sub-sections below:

1. Maintenance and Operation Manuals

B. The As-Built drawings are to include Equipment Layout and System Single Line Drawings.

END OF SECTION

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CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1 General

1.1 Summary

1.1.1. This section outlines the baseline standards for all low voltage communications systems cabling and conduit. The specific requirements found in related sections supersede requirements listed in this section. Standards that have been established by the industry and supplemented by the district are listed in this section to assure proper and consistent installation of all systems.

1.1.2. During the course of installation, contractors may discover components and installations that do not meet current District standards. Contractors will install new systems separate from these non-standard installations or retrofit the existing installation to bring into compliance with current District standards. Expanding on a non-compliant, legacy system will be deemed non-compliant to the contracted work and must corrected.

1.2 Qualifications

1.2.1. The contractor shall hold a valid State of California C-7 or C-10 license for all low voltage installations and a State of California C-10 License for any related high-voltage applications, shall have been in business of furnishing and installing communication systems of this type for at least two years, and capable of being bonded to assure the District of performance and satisfactory service during the guarantee period.

1.2.2. The contractor shall be a factory authorized installer for the brand of equipment offered and shall maintain a fully equipped service organization capable of furnishing adequate repair service to the equipment. The Contractor shall maintain a spare set of all major parts for the system at all times.

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1.3 Related Sections

A.	Section 27 00 00	PUSD - Communications
B.	Section 27 05 26	PUSD - Grounding and Bonding for Communications Systems
C.	Section 27 05 28	PUSD - Pathways for Communications Systems
D.	Section 27 05 43	PUSD - Underground Ducts and Raceways for Communications Systems
E.	Section 27 11 00	PUSD - Communications Equipment Room Fittings
F.	Section 27 13 00	PUSD - Communications Backbone Cabling
G.	Section 27 13 13	PUSD - Communications Copper Backbone Cabling
H.	Section 27 13 23	PUSD - Communications Optical Fiber Backbone Cabling
I.	Section 27 15 00	PUSD - Communications Horizontal Cabling
J.	Section 27 15 01.15	PUSD - Access Control Communications Conductors and Cables
K.	Section 27 15 01.17	PUSD - Intrusion Detection Communications Conductors and Cables
L.	Section 27 15 13	PUSD - Communications Copper Horizontal Cabling
M.	Section 27 15 43	PUSD - Communications Faceplates and Connectors
N.	Section 27 16 19	PUSD - Communications Patch Cords, Station Cords, and Cross Connect Wire
O.	Section 27 20 00	PUSD - Data Communications
P.	Section 27 21 00	PUSD - Data Communications Network Equipment
Q.	Section 27 21 29	PUSD - Data Communications Switches and Hubs
R.	Section 27 21 33	PUSD - Data Communications Wireless Access Points
S.	Section 27 30 00	PUSD - Voice Communications
T.	Section 27 40 00	PUSD - Audio-Video Communications
U.	Section 27 51 00	PUSD - Distributed Audio-Video Communications Systems
V.	Section 27 51 13	PUSD - Networked Paging System
W.	Section 28 10 00	PUSD - Access Control System
X.	Section 28 20 00	PUSD - Video Surveillance System
Y.	Section 28 30 00	PUSD - Security Detection, Alarm, and Monitoring
Z.	Section 28 50 00	PUSD - Specialized Systems

1.4 Applicable Standards

1.4.1. The equipment shall be U.L. listed labeled, and approved for the application shown in the contract documents.

1.4.2. The complete system material, equipment, testing, installation and workmanship shall comply with requirements of:

A. The contract documents
B. All related sections and divisions pertaining to the type of work being performed
C. ANSI/TIA 568 Commercial Building Telecommunications Standards (current edition, including all applicable revisions, addendums and errata)
D. ANSI/EIA/TIA-569 Commercial Building Standard for Telecommunications Pathways and Spaces (current edition, including all applicable revisions, addendums and errata)
E. ANSI/EIA/TIA-606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings – all applicable revisions and addendums

F. CEC (current edition, including all applicable revisions, addendums and errata)
G. CFC (current edition, including all applicable revisions, addendums and errata)
H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
I. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials
J. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops
K. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems
L. UL 263 - Fire Tests of Building Construction and Materials
M. UL 723 - Tests for Surface Burning Characteristics of Building Materials
N. UL 1479 - Fire Tests of Through-Penetration Firestops
O. UL 2079 - Tests for Fire Resistance of Building Joint Systems
P. UL Fire Resistance Directory

1.5 Definitions and acronyms

A. CEC: California Electrical Code
B. CFC: California Fire Code
C. EMT: Electrical Metallic Tubing
D. Firestopping (through-penetration protection system): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.
E. FMC: Flexible Metal Conduit
F. IDF: Intermediate Distribution Frame
G. IMC: Intermediate Metal Conduit
H. LAN: Local Area Network
I. LFMC: Liquidtight Flexible Metal Conduit
J. MDF: Main Distribution Frame
K. NEC: National Electrical Code
L. PVC: Polyvinyl Chloride plastic
M. WAN: Wide Area Network

2 Products

2.1 Product Standards

2.1.1. All materials shall conform to the current applicable industry standards including but not limited to:

2.1.1.1 NEMA (National Electrical Manufacturers' Association)

2.1.1.2 ANSI (American National Standards Institute)

2.1.1.3 ASTM (American Society for Testing and Materials)

2.1.1.4 ICEA (Insulated Cable Engineers Association)

2.1.1.5 IEEE (Institute of Electrical and Electronic Engineers)

2.1.1.6 National Electrical Safety Code

2.1.1.7 Telecommunications Industry Association (TIA)

2.1.1.8 Electronic Industries Alliance (EIA)

2.1.2. Underwriters Laboratories Listing (UL)

2.1.2.1 All Material shall be Underwriters Laboratories Listed unless otherwise specified

2.1.3. Product Condition

2.1.3.1 All products must be new, unless otherwise specified

2.1.4. Product substitutions shall be managed according to the following guidelines:

2.1.4.1 Where specified only by reference standards, select any product meeting standards by any manufacturer.

2.1.4.2 Where specified by naming several products or manufacturers, select any product and manufacturer named that meets the specified requirements.

2.1.4.3 Submit requests for substitutions within 10 days of contract award

2.1.4.4 Acceptance of substitutions is at the discretion of the Districts ITS department's project manager. The District reserves the right to determine suitability of the substitute product and reject any and all materials submitted for substitution

2.1.4.5 All substitute products and materials must be approved for substitution by the District in writing prior to installation.

2.1.4.6 Products rejected or otherwise judged unsatisfactory by the District will not be authorized for use in completing the Work. Any unapproved products discovered as part of the installation will be removed and replaced with District-specified and approved products at the Contractor's expense.

3 Execution

A. Each Contractor shall be knowledgeable of work to be performed by other trades and take necessary steps to integrate and coordinate their work with other trades.
B. The Contractor shall be responsible for furnishing all materials on the drawings or as specified herein for a complete system.
C. All telecommunications infrastructure shall be installed in an aesthetically pleasing and functional fashion.

D. All outages affecting users, including wireless access points, shall be submitted to the Districts ITS Department's project manager for approval two weeks before starting any work that will affect user connectivity.
E. All work by the contractor must comply with the manufacturer's product recommended installation instructions and warranty requirements.

End of Section

SECTION 27 05 26
PUSD - GROUNDING & BONDING FOR TELECOMMUNICATIONS SYSTEMS

Version 2022-08-25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1 General

1.1 Related Sections

Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

1.2 Related Documents

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3 Qualifications

The Installing Electronic Systems Contractor shall hold a valid State of California C-7 or C-10 license for all low voltage installations and a State of California C-10 License for any related high-voltage applications, shall have been in business of furnishing and installing communication systems of this type for at least ten years, and capable of being bonded to assure the District of performance and satisfactory service during the guarantee period.

The Installing Electronic Systems Contractor shall be a factory authorized distributor and warrantee station for the brand of equipment offered and shall maintain a fully equipped service organization capable of furnishing adequate repair service to the equipment. The Contractor shall maintain a spare set of all major parts for the system at all times.

1.4 Definitions

1.4.1 BCT: Bonding conductor for telecommunications.

1.4.2 BDF: Building Distribution Frame

1.4.3 BICSI: Building Industry Consulting Service International.

1.4.4 CEC: California Electrical Code (CCR Title 24, Part 3) based on the National Electrical Code.

1.4.5 EMT: Electrical metallic tubing.

1.4.6 IDF: Intermediate Distribution Frame

1.4.7 MDF: Main Distribution Frame

1.4.8 LAN: Local area network.

1.4.9 RCDD: Registered Communications Distribution Designer.

1.4.10 TGB: Telecommunications grounding busbar.

1.4.11 TMGB: Telecommunications main grounding busbar.

1.5 Applicable Standards

1.5.1 The equipment shall be U.L. listed labeled, and approved for the application shown in the contract documents.

1.5.2 The complete system material, equipment, testing, installation and workmanship shall comply with requirements of:

1.5.2.1 The Contract Documents.

1.5.2.2 ANSI/TIA 568 Commercial Building Telecommunications Standards (Current Editions, including all applicable revisions, addendums and errata's.)

1.5.2.3 ANSI/EIA/TIA-569 Commercial Building Standard for Telecommunications Pathways and Spaces (Current Edition, including all applicable revisions, addendums and errata's.)

1.5.2.4 ANSI/EIA/TIA-606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings – All applicable revisions and addendums.

1.5.2.5 J-STD-607-B Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications (Current Edition, including all applicable revisions, addendums and errata's.)

1.5.2.6 Building Industries Consulting Services, International (BICSI) Telecommunications Distribution Methods Manual (TDMM) (Current Edition, including all applicable revisions, addendums and errata's.)

1.5.2.7 CEC (Current Edition, including all applicable revisions, addendums and errata's.)

1.6 Action Submittals

1.6.1 Product data for each type of product used.

1.6.1.1 Shop Drawings: For communications equipment room signal reference grid. Include plans, elevations, sections, details, and attachments to other work.

1.6.1.2 Include dimensioned plan and elevation views of telecommunications equipment rooms, labeling each individual component. Show equipment rack assemblies, method of field assembly, workspace requirements, and access for cable connections.

1.6.1.3 System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by District.

1.6.1.4 Cabling Administration Drawings.

1.7 Informational Submittals

1.7.1 As-Built Data: Plans showing as-built locations of grounding and bonding infrastructure, including the following: BCT, TMGB, TGBs, and routing of their bonding conductors.

1.7.2 Qualification Data: For Installer.

1.7.3 Qualification Data: For testing agency and testing agency's field supervisor.

1.7.4 Field quality-control reports.

1.7.5 Closeout Submittals

1.7.5.1 Result of the bonding-resistance test at each TMGB/TGB and its nearest grounding electrode.

1.8 Quality Assurance

Products, services, and materials provided by the Contractor shall be new and of high quality and free of faults and defects.

Provide products, services, and materials as specified in this document. Substitution of products, services, or materials must receive approval in writing from the Districts ITS – Systems Administration Department.

Contractor shall warranty all work executed and materials furnished shall be free from defects of material and workmanship for a period of two (2) years from acceptance date of Contract Completion. Immediately upon receipt of written notice from the District, Contractor shall repair or replace at no expense to the District: Any defective material or work which may be discovered before final acceptance or work, or within warranty period; any material or work damaged thereby; and adjacent material or work which may be displaced in repair or replacement.

Examination of or failure to examine work by the District shall not relieve Contractor from these obligations.

If Contractor fails to repair or replace material or work indicated above within 7 days of receiving written notice, the District, with its own personnel or by Contract, may proceed with repair or replacement and assess cost against Contractor, if Contractor does not respond accordingly.

Persons skilled in trade shall install system in accordance with best trade practice. Further, in accordance with all applicable building codes. Contractor and all contractors' employees terminating cable to wiring terminating devices shall be certified by the manufacturer of the wiring device. Copies of certificates shall be provided to the District Representative prior to the start of work.

2 Products

2.1 System Components

2.1.1 Comply with J-STD-607-B.

2.2 Conductors

2.2.1 Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- Harger Lightning and Grounding.
- Panduit Corp.
- Tyco Electronics Corp.
- Comply with UL 486A-486B.

2.2.2 Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.

2.2.2.1 Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.

2.2.2.2 Cable Tray Equipment Grounding Wire shall be No. 6 AWG and not longer than 12 inches (300 mm). The jumper shall be a wire and shall have a crimped grounding lug with two holes and long barrel for two crimps. Attach with grounding screw or connector provided by cable tray manufacturer.

2.2.3 Bare Copper Conductors:

2.2.3.1 Solid Conductors: ASTM B 3.

2.2.3.2 Stranded Conductors: ASTM B 8.

2.2.3.3 Tinned Conductors: ASTM B 33.

2.3 Connectors

Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.

Retain "Manufacturers" Paragraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.

2.3.1 Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- Burndy; Part of Hubbell Electrical Systems.
- Chatsworth Products, Inc.
- Harger Lightning and Grounding.
- Panduit Corp.
- Tyco Electronics Corp.

2.3.2 Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467. Electroplated tinned copper, C and H shaped.

2.3.3 Signal Reference Grid Connectors: Combination of compression wire connectors, access floor grounding clamps, bronze U-bolt grounding clamps, and copper split-bolt connectors, designed for the purpose.

2.3.4 Busbar Connectors: Cast silicon bronze, solderless compression or exothermic-type, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch (15.8- or 25.4-mm) centers for a two-bolt connection to the busbar.

2.3.5 Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.4 Grounding Busbars

2.4.1 Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- Chatsworth Products, Inc.
- Harger Lightning and Grounding.
- Panduit Corp.

2.4.2 TMGB: Predrilled, wall-mounted, rectangular bars of hard-drawn solid copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, length as indicated on Drawings. The busbar shall be NRTL listed for use as TMGB and shall comply with J-STD-607-B.

2.4.2.1 Predrilling shall be with holes for use with lugs specified in this Section.

2.4.2.2 Mounting Hardware: Stand-off brackets that provide a 4-inch (100-mm) clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.

2.4.2.3 Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

2.4.3 TGB: Predrilled rectangular bars of hard-drawn solid copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, length as indicated on Drawings. The busbar shall be for wall mounting, shall be NRTL listed as complying with UL 467, and shall comply with J-STD-607-B.

2.4.3.1 Predrilling shall be with holes for use with lugs specified in this Section.

2.4.3.2 Mounting Hardware: Stand-off brackets that provide at least a 2-inch (50-mm) clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.)

2.4.3.3 Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

2.4.4 Rack and Cabinet Grounding Busbars: Rectangular bars of hard-drawn solid copper, accepting conductors ranging from No. 14 to No. 2/0 AWG, NRTL listed as complying with UL 467, and complying with J-STD-607-B.

2.4.4.1 Predrilling shall be with holes for use with lugs specified in this Section.

2.4.4.2 Cabinet-Mounted Busbar: Terminal block, with stainless-steel or copper-plated hardware for attachment to the cabinet.

2.4.4.3 Rack-Mounted Horizontal Busbar: Designed for mounting in 19-inch (483-mm) equipment racks. Include a copper splice bar for transitioning to an adjoining rack, and stainless-steel or copper-plated hardware for attachment to the rack.

2.5 Labeling

2.5.1 Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- Brother International Corporation.
- HellermannTyton.
- Panduit Corp.

2.5.2 Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.5.3 Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

2.6 Labeling

2.6.1 Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- Brother International Corporation.
- HellermannTyton.
- Panduit Corp.

2.6.2 Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.6.3 Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

2.7 Application

2.7.1 Conductors: Install solid conductor for No. 8 AWG and smaller and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

2.7.2 Conductor Terminations and Connections: Equipment Grounding Conductor Terminations: Bolted connectors.

2.7.3 Conductor Support: Secure grounding and bonding conductors at intervals of not less than 36 inches (900 mm).

2.7.4 Grounding and Bonding Conductors:

2.7.4.1 Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.

2.7.4.2 Install without splices.

2.7.4.3 Support at not more than 36-inch (900-mm) intervals.

2.7.4.4 Conductors shall not be installed in EMT unless otherwise indicated.

2.8 Connections

Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using equipment grounding conductors not smaller than No. 6 AWG.

Stacking of conductors under a single bolt is not permitted when connecting to busbars.

2.8.1 Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:

- Use crimping tool and the die specific to the connector.
- Pretwist the conductor.
- Apply an antioxidant compound to all bolted and compression connections.
- Primary Protector: Bond to the TMGB with insulated bonding conductor.

2.8.2 Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications bonding and grounding system. Install top-mounted rack grounding busbar unless the enclosure and rack are manufactured with the busbar. Bond the equipment grounding busbar to the TGB No. 6 AWG bonding conductors.

2.8.3 Shielded Cable: Bond the shield of shielded cable to the TGB in communications rooms and spaces. Comply with TIA/EIA-568-B.1 and TIA/EIA-568-B.2 when grounding screened, balanced, twisted-pair cables.

2.8.4 Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.

2.9 Identification

2.9.1 Labels shall be preprinted or computer-printed type.

2.9.2 Label each telecommunications conductor at its attachment point: "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!"

2.10 Firestop Systems

2.10.1 A firestop system is comprised of the item or items penetrating the fire rated structure; the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure. Firestop systems comprise an effective block for fire, heat, vapor and pressurized water stream.

2.10.2 All penetrations through fire rated building structures (walls and floors) shall be sealed with an appropriate firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating items i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly firestopped.

2.10.3 Firestop systems shall be UL Classified to ASTM E814 (UL 1479) and shall be approved by a qualified Professional Engineer (PE, licensed (actual or reciprocal) in the state where the work is to be performed. A drawing showing the proposed firestopped system, stamped/embossed by the cognizant PE shall be provided to the District's Technical Representative prior to installing the firestop system.

2.10.4 All firestop systems shall be installed in accordance with the manufacturer's recommendations and shall be completely installed and available for inspection by the local inspection authorities prior to cable system acceptance.

2.11 Field Quality Control

2.11.1 Testing Agency: Engage a qualified testing agency to perform tests and inspections.

2.11.2 Perform tests and inspections.

2.11.3 Tests and Inspections:

2.11.3.1 Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

2.11.3.2 Test the bonding connections of the system using an AC earth ground-resistance tester, taking two-point bonding measurements in each telecommunications equipment room containing a TMGB and a TGB and using the process recommended by BICSI TDMM. Conduct tests with the facility in operation.

2.11.3.3 Measure the resistance between the busbar and the nearest available grounding electrode. The maximum acceptable value of this bonding resistance is 100 milliohms.

2.11.3.4 Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.

2.11.3.5 With the grounding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to the TMGB. Maximum acceptable ac current level is 1 A.

2.11.4 Excessive Ground Resistance: If resistance to ground at the BCT exceeds 5 ohms, notify District's ITS – Systems Administration department promptly and include recommendations to reduce ground resistance.

2.11.5 Grounding system will be considered defective if it does not pass tests and inspections.

2.11.6 Prepare test and inspection reports.

2.12 Cleaning And Protection

The contractor shall thoroughly clean all equipment and materials. All exposed parts of the equipment, cabinets, and other equipment shall be left in a clean condition, unblemished and free of all dirt, dust, smudges, spots, fingerprints, etc., The contractor shall remove all debris and rubbish occasioned by the electronic systems work from the site. The contractor shall thoroughly clean all buildings of any dirt, debris, rubbish, marks, etc., caused by the performance of this work.

2.13 Warranty

2.13.1 The entire system shall be warranted free of mechanical or electrical defects for a period of one (1) year after final acceptance of the installation. Any material showing mechanical or electrical defects shall be replaced promptly at no expense to the District.

2.13.2 The contractor shall maintain a competent service organization and shall, if requested, submit a service maintenance agreement to the District after the end of the guarantee period.

2.13.3 A typewritten notice shall be posted at the equipment rack which shall indicate the firm, address and telephone number to call when service is necessary. The notice shall be mounted in a neatly finished metal frame with a clear plastic window and securely attached to the inside of the door.

2.13.4 Special Warranty: The contractor shall warrant the cabling system against defects in workmanship for a period of one year from the date of system acceptance. The warranty shall cover all labor and materials necessary to correct a failed portion of the system and to demonstrate performance within the original installation specifications after repairs are accomplished. All warranty repairs shall be done within fourteen days from being notified in writing by the District. This warranty shall be provided at no additional cost to the District.

END SECTION

SECTION 27 05 28
PUSD – Pathways for Communications Systems

Version 2023-11-30

CONTRACTOR TO FOLLOW THESE SPECIFICATIONS FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1 General

1.1 Summary

A. This section outlines the baseline standards for all low voltage communications systems pathways and raceways. The specific requirements found in related sections supersede requirements listed in this section.

B. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

2 Typical Components

The following list of components is current as of revision date of this specification. Part Numbers may be changed by the manufacturer at any time. Please use manufacture's substituted parts for the appropriate replacement part as needed or coordinate with the District to assure the correct parts used. All new installation shall employ the following specification regardless of currently employed systems unless authorized by the District in writing.

2.1 Back Boxes

All Backboxes must be of the appropriate size to support the quantity of cables needed while maintaining the bend radius on all cables.

2.1.1. Flush Mount:

2.1.1.1 Standard deep metal back box with 3/4" and 1" knockouts.

2.1.2. Indoor Surface Mount:

2.1.2.1 Single Gang: Wiremold Part No. 2348*

2.1.2.2 Double Gang: Wiremold Part No. 2348S/51

2.1.3. Outdoor:

2.1.3.1 Standard weatherproof deep metal back box with 3/4" and 1" knockouts.

2.1.3.2 Must be listed for wet locations

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2.2 Metallic Raceway System

Part Numbers are for ivory colored components but may be substituted with color to match décor. If additions to existing raceways and boxes are installed, they should of the same color. If wall color is something other than an available color, raceway will be painted to match the wall directly behind the raceway.

2.2.1. Wiremold 500 Series

2.2.1.1 Two-piece surface-mount raceway – Part No. V500

2.2.1.2 Bushing – Part No. 502

2.2.1.3 Connection Cover – Part No. V506

2.2.1.4 Coupling – Part No. 5701

2.2.1.5 Supporting Clip – Part No. V5703

2.2.1.6 Flat Elbow – Part No. V511

2.2.1.7 Internal Elbow – Part No. V517

2.2.1.8 External Elbow – Part No. V518

2.2.2. Wiremold 700 Series

2.2.2.1 Two-piece surface-mount raceway – Part No. V700

2.2.2.2 Bushing – Part No. 702

2.2.2.3 Connection Cover – Part No. V706

2.2.2.4 Coupling – Part No. 5701

2.2.2.5 Supporting Clip – Part No. V5703

2.2.2.6 Flat Elbow –Part No. V711

2.2.2.7 Internal Elbow – Part No. V717

2.2.2.8 External Elbow – Part No. V718

2.2.3. Wiremold 2000 Series

2.2.3.1 Two-piece surface-mount raceway –Part No. WM2300BAC

2.2.3.2 Entrance end fit –Part No. WM2310A

2.2.4. Wiremold 500 / 700 Series

2.2.4.1 Singe-Gang Shallow Switch and Receptacle Box Fitting – V5748S

2.2.4.2 Two-Gang Shallow Switch and Receptacle Box Fitting – V5747-2

2.2.4.3 Single-Gang Flush Type Extension Adapter Fitting – V5751

2.2.4.4 Two-Gang Flush Type Extension Adapter Fitting – V5751-2

2.2.4.5 Blank Extension Box – Part No. V5760

2.3 Non-Metallic Raceway System

Part Numbers are for white colored components but may be substituted with color to match décor. The District generally employs ivory colored component. If additions to existing raceways and boxes are installed, they should of the same color.

2.3.1. Wiremold 3200 Series

2.3.1.1 Two-piece surface-mount raceway –Part No. WM2300BAC

2.3.1.2 Entrance end fit –Part No. WM2310A

2.3.1.3 Raceway clip cover –Part No. WM 2306

2.3.1.4 Flat Elbow –Part No. WM2311

2.3.1.5 Internal Elbow – Part No. WM 2317

2.3.1.6 External Elbow – Part No. WM 2318

2.3.1.7 T-connector cover – Part No. WM 1315

2.4 J-Hooks

2.4.1.1 B-Line 2inch Cable Hook with Clip, Part No BL-BCH32-W2

2.4.1.2 B-Line 2inch Cable Hook with L-Bracket, Part No. BL-BCH21-RB

2.5 Conduit

Electrical Conduits in compliance with NEMA specifications.

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3 Installation

3.1 General Installation

3.1.1. All exposed conduits, raceways and boxes shall be painted to match the area directly behind the conduit, raceway or box unless otherwise noted.

3.1.2. Non-metallic systems, such as Wiremold 2300 series should be colored to match décor, if not possible they should be white or ivory.

3.1.3. All exposed conduits, raceways and boxes shall be mounted in an aesthetically pleasing fashion concealing the conduit or pathway wherever possible.

3.1.4. Unless otherwise noted horizontal conduit and raceway over 3’ from the floor will be mounted within 6” of the celling following the lines of the celling.

3.1.5. Unless otherwise noted use of zip ties for any low voltage cabling is forbidden. For bundling and wire management velcro must be used.

3.1.6. Cables must be property supported and follow an approved pathway.

3.2 Supporting Devices

3.2.1. Provide ICC-ES Code Compliant corrosion resistant anchors & fasteners in compliance with ACI, ASTM and CBC as applicable to installed locations. Submit appropriate anchors and fasteners as manufactured by Hilti/DeWalt/Redhead or approved equal with ICC- ES approval.

3.2.2. Install conduit and raceway support and spacing in accordance with CEC.

3.2.3. Install multiple conduit runs on common hangers.

3.3 Sleeves

3.3.1. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

3.3.2. Extend sleeves through floors 2 inches above finished floor level. Caulk joint between sleeves and floor.

3.3.3. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with firestopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

3.3.4. Seal both sides of sleeve with firestopping compound.

3.4 Conduit & Raceway

3.4.1. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

3.4.2. Install raceways accordance with CEC & CFC guidelines.

3.4.3. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

3.4.4. Install suitable caps to protect installed conduit against entrance of dirt and moisture.

3.4.5. Conduit & Raceway Types & Guidelines:

3.4.5.1 Cut raceways square using saw or pipe cutter; de-burr cut ends.

3.4.5.2 Bring conduit to shoulder of fittings; fasten securely.

3.4.5.3 Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

3.4.5.4 Install fittings to accommodate expansion and deflection where raceway crosses seismic and expansion joints.

3.4.5.5 Close ends and unused openings in wireway.

3.4.5.6 All Conduits will be capped with a plastic bushing to avoid cable damage

3.4.5.7 Use of split Y conduit fittings or other conduit intercept methods is expressly **forbidden**. When joining multiple conduits together a pull box or vault is required.

3.4.5.8 Use of pull elbows are expressly **forbidden**.

3.4.5.9 Flexible Metallic & Flexible Nonmetallic:

a) Not permitted except where required for systemic or vibration requirements.

b) Use must be approved in writing by the Districts ITS department.

3.4.5.10 EMT:

a) Permitted to be installed indoors above celling and intra-wall.

b) Permitted to be installed outdoors when installed above 10 feet in height and weatherproof fittings are used.

c) Not permitted in any location where the conduit is subject to severe physical damage.

3.4.5.11 Ridged:

a) Permitted to be installed anywhere that EMT is allowed as well as outdoors in areas under 10 feet in height.

b) Permitted in locations where conduit may be subject to severe physical damage; however, precautions should be taken to minimize the chance of severe physical damage.

3.4.5.12 Rigid Nonmetallic:

a) Conduit will be a minimum of Schedule 40, unless otherwise specified.

b) Permitted only for underground installation, unless otherwise specified.

c) Join conduit using cement as recommended by manufacturer. Wipe conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.

3.4.5.13 Non-Metallic Raceway System:

a) Permitted to be used indoors only when running cables within the walls is not feasible.

b) Use must be approved by the Districts ITS department project manager.

3.4.6. Conduit Size:

3.4.6.1 Conduit sizing shall be a minimum of ¾ inch conduit.

3.4.6.2 Conduit installed between the IDF and MDF shall be a 2-inch conduit minimum.

3.4.6.3 Conduit size shall be determined by the number of cables required and the conduit fill ratio, unless otherwise specified.

3.4.6.4 For conduits feeding a multiple-outlet surface raceway, a minimum of one 1½" conduit shall be supplied for every 18' of raceway.

3.4.7. Raceway Fill Ratio:

Raceways will not be filled above 60%. The exact number of cables through each conduit will vary by the size of the conduit, distance of the run, number of bends and Outside Diameter (OD) of the cable.

3.4.7.1	Max fill ratio straight raceways shorter than 6ft:	60%
3.4.7.2	Max fill ratio raceways less than 100ft:	40%

3.4.7.3 Max fill ratio raceways over 100ft: 28%

3.4.7.4 Continuous raceways with more than 180° worth of bends are not allowed.

3.4.7.5 If a raceways reaches the maximum fill rate, a tag will be attached to the raceways inside the pull box indicating that the raceways is full.

3.4.8. Pathway Routing

3.4.8.1 Install no more than equivalent of two 90° bends between boxes. Install factory elbows for bends in metal conduit larger than 2-inch size.

3.4.8.2 Route exposed raceway parallel and perpendicular to walls.

3.4.8.3 Route raceway installed above accessible ceilings parallel and perpendicular to walls.

3.4.8.4 Route conduit under slab from point-to-point.

3.4.8.5 Maintain clearance between raceway and piping for maintenance purposes.

3.4.8.6 Maintain 12-inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.

3.4.8.7 Underground conduct shall be installed per section 27 05 43

3.4.9. Mounting and Attachment

3.4.9.1 Arrange raceway supports to prevent misalignment during wiring installation.

3.4.9.2 Group related raceway; support using conduit rack. Construct rack using steel channel and provide space on each for 25 percent additional raceways.

3.4.9.3 Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports

3.4.9.4 Do not attach raceway to ceiling support wires or other piping systems.

3.4.9.5 Construct wireway supports from steel channel.

3.4.9.6 Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

3.5 Boxes

3.5.1.1 Install wall mounted boxes at elevations to accommodate mounting heights. If drawings are provided install as indicated on Drawings.

3.5.1.2 Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.

3.5.1.3 Orient boxes to accommodate wiring devices.

3.5.1.4 In Accessible Ceiling Areas: Install outlet and junction boxes no more than 18 inches from ceiling access panel or from removable recessed luminaire.

3.5.1.5 Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.

3.5.1.6 Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

3.5.1.7 Install stamped steel bridges to fasten flush mounting outlet box between studs.

3.5.1.8 Install flush mounting box without damaging wall insulation or reducing its effectiveness.

3.5.1.9 Install adjustable steel channel fasteners for hung ceiling outlet box.

3.5.1.10 Do not fasten boxes to ceiling support wires or other piping systems.

3.5.1.11 Support boxes independently of conduit.

3.5.1.12 Install gang box where more than one device is mounted together. Do not use sectional box.

3.5.1.13 Install gang box with plaster ring for single device outlets.

3.6 J-Hooks

3.6.1.1 The portions of cables installed without raceways or cable tray supports shall be installed with “J-hook” cable supports.

3.6.1.2 The “J-hooks” shall provide a wide flat cable support base (0.5”W minimum) and smooth rounded corners, specifically designed for Category-6 and fiber optic cable support.

3.6.1.3 The individual “J-hook” will be appropriately attached to the building structure through methods such as “beam clamp”, “hanger rod”, clevis hanger styles.

3.6.1.4 Install “J-hooks” not more than 48 inches on center along the entire cable length, at each cable change in direction, to insure less than 6 inches of cable sag between adjacent hooks. Secure cables to “J-hooks” with hook and loop

straps. “J-hooks” supported cables, bundle cables together with hook and loop straps.

3.6.1.5 “Bridle rings” shall not be used to support cables.

3.6.1.6 Cables shall not rest directly on ceilings, ceiling hangers, lighting fixtures, air ducts, piping, or equipment.

3.6.1.7 Cables shall be loosely bundled in groups not greater than 40 cables.

3.7 Pull String

3.7.1. When using an existing pull-string to run cables through conduit, a new pull-string will be installed to replace the one being used.

3.7.2. For conduits 1-1/2 inches and larger the pull-string is to be of the polyester tape variety (“mule tape”) rated up to 1200lb

3.7.3. For conduits smaller than 1-1/2 inches the pull string is to be nylon pull-string such as Greenlee Poly Line 430 rated up to 210lb.

3.8 Firestopping

3.8.1. Install firestopping per the CEC and CFC requirements

3.8.2. Install material at perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.

3.8.3. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

3.8.4. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating.

3.8.5. Seal pipe penetrations at telecommunication rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

END SECTION

SECTION 27 05 43
PUSD – Underground Ducts and Raceways for Communications Systems

Version 2022-08-25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1 General

1.1 Summary

A. This section outlines the baseline standards for all underground ducts and pathways for low voltage communications systems. The specific requirements found in related sections supersede requirements listed in this section.

B. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

1.2 Job Conditions

1.2.1. Environmental Requirements: Provide dewatering and drainage as required in accordance with Los Angeles County requirements and all requirements of the State Water Quality Resources, and as required accomplishing this work. Discharge only clean water and only at approved locations. Provide berms at tops of excavations and embankments and protect the excavation slope with plastic during rainy weather. Divert all water away from excavations and slopes.

1.2.1.1 Contractor shall be responsible for protection and maintenance of all "work areas" during inclement weather, shall maintain existing site drainage in all "non-work areas", and shall not create conditions which would cause any existing portions of site or improvements to be damaged by inclement weather.

1.2.1.2 Flooded Excavations: Should excavations become flooded with standing water, Contractor shall immediately begin pumping to remove such standing water. Failure to protect excavations or to promptly remove such standing water, which results in saturation of subsoils shall require Contractor to remove such saturated soils and replace the soil by properly compacted fill as directed by District Soils Engineer at NO additional cost to District.

1.2.1.3 Erosion Control Plans: Contractor shall implement Erosion Control Plan, prepared by others, for the site and be responsible for implementing and maintaining all erosion control mediation devices. Contractor shall further be responsible for maintaining, updating and implementing the Erosion Control Plans in accordance with local jurisdictions and their requirements. Contractor shall modify the Erosion Control Plans, provide additional devices,

and implement changes as required or necessitated as work progresses at NO additional cost to District. Contractor shall send one copy of the plan to School District.

1.2.1.4 Storm Water Regulations: Contractor shall coordinate work and comply with all requirements of Federal Clean Water Act "NPDES Program" (National Pollutant Discharge Elimination System) which is administered through State of California "2009 General Permit for Storm Water Discharge Associated with Construction Activity". Contact: State Water Resources Control Board, Sacramento, CA, 916-657-1146.

1.2.2. Existing Conditions:

1.2.2.1 Grading work and equipment shall be confined to work area; remainder of site is not included in work area(s):

1.2.2.2 CAUTION! Take special care to not damage, modify or move existing utilities, permanent field equipment, drainage systems, landscape sprinkler lines, retaining walls, curbs, walks, trees, AC paving, turf, or any other items except as required in the Contract. Any damage to any existing items to remain, such as landscape sprinklers, utilities, drain lines, trees, AC paving, turf, or any other items shall be repaired or replaced according to requirements of appropriate Spec. Section and the District at NO cost to District.

1.2.2.3 Contractor is hereby advised that existing underground utility locations are typically not shown. Some existing utilities or other items may be very shallow and Contractor is warned that extreme caution is advised in all demolition and earthwork operations.

1.2.2.4 All damage and associated repairs to existing underground utilities and improvements are the sole responsibility of Contractor.

2 Typical Components

The following list of components is current as of revision date of this specification. Part numbers may be changed by the manufacturer at any time. Please use manufacture's substituted parts for the appropriate replacement part as needed or coordinate with the District to assure the correct parts used. All new installation shall employ the following specification regardless of currently employed systems unless authorized by the District in writing.

2.1 Conduit

2.1.1. PVC Conduit must be schedule 40 or greater be manufactured to comply with NEMA, NEC and UL specifications.

2.1.2. Galvanized ridged steel conduit wrapped in 10 Mil PVC pipe wrap for stub-ups.

SECTION 27 05 43
PUSD – Underground Ducts and Raceways for Communications Systems

Version 2022-08-25

3 Installation

3.1 General Installation

3.1.1. The district expressly forbids direct burial of data and voice cables. All cables running underground must be run through appropriate vaults and conduits.

3.1.2. Pathway should be designed so as to remain outside of the drip line of existing trees.

3.2 Excavation

3.2.1. Contractor must comply with California Government Code 4216 and is responsible for calling Dig Alert whenever excavating.

3.2.2. Where crossing of concrete or asphalt is required, saw cut and remove surface material prior to excavating. Remove concrete in complete sections from control joint to control joint regardless of the width of the excavation. Restore concrete and asphalt surfaces following excavation to match existing depth, strength, color, and type of material.

3.3 Bracing & Shoring

3.3.1. Contractor is solely responsible for the stability of all slopes and excavations, decreasing the inclinations as required, and all bracing, shoring and other protective measures as required at NO additional cost to District.

3.3.2. Contractor shall be solely responsible for design, construction, and maintenance of any and all bracing and shoring to safely support all loads.

3.3.3. If steep or vertical-sided excavations are necessary, Contractor shall shore sidewalls in accordance with Cal/OSHA Excavation Standards, good construction practices, and all applicable safety ordinances and codes to provide trench/soil stability during construction and shall submit shoring system design to District's Soils Engineer for review and approval. For steep or vertical-sided excavations whose depth exceeds 4 feet, shoring and bracing is mandatory.

3.4 Fill

3.4.1. Base:

3.4.1.1 Scarify and moisture-condition the subgrade bed to receive fill prior to placing materials.

3.4.1.2 Moisture-condition base material to within three (3) percent of optimum moisture content and place in loose, horizontal layers.

3.4.1.3 Level the subgrade bed using sand for trenches and gravel for MH/HH as necessary to form an even base.

3.4.2. Bedding: Do not exceed 4” depth of bedding lifts/layers before compacting

3.4.3. Backfill: Do not exceed 6” depth of backfill lifts/layers before compacting.

3.4.4. Compaction: Compact using a vibratory plate or roller or other mechanical device. Compaction through jetting and/or pounding is not acceptable.

3.4.4.1 Bedding: Compact material to a dense state equaling at least 95% of the maximum dry density per ASTM D1557.

3.4.4.2 Backfill: Compact material up to two (2) feet below the finished grade with a minimum relative compaction of 90% of the maximum dry density per ASTM D1557. Compact material from two (2) feet below the finished grade up to the finished grade with a minimum relative compaction of 95% of the maximum dry density per ASTM D1557.

3.5 Repair / Replace

3.5.1. Surfaces removed or damaged during installation of underground ducts and raceway will be repaired / replaced with new material matching the specs of what was removed.

3.5.2. Where concrete is to be replaced steel dowels will be installed every 18” to tie the new slab to the existing slab.

3.6 Underground Conduits

3.6.1. Provide bushing on all conduit terminations.

3.6.2. All bends shall be factory made and be 10 times the diameter of the conduit.

3.6.3. Splice conduits with fittings approved by the conduit manufacturer for the specified applications.

3.6.4. PVC conduits shall be minimum of schedule 40 constructions, including if concrete encased.

3.6.5. Use galvanized rigid steel conduit for stub-ups. Couple steel conduits to the ducts with adapters designed for the purpose.

3.6.6. Galvanized ridged steel conduit will be continuously wrapped with 10Mil PVC pipe wrap for the entire underground section and extend a minimum of 12” above finished grade.

3.6.7. All conduits entering the building must be sloped to drain into the maintenance hole/hand hole and not into the building. This slope must be at least 1% at all points.

3.6.8. Conduits should enter the Maintenance Hole (MH) at the lower level of the vault and reserve the upper layers for expansion.

3.6.9. As a minimum, 4 2" conduits shall be installed to each building. This will provide for one conduit for copper, one for fiber optic cabling and two for spares.

3.6.10. Electrical conduits shall be spaced no less than 12 inches from voice and data conduits, with either one sack slurry or sand fill. The top of the conduit shall be a minimum of 24 inches below grade.

3.6.11. Mark trenches with an Underground Warning Tape approximately 18 inches below grade. Tape must be 6" wide, orange in color and denote buried fiber optic cable.

3.6.12. Multiple voice/data conduits should be separated from each other using a spacing device such as Carlon spacers or equivalent

3.6.13. No conduit from maintenance hole/hand hole to the building entrance facility shall have more than two 90 degree bends or any combination of bends/sweeps totaling more than 180 degrees.

3.6.14. Conduits traversing parking lots or driveways must be concrete encased.

3.7 Underground Pull Boxes, Vaults & Handholds

3.7.1. Must be traffic rated and marked "Communications" on the lid

3.7.2. Will be installed according to the manufactures specifications

3.7.3. Will be installed for every 100 feet of continuous conduit.

3.7.4. Will be installed when the run exceeds 180º worth of bends.

3.7.5. For each cable pull where a cable direction change is required.

3.7.6. All conduits will be capped or sealed to prevent dirt or debris from entering the conduit.

3.8 Tracer Wire

3.8.1. Tracer wire is to be installed in trench for every new conduit run

3.8.1.1 Pull Box, Vault & Handholds: tracer wire will terminate within each Pull Box, Vault & Handhold near the top and consist of a 1' loop.

3.8.1.2 Above Ground: When pathway transitions to above ground tracer wire will be installed in conduit parallel to the pathway and will terminate in the same enclosure as the pathway with a 1' loop.

3.8.2. Tracer wire shall be orange in color and a minimum of 12 AWG with HDPE or LLDP sheath.

3.8.3. Use of THHN and THWN electrical wire is prohibited.

3.9 Pull String

3.9.1. When using an existing pull-string to run cables through conduit, a new pull-string will be installed to replace the one being used.

3.9.2. For conduits 1-1/2 inches and larger the pull-string is to be of the polyester tape variety ("mule tape") rated up to 1200lb

3.9.3. For conduits smaller than 1-1/2 inches the pull string is to be nylon pull-string such Greenlee Poly Line 430 rated up to 210lb.

Sealing

3.9.4. Any empty conduit or innerduct that enters the building must be properly sealed in order to prevent rodents, water or noxious fumes from entering the building. These can be sealed with either expanding foam or Jackmoon plugs

END SECTION

SECTION 27 11 00

PUSD - Communications Equipment Room Fittings

Version 2022-08-25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1. General

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Specification in this section is in the process of being updated. Please refer to Section 27 20 00 for the information covered in this section.

SECTION 27 13 00
PUSD - Communications Backbone Cabling

Version 2022-08-25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1. General

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Specification in this section is in the process of being updated. Please refer to Section 27 20 00 for the information covered in this section.

SECTION 27 13 13
PUSD - Communications Copper Backbone Cabling

Version 2022-08-25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1. General

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Specification in this section is in the process of being updated. Please refer to Section 27 20 00 for additional information covered by this section.

1 Backbone Copper Category Cable

The building backbone consists of the cable and the supporting infrastructure within a building or cluster of buildings that connects the Telecommunications Spaces (MDF/BDF/IDF').

1.1 Copper Category Cable Specifications

Cables shall meet the following requirements:

1. UL 444 and 1666, ANSI/TIA-568, FCC Part 68, Category 5e, listed as CMR, CMP, Indoor/Outdoor, or OSP. Cable must be rated for the environment it is installed in.
2. Riser or plenum rated multi-pair copper cables shall be installed between the MDF and IDF as required per section 2.2.
3. The cable is labeled on both ends clearly identifying the opposite end of the cable based on a cable number assigned by the District ITS Representative. The cable pair count shall also be included in the label.
4. The minimum bend radius during installation is 10 times the outside diameter of the cable and 8 times the outside diameter after installation. Minimum bend radius shall be maintained during and after the installation phase.
5. Cable will include a minimum of a 10' service loop on each side prior to terminations at the MDF/BDF/IDF locations. The District ITS Representative shall approve the location of this service loop prior to cable installation and termination.
6. The Cable is terminated on a Siemon 66M150 blocks with 89B standouts or equivalent.

1.2 Copper Backbone Category Cable Sizing

1. The size of the backbone cable is a function of the number of voice ports supported by the IDF.
2. The minimum number of copper cable pairs required for each voice port = 2 pairs.

3. Cables shall be sized to the next larger, standard pair size (i.e. 25, 50, 100, etc.).
4. In the event of a conflict between the spec and the drawings the larger pair count will be used.

1.3 Outside Plant UTP Copper Category Cable

1. All outside plant cable shall be OSP or Indoor/Outdoor rated.
    a. Any cable that will traverse any outdoor or underground conduit but will also have section traveling continuously for more than 50ft before termination must employ indoor/outdoor rated cable instead of OSP.
    b. Any cables traversing very long lengths and/or has any sections “free runs” (not going through conduit, vaults or junction boxes or otherwise exposed to the elements) must employ OSP.
2. OSP Copper cable shall have a loop left in each Manhole/pull box.

SECTION 27 13 23

PUSD - Communications Optical Fiber Backbone Cabling

Version 2022-08-25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1. General

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Specification in this section is in the process of being updated. Please refer to Section 27 20 00 for the information covered in this section.

SECTION 27 15 13

PUSD - Communications Copper Horizontal Cabling

Version 2022-08-25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1. General

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Specification in this section is in the process of being updated. Please refer to Section 27 20 00 for the information covered in this section.

SECTION 27 15 01.15
PUSD – Access Control Communications Conductors and Cables

Version 2023-11-30

THE CONTRACTOR SHALL FOLLOW THESE SPECIFICATIONS FOR ALL PRODUCTS AND INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH THE DISTRICT'S ITS DEPARTMENT PROJECT MANAGER PRIOR TO THE START OF ANY RELATED WORK.

1 General

1.1 Summary

This section outlines the baseline standards for all access control systems cabling. The requirements found in this section supersede requirements listed in other sections. All Ethernet network cable required for the intrusion detection systems shall have a jacket color of orange and follow the specifications outlined in Section 27 20 00.

Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

1.2 Submittals

Contractor to supply map of the site outlining the path that the cables were ran, the location of any cable splices, and the location of any pathway used that has less than 25% remaining capacity based on the fill ratios documented in Section 27 05 28.

2 Typical Components

2.1 Typical Cable Types

2.1.1. Composite Access Control Wire, 16 conductor (#22-3pr, #18-4c, #18-6c) (Preferred)

2.1.2. Composite Access Control Wire, 16 conductor (#18-3pr, #16-4c, #18-6c)

2.1.3. 18 gauge AWG, 2 conductor ("18/2")

2.1.4. 18 gauge AWG, 4 conductor ("18/4")

2.1.5. 18 gauge AWG, 6 conductor ("18/6")

2.1.6. 18 gauge AWG, 8 conductor ("18/8")

2.1.7. 22 gauge AWG, 2 conductor ("22/2")

2.1.8. 22 gauge AWG, 4 conductor ("22/4")

2.1.9. 22 gauge AWG, 5 conductor ("22/5")

SECTION 27 15 01.15
PUSD – Access Control Communications Conductors and Cables
Version 2023-11-30

2.2 Typical Cable Jacket Ratings

2.2.1. Plenum

2.2.2. Indoor/Outdoor

2.3 Cable Splice

2.3.1. Dolphin 1-Port Moisture Resistant, Run Tap Insulation Displacement Connector

3 Installation

3.1 Cable Installation

3.1.1. Cable Requirements

3.1.1.1 Cables shall be UL listed, complying with California Electrical Code and ETL verified to meet or exceed specified requirements and be rated for the space that they occupy.

3.1.1.2 It is the responsibility of the contractor to utilize the appropriately rated cable. Unless otherwise noted all cable will be plenum rated. All cables that traverse any outdoor or underground conduit shall be either OSP or indoor/outdoor rated. If a cable that outdoor or underground conduit also traverses a plenum air space, then the cable must be Plenum OSP or plenum indoor/outdoor rated.

3.1.1.3 All cable conductors must be copper; copper-clad aluminum is not allowed

3.1.1.4 Unless otherwise noted use of zip ties for any low voltage cabling is forbidden. For bundling and wire management velcro must be used.

3.1.1.5 Cables between access control components shall have a jacket color of white or grey, unless the cable type is OSP in which case black is acceptable.

3.1.1.6 With the exception of cables for transfer hinges, all cable runs shall be home run, cable splices are not allowed for new installs.

3.1.1.7 If shielded cable is utilized, then all shielding must be bonded together and connected to ground at the reader controller.

3.1.2. Installation

3.1.2.1 Cables shall be installed through pathways defined in Section 27 05 28 and Section 27 05 43

3.1.2.2 Cables pulled through all conduits and raceways must use Dynablue cable pulling lubricant. Lubricant shall be continuously applied to all cables. The cable manufacturer must specifically approve all lubricants. **The district expressly prohibits yellow 77 and other wax based lubricants**.

3.1.2.3 All exposed cable must be in conduit/raceway. Conduits/raceways are optional above 8' in a limited access room (e.g., Electrical or Mechanical rooms)

3.1.2.4 Cable shall be installed above fire-sprinkler and systems and shall not be attached to the system or any ancillary equipment or hardware.

3.1.2.5 The maximum sag allowed when pulling through J-hooks is six inches.

3.1.2.6 Care shall be taken to ensure that cables are not resting directly on ceilings, ceiling hangers, lighting fixtures, air ducts, piping, or equipment.

3.1.2.7 Cables shall be bundled in groups of not greater than 40 cables.

3.1.2.8 Cables shall be installed so that they do not obscure any valves, fire alarm conduit, boxes, or other control devices.

3.1.2.9 Any cable damaged during installation shall be replaced by the contractor prior to final acceptance at no cost to the District.

3.2 Service Loops

3.2.1. For each cable provide 10 feet of service loop at both ends of the cable, unless otherwise noted.

3.2.1.1 End devices such as readers, strikes, transfer hinges, and switches must have a minimum of 18” of service slack at the device side.
Example: The cable from a reader interface to a strike needs a 10’ service loop at the reader interface and 18” of service slack at the strike.

3.2.2. Loop will have a minimum diameter of 18 inches.

3.2.3. Loops will be mounted either to a backboard or supported using J-Hooks. If J-Hooks are used they must be mounted according to Section 27 05 28.

3.2.4. Access Control Panel and Reader Interface

3.2.4.1 When access control panel and reader interface is located in a limited access area, such as a data room or electrical room, the loop will be mounted on the backboard adjacent to or above the access control panel.

3.2.4.2 When access control panel and reader interface is located in a public space, such as a classroom or office, the loop will be mounted above the celling.

3.3 Cable Splice

3.3.1. With the exception of cables for transfer hinges, cable splices are only permitted to extend or repair an existing cable. All new runs must be home run from the access control panel or reader interface to the device.

3.3.2. Strip wire before applying the moisture resistant connector

3.3.3. Each side of the splice will have a two-foot service loop. Loops will be group together with hook and loop straps.

3.3.4. Cable splices are not permitted for Ethernet cables.

3.4 Cable Termination

3.4.1. When connecting to devices that have connectors already on the cable, the corresponding pigtail connector shall be used. Modifying the device cable to remove the connector is not allowed.

3.4.2. When terminating cable on device that has a terminal block then the cable shall be stripped so that the cable makes a solid mechanical bond and so that no exposed wire is visible.

4 Cable Labeling

4.1 Cables

4.1.1. All label printing will be machine generated using indelible ink ribbons or cartridges on self-laminating labels.

4.1.2. Label shall be wrapped completely around the cable and back onto itself so that it cannot be removed easily.

4.1.3. Cables shall be labeled on both sides within one foot of termination point.

4.1.4. Cable Labeling Standard:

a) Access Control Panel to Reader Interface: A-P[PanelID]-[RoomIdentifier]
Example: A-P01-B205

b) Reader Interface to Device: A-DeviceType
Example: A-Reader

4.2 Cable Splice

4.2.1. Except for the purpose of repairs of existing cable or for connecting end devices (transfer hinges, readers, door position switches, etc.) splices shall not be allowed. Cables spliced for the purposes of repair shall be identified on both ends with a band of blue electrical tape or blue shrink wrap.

4.2.2. When a splice is utilized for a repair both cables must be labeled in accordance with section 4.1 within one foot of the splice.

END SECTION

SECTION 27 15 01.17
PUSD – Intrusion Detection Communications Conductors and Cables

Version 2022-08-25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1 General

1.1 Summary

This section outlines the baseline standards for all intrusion detection systems cabling. The requirements found in this section supersede requirements listed in other sections. All Ethernet network cable required for the intrusion detection systems shall have a jacket color of orange and follow the specifications outlined in Section 27 20 00.

Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

1.2 Submittals

Contractor to supply map of the site outlining the path that the cables were ran, the location of any cable splices, and the location of any pathway used that has less than 25% remaining capacity based on the fill ratios documented in Section 27 05 28.

2 Typical Components

Cables shall be UL listed, complying with California Electrical Code and ETL verified to meet or exceed specified requirements. All cables will be rated for the space that they are installed and must be copper conductors; copper-clad aluminum is not allowed. Cables installed in underground conduit will be OSP loose tube gel filled with rated jacket.

2.1 Typical Cable Types

2.1.1. 22 gauge AWG, 4 conductor ("22/4") unshielded cable using standard alarm colors Black, Red, White, and Light Green

2.1.2. 20 gauge AWG, 12 conductor ("20/12") unshielded cable using standard alarm colors Black, Red, White, Light Green, Orange, Light Blue, Brown, Yellow, Violet, Gray, Pink, and Tan

2.2 Punch Block

2.2.1. Siemon 66M150 blocks with 89B standouts

2.3 Bridge Clips

2.3.1. Semon SMBC-2-3 - Red

2.3.2. Semon SMBC-2-2 - White

2.4 Cable Splice

2.4.1. Dolphin 1-Port Moisture Resistant, Run Tap Insulation Displacement Connector

3 Installation

3.1 Cable Installation

3.1.1. Cable Requirements

3.1.1.1 Cables shall be U. L. listed, complying with California Electrical Code and ETL verified to meet or exceed specified requirements and be rated for the space that they occupy.

3.1.1.2 It is the responsibility of the contractor to utilize the appropriately rated cable. All cables that traverse any outdoor or underground conduit shall be either OSP or indoor/outdoor rated. All cables running through a plenum air space must be plenum rated.

3.1.1.3 Cables between alarm components shall have a jacket color of white or grey, unless the cable type is OSP in which case black is acceptable.

3.1.1.4 All cable runs shall be home run, cable splices are not allowed for new installs.

3.1.2. Installation

3.1.2.1 Cables shall be installed through pathways defined in Section 27 05 28

3.1.2.2 Cables pulled through all conduits and raceways must use Dynablue cable pulling lubricant. Lubricant shall be continuously applied to all cables. The cable manufacturer must specifically approve all lubricants. **The district expressly prohibits yellow 77**.

3.1.2.3 Cable shall be installed above fire-sprinkler and systems and shall not be attached to the system or any ancillary equipment or hardware.

3.1.2.4 The maximum sag allowed when pulling through J-hooks is six inches.

3.1.2.5 Care shall be taken to ensure that cables are not resting directly on ceilings, ceiling hangers, lighting fixtures, air ducts, piping, or equipment.

3.1.2.6 Cables shall be bundled in groups of not greater than 40 cables.

3.1.2.7 Cables shall be installed so that they do not obscure any valves, fire alarm conduit, boxes, or other control devices.

3.1.2.8 Any cable damaged during installation shall be replaced by the contractor prior to final acceptance at no cost to the District.

3.1.2.9 If shielded cable is utilized, then all of the shielded wires must be bonded together all the way back to the alarm panel enclosure where it will be bounded to ground.

3.2 Service Loops

3.2.1. For each cable provide 10 feet of service loop at both ends of the cable, unless otherwise noted.

3.2.2. Loop will have a minimum diameter of 18 inches.

3.2.3. Loops will be mounted either to a backboard or supported using J-Hooks. If J-Hooks are used they must be mounted according to Section 27 05 28.

3.2.4. Alarm Panel and Consolidation Point

3.2.4.1 When alarm panel or consolidation point is located in a limited access area, such as a data room or electrical room, the loop will be mounted on the backboard adjacent to or above the alarm panel or consolidation point.

3.2.4.2 When alarm panel or consolidation point is located in a public space, such as a classroom or office, the loop will be mounted above the celling.

3.3 Cable Splice

3.3.1. Cable splices are only permitted to extend or repair an existing cable. All new runs must be home run from the panel or consolidation point to the sensor.

3.3.2. Strip wire before applying the moisture resistant connector

3.3.3. Each side of the splice will have a two-foot service loop. Loops will be group together with hook and loop straps.

3.3.4. Cable splices are not permitted for Ethernet cables.

3.4 Cable Termination

3.4.1. When connecting to devices that have connectors already on the cable, the corresponding pigtail connector shall be used. Modifying the device cable to remove the connector is not allowed.

3.4.2. When terminating cable on device that has a terminal block then the cable shall be stripped so that the cable makes a solid mechanical bond and so that no exposed wire is visible.

4 Cable Labeling

4.1 Cables

4.1.1. All label printing will be machine generated using indelible ink ribbons or cartridges on self-laminating labels.

4.1.2. Label shall be wrapped completely around the cable and back onto itself so that it cannot be removed easily.

4.1.3. Cables shall be labeled on both sides within one foot of termination point.

4.1.4. Cable Labeling Standard:

a) Sensor to Alarm Panel: I-P[PanelID]-[RoomIdentifier]
Example: I-P01-B205

b) Sensor to Consolidation Point: I-C[ConsolidationPointlID]-[RoomIdentifier]
Example: I-C03-B205

c) Alarm Panel to Consolidation Point: I-P[PanelID]- C[ConsolidationPointlID]
Example: I-P01-C03

4.2 Cable Splice

4.2.1. Cables that have been spliced shall be identified on both ends with a band of red electrical tape or red shrink wrap.

4.2.2. At the point of splice both wires must be labeled as outlined in 4.1.

SECTION 27 15 13

PUSD - Communications Copper Horizontal Cabling

Version 2022-08-25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1. General

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Specification in this section is in the process of being updated. Please refer to Section 27 20 00 for the information covered in this section.

SECTION 27 15 43

PUSD - Communications Faceplates and Connectors

Version 2022-08-25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1. General

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B. Specification in this section is in the process of being updated. Please refer to Section 27 20 00 for the information covered in this section.

SECTION 27 16 19
PUSD - Communications Patch Cords, Station Cords, and Cross Connect Wire

Version 2022-08-25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK.

1. General

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B. Specification in this section is in the process of being updated. Please refer to Section 27 20 00 for the information covered in this section.

SECTION 27 20 00
PUSD - Data Communications

Version 2023.05.05

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS DEPARTMENT PERSONNEL PRIOR TO START OF WORK

1. General

1.1 Summary

This chapter describes the requirements for voice and data cabling for Pomona Unified School District and is divided into sections for ease of reference.

Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

Any discrepancies between this document, the drawings, and the physical site must be brought to the attention of the District. This includes any part or method specified that is not optimal for the application listed. Installation of approved parts in a sub-optimal usage will be considered to not meet these specifications.

In order to establish quality and standards of performance of equipment, the district requires that contractors use Leviton System Components or equivalent. All mechanical, electrical and general information set forth on the respective data sheets for each specified item shall be considered as part of these specifications and binding herein. Any proposed equal item offered shall be substantiated fully to prove equality. A list of at least six jobs of the identical equipment that has been in service for at least three years must be submitted with telephone numbers and addresses.

All of the Electronic Systems Equipment shall be furnished and installed by an Authorized Manufacturer Distributor of the equipment that is also an Authorized Installer. The Contractor shall furnish a letter or certification from the manufacturer of all major equipment, which certifies that the Installing Communication Contractor is the Authorized Distributor and that the equipment has been installed according to factory intended practices. The Contractor shall also furnish a written guarantee from the manufacture that they will have a service representative assigned to this area for the life of the equipment.

All data cabling, including wire, fiber, terminators, and patch cables, shall include a lifetime warranty backed by the manufacturer. Please see specific required components at:

SECTION 27 20 00
PUSD - Data Communications

Version 2023.05.05

https://www.leviton.com/en/support/product-support/networking/network-solutions-warranties

As the component requirements for Leviton's Limited Lifetime Product and Performance Warranty may occasionally change, the components listed at this URL supersedes those listed on this specification. It is the responsibility of the contractor to satisfy this requirement based on Leviton's requirements. The District should be contacted to resolve any discrepancies.

The entire system shall be installed by a single contractor. If subcontractors are used, they will perform work as an agent of the primary contractor and such work will be the responsibility of and warranted by the primary contractor. Upon notification by the District of a failure, the Contractor shall repair or replace components that no longer fall within the specifications set by the manufacturer. All data wiring shall be certified as required by the manufacturer to comply with the warranty. The certification documentation shall be presented to the District upon completion of the certification.

Unless otherwise stated and approved by the District in writing, all components required to create a complete connection to the district network must be submitted and provided by the contractor. This may include miscellaneous items such as switching/routing equipment, adapters, cables, media converters, hardware, etc. that may not have been included in the district specification. This may also include hardware that may need to be added to existing equipment. If any components were left out of the process during proposal or submittal that would cause the connection to be incomplete, the contractor must provide such components at no cost to the district. Any discrepancies must be reported to the District prior to the start of work. A complete connection means that traffic from the district network is able to reach each specified connection outlets in all classrooms.

The district has adopted Cisco and Aerohive technology as the standard for all wired and wireless network equipment installation. All equipment and components are to be in new condition, purchased from an authorized retailer. While the District will entertain proposed solutions from other manufacturers, it is the vendor's responsibility and obligation to provide documentation and other evidence that a non-District standard product is functionally equivalent or better, this information must be provided at the time of the Bid Opening in order for the possible equivalent products to be considered during Bid evaluations. Without such documentation, the District cannot accept the argument on functional equivalency or better based upon on cost alone. In addition, any proposed solution must be fully compatible and interoperable with the District's existing network and VoIP infrastructure without sacrificing any extensible features. Refurbished or alternative equipment may only be used with prior written consent letter from the District. The Districts decision is final on such matters.

SECTION 27 20 00
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The model of the equipment listed in this specification is a baseline list of equipment that is updated to reflect the latest known generation of equipment. The District will make every attempt at keeping this list up-to-date. If the listed items become outdated or unavailable, the contractor is responsible for informing the District or substituting with the current generation or replacement equipment as needed to accomplish the installation without sacrificing compatibility or features. Replacement must be a direct replacement model or upgrade as approved and recommended by District standard manufacturers as detailed on the device EoL notification.

The District currently employs wireless infrastructure using Aerohive wireless access points as well as Cisco. Any new installation should employ Aerohive access points unless authorized in writing by the district.

The specification is primarily for communication (low-voltage) components but may refer to electrical (high-voltage) specifications. This is not intended to be authoritative on this subject. If there is a separate electrical specification for this job, it will take precedence over any statements concerning electrical systems in this specification.

2. Quality Assurance Standards

2.1 Industry Standards

This specification refers to various authoritative industry standards. This district will make every attempt to be compliant to all of these standards. In the event that any statements in this specification contradict these standards, the contractor must bring it to the attention of the district to determine the course of action. The list of standards includes, but is not limited to:

ISO
ANSI/EIA/TIA especially 568-A/B/C (with 568C taken precedence), 569, and 607
ITU-T especially G.651 and G.652
CSA/CEC
NEC/NFPA
NEMA
AWG
IEEE
NFPA

2.1.1 Seismic Standard

Manufacturer Seismic Qualification Certification: Submit certification that distribution racks and their components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

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Basis for Certification: Base certification on the maximum number of components capable of being mounted in each rack type. Identify components on which certification is based. Indicate whether withstand certification is based on actual test of assembled components or on calculation. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity of each rack-mounted component and of each assembled rack type, and locate and describe mounting and anchorage provisions. Provide a detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

2.1.2 Fiber Optic and Copper Data System:

Leviton Systems Corning Fiber Optics

The current district standard employs Leviton System components (including Leviton qualified third-party components) or proven equivalents.

2.2 District

2.2.1 Installer Qualifications

The system installer must have, on staff, a registered communication distribution designer certified by Building Industry Consulting Service International.

In order to establish quality and standards of performance of equipment, contractors will use Leviton systems components or equivalent in specification and quality to maintain the warranty of all installed channels. All mechanical, electrical and general information set forth on the respective data sheets for each specified item shall be considered as part of these specifications and binding herein. Any proposed equal item offered should be substantiated fully to prove equality. A list of at least six jobs of the identical equipment that has been in service for at least three years must be submitted with contact telephone numbers and addresses. The District reserves the right to require a complete sample of any proposed equal item and may, if necessary, request a sample tested by an independent testing laboratory to prove equality. The decision of the District regarding equality of proposed equal items will be final.

If a substitution item is given final acceptance by the District, the contractor shall pay all costs (including travel, lodging, meals, computers, etc.) required to provide factory certification, equal to that of a Factory Authorized Distributor of the substituted item, for at least two (2) selected District representatives. This training shall occur at the primary

factory of the substituted item in question and shall allow the selected District representatives to provide any and all Factory / Manufacturer approved repairs, services, software upgrades, etc., without affecting any available or applicable Manufacturer Warranties.

All of the Electronic Systems Equipment shall be furnished and installed by the Authorized Factory Distributor of the equipment. The Contractor shall furnish a letter from the manufacturer of all major equipment, which certifies that the installing Communication Contractor has obtained the equipment through an Authorized Distributor and that the equipment has been installed according to factory intended practices. The Contractor shall also furnish a written guarantee from the manufacture that they will have a service representative assigned to this area for the life of the equipment. Contractor must employ at least one certified (CCNA, CCNP, etc.) to install and configure the LAN equipment as coordinated with District IT department. Contractor must also employ Aerohive certified installers if working with Aerohive access points.

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.

2.3 Planning and Coordination

Before work commences, the installing contractor shall meet jointly with district representatives and, if necessary, the telecommunications and LAN equipment suppliers to exchange information and agree on the deployment and installation schedule and procedures. The locations and orientation of distribution frames, cross-connects, and patch panels in equipment rooms and wiring closets shall also be decided to minimize the impact on other services sharing the space.

Any electronic equipment purchased as part of the job with a cost of more than $500 must be sent to the district warehouse for asset recording and inventory before being installed at the final location. No exceptions.

Work done at school sites must be scheduled in advance. Contractors are to inform the ITS department of the scope of work, the area that will be worked in, and the time and date of work. ITS will get authorization from the school administration before the work is scheduled. If contractor attempts to begin work without getting authorization, the school site will be instructed to ask the contractor to leave.

The district will attempt to communicate any safety concerns such as other pending work to the facilities, areas with asbestos, lead or other hazards. If the contractor has such

concerns, the district must be notified immediately before the start of work. The District Maintenance and Operations Department shall advise on any needed provisions.

3 Typical Components

The following list of components is current as of revision date of this specification. Part Numbers may be changed by the manufacturer at any time. Please substitute the appropriate replacement part as needed or coordinate with the District to assure the correct parts used. All new installation shall employ the following specification regardless of currently employed systems unless authorized by the District in writing.

Cables shall be U.L. listed, complying with California Electrical Code and ETL verified to meet or exceed specified requirements. All fiber and copper cables will be rated for the space that they are installed. Cables installed in underground conduit will be OSP loose tube gel filled with rated jacket, etc.

3.0.1 OSP vs indoor/outdoor rated copper and fiber optic cables – Per current EIA/TIA standards, any copper or fiber cable that will traverse any outdoor or underground conduit but will also have section traveling continuously for more than 50ft before termination must employ indoor/outdoor rated cable instead of OSP. Any cables traversing very long lengths and/or has any sections “free runs” (not going through conduit, vaults or junction boxes or otherwise exposed to the elements) must employ OSP. If both condition exist for Fiber cables, a fusion splice will need to be used to transition from one to the other. If this condition exists for copper cables, a new IDF location must be recommended.

3.1 Fiber Optic System

All new fiber installs shall be single mode cable following the specifications outlined in section 3.1.2. Multimode cable is only allowed for repairing existing fiber or with written approval of the ITS department’s project manager.

3.1.1 Multi-Mode Cable

Fiber optic cable (50/125micron – OM3 and OM4) graded index multi-mode, minimum 24 conductor, optical glass fibers for use with, but not limited to, ETHERNET, TOKEN RING and FDDI communication systems; potential dual operation at 850nm and 1300nm wave length. Corning or equal. Unless stated otherwise, for new multimode installations OM4 cable is specified and shall have an aqua colored jacket for interior-rated cables with black allowable for OSP and underground cable.

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Fibers will terminate on Leviton HDX 12-fiber shuttered splice module SPLCH-12AQ. Use of the Leviton HDX to SDX Adapter Bracket will be required if mounting in an SDX enclosure and there is not already an adapter bracket with an open slot available. For fiber counts exciding 12 fibers, multiple fiber splice modules must be utilized and located next to each other. When splitting between multiple modules fibers must be bundled and protected so that all fibers in a module move together and cannot get snagged when the module or tray is moved.

Fiber strands shall meet the following minimum specifications:

3.1.1.1 OM3

WAVE LENGTH	MIN. BANDWIDTH	MAX. ATTEN.
850nm	2000MHz per km	2.5dB per km
1300nm	1500MHz per km	1.0dB per km

3.1.1.2 OM4

WAVE LENGTH	MIN. BANDWIDTH	MAX. ATTEN.
850nm	4700MHz per km	2.5dB per km
1300nm	3500MHz per km	1.0dB per km

3.1.2 Single-Mode Cable

Fiber optic cable optical fibers (9/125micron) graded index single-mode, minimum 12-conductor, and optical glass fiber, potential dual operation at 1300nm and 1550nm wave length. Unless stated otherwise, for new single mode installations G.652.D cable is specified and shall have a yellow colored jacket for interior-rated cables with black allowable for OSP and underground cable. For runs utilizing existing pathways with tight bends G.657.B3 fiber shall be used.

Fibers will terminate on a Leviton HDX 12-fiber shuttered splice module SPLCH-12BL. Use of the Leviton HDX to SDX Adapter Bracket will be required if mounting in an SDX enclosure and there is not already an adapter bracket with an open slot available. For fiber counts exciding 12 fibers, multiple fiber splice modules must be utilized and located next to each other. When splitting between multiple modules fibers must be bundled and protected so that all fibers in a module move together and cannot get snagged when the module or tray is moved.

Fiber strands shall meet the following minimum specifications:

3.1.2.1 OS1

WAVE LENGTH	MIN. BANDWIDTH	MAX. ATTEN.
1310nm	N/A	1.00dB per km
1550nm	N/A	1.00dB per km

3.1.2.2 OS2

WAVE LENGTH	MIN. BANDWIDTH	MAX. ATTEN.
1310nm	N/A	0.40dB per km
1550nm	N/A	0.40dB per km

3.1.3 Fiber Distribution Box

New fiber termination panels in the MDF/BDF shall employ Leviton Opt-x Uhdx Distribution Enclosure With Sliding Tray, capable of handling a minimum of 24 Leviton HDX 12-Fiber Splice modules.

New IDF fiber termination panels shall be Leviton Opt-X 1000i SDX 1RU Distribution and Splice Enclosure, empty, with sliding tray. Use of the Leviton HDX to SDX Adapter Bracket will be required if there is not already an adapter bracket with an open slot available.

3.1.4 Fiber Optic Patch Cable

Current system employ
ST-LC Fiber Patch Cable in various lengths

New systems will employ
LC to LC Fiber Patch Cables in various lengths

Previous systems employ
Dual ST to ST Fiber Patch Cable
SC to SC Fiber Patch Cable
SC to LC Patch Cable

3.2 Copper Cable System – Data

3.2.1 Horizontal Cable

**For the purpose of color code identification, PUSD considers any color within the Purple color range to be synonymous with Purple. These include violet, magenta, lavender, lilac, indigo and others that fall with this range.*

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Cables shall be U. L. listed, complying with California Electrical Code and ETL verified to meet or exceed specified requirements.

All non fiber cables will be copper wire, aluminum or copper clad aluminum is not allowed.

Interior

Category 6 cables shall be 22 to 23 AWG wire (4 pair), individually insulated and color coded, with an overall non-conductivity and appropriately rated purple or blue jacket, as manufactured Berk-Tek, etc. meeting EIA/TIA TSB36. Unless otherwise designated, all data cables are to be category 6, rated to 550MHz.

23AWG 4Pair TP BC Solid CAT6 Indoor/Outdoor Black Jacket as Manufactured by Berk-Tek for runs between buildings using underground and/or outdoor conduit and vaults. Must be installed inside grounded metal conduit and pullboxes.

**For cables running through plenum, even short distances, plenum rated cables must be employed regardless of what currently exists*

23AWG 4Pair TP BC Solid CAT6 Outside Plant Flooded Black Jacket as manufactured by Berk-Tek for Outside Plant use only; not UL listed; not fire retardant; no more than 50ft in-building length.

3.2.2 Outlet Termination

See section 4.6.1.1 to determine the correct color jack to use.

Leviton EXTREME Cat 6 QUICKPORT Jack, Purple	(61110-RP6)
Leviton EXTREME Cat 6 QUICKPORT Jack, Orange	(61110-RO)
Leviton EXTREME Cat 6 QUICKPORT Jack, Red	(61110-RR6)
Leviton EXTREME Cat 6 QUICKPORT Jack, Green	(61110-RV6)

3.2.3 Patch Panel

- Standard Density:
  - Flat QUICKPORT™ Patch Panel with Vertical Numbering, 48-Port, 2RU, Black. Cable management bar included. (49255-48N)
- High Density:

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Leviton QuickPort High-Density 1RU 48-Port Patch Panel with Vertical Numbering (49255-v48)

3.2.4 Patch Cable

The modular patch cord shall meet or exceed the requirements for Category 6 described in TIA/EIA-568-B.2-1The cords shall meet TIA/EIA-568-B.2-1. All plastics used in construction of the connector bodies shall be fire-retardant with a UL flammability rating of 94V-0.

Category 6 Rated 4-Pair stranded UTP purple (violet) patch cord with boot.

Category 6 Rated 4-pair stranded UTP green cross-over patch cord with boot

Cable lengths of 3, 7, 10 and 15ft lengths are supported by the district.

3.2.5 Copper Cable System – Voice

3.2.5.1 Cable

The district has adopted using Category 6 cables and termination jacks in place of Category 3 components for all new voice installation. This will enable support for both standard analog and VOIP equipment.

Category 6 Voice Cable shall be four pair 24 AWG beige in color from Data/Voice jack location to MDF or IDF. Please see cable specification in section “Copper Cable System –Data”.

Voice tie cables between IDF terminals and MDF terminals shall be not less than 25 pair category 3 24 AWG per 20 classrooms.

3.2.5.2 Punch block

Siemon 66M150 blocks with 89B standouts

3.2.5.3 Patch Panel (for VOIP Equipment)
See Data – Copper section

3.2.5.4 Termination
Leviton 61110-RW6 (White – Cat6 Voice) modular RJ45 jack insert
wall jack, Allen tel 219-4.

3.2.5.5 Phones

ITT/Cortelco 255444-MBA-20H Ash wall telephone
(Cisco IP Phones – Model No.)

3.3 Installation Hardware

3.3.1 Modular Outlet Faceplate

Single Gang 1-port face plate – Leviton Part No. 41080-1WP*
Single Gang 2-port face plate – Leviton Part No. 41080-2WP*
Single Gang 4 port face plate – Leviton Part No. 41080-4WP*
Single Gang 6 port face plate – Leviton Part No. 41080-6WP*
Port blanks – Leviton Part No. 41084BWB*
2-port Telecom type (biscuit) surface mount housing Leviton Part No. 41089-2WP*
Stainless steel Wallphone wallplate, Leviton Part No. 4108W-1SP
Blank Wallplate, Leviton Part No. WP-PB IV

It is preferred to have all cables run through wall conduits without using surface mount raceways. When needed, the raceway systems below may be employed.

3.3.2 Outlet Box

Single Gang Surface Mount backbox – Wiremold Part No. 2348*
Double Gang Surface Mount backbox – Wiremold Part No. 2348S/51

3.3.3 Surface Mount Raceway

Wiremold 3200 Series
Two-piece surface-mount raceway –Part No. WM2300BAC
Entrance end fit –Part No. WM2310A
Raceway clip cover –Part No. WM 2306
Flat Elbow –Part No. WM2311
Internal Elbow – Part No. WM 2317
External Elbow – Part No. WM 2318
T-connector cover – Part No. WM 1315

**Part Numbers are for white colored components but may be substituted with color to match décor. The District generally employs ivory colored component. If additions to existing raceways and boxes are installed, they should of the same color.*

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3.3.4 Cable Support

B-Line 2inch Cable Hook with Clip, Part No BL-BCH32-W2
B-Line 2inch Cable Hook with L-Bracket, Part No. BL-BCH21-RB
CPI Cable Runway Series runway sections (ladders), radii, bends junctions supports hardware, various part no.

3.3.5 Conduits

Electrical Conduits as Manufactured by Allied Electrical or equivalent in compliance to NEMA, IBEW, NECA and Division 16 Section "Raceways and Boxes."

3.3.5.1 PVC (Plastic)

Schedule 40 Conduit
Schedule 40 90,45 Degree Bend
Compression Coupler
Set Screw Coupling
Connector

3.3.5.2 EMT (Galvanized Steel, Thin Wall)

Seal-Tight Conduit
Seal-Tight Connectors
Plastic Bushing
Sleeve Kit
Lock Nut
Locking Ring
Outdoor Box (Various Sizes)
Outdoor Pull Box (Various Sizes)

3.3.5.3 Rigid (Coated or Galvanized Steel or Aluminum)

IMC Type Conduit
Couplers
Nipples
Unistrut Strap

3.3.6 Racks and Cabinets

3.3.6.1 MDF & Server Racks

APC NetShelter SX 42U 750mm Wide x 1070mm Deep Networking Enclosure with Sides Black, APC Part No. AR3140

3.3.6.2 IDF Racks

- Two post rack for IDF rooms

  19” W Universal Rack System CPI (46353-505)

- Wall mount IDF cabinet

  Cabinet height is determined by the number of patch panels being installed or unless otherwise specified in writing by the ITS department project manager.

1 Patch Panel	CUBE-iT Wall-Mount Cabinet 24” (11840-724)
2 Patch Panels	CUBE-iT Wall-Mount Cabinet 36” (11840-736)
3-4 Patch Panels	CUBE-iT Wall-Mount Cabinet 48” (11840-748)

  Wall mount IDF cabinets to include Low-Decibel Dual-Fan and Filter Kit for CUBE-iT Wall-Mount Cabinet (40975-001)

Please see spec chart at www.chatsworth.com and configure as needed

Modification of the IDF cabinet is not allowed without written approval from the manufacture. Any modifications to the cabinet that jeopardize the structural integrity of the cabinet will result in the replacement of the cabinet at the contractor’s expense.

3.3.6.3 Wire Management

2U 3"x3" front, 2"x4" rear horizontal wire manager w/ hinges, Hellerman Tyton Part No. WMB2

1U 1.5"x3" front, 1.5"x4" rear horizontal manager; HellermanTyton Part No. WMBP2

Vertical Cabling Ring (Cabinet Enclosures), Chatsworth Product Inc. (CPI) Part Numbers: 12465-xxx

Enhanced Cable Management for Cabinet Enclosures, CPI Part No. 13170-700

Front to Back management Tray for Enhance Cable Management, CPI 13168-701
Combination Cabling Section (CCS) Vertical Cable Management (Rack System), CPI Part No. 30165-703

Single Sided Wide Vertical Cabling Section (VCS) Vertical Cable Management (Rack System), CPI Part No. 11374-103

Velcro 3/4X15 Cable Ties – Black

All cable routing and management systems must be fully compliant with CAT6 specifications in bend radii and cable pack density

3.3.7 Grounding Bus

Grounding Components that meet with California Electrical Code, BICSI and ANSI/EIA/TIA standards are required –Chatsworth Products Inc. or equivalent. Parts vary by application.

3.3.8 Backboard

¾" thick fire-treated, void-free plywood panel painted with a fire-resistant paint. Size varies by application

3.3.9 Labeling

Brother P-Touch Industrial Strength Series Label Tape (High Heat Tolerance)
Cable Wrap-around Labels (8mm), Leviton Part No. 59260-W

3.4 Switching and Routing Equipment

3.4.1 Core Switch Equipment (or equal)

4500-E series switches with supervisor 8-E, 7-E, or 7-LE and dual 2800W power supplies
6500-E series switches with supervisor T2 or 6T and dual 3000W power supplies

3.4.2 Edge Switch Equipment (or equal)

Cisco WS-C3650-48PQ-S	48 Port PoE+ Switches with 10GbE SFP+ Uplinks
Cisco WS-C3650-24PD-S	24 Port PoE+ Switches with 10GbE SFP+ Uplinks

Switches should be stacked using the StackWise-160 stacking cables when available and SX, LX, or SFP interconnect cables when stacking with non-Cisco 3650 series switches

3.4.3 Wireless Network Equipment (or equal)

Aerohive AH-AP230	802.11a/g/n/ac AP, FCC (3x3)
Aerohive AH-AP1130***	802.11a/g/n/ac AP, FCC (2x2:2) (Outdoor)

**Power injectors are not allowed for new installations. A proper PoE switch must be employed to power new access points unless authorize in writing by the District.

***Alternate type of external antenna may be specified according to the coverage needed.

3.4.4 Routers (or equal)

Cisco ASR-9001
Cisco 2921

4 Installation

4.1 General

Standards have been established by the industry and supplemented by the district in this section to assure proper and consistent installation of all system.

During the course of installation, contractors will discover many components and installations that do not meet current District standards since many were installed before District and/or industry standards existed. It is expected that contractors will install new systems separate from these non-standard installations or otherwise elect to retrofit the existing installation to bring into compliance with current District standards. Piggybacking on a non-compliant legacy system will be deemed non-compliant to the contracted work and must corrected.

4.2 Network Design

PUSD employs a star typography for the site's Local Area Network. This means that there is a Main Distribution Frame (MDF) in a logical and central location which connects to the rest of the campus; this is also the typical location for Telephone Voice Systems, WAN connections and other campus-wide systems. From the MDF, a continuous Fiber Optic connection is made to Intermediate Distribution Frames to service

each wing or area of the site. Each wing should be serviced by one or more IDFs. Classrooms separated by less than 10 ft would be considered part of the same wing. Wings may be serviced by multiple IDFs if needed.

Typical classrooms have 8 connections per classrooms. The location of the data outlet will be ADA, NEC and CSA compliant. The bottom the receptacle box will be installed 18inchs from the floor. Data outlets will be installed no more than 6 ft from existing or concurrently installed power outlets. If a requested location does not fit these requirements, the contractor will notify the district before installation for instruction.

Design proposal will be submitted in the form of a digital map drawing (CAD) with clear markings of data outlets, MDF/IDF, pertinent pathways and junction boxes and any relevant information. The final design must be approved by the district in writing before installation.

4.3 Data Centers and Distribution Frames (MDF and IDF)

4.3.1 Standards

4.3.1.1 MDF

The MDF will be installed in a dedicated room with enough enclosed space to provide room for a minimum of three 42U 4 post racks and a minimum of one wall covered with at least three 4x8 sheets of fire rated backboard. Racks are required to have a minimum of 4’ of clearance in front, back, and at the end of the row. Backboard must have a minimum of 4’ of clearance in front of it. Room will be equipped appropriate environmental systems to maintain proper operating conditions.

Racks will be allocated as follows:

- One rack for cores switch, core network equipment, fiber enclosures.
- One rack for site servers.
- One or more racks for copper patch panels and edge switches.

4.3.1.1.1 MDF Power

MDF will be equipped with a minimum of a 100A 208V three phase dedicated electrical panel. Panel must be sized to accommodate all equipment located in the room plus have a minimum of four extra breaker spaces for future devices.

Each rack will have two dedicatee 30A 208V circuits with L6-30 receptacles and one dedicated 20A 120V circuit with two 5-20 double duplex receptacles. Unless otherwise noted core switch and site server racks will each have a dedicated 30A 208V UPS

plugged into one of the L6-30 receptacles and a 30A 208V PDU plugged into the other L6-30 receptacle. Racks for edge switches will have two 30A 208V PDUs plugged into the L6-30 receptacles.

Backboard will have a minimum of two dedicated 20A 120V circuits each with a 5-20 double duplex receptacles. Receptacles shall be mounted at the top of the backboard with one double duplex receptacle will be 3’ in from the left edge of the backboard and one double duplex receptacle will be 3’ in from the right edge of the backboard.

4.3.1.2 IDF

IDFs for new facilities will be installed in a dedicated closet or shared electrical closet. IDF will have a minimum of one 7’ tall 2-post rack with a cable management. Each rack will be have one dedicated 30A 208V circuit with a L6-30 receptacle and one dedicated 20A 120V circuit with two 5-20 duplex receptacles.

IDFs installed at existing facilities may be installed in closets or classrooms where. IDFs installed in classrooms will employ lockable enclosures and have one dedicated 20A 120V circuit with two 5-20 duplex receptacles installed on the back wall of the cabinet. The locking cylinders (front and rear) will keyed to the district standard (CH761).

All IDF locations must have environmental systems are available to maintain proper operating conditions for equipment.

Any data centers supporting more Ethernet channels than can be installed on a single Rack shall have multiple racks and be contained in a dedicated closet with enough space to provide at least 3ft of clearance to the front, side and rear. Racks may be installed side by side, with vertical wire management in between, as long as there is the standard clearance to the sides of the outer racks.

4.3.1.1 Environmental

All data centers will be supported with the proper HVAC system to sustain an ambient temperature of 65 to 80 degrees Fahrenheit and humidity of between 10% and 85% to avoid condensation and ESD. Any Rack or Cabinets installed in a classroom or other non-dedicated area must have an evaluation performed to assure proper cooling for such equipment with existing cooling systems. If existing systems is inadequate, contractors must recommend additions, upgrade or recommend against installation of equipment. Installation of equipment in environmentally inadequate space will be considered to not conform to the district specification.

Addition of equipment to classrooms must not increase noise levels by more than 20 dB (SPL) over previous noise levels. Noise reduction must not be remedied at the expense of cooling factors.

Proper sized Cabinet Enclosure or Rack will be installed to support a minimum of 8 connections per classroom to all classrooms that will be supported by the IDF regardless of how many connections are installed at that time. In addition, every classrooms would require two connection for a wireless access point (WAP).

2' Cabinets may support a maximum of 96 total Ethernet channels, including up to two 48-port switch
3' Cabinets and Racks may support a maximum of 144 total Ethernet channels, including up to three 48-port switches
4' Cabinets and Racks may support a maximum of 192 total Ethernet channels, including up to four 48-port switches
7' Cabinets and Racks may support a maximum of 384 total Ethernet channels, including up to seven 48-port switches

Example: A Wing of 6 classrooms may have up to 60 connections including 3 wireless connections. Even if only 3 connections are installed in each classroom, a 3ft cabinet would be installed.

4.3.2 Installation

Floor mount racks and cabinets shall be securely attached to the concrete floor as specified by the manufacture or using 3/8" hardware, whichever is greater. Racks shall be installed with a minimum clearance of three feet behind the rack three feet on either side, and three feet in front. A cable ladder will be installed to secure the top of the rack using the appropriate hardware and attached to at least one wall. A backboard will be installed on the wall behind the rack for mounting cable service loops, telco blocks and other wall mounted equipment. Vertical wire management shall be supplied to each side of all open racks. All Racks shall be floor mounted and installed in secure spaces such as communications closet.

Only Cabinet enclosures will be use in classrooms. 2ft – 4ft Cabinets will be installed against a treated backboard using bolts with anchors. 2-inch clearance from the ceiling will be provided and a minimum of 3ft of clearance side-to-side, but no more than 6ft from the adjacent wall. Enclosures will have sleeve conduits installed on entrance holes before running cable through. Ceiling tiles may only be cut as needed to allow sleeve conduits through. Ceiling tiles excessively cut or broken will be replaced at the cost of the contractor.

4.3.2.1 Component Installation

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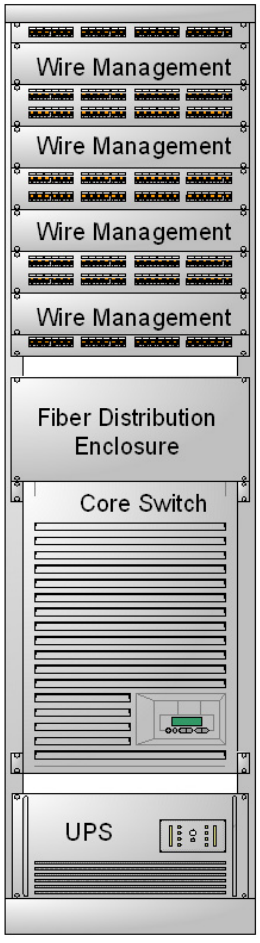
Patch Panel, Fiber Optic Distribution box and Switch equipment must be installed from top to bottom, starting with the first patch panel position and first switch position. Mounting of the fiber patch panel shall be below the copper patch panels. The first patch panel will always be installed in the first U position. Fiber Distribution box position always remains the same for each sized rack or cabinet. This is typically at, from the top, U-space#5(2ft cabinet), U#8(3ft), U#10(4ft), or U#16(7ft). The first switch would be installed at the next U position below the Fiber Optic Enclosure U#6(2ft), U#9(3ft). U#11(4ft), and U#21(7ft). All unused locations in the fiber termination panels shall be filled with blank panels.

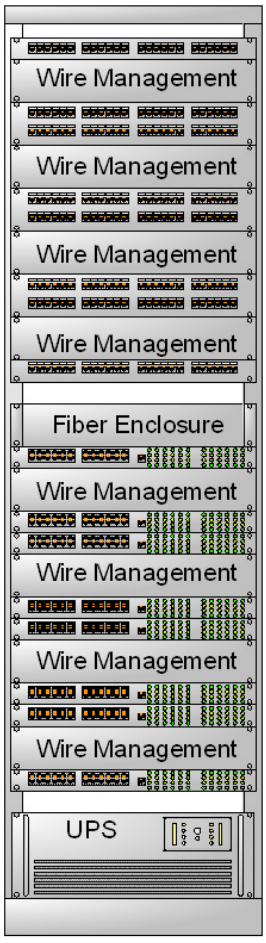
Please see Rack Space Diagram for specific placement of equipment and component.

Rack Space Diagram

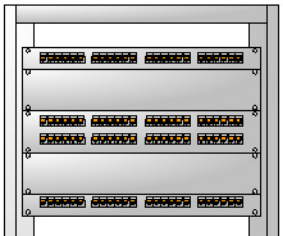
7ft Rack MDF



7ft Rack/Cabinet IDF

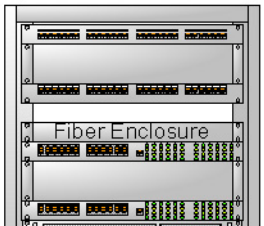


4ft Rack/Cabinet



3ft Rack/Cabinet

2ft Cabinet



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All equipment and components must follow the U-space designation indicated on the rack or cabinet. No mounting in-between U-Spaces unless specifically authorized by the district.

If the combination of equipment, components, cables, etc. weights more than the cabinet is rated for, the district must be informed before work is done. Any screws that are stripped at either thread or driver slot must be removed, disposed of and replace immediately.

The inter-bay manager shall have integral routing and slack storage loops supporting a 1.5" minimum bend radius. Horizontal cable management shall be providing in each rack. One combination front and rear horizontal wire management shall be provided for each fiber termination box, for each 48 ports of RJ45 panels, and each 48 ports of switches. For Cat 6 cables, the district-approved cable fill rate for 2U wire management is no more than 48 cables, with no more than 19 inch of each cable residing inside the wire management. 1U wire management fill rate is 24 cables.

All patch cord must follow this path in connecting patch panel to switching equipment:

- Connection to patch panel
- Routed through appropriate slot on the adjacent horizontal wire management
- Exit the wire management on the corresponding side (port 1-12 left, port 13-24 right, port 26-38 left, 39-48 right)
- Routed through vertical wire manager (if present)
- Enter wire management for switching equipment (if present)
- Routed through the appropriate slot
- Patched to the correspond switch port

- Any deviation from this would indicate a missing component, patch cord of improper length, or cabinet of improper size.
- Patch cord employed shall be long enough to connect the patch panel port to switching equipment without causing bends or kinks against Cat 6 system specifications. The Patch cord must also be short enough to avoid unnecessary slack or over-stuffing of wire managers (no more than 19 inches of any single patch cable inside the wire manager).

4.3.2.2 Patch panel to switch connection scheme

Each patch panel will be designated and labeled with a letter, starting with A.
The corresponding switch will also be labeled with that same letter.
Starting with the first fully populated patch panel, each port will be connected to a corresponding port on the switch designated for that patch panel. In the event that two 24-port patch panels are connected to a 48-port switch, the second patch panel would start at port 25.
Once all fully populated patch panels are connected to switches, the remaining patch panels (those that are not fully populated with horizontal cable) will be consolidated onto the remaining switch(es).
All cables shall be organized with Velcro cable ties to ensure a neat and manageable system. Only Velcro may be used for entire run. Plastic “Zip Ties” are expressly forbidden.

4.3.3 Grounding and Bonding

IDF and MDF racks/cabinets must be grounded and bonded following the California Electrical Code grounding requirements for Telecommunications Systems. A telecommunications ground bus bar shall be provided whenever there is more than one rack/cabinet in an IDF and/or MDF. The telecommunications ground bus bar shall attach to the grounding electrode system, the ground bus, the rack and hardware to create a common electrical potential system. If the data contractor is the prime contractor, or no electrical contractor is working concurrently in association with this project, then the data contractor shall be responsible for grounding and bonding the IDF and/or MDF.

4.4 Cable Routing and Pathways

4.4.1 Standards

Exterior and hidden conduits are typically EMT (above ceiling and intra-wall), PVC (underground), or rigid (outdoor).

Conduits will not be filled above 60%. The exact number of cables through each conduit will vary by the size of the conduit, distance of the run, number of 90 degree bends and Outside Diameter (OD) of the cable.

For sleeves and straight conduits shorter than 50ft – 60%
For straight conduits shorter than 100ft – 40%
For conduit runs over 100ft or with two 90º bends – 28%

Continuous conduits with more than two 90 º bends are not allowed.

Example: A 1½ inch sleeve conduit may have no more than 29 CAT6 cables having an OD of .232 inch. A 2 inch conduit may have up to 48 cables.

4.4.2 Installation

4.4.2.1 Conduits and Ducts

Cable raceways shall not be filled greater than the with California Electrical Code maximum fill for the particular raceway type. Conduit sizing shall be a minimum of ¾" inch conduit for each outlet with no more than two outlets fed by one 1½" homerun. If two outlets are fed by one homerun, the conduit shall be 1½" to the IDF or MDF and ¾" to the end box. For conduits feeding a multiple-outlet surface raceway, one 1½" conduit shall be supplied for every 18' of raceway. These specifications shall take precedence over conduit routing shown on the plans that deviate from this method. The data contractor shall bring any discrepancies to the attention of the owner.

Cables being pulled through walls and between building will be pulled through a sleeve conduit (galvanized EMT nipple) of the appropriate length secured with lock nut and washer and capped with a plastic bushing to avoid cable damage. In accordance with NFPA codes, firestop compound will be use to seal each conduit leading from one room or area of building to another. Combination of different firestop compounds is expressly forbidden.

When using an existing pull-string to run cables through conduit, a new pull-string will be installed to replace the one being used. For conduits 1-1/2 inches and larger the pull-string is to be of the polyester tape variety ("mule tape") rated up to 1200lb. For conduits smaller than 1-1/2 inches the pull string is to be nylon pull-string such Greenlee Poly Line 430 rated up to 210lb.

Where cables are "pulled through" or pulled from a "center of run pull" without splices or terminations, lead out the cables at manholes, pull boxes and conduits taking care to feed them in again by hand for the next run.

Splicing of cables or conductors is not permitted except as approved by the District ITS department.

Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

Dynablue cable pulling lubricant shall be continuously applied to all cables. The cable manufacturer must specifically approve all lubricants. The district expressly prohibits yellow 77.

The use of flex conduits is forbidden with low voltage systems.

4.4.2.2 Pull Boxes and Vaults

The district expressly forbids direct burial of data and voice cables. All cables running underground must be run through appropriate vaults and conduits.

A junction box will be installed for every 100ft of continuous conduit. A junction box will be installed when the number of 90º bends exceeds two. For each cable pull where a cable direction change is required, flexible feed-in tubes, pullout devices, multi-segmented sheaves, etc. shall be used to insure proper cable pulling tensions and side wall pressures. Cables shall not be pulled directly around a short right-angle bend. Any device or surface in which the cable comes in contact with when under pull-in tension shall have a minimum radius 50% greater than the final specified minimum installed cable bend radius. For conduits 1-1/2 inches and larger a pull-string is to be of the polyester tape variety (“mule tape”) rated up to 1200lb will be installed between each junction box and secured at each junction box for each conduit connecting them unless a conduit has met or exceeded the conduit fill rate. For conduits smaller than 1-1/2 inches the pull string is to be nylon pull-string such Greenlee Poly Line 430 rated up to 210lb will be installed between each junction box and secured at each junction box for each conduit connecting them unless a conduit has met or exceeded the conduit fill rate. If a conduit reaches the maximum fill rate, a tag will attached to the conduit inside the pull box indicating that the conduit is full. Pull strings must start/end at each pull box. The same string must not be run continuously through more than two pull boxes. Pull boxes installed on the side of buildings will be Galvanized EMT painted gray and secured with by screws. Any stripped screws must be replaced immediately.

Concrete vaults or manholes will be installed connected with minimum 2 inch PVC conduits. Vaults will be covered with Iron grated cover secured with 3/8 inch bolts.

Cables pulled through vaults will have a 360º loop around the edge of the vault while not exceeding bending radius for the type of cable. The bottom of the vault shall be filled with a minimum of 2 inches of gravel. No more than two 90º bends in conduits between vaults and pull boxes including vertical bends leading to pull boxes installed on the side buildings.

In the event that a cable must change direction within a pull box or manhole, a minimum 360º loop of the cable shall be created to maintain the bend radius.

4.4.2.3 Plenum/Ceiling

When not installed in conduit, (per the plans and electrical specifications requirements), all horizontal cables shall be supported at a maximum of four-foot intervals. Cables shall not be attached to walls, ceiling grid or lighting support wires directly. At no point shall cable(s) rest on acoustic ceiling grids or panels, nor shall they be attached to ceiling grind wires. Horizontal distribution cables shall be loosely bundled in groups not greater than 40 cables. Bundles shall be supported by cable tray, conduit, trapezes, or multiple support straps and hooks. Any hanger used shall be rated and tested for hanging category 6 cables. Where light support style wires for drop cable legs are required, and installed by the data contractor specifically for this use, the contractor shall install multi-function clips to support the cabling hangers. Cables must be supported every 4 ft using support hooks (such as J-hooks or D brackets) with a lateral thickness of no less than ½ inch. J-hooks or brackets attached to grind wire may support no more than 40 cables at each grind wire regardless the number of hooks attached to each grind wire. When a coil of cable is attached to grind wires each time a cable passes through the J-hook counts as one wire. If additional cables support is needed, J-hooks must be attached to staggered grind wires. If grind wire placement is not sufficient for having hooks every 4ft as well as supporting no more than 40 cables each, alternative support cable or bracket must be installed. Thin support wires may not be used to directly support cables. Nylon “Zip-ties” may not be used to bundle or support cables directly but may be used to reinforce broad hooks and loops (Velcro) strips. Cables laying on or supported by ceiling tiles or draped over ducts is expressly forbidden, regardless of existing cable routing.

4.4.2.4 Walls

It is preferred that the each outlet is feed by conduit inside the wall to an internal device box instead of surface mount raceways.
Internal conduit will be a minimum of 1 inch in diameter. Top entrance conduit entering each wall may have a bend radius of no more than 10”.

When running cables within walls is not feasible, a non-metallic raceway system, such as Wiremold 2300 series, may be used.

4.4.2.5 Raceways and Device Boxes

No data/voice outlet will be installed over 6 ft from an electrical outlet. Conduits run in parallel to any electrical conduits will be no less than 6 inches from this conduit. Perpendicular runs (jumps) are exempt from this.

When installed on painted surfaces, adhesive backs of the raceways will NOT be used. Instead, Raceway backs will be secured every 18 inches using the appropriate screws for the surface that the raceway will be installed on. When installed on a smooth, unpainted surface, adhesive backs may be used with or without screws depending on the surface material. Raceways will be colored white or ivory or to match décor.

4.5 Fiber Optic Cabling

4.5.1 Standards

Unless otherwise indicated in writing, all fiber cabling shall be a “home run” to the MDF, meaning there is no coupling or cross connection at any junctions between the IDF and the MDF. Cables will be rated for the space in which it is installed. E.g., fiber cables installed in underground conduit will be OSP loose tube gel filled with rated jacket.
For Fiber runs from 100 to 500 meters, multi-mode cable shall be used to create a 10Gbps backbone between IDFs. OM3 fiber optic cable (50micron core) may be used with prior district approval up to 300 meters; OM4 fiber optic cable (50micron) may used up to 400 meters. While OM3 cables remain an option for shorter runs, all new installation will generally use OM4 cables even at these shorter ranges.

For backbones specifically created to support 40Gbit bandwidth between IDFs, OM4 cables shall be used up to 150 meters.

Beyond 400 meters, a single-mode fiber optical cable (9/125micron) shall be employed up to 60 kilometers.

4.5.2 Installation

Provide fiber optic cable routed between buildings as needed and terminate on a wall mount or rack enclosure. Leave at least 10' of slack cable at each end. Slack shall be

organized in a loop no less than 18” in diameter and secured against the backboard or back of the cabinet.

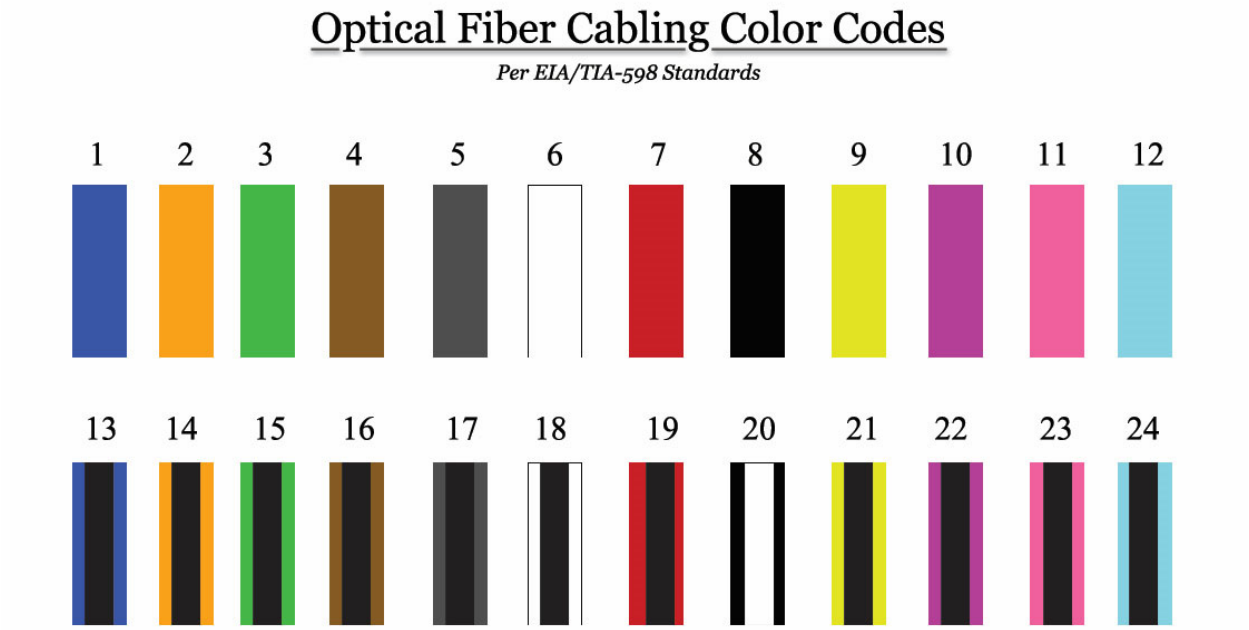
Fiber cables may share conduit space with low voltage data and telecommunications cabling as long as the total fill rate of this conduit is not exceeded. Running fiber cables through conduits with high voltage power, fire alarm and bell systems is not permitted. Pulling eyes on optical fibers and copper conductor shall not be used. Provide a full 360º loop of cable around manhole and pull box interiors for all fiber optic cabling.

All fibers in a multi-fiber cable shall be fully operational within the performance characteristics specified prior to and after the cable is installed. The use of spare fibers in the cable to compensate for defective fibers is not permitted. Defective cables shall be removed and replaced with fully functional cables at no additional cost to the contract.

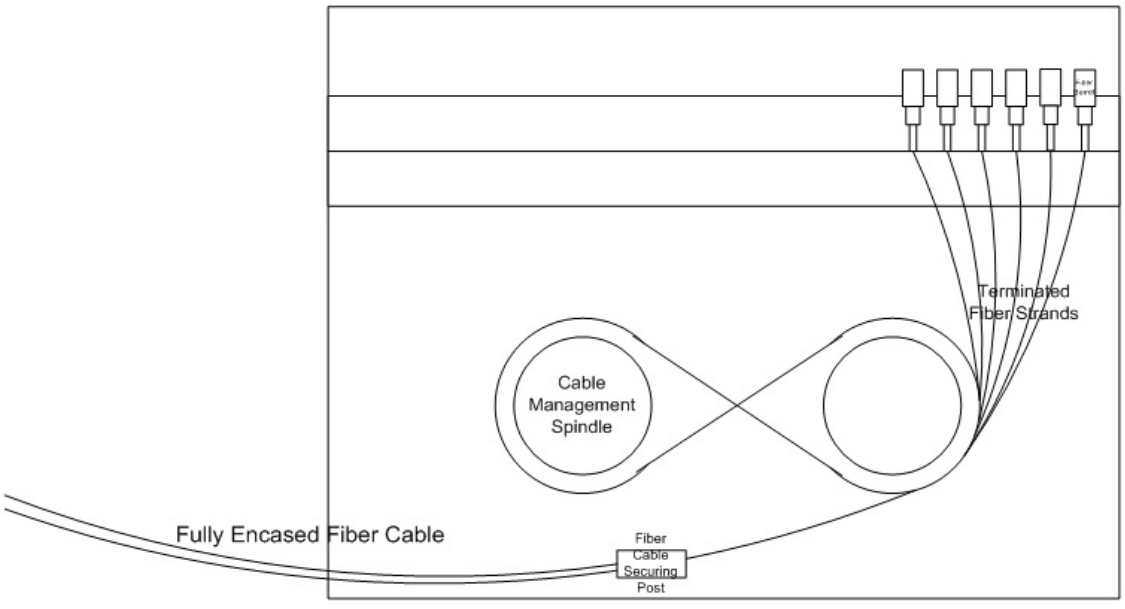
4.5.3 Termination

For all installations, all fiber will be terminated on both ends using Leviton SDX 24-Fiber Splice modules with LC connectors. Provide dust cover caps for each unused connector.

For upgrades to existing Fibers, all strands in the cable must be terminated and installed in the proper order in the fiber termination panel.



Fiber Optic Cable Enclosure



All unused locations in the fiber termination panels shall be filled with blank panels.

4.5.4 Labeling

The index card of each fiber termination panel must be completed. This card will list the source (or destination) of the cable plus a unique number, starting from 1, will be assigned for each strand

(typically, blue = 1, orange = 2, etc.). Typical examples are:

(at MDF)	(at IDF 4)
IDF4-1	MDF1
IDF4-2	MDF2

i.e. Fiber optic cables shall be labeled at both ends of each cable and at each pull box as follows: Y1/Y2

Y1= the source closet ID of the cable.
Y2= the destination closet ID of the cable.

Example:
0/1 would be a cable run from the MDF to IDF # 1

4.5.5 Testing

Cables may be used for, but not limited to, Ethernet, SONET, video, or Fibre Channel and must be capable of carrying this data.

Each individual optical fiber and copper wire conductor in all terminated and un-terminated cables provided in the contract shall be tested after installation, splicing and termination is completed.
Fiber - All fiber terminations shall be visually inspected with a minimum 200x microscope to ensure that no surface imperfections exist after final polishing. In addition, each fiber strand shall be tested for attenuation with an optical power meter and light source as well as an OTDR. Cable length and splice attenuation shall be verified using an OTDR.

Attenuation - Backbone multimode fiber shall be tested at both 850 nm and 1300 nm in one direction using an LED light source and power meter. Horizontal distribution multimode optical fiber attenuation shall be measured at either 850 nanometers (nm) or 1300 nm. Test set-up and performance shall be conducted in accordance with ANSI/EIA/TIA-526-14 Standard, Method B. One 2-meter patch cord shall be used for the test reference and two 2-meter patch cords shall be used for the actual test. This test method uses a one jumper reference, two jumper test to estimate the actual link loss of the installed cables plus the loss of two connectors. This measurement is consistent with the loss which network equipment will see under normal installation and use. Test evaluation for the panel to panel (backbone) or panel to outlet (horizontal) shall be based on the values set forth in the EIA/TIA-568-A Annex H, Optical Fiber Link Performance Testing. Refer to section 2.01B for maximum attenuation values.

4.6 Category 6 Data System

4.6.1 Standard

4.6.1.1 Ethernet Jacks

Purple*	Denote client connected Cat6 ports.
Orange	Denote non connected Cat6 ports such as access points, CCTV cameras and other non-client related devices.
Red	Denote fire alarm ports
Green	Denote AV connected ports

Previous/existing (obsolete) Standards

- Blue Ethernet Jacks denote Cat5E ports.
- Orange Ethernet Jacks denote Cat5 ports.
- White Ethernet Jacks denote Voice jacks.

4.6.1.2 Patch Cords

Purple*	Indicate a client device with a Cat6 rating.
Orange	Indicate a non-client device.
Red	Indicate fire alarm systems.
Green	Indicate crossover cables

Previous/existing (obsolete) standards

- Yellow patch cords indicate Cat5E rating.
- Blue or Black cords indicate Cat5 rating.

No patch cord longer than 15ft shall be employed anywhere along the datalink from computer desktop to switching equipment port unless explicitly authorized by the district in writing.

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**For the purpose of color code identification, PUSD considers any color within the Purple color range to be synonymous with Purple. These include violet, magenta, lavender, lilac, indigo and others that fall with this range.*

4.6.1.3 Horizontal cable

Category 6 system horizontal cables shall have purple or blue jackets with the exception of indoor/outdoor and OSP cables which will have a black jacket. Unless otherwise specified, the District only authorizes Category 6 rated components for all future installation. Other listed district standards are for reference only.

The minimum bend radius for all cables and the maximum pulling tension shall not exceed manufacturer's recommendations or rated specification of such cables.

Data termination locations will be ADA, NEC and CSA compliant with bottom of outlet boxes measuring 18 high from the floor.

4.6.2 Installation

Provide copper cables from each data system jack indicated on the drawings to the appropriate voice or data IDF or MDF patch panel.

Provide 12 inches of cable slack (service loop) at outlets either behind faceplate or at the top of the wall, above the visible ceiling.

Copper wire cables connecting to equipment racks shall be installed with not less than 10 feet (3 meters) each of slack at the IDF location. The slack cable shall be coiled and mounted on the backboard or rear panel of the cabinet. Alternatively, if there is not enough space inside the cabinet, such as 2 or 3ft cabinets, the coil can be located above the ceiling as long as proper support is installed. Coils will employ Velcro for bundling. No nylon zip ties may be used for support or bundling throughout the length of the cable.

For each cable pull where a cable direction change is required, flexible feed-in tubes, pullout devices, multi-segmented sheaves, etc. shall be used to insure proper cable pulling tensions and sidewall pressures. Cables shall not be pulled directly around a short right angle bend. Any device or surface the cable comes in contact with when under pull-in tension shall have a minimum radius 50% greater than the final specified minimum installed cable bending radius.

Consolidation points are expressly prohibited unless approved by the district ITS department.

4.6.3 IDF

Each cable must be routed through wire management and approach the termination point perpendicular to the patch panel. There should be at least 4 inch of cable from wire management exit to termination.

Routing of cables, bundling, support and termination of CAT6 cables must follow ANSI/TIA-568B.2-1 specification, such as:

- Separation of individual twisted pair is to be no more than .5" from termination point.
- Cable jacket may be striped back no more than ¾ inches from termination point.
- cable bundles are to remain loose. No tight (cigarette packs) bundles are allowed.

Whenever possible (if enough slack is available), cables terminated on to older patch panels should be re-terminated on new patch panels along with newer cables (i.e. Cat5 cables re-terminated on a Cat 6 patch panel) if the patch panel is not full. New cables may not be terminated on older patch panels (i.e. Cat6 cable terminated on Cat5e patch panel).

Example:

> *An IDF has a Cat5e patch panel with 5 Cat5e cables terminated. 14 new Cat6 cables will be installed along with a new Cat6 24 port patch panel. The Cat5e cables should be disconnected from the Cat5e patch panel. The Cat6 patch panel would be installed in its place with the Cat5e cables terminated in position 1-5 and relabeled as needed (at the patch and the outlet port) and the new Cat6 cables installed in position 6-19.*

If the combination of old and new cables adds up to more than available ports on the new patch panel, all cables on any incomplete patch panel shall be re-terminated on a new CAT6 patch panel. New CAT6 cables shall be installed at the tail end of the new panel plus any additional panels needed.

It is also possible to terminate a CAT5e cable onto a **blue** CAT5e rated keystone and installed on modular patch panel plates such as Leviton 69270-D48. This will allow for mixes rated cables on the same panel.

Orange CAT6 keystones will be installed on modular patch panels for all non-client ports (devices such as AP's, CCTV cameras, etc) These ports should be grouped together at the end of the patch panel.

A 14 foot Category 6 patch cord will be provided for each station outlet port and one variable length Category 6 (depending on what is required to properly patch over all ports from Patch panel to switching equipment; cable length must be long enough for connection with compromising cable bend radii but short enough as to not produce unnecessary slack) patch cord for each position terminated in the MDF and IDF. Patch cords shall be violet for Category 6 wiring. Crossover cables (568A to 568B) shall be green.

Each Cable shall be labeled with over-the-wire labels within 6 inches from termination on each end following the same labeling scheme as the outlet faceplate.

4.6.4 Category 6 Voice System

For all future installations, cables installed for use with analog voice system will be Category 6 cables to allow for easy transition to digital or VOIP systems.

All Category 6 voice cables shall be run along the same path and conduit as data cables. Cat 6 Voice cables installed for analog systems shall also be included in the same service loop as data cables but will exit and be terminated on a 66M150 blocks with 89B standouts.
Only the blue and white cable will be terminated to the 66M150 block for individual cables. All pairs shall be terminated on one side of the 66 block(s) for a tie cable.

4.6.5 Termination

All cable pairs shall be terminated at the outlet. Outlet labeling shall be same as outlined above at all IDF and MDF locations for telco connections.

Data outlet shall be cabled with four 4 pair, category 6, 23 AWG copper cables, terminating on RJ45 jack equipped with 110 type terminations and on the MDF/IDF data category 6 patch panels in compliance with TIA 568B wiring standards, using 110 type hardware as shown in the drawings.

Separation of individual twisted pairs is to be no more than .5" from termination point.

3.3ft. (1 meter) slack will be left above the ceiling at the termination point. An additional 1ft. (.3 meter) behind the outlet (in the device box) should also be left if possible without cause excessive kinks to the cable.

4.6.6 Labeling

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4.6.6.1 Horizontal Cable

Cables shall be identified by a self-adhesive label as detailed below. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate. Outlet labeling shall be applied to the faceplate, below (or adjacent to) the outlet. All labeling shall be approved by the owner's representative before any labeling begins. Any labeling installed before the complete project labeling scheme has been approved by the owner may need to be replaced at contractor's expense.

4.6.6.2 Outlet Port

All cables, outlets, and terminations shall be labeled and designated in accordance with following standards.

X1-X2

X1= The MDF or IDF ID number. The MDF is ID 0.
X2= The termination point on the patch panel.

Examples:

0-1 would indicate a cable run to the MDF and terminated on position 1 of the patch panel.
4-32 would indicate a cable run to IDF # 4 and terminated on position 32 of the patch panel (i.e., the 8th port on the second patch panel).

When a data jacks and voice jacks terminated on the same outlet, data jacks will precede voice jacks from left to right, top to bottom.

Example: D= Data, V = Voice

D D	D D	D V
V V	D D	V V
	D V	

Data outlets specifically for wireless access points will be terminated on a telco style two port surface mount biscuit at the edge of the ceiling adjacent to the wall or as need to supply data to the access point. The biscuit must use standard 110-type data outlets.

Data outlet as well as the corresponding patch panel port for wireless access points will be label as follows:

X1-W-X2 = (IDF#)-W-(termination point on the patch panel)

"W" denotes a channel specifically for wireless network

All voice tie cables between IDFs and MDFs shall be labeled at both ends as follows:

T1-T2

T1= The source closet name or ID of the cable.
T2= The destination closet name or ID of the cable.

Example:
0-1 would be a cable run from the MDF to IDF # 1.

Cabinets and Racks

All IDF locations shall be labeled with a self-adhesive label mounted in the lower-right corner of the outside Plexiglas door of the wall-mounted cabinet, or on the top center of a floor-mounted cabinet or rack, as follows.

IDF-X

X= the IDF ID number. All IDF's must have a unique number starting from 1. ID 0 is reserved for the MDF.

All identification labels will be mechanically printed. Hand written labels will not be accepted.

4.6.7 Testing and Certification

All cables and termination hardware shall be 100% tested for defects in installation to verify cable performance under installed conditions. All conductors of each installed cable shall be verified useable by the contractor prior to system acceptance. Any defect in the cable system installation including but not limited to cable, connectors, feed-through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.

Copper - Each cable shall be tested for continuity on all pairs and/or conductors. Twisted-pair voice cables shall be tested for continuity, pair reversals, shorts, and opens using a "green light" type test set. Twisted-pair data cables shall be tested for the all of the above requirements, plus tests that indicate installed cable performance. All category 6 cables shall be tested to ensure standard performance compliance to 550MHz. All tests shall be

saved in electronic format for the owner's use. These data cables shall be tested using a (Class II) cable analyzer.

Continuity - Each pair of each installed cable shall be tested using a "green light" test set that shows opens, shorts, polarity and pair-reversals. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test set in accordance with the manufacturers recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance. In addition, the three cables adjacent to the failed cable, in both directions, must also be re-tested to assure that correction measure have not change the performance of near-by cables.

Length - Each installed cable shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the TIA/EIA-568-A Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the longest pair length shall be recorded as the length for the cable. For Category 6 cabling, the total length of horizontal cabling shall not exceed 90m (295 ft.). Testing shall be for the data link, and not channel.

Performance Verification - High speed unshielded twisted pair (UTP) data cable shall be performance verified using an automated test set. This test set shall be capable of testing for the continuity and length parameters defined above, and provide results for the standards tests, including: Near End Cross-Talk (NEXT); Attenuation; Attenuation to Cross-Talk Ratio (ACR); Equal-Level Far-End Crosstalk (ELFEXT); Power Sum NEXT, ACR, and ELFEXT (PSNEXT, PSACR, PSELFEXT), and Insertion and Return Loss (IL, RL).

Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the TIA/EIA Standard, and the result shown as pass/fail. Test results shall be printed directly from the test unit or from a download file using an application from the test equipment manufacturer. The printed test results shall include all tests performed, the expected test result and the actual test result achieved.

4.6.8 Voice Termination Locations

The MDF and all IDFs are to be installed directly on the backboard. If the MDF or IDF is not in a dedicated communications closet, the terminal blocks shall be enclosed in a communications box appropriate for the space in which it is installed.

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4.7 Electronics and Instruments

Switching and routing equipment must be fully configured and rack-installed. Equipment will be installed in specific U-Space locations detailed in diagram in Figures 4.3.2.1 Configuration typically includes adding the switch to the VTP domain, assigning an IP address, configuring SNMP, telnet passwords, and other management options, powering up and testing the equipment, connecting all patch cables, and placing the cables into the wire management ("dressing" the rack). Each switch will be label with the Management VLAN's IP address. The first two switches of each switch stack in an IDF must be connected by Fiber directly to the Fiber Distribution Box going back to the MDF using a GBIC or SFP module and fiber patch cable. Each additional switch will have a stacking cable connected to each of the first two switches. Up to three additional switches may be added – a total of 5 switches per "stack". The 6th switch would require an additional "stack" and will again be connected directly to the MDF via Fiber. Whenever there is more than one "stack", stacks should be evenly divided in numbers of switches. Switches connected via StackWise cables are limited to nine unit stacks.

All configuration and network designs for switches, access points, routers, and other equipment will be done under the supervision of the District's Systems Administrator or his designee. This includes IP addressing, HSRP, EIGRP, OSPF, and other protocol configuration.

All patch cables must be installed one-to-one. That is, every jack on the patch panel will be connected to the corresponding position on the switch. For example, ports 1-24 will connect to ports 1-24 on the first switch, ports 25-48 would connect on ports 1-24 of the second switch, etc., with port 1 connecting to port 1, port 2 to port 2, etc.

Provide two appropriate fiber patch cables for every switch or switch cluster to be installed. Typically, this is two patch cables for every fraction of 24 wires run to an IDF. Additionally, provide stacking cables as needed for IDF stacks of switches.
Provide, configure, and install Cisco switches and routers, as indicated by the District Systems Administrator or on the plans, to permit connectivity on every new data cable. IP addresses and other information is available from the District ITS department.

4.7.1 Wireless Access Point Implementation Procedure for Contractors

4.7.1.1 Planning

Plan with CAD drawing of the deployment area and installation location will be provided by the district.

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This proposal drawing will include the coverage area
PUSD and contractor will work to create a deployment list that includes:

PUSD

- Locations (Room Number)

Contractor

- Serial No.
- Mac Address
- Uplink Switch IP and Port No.

4.7.1.2 Labeling

Each access point shall be labeled in large print with the MAC address.

4.7.1.3 AP Configuration:

- Contractor will provide the completed spreadsheet with the Serial and MAC of each AP and the location each will be installed.
- Access points with dual uplinks must be cabled and patched over as sequential odd/even numbered ports on both the patch panel and the switch so that the odd numbered port is always providing the POE to the AP. (Example: On a Cisco switch the AP should be patched over to ports 3&4 whereas port 3 provides the POE power.)
- Access points with dual uplinks must patched over so that both ports for the AP reside on the same ASIC on the switch.
- PUSD will enter this info into Hive Manager.
- PUSD will create/configure the correct VLANs if not already done.
- Contractor will also configure the correct VLAN settings on the uplink port of the network switch as needed. This configuration will also be provided by PUSD. Typical configuration (this may vary depending on the specific switch model/ios version and other factors (such as the use of Power Injectors and future security features):

```
interface FastEthernet0/x
description AP <AP Hostname>
ip arp inspection trust
switchport trunk encapsulation dot1q
switchport trunk native vlan 3
switchport mode trunk
```

- Contractor will install the AP to Manufacturer's and PUSD specs and power on the AP. The APs should download the needed configuration from Hive Manager and configure as necessary.

- Contractor will connect to

Signal Testing and Adjustments
Contractor - Signal test will be done from the extremities (corners of the opposite room or other areas that may be more affected by obstruction or interference) of the coverage area of each AP. Using the weakest measurements:

Measure the RSSI in dBm
Measure the Noise Level
Determine the SNR level (if your utility doesn't already provide this)
Measure the RSSI of the nearest Access if within range.

RSSI must be above -69dBm
SNR must be no lower than 20dB, preferably higher than 25dB range.
All AP should be adjusted so that the RSSI of the current AP is at least 15dB higher than the nearest AP. This process may involve adjustment to existing Access Points.

Provide the Disrtict with a report on co-channel interference/overlap.

5 Post installation

5.1 Clean-up

- Except for necessary modifications directly related to the scope of work, all facilities must be returned to their original condition before work started.

- Any incidental repair work needed directly related to the work will be carried out at the cost of the contractor unless agreed to in writing before work is performed.

- Any previous installation marked for demolition as agreed by the contractor and the district must be completed including any patch work and repair to the facility.

- All new wall outlets must be cleaned of smudges and dust.

- All Cabinets and Data Closets must be free of debris such as cut wires, metal shavings, and extra parts.

- Unless otherwise stated, all related unused parts, such as dust-covers, caps, cables, connectors, blanks, and manuals must be returned to the district.

- All keys that are borrowed for access to the facilities must be returned. If keys are lost, the district has the right to change locks for the affected area at the expense of the contractor.

- Missing items from facilities after jobs will be investigated

- Contractors must assure that all doors are properly closed and locked before leaving.

- Any damages caused by the installation will be repaired at the contractor's expense unless the owner is made aware of the likely damage before work and has agreed in writing to waive the contractor from responsibility.

5.2 Inspection

- A preliminary report with all the relevant test results will be presented to the district.

- At the owner's discretion, the documentation will be used to spot check all test results and quality of installation. Please see Testing and Certification section for each respective Data System (Sections 4.5.5 and 4.6.7).

- A punch-list will be created if any problems are found.

- Only after all items have been resolved will Owner sign off on job.

5.3 Deliverables

- At the close of the Job, the contractor will provide a package with the following items before Owner will sign off on a job:

- Letter of completion

- All relevant test results on electronic file (no print-outs necessary). If the results are in a proprietary format, software capable of reading this format must also be included.

- As-Built Drawing detailing all MDF/IDF designation, all port types/locations and designation using district approved symbols and legend. As-Built must contain only communication systems and show all data/voice locations numeric designation, IDF location and designation, and all relevant pathway information including installed junctions and pullboxes. As-Built drawings will be provided in color print as well as

in an editable electronic file (.dwg). Such files and all intellectual rights to them will become the property of Pomona USD.

- 14ft patch cords for each station outlet.
- Unused parts accepted and paid for by the District.
- Removed equipment, returned to the ITS department.
- Pertinent Equipment Manuals
- Contractor and Component Manufacturer's contact information
- Documentation of Warranty
- Pull Sheet of all parts used as applicable (a Sales Order would suffice if accurate)
- All electronic files will be submitted on CD/DVD

Wireless LAN Deliverables

Deployment spreadsheet that will include:

- AP Installation Location
- AP Hostname
- Serial No.
- MAC address
- Channel/Band Assignment
- Radio Power setting (dBm)
- Uplink Switch IP
- Uplink port No.
- Signal Test Results
    - RSSI
    - SNA
    - RSSI of the nearest AP

Relevant As-builts in DWG format using the original vectors (not raster overlay)

SECTION 27 21 00

PUSD - Data Communications Network Equipment

Version 2022.08.25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK.

1. General

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Specification in this section is in the process of being updated. Please refer to Section 27 20 00 for the information covered in this section.

SECTION 27 21 29

PUSD - Data Communications Switches and Hubs

Version 2022.08.25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1. General

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Specification in this section is in the process of being updated. Please refer to Section 27 20 00 for the information covered in this section.

SECTION 27 21 33

PUSD – Data Communications Wireless Access Points

Version 2022.08.25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK.

1. General

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Specification in this section is in the process of being updated. Please refer to Section 27 20 00 for the information covered in this section.

SECTION 27 30 00
PUSD - Voice Communications

Version 2022.08.25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK.

1. General

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Specification in this section is in the process of being updated. Please refer to Section 27 20 00 for the information covered in this section.

SECTION 27 40 00
PUSD - Audio-Video Communications

Version 2022.08.25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK.

1. General

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Specification in this section is in the process of being updated. Please refer to Section 27 20 00 for the information covered in this section.

1.1 Section 27 15 00 Overrides

This section list

1.1.1 Horizontal Copper Cable

A. Point to point horizontal cable that will not part of an Ethernet link, such as HDBase-T, will be green in color.

B. All other speculations for horizontal cable listed in Section 27 15 13 and related sections apply.

1.1.2 Horizontal Copper Cable Termination

A. All network jacks for AV Systems will be green in color on both the station side of the link and on the patch panel

B. Termination of horizontal cable directly on an RJ45 modular plug is forbidden.

C. All other specifications for horizontal cable termination listed in Section 27 15 13 and related sections apply.

1.1.3 Patch Cables

A. All patch cables for Audio-Video Communications systems and equipment will be green in color.

B. All other specifications for horizontal cable termination listed in Section 27 16 19 and related sections apply.

SECTION 27 51 00

PUSD - Distributed Audio-Video Communications Systems

Version 2022.08.25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1. General

A. Specification in this section is in the process of being updated. Please refer to Section 27 51 13 for the information covered in this section.

B. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

SECTION 27 51 13
Network Paging Systems

Version 2022.08.25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1. General

1.1 Introduction

The district has adopted the Atlas IED GlobalCom system for IP based paging solutions. Any solution provided must be compatible and integrate with this existing system and act as one seamless system or replace the existing system in its entirety district wide. It is the intent of this system to be centrally managed for the purposes of schedule management and support the creation of a district wide "all call" paging zone.

1.2 General Requirements

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Any discrepancies between this document, the drawings, and the physical site or any part or method specified that is not optimal for the application listed must be brought to the attention of the District's Systems Administration department. Installation of approved parts in a sub-optimal usage will be considered to not meet these specifications.

C. All of the electronic systems equipment shall be furnished and installed by the authorized manufacturer's distributor or installer of the equipment and shall include evidence of this authorization in their proposal.

D. The entire access control system shall be installed by a single contractor. If subcontractors are used, they will perform work as an agent of the primary contractor and such work will be the responsibility of and warranted by the primary contractor. Upon notification by the District of a failure, the Contractor shall repair or replace components that no longer fall within the specifications set by the manufacturer.

1.3 Substitutions

Parts and software may be substituted with equivalent products providing that the vendor can show that the product is equivalent. If a substitution item is given final acceptance by the Systems Administration department, the contractor shall pay all costs (including travel, lodging, meals, computers, etc.) required to provide factory certification, equal to that of a factory authorized distributor of the substituted item, for at least two selected District representatives. This training

will be provided by the manufacture of the substituted item in question and shall allow the selected District representatives to provide any and all factory/manufacturer approved repairs, services, software upgrades, etc., without affecting any available or applicable manufacturer warranties.

2 Quality Assurance Standards

2.1 Requirements of Regulatory Agencies

A. Furnish security equipment to comply with the requirements of laws, codes, ordinances, and regulations of the governmental authorities having jurisdiction where such requirements exceed. Standards include, but are not limited to:

   a. UL6500 - Standard for Audio/Video and Musical Instrument Apparatus for Household, Commercial and Similar General Use
   b. UL1480 - Standard for Safety Speakers for Fire Alarm, Emergency, and Commercial and Professional Use
   c. ASTM E 1374-02 - Standard Guide for Open Office Acoustics and Applicable ASTM Standards
   d. ASTM E 1573-02 - Standard Test Method for Evaluating Masking Sound in Open Office Using a Weighted and One-Third Octave Band Sound Pressure Levels
   e. ASTM E 1130-02e1 - Standard Test Method for Objective Measurement of Speech Privacy in Open Offices Using Articulation Index

B. Furnish security equipment to comply with the requirements of American National Standards for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People (ICC/ANSI A117.1), the governmental authority having jurisdiction and to comply with Americans with Disabilities Act.

2.2 Contractor qualifications

A. Trained, authorized, and certified to install the specified products.
B. Has a minimum of five years of system design, engineering supervision, and installation experience in the access control industry.
C. Will maintain a fully staffed local office within 60 miles of the work site. The service center will be staffed by factory-trained technicians.
D. The contractor must maintain an inventory of spare parts and other items critical to system operation and as necessary to meet the emergency service requirements for warranty service, within the local service center.
E. Must have engineering and project management capability consistent with the requirements of this project. The contractor shall provide a project manager who is actively involved in the project. This person shall be the same individual throughout the course of the project and shall be the person responsible for the scheduling of the system programming, preparation of the

operation and maintenance manuals, training programs, documentation and system testing, maintenance of Drawings and the coordination of all subcontract labor. The District reserves the right to approve the contractor's Project Manager.

F. Must abide by and adhere to all Drug Free School Zone laws and participate in a drug-free workplace program.

2.3 Pre-Installation Conference

Prior to work commencing, a conference between the contractor and the Systems Administration department shall take place to review materials and procedures and to coordinate related work. The locations and orientation of distribution frames, cross-connects, and patch panels in equipment rooms and wiring closets shall also be decided to minimize the impact on other services sharing the space.

Work done at school sites must be scheduled in advance. Contractors are to inform the ITS department of the scope of work, the area that will be worked in, and the time and date of work. ITS will get authorization from the school administration before the work is scheduled. If contractor attempts to begin work without getting authorization, the school site will be instructed to ask the contractor to leave.

The district will attempt to communicate any safety concerns such as other pending work to the facilities, areas with asbestos, lead or other hazards. If the contractor has such concerns, the district must be notified immediately before the start of work. The District Maintenance and Operations Department shall advise on any needed provisions.

2.4 Warranty

A. All components shall be supplied with a minimum five-year warranty against defects in materials and workmanship, commencing upon approval of the notice of completion of the project.

B. During the system warranty period, system updates are to be made available to District at no charge.

3 System Requirements

3.1 General Requirements

1. The intent of this specification is to provide a hybrid IP and 70v classroom bell and paging system. Classrooms speakers must IP based and have the ability to control each and every speaker individually. Outside and common areas must be grouped together in a logical manor and homerun back to the MDF.
    a. Speakers located in classrooms must have the ability to be controlled individually
    b. Speakers located in common areas and outside must be grouped together in a logical manor

2. The entire classroom bell and paging system shall be controllable from a windows based computer.
3. The basic system configuration shall provide dual channel paging for alternating networked speakers.
4. The system shall provide accommodation for the integration of existing, or future, 70.7 volt amplifiers and speaker arrays for use in the creation of hybrid systems having traditional 70.7 volt zones as well as IP addressable speaker zones under the same software control.

3.2 Announcement Control System

The Announcement Control System must provide the following:

1. Minimum of 1 FXS port to connect to the FXO port on the districts phone system with the ability to accept DTFM tone codes for PA zone selection.
2. Minimum of 4 Dante Channels
3. Scheduler to run announcements / bells at specific times based on multiple complex schedules.
4. The system shall provide a timer function allowing network audio levels to be automatically controlled according to a calendar-based user defined schedule.
5. The system shall provide automatic daylight saving time adjustments.
6. The system shall provide a transition process that automatically increases the masking volume over a period of time according to a programmed schedule.
7. The system shall allow for up to four independent timer zones per programmable timer.
8. The system shall allow independent timer multiple schedules for each day of the week.
9. The system shall allow configurable levels of volume adjustment and attenuation.
10. Ability to set permission to restrict access to capabilities & speaker groups.
    a. Example: Ability to restrict access so principal is able to log into system to manage bell schedules and announcements but not change speaker configurations.
11. Ability to interface with the IP and Analog speakers identified in sections 3.3 and 3.4
12. Ability to digitally adjust volume for individual IP speakers in 0.5 dBA increments over a range of 35 dBA to 85 dBA @ 1m from the Announcement Control System.
13. The system shall be capable of ensuring that the expected network devices are present and communicating properly and identify network devices that are not communicating properly.
14. The network control software shall be capable of monitoring and displaying the current settings for all network devices and speakers.
15. The system shall be capable of generating detailed reports of all system settings down to the level of individual network devices and speakers.

16. Speaker controllers shall be capable of equalization, level adjustment and network audio channel selection for every channel.

3.3 IP Speakers

3.3.1 Specifications

All IP Speakers shall we wall mounted Atlas IED IP-SDM or equivalent with the following specifications:

1. LCD display configured as a clock with the ability to display other text content
2. Clock functionality set and synchronized through NTP
3. Powered over IEEE 802.11af (POE)
4. Native integration with Globalcom and InformaCast software

3.3.2 Installation

1. IP Speakers shall be surface mounted to the wall using the appropriate wall mount enclosure.
2. Network cabling for IP Speakers will conform with District communications specification 27 20 00
3. Horizontal network cable shall be terminated on a biscuit mounted within the enclosure.
4. All horizontal network able, key stone jacks (both IDF and device side), and patch cables shall be orange.

3.4 Analog Speakers

Analog speakers will be connected back to the IP paging system through an ATLAS/IED IP-ZCM1RMK IP to Analog gateway or equivalent and will be a traditional 70.7 Volt system. IP to Analog gateway to be located in the MDF. An Amplifier such as the ATLAS/IEDPA1001G or equivalent must be used when total power requirements exceed 15.

3.4.1 Specifications

Analog speakers will be 15W @ 70.7V and be rated for the environment they are installed in.

3.4.2 Installation

1. Each individual speaker shall be a continuous home run cable from the speaker to a euro style consolidation block located in the IDF serving the area. With each speaker receiving its own space on the block.
2. Cables must be ran using an approved pathway as outlined in section 27 05 28 of the Districts Communications System Spec.

3. Speakers shall use a minimum of 18/2 AWG shielded coper cable. Heavier gauge wire may be required due to distance or other design considerations; however, it is the contractor's responsibility to identify when wire should be sized larger.
4. A minimum of an 18/8 shielded copper tie cable will be installed between the IDF and the MDF terminating on euro style consolidation blocks in each location. Heavier gauge wire may be required due to distance or other design considerations; however, it is the contractor's responsibility to identify when wire should be sized larger.
5. Individual speakers shall be combined and cross connected on the consolidation block with no more than 8 speakers per pair of wires on the tie cable.
6. Shielding for all PA cables shall be bonded together at each IDF and bonded to ground at the MDF. To avoid ground loops shielding must be bonded to ground only at the MDF.
7. All cables must be permanently labeled using a machine generated label between 6" and 18" from the end of the cable. Label must clearly identify the opposite end of the cable.

3.4.2.1 Interior speakers

Interior speakers shall be flush mounted to using the appropriate mounting bracket unless otherwise specified.

3.4.2.2 Exterior speakers

Exterior speakers shall be wall mounted a minimum of 15' above the ground and located no less than 8' horizontally from any item that would serve as a climbing surface for vandals, such as vertical conduits and pipes.

4 Testing and Acceptance

4.1 Contractor On-Site Testing

Contractor shall functionally test and certify each component in the system after installation to verify proper operation and confirm that the wiring and installation conforms to District's Networked Paging Systems Specification or manufacture's best practices, whichever is stricter.

4.2 District Test and Inspection

Once the Contractor has finished the On-Site Testing, the District Systems Administration department will walk the site with the Contractor and functionally test and inspect select components in the system after installation to verify proper operation, confirm that the wiring and installation conforms to District's Networked Paging Systems Specification or manufacture's best practices (whichever is stricter), and generate a punch list, if necessary.

4.3 Final Test and Inspection

Once the contractor has finished correcting all of the issues identified on the punch list, the District Systems Administration department will walk the site with the Contractor and perform a final test and inspection of the system.

4.4 Operational Demonstration

At the request of the District, contractor will provide an Operational Demonstration to demonstrate any new features and functionality.

4.5 Acceptance Requirements

A. Receipt of final documentation.
B. Successful Final Test and Inspection.
C. Successful Operational Demonstration Test.
D. Successful training and demonstration, including operation of systems using the manuals.

5 Post Installation

5.1 Clean-up

A. Except for necessary modifications directly related to the scope of work, all facilities must be returned to their original condition before work started.
B. Any incidental repair work needed directly related to the work will be carried out at the cost of the contractor unless agreed to in writing before work is performed.
C. Any previous installation marked for demolition as agreed by the contractor and the district must be completed including any patch work and repair to the facility.
D. All new wall outlets must be cleaned of smudges and dust.
E. All Cabinets and Data Closets must be free of debris such as cut wires, metal shavings, and extra parts.
F. Unless otherwise stated, all related unused parts, such as dust-covers, caps, cables, connectors, blanks, and manuals must be returned to the Systems Administration department.
G. All keys that are borrowed for access to the facilities must be returned. If keys are lost, the district has the right to change locks for the affected area at the expense of the contractor.
H. Missing items from facilities after jobs will be investigated
I. Contractors must assure that all doors are properly closed and locked before leaving.
J. Any damages caused by the installation will be repaired at the contractor's expense unless the District is made aware of the likely damage before work and has agreed in writing to waive the contractor from responsibility.

SECTION 27 51 13
Network Paging Systems

Version 2022.08.25

5.2 Deliverables

5.2.1 Software & Software Licenses

Any and all software and software licenses that were installed/used as part of this project

5.2.2 Parts and Hardware

5.2.2.1 Keys

All of the keys for all hardware with a lock.

5.2.2.2 Unused Parts and Hardware

All unused parts and hardware including any parts and hardware that was removed and not reused during the course of the project need to be returned to the Systems Administration department.

5.2.2.3 Failed Parts and Hardware

Unless otherwise specified all failed parts and hardware not covered under warranty need to be returned to the Systems Administration department.

5.2.3 Documentation

5.2.3.1 Access Control Panels

A. Site and Room where panel is located
B. IP Address Assigned to the Panel
C. Name of panel in the Access Control System

5.2.3.2 Readers/Reader Interface

A. Site, Room, Location where reader interface is installed
B. Channel that the reader interface is installed on
C. ID that the reader interface is configured for
D. Name of the Area that the Reader is a member of
E. Name of the Reader in the Access Control System

5.2.3.3 Areas

A. List of all newly created area in the Access Control System

5.2.3.4 Manuals

One set of manuals and install guides for each type hardware and equipment installed.

SECTION 28 10 00
ACCESS CONTROL

Version 2023-11-30

CONTRACTOR MUST FOLLOW THESE SPECIFICATIONS FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PROJECT MANAGER PRIOR TO START OF WORK

1. General

1.1 Introduction

The district has adopted Vanderbilt SMS Enterprise as its access control system. Any products provided must be compatible and integrate with this existing system and act as one seamless system or replace the existing system in its entirety district wide. It is the intent of this system to be centrally managed for controlling user access district wide and to be capable of automation for account creation and management.

1.2 General Requirements

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Any discrepancies between this document, the drawings, and the physical site or any part or method specified that is not optimal for the application listed must be brought to the attention of the District's Systems Administration department. Installation of approved parts in a sub-optimal usage will be considered to not meet these specifications.

C. All of the electronic systems equipment shall be furnished and installed by the authorized manufacturer's distributor or installer of the equipment and shall include evidence of this authorization in their proposal.

D. The entire access control system shall be installed by a single contractor. If subcontractors are used, they will perform work as an agent of the primary contractor and such work will be the responsibility of and warranted by the primary contractor. Upon notification by the District of a failure, the Contractor shall repair or replace components that no longer fall within the specifications set by the manufacturer.

E. System must be installed according to manufacture requirements to be backed by the Manufactures warranty. At a minimum the installation must be supervised and inspected by an installer with a valid Vanderbilt installer certification for SMS Enterprise issued within the last 5 years.

SECTION 28 10 00
ACCESS CONTROL

Version 2023-11-30

1.3 Substitutions

Parts and software may be substituted with equivalent products providing that the vendor can show that the product is equivalent. If a substitution item is given final acceptance by the Systems Administration department, the contractor shall pay all costs (including travel, lodging, meals, computers, etc.) required to provide factory certification, equal to that of a factory authorized distributor of the substituted item, for at least two selected District representatives. This training will be provided by the manufacture of the substituted item in question and shall allow the selected District representatives to provide any and all factory/manufacturer approved repairs, services, software upgrades, etc., without affecting any available or applicable manufacturer warranties.

2 Quality Assurance Standards

2.1 Requirements of Regulatory Agencies

A. Furnish security equipment to comply with the requirements of laws, codes, ordinances, and regulations of the governmental authorities having jurisdiction where such requirements exceed. Standards include, but are not limited to:
    a. NEC/NFPA
    b. TIA 568-C
    c. TIA 569
    d. TIA 607
B. Furnish security equipment to comply with the requirements of American National Standards for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People (ICC/ANSI A117.1), the governmental authority having jurisdiction and to comply with Americans with Disabilities Act.

2.2 Contractor qualifications

A. Trained, authorized, and certified to install the specified products. Contractor must possess a current and valid Installer Certification. Certification must be issued within the last 2 years or have an expiration date printed on the certification that shows that it is valid for the duration of the project.
B. Has a minimum of five years of system design, engineering supervision, and installation experience in the access control industry.
C. Will maintain a fully staffed local office within 60 miles of the work site. The service center will be staffed by factory-trained technicians.
D. The contractor must maintain an inventory of spare parts and other items critical to system operation and as necessary to meet the emergency service requirements for warranty service, within the local service center.

E. Must have engineering and project management capability consistent with the requirements of this project. The contractor shall provide a project manager who is actively involved in the project. This person shall be the same individual throughout the course of the project and shall be the person responsible for the scheduling of the system programming, preparation of the operation and maintenance manuals, training programs, documentation and system testing, maintenance of Drawings and the coordination of all subcontract labor. The District reserves the right to approve the contractor's Project Manager.
F. Must abide by and adhere to all Drug Free School Zone laws and participate in a drug-free workplace program.

2.3 Pre-Installation Conference

Prior to work commencing, a conference between the contractor and the Systems Administration department shall take place to review materials and procedures and to coordinate related work. The locations and orientation of distribution frames, cross-connects, and patch panels in equipment rooms and wiring closets shall also be decided to minimize the impact on other services sharing the space.

Work done at school sites must be scheduled in advance. Contractors are to inform the ITS department of the scope of work, the area that will be worked in, and the time and date of work. ITS will get authorization from the school administration before the work is scheduled. If contractor attempts to begin work without getting authorization, the school site will be instructed to ask the contractor to leave.

The district will attempt to communicate any safety concerns such as other pending work to the facilities, areas with asbestos, lead or other hazards. If the contractor has such concerns, the district must be notified immediately before the start of work. The District Maintenance and Operations Department shall advise on any needed provisions.

2.4 Warranty

A. The entire system shall be provided with a one-year factory warranty against defects in materials and workmanship, commencing upon approval of the notice of completion of the project.
B. During the system warranty period, system updates are to be made available to District at no charge.

3 Typical Components

The following list of components is current as of revision date of this specification. Part numbers may be changed by the manufacturer at any time. Please substitute the appropriate replacement part as needed or coordinate with the District to assure the correct parts used.

3.1 Cabling

Cabling must follow standards outlined in 27 15 01.15

SECTION 28 10 00
ACCESS CONTROL

Version 2023-11-30

3.2 Access Control Enclosure

A. Altronix Trove2M2 + RSB1
   a. *Unless otherwise specified this is the enclosure used for all new access control installs.*
   b. *Supports equipment required for 1-16 access control locks.*
   c. *Install (1) 3/4" conduit for power and (2) 2" conduits for low voltage wiring & data3*

3.3 Reader Controller

B. VMRC-2S3NB Dual Reader Controller capable of supporting 30 additional devices
   a. *Unless otherwise specified this is the reader controller used for all projects*

C. VMRC-1S3NB PoE capable Single Reader Controller supporting 8 additional devices
   a. *Only approved in limited circumstances and use must be approved in writing by PUSD Systems Administration*

D. VRCNX-A Vanderbilt SMS Reader Controller with NEMA 1 enclosure with lock
   a. *Only used to replace existing controllers with VRINX's attached*

3.4 Power Supply

A. eFlow104NB – Altronix power supply charger – board only
   - 120VAC Input
   - 24VDC, 10A output

B. AL1024ULXPD16 - Altronix power supply/charger with lock
   - Only approved in limited circumstances and use must be approved in writing by PUSD Systems Administration
   - 120VAC Input
   - 24VDC, 10A output with 16 fuse protected outputs
   - Two 12VDC / 12Ah batteries per power supply wired in series to provide 24VDC

3.5 Power Distribution

A. ACM8 - Altronix Access Power Controller – board only
   - *8 3.5A Fuse Protected Relay Outputs*
   - Used in Trove enclosure to power the strikes and controlled by the VMRC-1, VMRC-2, VRI-1, and VRI-2 boards.

B. PDS16 – Altronix Access Power Controller – board only
   - Stacked with the VR6 to distribute 12VDC power
   - *16 3A Fuse Protected Outputs*
   - Used in Trove enclosure to power the VMRC-1, VMRC-2, VRI-1, and VRI-2 boards.

C. VR6 – Voltage Regulator – board only
   - 24VDC input into 12VDC output
   - Stacked with the PDS16

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3.6 Reader Interface

All reader interfaces not located within the Trove enclosures must have a lock.

A. VRI-2S3NB Vanderbilt SMS Dual Reader Interface
   a. *Unless otherwise specified this is the reader interface used for all new projects*

B. Special Readers - *Only approved in limited circumstances and use must be approved in writing by PUSD Systems Administration*
   a. VRINX Vanderbilt SMS Single Reader Interface
   b. VRI-1S3 Vanderbilt SMS Single Reader Interface

3.7 Reader

Note: Readers are 12V only. If using with a VRI-1 or VRI-1S3 a 24VDC to 12VDC adapter will be required.

A. IRXPO–2S–BLE iRox Pro + U.S. Single Gang multiCLASS SE Wall Reader with BLE
   a. *Unless otherwise specified this is the reader interface used for all new projects*

B. IRXPO–3S–BLE iRox Pro + U.S. Double Gang multiCLASS SE Wall Reader with BLE
   a. Used for vehicle reader pedestals

C. IRXPO–1S–BLE iRox Pro + Narrow multiCLASS SE Wall Reader with BLE
   a. *Only approved in limited circumstances and use must be approved in writing by PUSD Systems Administration*

3.8 Door Unlock Switches

Door Unlock switches shall be a red single pole toggle switch mounted in a single or multi gang box with an engraved cover identifying the switches as Door Unlock Switches and the corresponding door(s) that the switch opens. Contact Districts ITS Systems Administration for the exact wording of the labels.

3.9 Door Position Switch

GE/Interlogix 1076D-N White DPDT Steel Door Contact with 1/2" Gap allowance

3.10 Request to Exit Sensor

BOSH DS160i High Performance Request-to-Exit Sensor

3.11 Door Hardware

The contractor shall be responsible for compliance with Section 08 71 00, Door Hardware. That section may provide certain items of door hardware for use of the system including power transfer hinges, door position switches, request-to-exit switches, and electric latch retraction panic hardware. The Contractor shall be responsible for all low voltage installation required to integrate the devices furnished by section 08 71 00 into the access control system. Any discrepancies between 08 71 00 and 28 10 00 shall be brought to the attention, in writing, of the Districts ITS Systems Administration department project manager for resolution.

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Contractor shall use factory pigtails when terminating connections to avoid voiding product warranties. OEM connectors shall not be removed without approval in writing from the Districts ITS Systems Administration department project manager.

3.11.1 Rim Strike

9600-630* HES Electric Service Mount Rim Strike (Fail Secure)

* Install strike with addition of HES 2005M3 Smart Pac III

3.11.2 Mortise Strike

8500* HES Mortise Electric Strike

* Install strike with addition of HES 2005M3 Smart Pac III

3.11.3 Cylindrical Strike

HES 8000C* HES 8000C No Cut Electric Cylindrical Strike

* Install strike with addition of HES 2005M3 Smart Pac III

3.11.4 Electrified Removable Mullion

Command Access V-KRM-EL Electric Power Transfer modification of the Sargent/Yale keyed removable mullion system

3.11.5 Electrified Panic

Contact the District Lock Shop for specifics on the make/model of Electrified Panic to use.

a. *Only approved in limited circumstances and use must be approved in writing by PUSD Systems Administration*

3.11.6 Electrified Transfer Hinge

Electrified transfer hinges must be split so that the section containing the wires can be removed without removing the door.

a. *Only approved in limited circumstances and use must be approved in writing by PUSD Systems Administration*

Contact the District Lock Shop for specifics on the make/model of transfer hinges to use.

4 Hardware Installation

The contractor shall furnish and install all hardware, devices, and components to meet the performance and functional requirements described in these contract documents. Include all items required,

whether or not individually specified, to ensure a completely operational integrated Security Management System. The contractor must complete all database entry, and provide the District with assistance on cardholder entry, as well as all system programming. No additional costs shall be allowed to make the system operational or to meet specifications.

4.1 Low Voltage/Communication Cabling

A. Cabling to be installed per section 27 15 01.15
B. Conduit/Raceway to be installed per section 27 05 28
C. Whenever possible all cables should run through the wall or above the celling without using surface mount raceways.
D. When service mounted raceway is required then a metallic raceway system will be utilized.
E. Door Cords and Transfer Hinges
    a. Transfer hinges must be used wherever electrified door hardware is used and must be able to power the lock as well as provide signal for the request to exit switch.
    b. Door cords are not permitted unless explicitly approved in writing by the Systems Administration department.

4.2 Access Control Enclosure

A. Enclosure must be installed so that the door to the cabinet can be opened a minimum of 120 degrees and have at least 3' of clearance in front. Enclosure must not interfere with the opening of any other surrounding equipment.
B. Enclosure will be installed adjacent the closest IDF unless otherwise directed to by the District's Systems Administration department.
C. Every enclosure must have (1) 3/4" conduit for 120v power and (2) 2" conduits for data / low voltage. Unless otherwise approved all conduits must exit the top of the enclosure. See section 5.1 Access Control Enclosure Layout for conduit layout.
D. Enclosure must have the Altronix RSB1 installed and mounted in the upper left corner of the enclosure. All splices to the RSB1 must be done utilizing push-in lever style wire connector rated for the wire sizes being used, such as the Wago 221-2401. Twist on wire nuts are not allowed within the Access Control Enclosure.
E. Input power must be hardwired on a dedicated 120V circuit. Load permitting, sharing the circuit used for the IDF and/or Alarm Panel is acceptable unless otherwise specified.
F. Exposed conduits and raceways for must be EMT or Ridged. For 120v power, Armored Cable, Metal Clad Cable and Flexible Metal Conduit Power are only approved for use above T-bar celling. Conduits and raceways must be secured per California Electrical Code requirements and painted to match wall directly behind them.

4.3 Reader Controller

A. Unless otherwise specified, Reader Controller must be installed in the access control enclosure. See section 5.1 Access Control Enclosure Layout for board layout.

B. Every Reader Controller must have one Ethernet network port in the enclosure (typically installed in a biscuit) going back to the nearest IDF and terminated on the patch panel. Ethernet install must comply with 27 20 00. All Ethernet cables and jacks must be orange.
C. Panel must be connected to the District's network and have a reserved IP address on the network provided by the Systems Administration department.
D. For Reader Controller without a data backplane such as the VMRC-1 or VMRC-2 and where the reader interfaces are not in the same enclosure a data backplane must be established using either euro style barrier strips or terminal blocks. Terminal strips with exposed metal parts such as the Eaton TB100-28 are forbidden. See section 5.1 for installation diagram.
E. The onboard relays may only be utilized for triggering non powered loads. For electrified door hardware, relays on the reader interface to be used to trigger the contacts on the Altronix ACM8 - Altronix Access Power Controller.

4.4 Power Supply

Power supplies are used to power the Reader Controller, Reader Interfaces, Associated Lock Hardware, and any accessories, as needed.

A. Unless otherwise specified Power Supply must be installed in the access control enclosure. See section 5.1 Access Control Enclosure Layout for board layout.
B. Input power for the power supply will be provided by the RSB1 in the Access Control Enclosure. All splices to the RSB1 must be done utilizing push-in lever style wire connector rated for the wire sizes being used, such as the Wago 221-2401. Twist on wire nuts are not allowed within the Access Control Enclosure.
C. 24VDC output from power supply will be connected to the

4.5 Power Distribution

4.5.1 ACM8 – 24DC Power

- ACM8 to be powered directly from the 24VDC output of the power supply
- Strikes will be wired to the ACM8 based on their Reader Address ID. For readers 1-8 the reader address ID matches that of the output ID. For readers 9-16 the formula reader address – 8 will be utilized to determine the output ID. *(Example: Reader Address 1 – Output 1 on the ADM8)*

4.5.2 PDS16 + VR6 – 12VDC Power

- VRI6 to be powered directly from the 24VDC output of the power supply
- VRI6 output to be set at 12VDC
- VRI6 and PDS16 to be stacked together per manufactures direction so that PDS16 outputs 12VDC
- 12VDC output to power the Reader Controller, and Reader Interfaces

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4.6 Reader Interface

A. Unless otherwise specified the reader interface will be installed in the same Access Control Enclosure as the Reader Controller.
B. Reader Interface must be installed on the secure side of the door unless approved in writing by the Districts Systems Administration Department.
C. Reader Interface for outdoor locations such as gates must be installed with the Reader Controller; outdoor enclosures for the Reader Interface are not permitted unless approved in writing by the Districts Systems Administration Department.
D. Reader Interface must be located within 500 wire-feet from the Reader Controller.
E. For installs where the reader interface is not located within the Access Control Enclosure:
    a. Reader Interface must be installed so that the door to the cabinets can be opened completely and have at least 3' of clearance in front and 1' of clearance on at least one side. Reader Interface must not interfere with the opening of any other surrounding equipment.
    b. Reader Interface must be mounted above the T-bar celling. If there is no T-bar celling then must be mounted a minimum of 8’ above the ground.

4.6.1 Installation

- Wiring from Reader Interface to the Reader Controller and Power Supply must be at least 18/4 unshielded cable (18/6 preferred) or greater gauge and must be one continuous run back to the Access Control Enclosure. Heavier gauge wire may be required to reduce voltage drop or higher current needs. It is up to the contractor to identify situations that require heavier gauge wire.
    - Red and Black wires are used for power and must be landed on a dedicated port on the power distribution board.
    - White and Green wires are used for communication and terminate on the Reader Controller.
- The onboard relays may only be utilized for triggering non powered loads. For electrified door hardware, relays on the reader interface to be used to trigger the contacts on the Altronix ACM8 - Altronix Access Power Controller.

4.7 Reader

- Reader will be mounted to the door jamb on the same side as the strike unless otherwise specified. For readers on doors not utilizing a strike the location of the reader will be specified during the initial job walk by the District Systems Administration department.
- Wiring from the Reader Interface to the Reader must be one continuous run of at least 18/6 unshielded cable or greater gauge. Unused wires should be neatly wrapped around cable for future use.

- Reader will be mounted so that the wires entering the conduit or door jamb are protected from damage.

4.8 Request to Exit Devices (REX)

Unless otherwise specified every access control door will have a REX device. Request to Exit Devices must be used in conjunction with Door Position switches and wired to the Reader Interface using at least 22/4 unshielded cable or greater gauge. If the opening has two doors, both doors must have REX switches.

The REX switch should be incorporated into the exit hardware so that it is triggered automatically when the door is opened from the inside. The exception to this would be for doors where electrified strikes are used, in this case a REX motion detector is acceptable. In both situations, the REX must be wired so that it only disables contact reporting and does not unlock the door.

4.9 Door Position Switch

Unless otherwise specified every access control door will have a door position switch. Door Position Switches must be used in conjunction with Request to Exit Devices and wired to the Reader Interface using at least 22/4 unshielded cable or greater gauge. If the opening has two doors, both doors must have door position switches. Door Position Switches should be installed on the top of the door or frame opposite the hinge. All four conductors must be connected from the door contact to the wire. The White/Green pair of wires will be used for the door position sensor and the red black will be left long, neatly coiled, for use with the intrusion system.

4.10 Door Unlock Switches

Door Unlock switches will be used whenever a door is needed to be left unlocked. Switch shall be mounted in a single or multi gang box with an engraved cover identifying the switches as Door Unlock Switches and the corresponding door(s) that the switch opens. Switch wire must be ran to the dry contacts on either the reader interface or an IO board such as the VI-16INS3 with a minimum of 22/4 unshielded cable.

4.11 Door Hardware

Door hardware power to be supplied / triggered via the ACM8 - Altronix Access Power Controller.

4.11.1 Single Door Opening

Electrified strikes must be used on all single door openings that are access controlled. It is the responsibility of the contractor to work with the District's Lock Shop to determine the correct type of electrified strike required. Electrified strikes will be used in conjunction with the HES Smart PAC III.

4.11.2 Double Door Opening With Removable Mullion

Double doors will utilizes an electric strike in conjunction with an electrified removable mullion. The electrified removable mullion must allow for the complete removal of the mullion without the needing to disconnect the power wires for the strike. It is the responsibility of the contractor to work with the District's Lock Shop to determine the correct type of electrified strike required Electrified strikes will be used in conjunction with the HES Smart PAC III.

4.11.3 Wired Locks with Integrated Reader Controller

Wired locks with integrated Reader Controllers not permitted unless explicitly approved in writing by the Districts Systems Administration department.

4.11.4 Wireless Locks

Wireless locks are not permitted unless explicitly approved in writing by the Systems Administration department.

4.12 Motorized Gates

Motorized gates must be connected to the access control system through a Reader Interface regardless of whether a reader will be installed. Gate will be wired to the Reader Interface as follows:

A. Relay 1 is wired to the gate opener contact as normally open
B. Relay 2 is wired to the exit loop contact as normally closed

4.13 Rollup Doors

Access controlled rollup doors will be wired to the Reader Interface as follows:

A. Relay 1 is wired to the opener contact as normally open.

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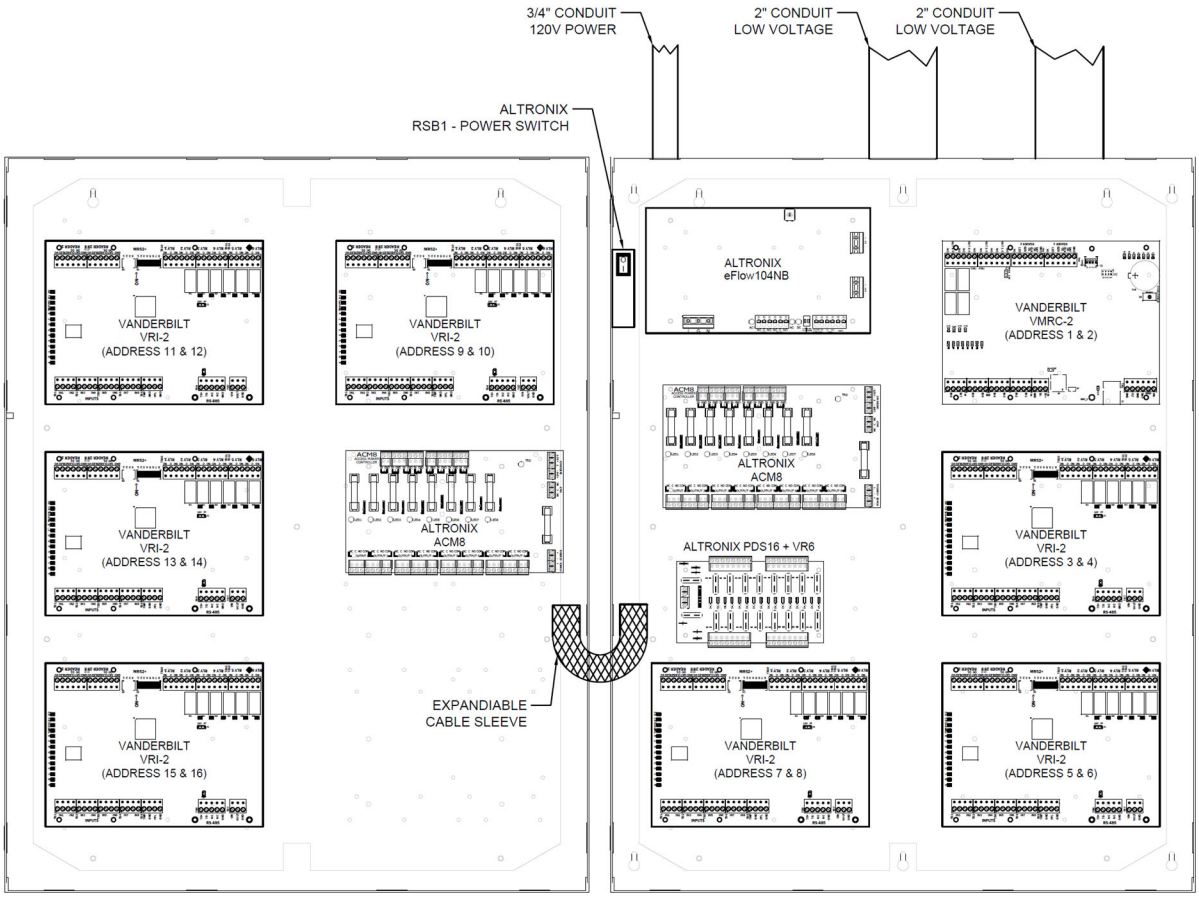
5 Diagrams

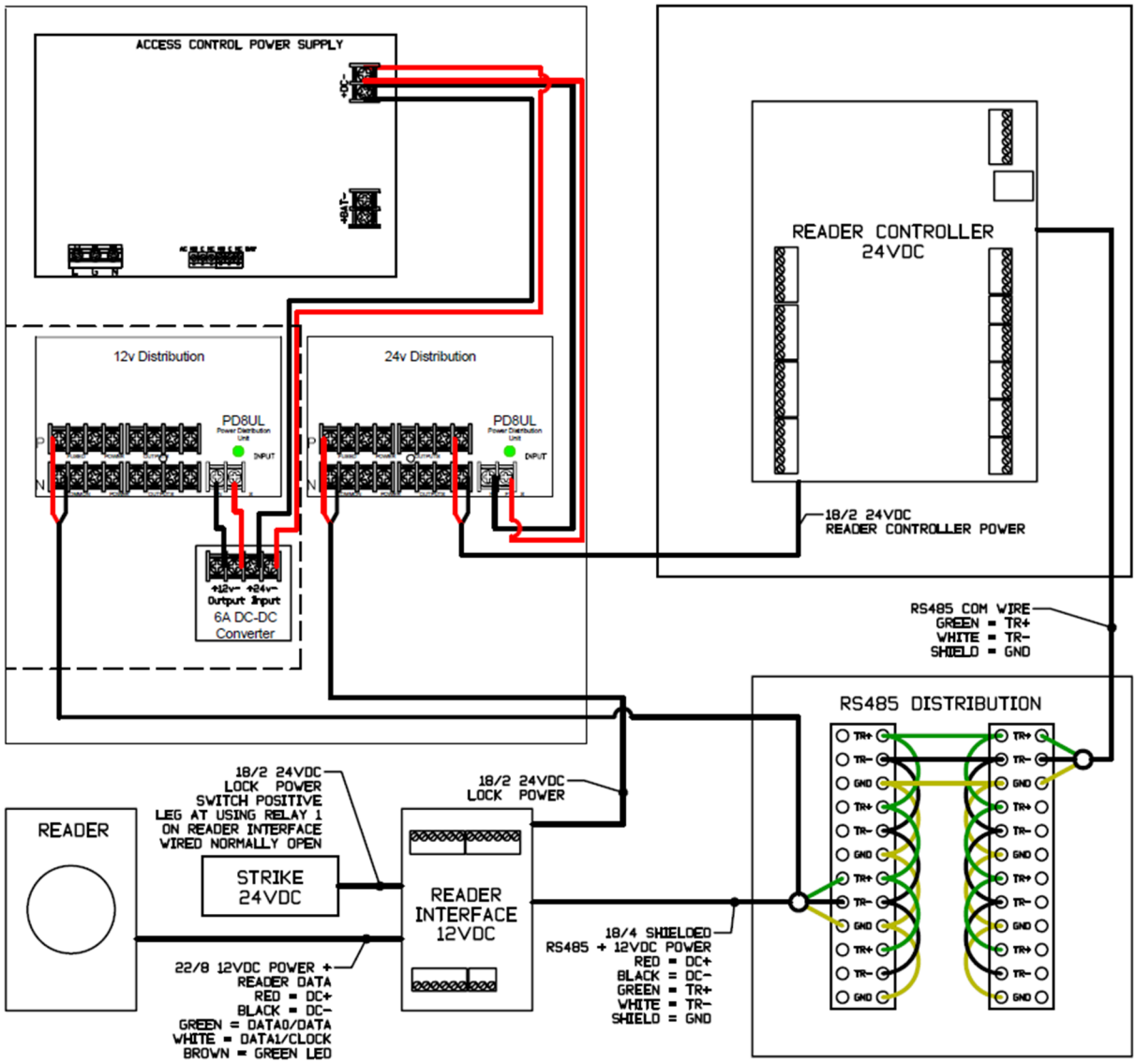
5.1 Access Control Enclosure Layout



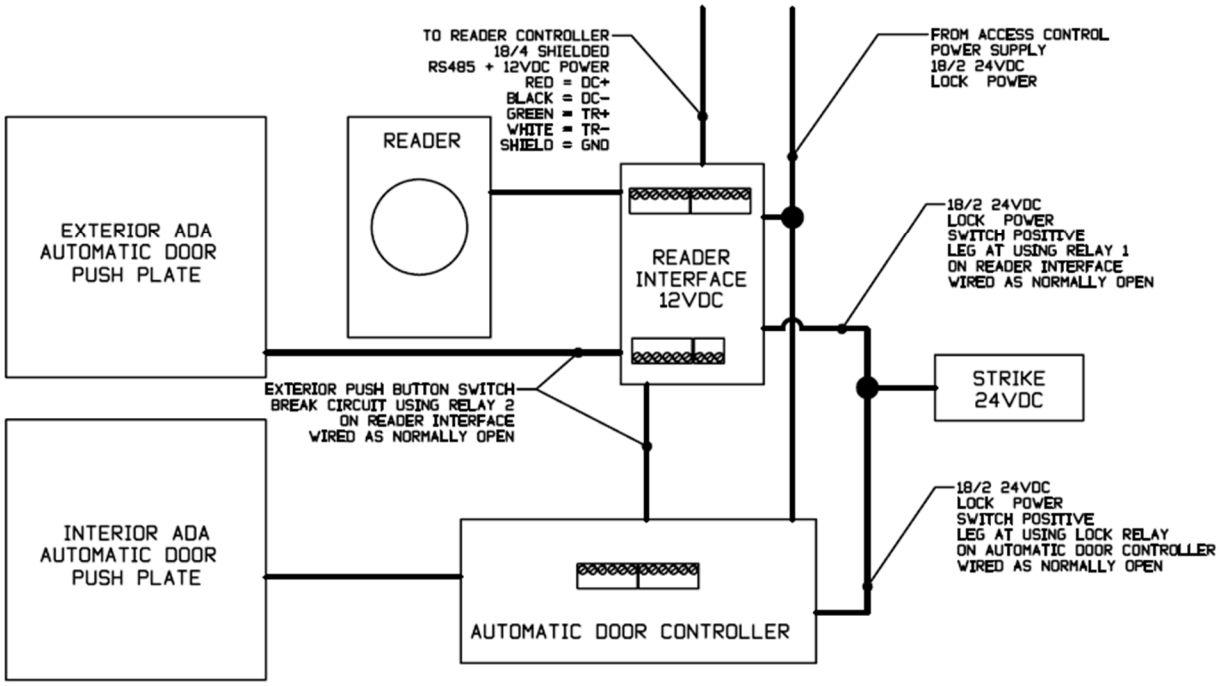
TROVE2M2
DOOR LAYOUT

TROVE2M2
ENCLOSURE LAYOUT

5.2 Sample System Wiring – Legacy Installs



5.3 Sample Access Control / ADA Opener Integration



6 Programming

Contractor is responsible for programming all newly-installed hardware and making sure that all devices and panels follow the established naming convention.

6.1 Naming Conventions

A. Reader Controller: <Site> <IDF Number> (e.g., Cortez IDF 1 or Cortez MDF)
B. Readers: <Site> <Room> <Door> (e.g., Cortez Classroom A101, Cortez Classroom A101 North)
C. Areas: <Site> <Room> (e.g., Cortez Classroom A101)

6.2 Reader Controller Configuration

New Reader Controllers will be configured with the IP address provided by the Systems Administration Department and added into SMS Enterprise.

6.3 Area Configurations

Areas in SMS Enterprise should match those of the physical area that the lock is providing access to. If more than one door is access controlled for the same physical area, all doors must be added to the same Area in SMS Enterprise unless otherwise specified.

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6.4 Reader Configuration

The District has two predefined reader templates defined that should be used in most instances. If these templates are not used then locks must be configured with the settings outlined below unless otherwise specified. Every reader needs to be added to the appropriate Area in SMS Enterprise. The "Special Access Privilege" request type is only used for toggle doors.

6.4.1 Predefined Reader Templates

A. School Crashbar Doors (Default)
B. School – Toggle Lock (Only used if specified)

6.4.2 Valid Access

All readers will be configured for a valid access request and will have the following settings unless otherwise specified:

A. Disable contact reporting for 30 seconds
B. Disable contact triggers for 30 seconds
C. Energize relay that lock is attached to for 3 seconds
D. Activate green LED for 3 seconds

6.4.3 Invalid Access

All readers will be configured for an invalid access request and will have the following settings unless otherwise specified:

A. Activate red LED for 1 second

6.4.4 Toggle (Special Access Privilege)

This is a special case and will only be used if specified; it is not set up by default. If specified, the reader will be configured for a "valid access – special access privilege" request and will have the following settings:

6.4.4.1 Toggle On (Valid Access – Special Access Privilege)

A. Disable contact reporting indefinitely (0 seconds)
B. Disable contact triggers indefinitely (0 seconds)
C. Energize relay that lock is attached to indefinitely (0 seconds)
D. Activate green LED indefinitely (65535 seconds)
E. Change reader type to Exit Only Reader

6.4.4.2 Toggle Off (Valid Exit – Special Access Privilege)

A. Reset all contacts
B. Reset relay
C. Reset LED
D. Change reader type to Normal Access Reader

6.4.5 Toggle (Button/Switch)

This is a special case and will only be used if specified; it is not set up by default. If specified, the reader will be configured for a "valid access – special access privilege" request and will have the following settings:

6.4.5.1 Toggle On (Button Latched/Switch On)

A. Disable reader reporting indefinitely (0 seconds)
B. Energize relay that lock is attached to indefinitely (0 seconds)
C. Activate green LED indefinitely (65535 seconds)

6.4.5.2 Toggle Off (Button Released/Switch Off)

A. Reset reader reporting
B. Reset relay
C. Reset LED

7 Labeling

7.1 Wire Labeling

All wires must be labeled on both sides. Labels must be machine printed and permanently affixed to the cable within 4" of termination. Labels be self-laminating wrap style labels or printable heat shrink. Flag style labeling is prohibited. All labeling must follow the established naming convention shown below.

7.1.1 Wire Labeling Conventions

A. From Reader Controller to:
   a. Reader: <Room>-RDR (e.g A101-RDR)
   b. Lock: <Room>-LCK (e.g. A101-LCK)
   c. DOD: <Room>-DOD (e.g. A101-DOD)
   d. REX: <Room>-REX (e.g. A101-REX)
   e. Button/Switch: <Room>-BTN (e.g. A101-BTN)
B. From end device (Reader, Lock, DOD, REX, Button, Switch, etc) to:
   a. Reader Controller < Reader Controller Name> (e.g. IDF1)
   b. Other Location/Device <Location>-<Device> (e.g. A101-VRI1)

7.2 Enclosures

The following information will be clearly labeled on the inside of all enclosures:

A. Any wiring diagram stickers supplied shall be installed on the inside of the enclosure.
B. Reader Controller: IP Address of Reader Controller.
C. Power Supply: Electrical panel and circuit that the Power Supply receives power from.
D. Reader Interface: ID number assigned to the Reader Interface.

7.3 Locks

When locks with integrated reader interfaces are used, the lock will be clearly labeled with the ID number assigned to the lock. Label will be located under the cover protecting the Reader Interface board.

8 Testing and Acceptance

8.1 Contractor On-Site Testing

Contractor shall functionally test and certify each component in the system after installation to verify proper operation and confirm that the wiring and installation conforms to District's Access Control Specifications or manufacture's best practices, whichever is stricter.

8.2 District Test and Inspection

Once the Contractor has finished the On-Site Testing, the District Systems Administration department will walk the site with the Contractor and functionally test and inspect select components in the system after installation to verify proper operation, confirm that the wiring and installation conforms to District's Access Control Specifications or manufacture's best practices (whichever is stricter), and generate a punch list, if necessary.

8.3 Final Test and Inspection

Once the contractor has finished correcting all of the issues identified on the punch list, the District Systems Administration department will walk the site with the Contractor and perform a final test and inspection of the system.

8.4 Operational Demonstration

At the request of the District, contractor will provide an Operational Demonstration to demonstrate any new features and functionality.

8.5 Acceptance Requirements

A. Receipt of final documentation.
B. Successful Final Test and Inspection.
C. Successful Operational Demonstration Test.
D. Successful training and demonstration, including operation of systems using the manuals.
E. Purging of Contractor User privileges and return of all key card media.

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9 Post Installation

9.1 Clean-up

A. Except for necessary modifications directly related to the scope of work, all facilities must be returned to their original condition before work started.
B. Any incidental repair work needed directly related to the work will be carried out at the cost of the contractor unless agreed to in writing before work is performed.
C. Any previous installation marked for demolition as agreed by the contractor and the district must be completed including any patch work and repair to the facility.
D. All new wall outlets must be cleaned of smudges and dust.
E. All Cabinets and Data Closets must be free of debris such as cut wires, metal shavings, and extra parts.
F. Unless otherwise stated, all related unused parts, such as dust-covers, caps, cables, connectors, blanks, and manuals must be returned to the Systems Administration department.
G. All keys that are borrowed for access to the facilities must be returned. If keys are lost, the district has the right to change locks for the affected area at the expense of the contractor.
H. Missing items from facilities after jobs will be investigated
I. Contractors must assure that all doors are properly closed and locked before leaving.
J. Any damages caused by the installation will be repaired at the contractor's expense unless the District is made aware of the likely damage before work and has agreed in writing to waive the contractor from responsibility.

9.2 Deliverables

9.2.1 Software & Software Licenses

Any and all software and software licenses that were installed/used as part of this project

9.2.2 Parts and Hardware

9.2.2.1 Keys

All of the keys for all hardware with a lock, including power supplies, reader controllers, and reader interface panels.

9.2.2.2 Unused Parts and Hardware

All unused parts and hardware including any parts and hardware that was removed and not reused during the course of the project need to be returned to the Systems Administration department.

9.2.2.3 Failed Parts and Hardware

Unless otherwise specified all failed parts and hardware not covered under warranty need to be returned to the Systems Administration department.

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9.2.3 Documentation

9.2.3.1 Access Control Enclosure

A. Site and Room where panel is located
B. IP Address Assigned to the Reader Controller
C. Name of panel in the Access Control System

9.2.3.2 Readers/Reader Interface

A. Site, Room, Location where reader interface is installed
B. Channel that the reader interface is installed on
C. ID that the reader interface is configured for
D. Name of the Area that the Reader is a member of
E. Name of the Reader in the Access Control System

9.2.3.3 Areas

A. List of all newly created area in the Access Control System

9.2.3.4 Manuals

One set of manuals and install guides for each type hardware and equipment installed.

END SECTION

SECTION 28 20 00
PUSD – Video Surveillance System

Version 2022.08.25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1 General

1.1 Introduction

The district has adopted Panasonic Video Insight as its video surveillance network video recorder (NVR) software; any solution provided must be compatible and integrate with this existing system and act as one seamless system or replace the existing system in its entirety district wide. It is the intent of this system to be centrally managed for controlling user access district wide and to be capable of automation for account creation and management.

1.2 General Requirements

A. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

B. Any discrepancies between this document, the drawings, and the physical site or any part or method specified that is not optimal for the application listed must be brought to the attention of the District's Systems Administration department. Installation of approved parts in a sub-optimal usage will be considered to not meet these specifications.

C. Any deviations from the requirements listed in this specifications must be approved in writing by the District's Systems Administration department.

D. Any changes to the design must be approved by the District Systems Administration staff

E. All of the electronic systems equipment shall be furnished and installed by the authorized manufacturer's distributor or installer of the equipment and shall include evidence of this authorization in their proposal.

F. The contractor shall include all the necessary parts and supplies needed for a fully functioning system in its scope.

G. The entire video surveillance system shall be installed by a single contractor. If subcontractors are used, they will perform work as an agent of the primary contractor and such work will be the responsibility of and warranted by the primary contractor. Upon notification by the District of a failure, the Contractor shall repair or replace components that no longer fall within the specifications set by the manufacturer.

H. Unless otherwise noted, all materials and equipment shall be new, of the type, capacity, and quality specified, free from defect, and has a warranty for a minimum of 3 years.

1.3 Substitutions

Parts and software may be substituted with equivalent products providing that the vendor can show that the product is equivalent. If a substitution item is given final acceptance by the Systems Administration department, the contractor shall pay all costs (including travel, lodging, meals, computers, etc.) required to provide factory certification, equal to that of a factory authorized distributor of the substituted item, for at least two selected District representatives. This training will be provided by the manufacture of the substituted item in question and shall allow the selected District representatives to provide any and all factory/manufacturer approved repairs, services, software upgrades, etc., without affecting any available or applicable manufacturer warranties.

2 Quality Assurance Standards

2.1 Requirements of Regulatory Agencies

A. Furnish security equipment to comply with the requirements of laws, codes, ordinances, and regulations of the governmental authorities having jurisdiction where such requirements exceed. Standards include, but are not limited to:
    a. NEC/NFPA
    b. TIA 568-C
    c. TIA 569
    d. TIA 607

2.2 Contractor qualifications

A. Trained, authorized, and certified to install the specified products.
B. Must have engineering and project management capability consistent with the requirements of this project. The contractor shall provide a project manager who is actively involved in the project. This person shall be the same individual throughout the course of the project and shall be the person responsible for the scheduling of the system programming, preparation of the operation and maintenance manuals, training programs, documentation and system testing, maintenance of Drawings and the coordination of all subcontract labor. The District reserves the right to approve the contractor's Project Manager.
C. Must abide by and adhere to all Drug Free School Zone laws and participate in a drug-free workplace program.

2.3 Pre-Installation Conference

Prior to work commencing, a conference between the contractor and the Systems Administration department shall take place to review materials and procedures and to coordinate related work. The

locations and orientation of distribution frames, cross-connects, and patch panels in equipment rooms and wiring closets shall also be decided to minimize the impact on other services sharing the space.

Work done at school sites must be scheduled in advance. Contractors are to inform the ITS department of the scope of work, the area that will be worked in, and the time and date of work. ITS will get authorization from the school administration before the work is scheduled. If contractor attempts to begin work without getting authorization, the school site will be instructed to ask the contractor to leave.

The district will attempt to communicate any safety concerns such as other pending work to the facilities, areas with asbestos, lead or other hazards. If the contractor has such concerns, the district must be notified immediately before the start of work. The District Maintenance and Operations Department shall advise on any needed provisions.

2.4 Warranty

A. All components shall be supplied with a minimum one-year warranty against defects in materials and workmanship, commencing upon approval of the notice of completion of the project.
B. During the system warranty period, system updates are to be made available to District at no charge.

3 Typical Components

3.1 Cameras

Currently the District supports the following IP Cameras for new and replacement installs.

3.1.1 2 Megapixel Camera

a. Arecont 2356PMTIR-S cameras with 8–22mm varifocal lenses (2.1MP)

3.1.2 5 Megapixel Camera

a. Advidia B-51 cameras with 9-22mm varifocal lenses (5MP)

3.1.3 Doorbell Camera

a. Hanwha Techwin TID-600R 2MP Video Intercom Station

4 System Requirements

4.1 General

A. The system will record on motion-only or full time depending on the need.
B. The system will record at 7-14 fps per camera.
C. The system will store recorded video for a minimum of fourteen (14) days before overwriting the earliest recorded images.

4.2 Recorder

If a recorder is needed for a project, design and specifications will be provided by the Districts Systems Administration Department.

4.3 Cameras

4.3.1 General

A. All cameras must be non-proprietary, i.e., they may not be compatible only with software, Network Video Recorders (NVRs), panels, and ancillary devices of only one manufacturer.
B. IP cameras must communicate directly with the NVR without the need of third party software or other intermediary products.
C. Fixed Dome
D. Wide Dynamic Range
E. IR LED for night vision
F. Remote zoom and focus
G. Auto focus
H. P-Iris control
I. Day/night functionality with mechanical IR cut filter
J. POE IEEE 802. 3af
K. H.264 and MJPEG compression
L. Outdoor Rated IP66 or better
M. IK-10 Vandal-Resistant or better

4.3.2 2 Megapixel Camera

A. Resolution 1920 x1080 @ 30FPS
B. Minimum 10-20mm varifocal lens or better
    a. Lens requirement is based on F1.6, 1/2.7" CMOS sensor

4.3.3 5 Megapixel Camera

A. Resolution 2560 x1920 @ 14FPS
B. Minimum 10-20mm varifocal lens or better
    a. Lens requirement is based on F2.0 1/2.5" CMOS sensor

4.3.4 Intercom Camera

A. Resolution 1920x1080 @ 14FPS
    a. Field of View
        - 180° (Horizontal)
        - 114° (Vertical)

5 Installation

5.1 General

A. Install must comply with all related sections listed in section 1.3
B. All materials shall be of the same brand or manufacturer throughout for each class/model of material or equipment.
C. The contractor will furnish and install dome cameras as needed.
D. The contractor will furnish and install all server used as NVRs as needed.
E. The contractor will furnish, install and configure all network switches as needed.
F. The contractor will furnish and install appropriate dome camera mounting hardware as needed.
G. The contractor will furnish and install media converters that will supply IEEE 802.3af power to the cameras as needed.

5.2 Locations

A. Cameras will be installed at locations as directed by District Systems Administration staff.
B. Cameras will be located so that the minimum pixel per foot (PPF) is 80 at the near end and 40 and the far end of the area of interest.
C. Cameras are to be located in a manner to maximize the depth of field.

5.3 Camera Instillation

A. The contractor will need to identify the ports available or needed on each switch and communicate with the District's Systems Administration staff to configure or add and configure the necessary switches.
B. For every camera location two CAT6 fully functioning and terminated network jacks will be installed.
    a. For cable lengths longer than 90 meters, the contractor shall use fiber optic cable and provide power for the contractor supplied media converters.
C. The contractor will configure and adjust cameras to cover the area of interest and meet the pixels per foot requirement
D. The contractor will test and confirm video connectivity.
E. The contractor will take necessary precautions to ensure water does not enter the camera housing, camera, or structure.
F. The contractor will take necessary precautions to ensure secure mounting of equipment.
G. Flexible conduit is permitted only for segments under 12 inches.

5.4 Camera Mounting

A. Camera must be mounted so that it is a minimum of 10' off of the ground and no higher than 20' off the ground, unless otherwise specified.

B. Camera must be mounted a minimum of 6’ away from any object that may be used as a ladder to reach the camera, such as fencing, conduits, of piping.

C. Vertical Surfaces
   a. Cameras mounted to walls and other vertical surfaces will use the appropriate wall mount adaptor to ensure a camera is mounted horizontally. Vertical mounting is not permitted.
   b. The wall mount adaptor will be secured to the wall using one of the methods listed below:
      i. To an existing electrical box using the appropriate camera j-box adaptor.
      ii. Through bolts installed in such a manor to prevent the camera from being ripped off the wall.
      iii. Epoxy anchors for concrete or masonry walls where through bolts are not possible. Epoxy anchors must have a minimum of a 4” embedment depth.
      iv. Concrete anchors or lag screws are approved only for interior installations.

D. Pole Mounting
   a. Cameras mounted to poles will utilize the appropriate pole mount adaptor to ensure a camera is mounted horizontally.
   b. Poles installed for the sole purposes of camera mounting must be designed to withstand vandalism and not be easily bent.

E. Horizontal Surfaces
   a. Cameras mounted to horizontal surfaces must be flush mounted whenever possible and utilize the appropriate celling mount adaptor.
   b. Cameras mounted in drop celling’s must be additionally secured with a safety wire which allows the camera to fall no more than 3”
   c. Cameras mounted under breezeways and less than 15’ off the ground will be mounted to a round electrical box adapter plate to provide for a more secure mounting of the camera. Plate will be attached to the breezeway utilizing no less than (8) screws distributed throughout the plate. Screws should be between 1-1/2” and 2-1/2” in length and utilize the longest possible screw without going through to the other side.

F. Intercom Camera
   a. Camera will be securely mounted to resist vandalism from kicking, prying and hitting attacks. Screws should be between 1-1/2” and 2-1/2” in length and utilize the longest possible screw without going through to the other side.
   b. Camera will be mounted so that the operable portion of the device is ADA compliant and between 46” and 48” above walkway.
   c. Camera must be wired so that the relay triggers a contact on the Districts access control system and does not directly open the door.

6 Post Installation

6.1 Clean-up

A. Except for necessary modifications directly related to the scope of work, all facilities must be returned to their original condition before work started.
B. Any incidental repair work needed directly related to the work will be carried out at the cost of the contractor unless agreed to in writing before work is performed.
C. Any previous installation marked for demolition as agreed by the contractor and the district must be completed including any patch work and repair to the facility.
D. All new wall outlets must be cleaned of smudges and dust.
E. All Cabinets and Data Closets must be free of debris such as cut wires, metal shavings, and extra parts.
F. Unless otherwise stated, all related unused parts, such as dust-covers, caps, cables, connectors, blanks, and manuals must be returned to the Systems Administration department.
G. All keys that are borrowed for access to the facilities must be returned. If keys are lost, the district has the right to change locks for the affected area at the expense of the contractor.
H. Missing items from facilities after jobs will be investigated
I. Contractors must assure that all doors are properly closed and locked before leaving.
J. Any damages caused by the installation will be repaired at the contractor's expense unless the District is made aware of the likely damage before work and has agreed in writing to waive the contractor from responsibility.

6.2 Deliverables

6.2.1 Software & Software Licenses

A. Any and all software and software licenses that were installed/used as part of this project
   a. Contractor will furnish 1 perpetual video channel and/or server license for each camera installed (if needed).
   b. Contractor will furnish 1 annually renewable one-year video channel and/or server license software support agreements for each camera installed.
   c. Contractor will furnish 1 server license for each new server deployed
   d. Contractor will furnish Microsoft Windows 2019 standard core license for each new server deployed appropriately licensed for the number of CPU cores the server has.

6.2.2 Parts and Hardware

6.2.2.1 Unused Parts and Hardware

All unused parts and hardware including any parts and hardware that was removed and not reused during the course of the project need to be returned to the Systems Administration department.

6.2.2.2 Failed Parts and Hardware

Unless otherwise specified all failed parts and hardware not covered under warranty need to be returned to the Systems Administration department.

6.2.3 Documentation

6.2.3.1 As-built Drawings

As-built drawings showing path used and switch port information required.

6.2.3.2 Manuals

One set of manuals and install guides for each type hardware and equipment installed.

END OF SECTION

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Intrusion Alarm System

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CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1. General

1.1 Introduction

The district has adopted the DMP Entre Access & Security Management System as its intrusion alarm system; any solution provided must be compatible and integrate with this existing system and act as one seamless system or replace the existing system district wide. It is the intent of this system to be centrally managed of arming/disarming the system as well as monitoring for trouble events and alarms.

1.2 General Requirements

A. Any discrepancies between this document, the drawings, and the physical site or any part or method specified that is not optimal for the application listed must be brought to the attention of the District's Systems Administration department. Installation of approved parts in a sub-optimal usage will be considered to not meet these specifications.

B. All of the electronic systems equipment shall be furnished and installed by the authorized manufacturer's distributor or installer of the equipment and shall include evidence of this authorization in their proposal.

C. The entire alarm system shall be installed by a single contractor. If subcontractors are used, they will perform work as an agent of the primary contractor and such work will be the responsibility of and warranted by the primary contractor. Upon notification by the District of a failure, the Contractor shall repair or replace components that no longer fall within the specifications set by the manufacturer.

D. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

1.3 Substitutions

Parts and software may be substituted with equivalent products providing that the vendor can show that the product is equivalent. If a substitution item is given final acceptance by the Systems Administration department, the contractor shall pay all costs (including travel, lodging, meals, computers, etc.) required to provide factory certification, equal to that of a factory authorized distributor of the substituted item, for at least two selected District representatives. This training will be provided by the manufacture of the substituted item in question and shall allow the selected District

representatives to provide any and all factory/manufacturer approved repairs, services, software upgrades, etc., without affecting any available or applicable manufacturer warranties.

2 Quality Assurance Standards

2.1 Requirements of Regulatory Agencies

A. Furnish security equipment to comply with the requirements of laws, codes, ordinances, and regulations of the governmental authorities having jurisdiction where such requirements exceed the requirements of the Specifications.
B. Furnish security equipment to comply with the requirements of American National Standards for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People (ICC/ANSI A117.1), the governmental authority having jurisdiction and to comply with Americans with Disabilities Act.

2.2 Contractor qualifications

A. Trained, authorized, and certified to install the specified products.
B. Has a minimum of five years of system design, engineering supervision, and installation experience in the alarm industry.
C. Will maintain a fully staffed local office within 60 miles of the work site. The service center will be staffed by factory-trained technicians.
D. The contractor must maintain an inventory of spare parts and other items critical to system operation and as necessary to meet the emergency service requirements for warranty service, within the local service center.
E. Must have engineering and project management capability consistent with the requirements of this project. The contractor shall provide a project manager who is actively involved in the project. This person shall be the same individual throughout the course of the project and shall be the person responsible for the scheduling of the system programming, preparation of the operation and maintenance manuals, training programs, documentation and system testing, maintenance of Drawings and the coordination of all subcontract labor. The District reserves the right to approve the contractor's Project Manager.
F. Must abide by and adhere to all Drug Free School Zone laws and participate in a drug-free workplace program.

2.3 Pre-Installation Conference

Prior to work commencing, a conference between the contractor and the Systems Administration department shall take place to review materials and procedures and to coordinate related work.

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2.4 Warranty

A. All components shall be supplied with a minimum one-year warranty against defects in materials and workmanship, commencing upon approval of the notice of completion of the project.
B. During the system warranty period, software and firmware updates are to be made available to District at no charge.

3 Typical Components

The following list of components is current as of revision date of this specification. Part numbers may be changed by the manufacturer at any time. Please substitute the appropriate replacement part as needed or coordinate with the District to assure the correct parts used.

3.1 Cabling

Cables shall be UL listed, complying with California Electrical Code and ETL verified to meet or exceed specified requirements. All cables will be rated for the space that they are installed and must be copper conductors; copper-clad aluminum is not allowed. Cables installed in underground conduit will be OSP loose tube gel filled with rated jacket. Cable gauges outlined below are the minimum gauge allowed. Cable must be properly sized to account for current and voltage drop requirements.

3.1.1 Typical Cable Types

A. 22 gauge AWG, 4 conductor (“22/4”) unshielded cable using standard alarm colors Black, Red, White, and Light Green
B. 20 gauge AWG, 12 conductor (“20/12”) unshielded cable using standard alarm colors Black, Red, White, Light Green, Orange, Light Blue, Brown, Yellow, Violet, Gray, Pink, and Tan.

3.2 Alarm Enclosure & Power Supply

A. 352P-G DMP Extra-large panel enclosure with 505-12 Power Supply

3.3 Power Distribution Board

A. PD16W Altronix – 16 Fused Outputs Power Distribution Module

3.4 Alarm Panel

A. XR150 DMP Dialer & Network Panel no Enclosure (See 3.2 for Enclosure)
B. XR550 DMP Dialer & Network Panel no Enclosure (See 3.2 for Enclosure)

3.5 Zone Expander

A. 714-16PCB DMP 16 Port Zone Expansion Module
B. 714-18T DMP 4 Zone Loop Expander with Built in Terminal Strip

3.6 Key Pad

A. DMP-7060-I Keypad Ivory

3.7 Motion Detector

C.	BSH-DS9370	Bosh DS9370, Ceiling Mount (360 motion)
D.	ISC-PDL1-WAC30G	Bosh Detector anti-mask, 100ft (30m)
E.	ISC-CDL1-W15G	Bosh Motion detector, 50ft (15m)

3.8 Door Contact

A.	1078W/1076W	GE Steel Door Contact
B.	ISN-C66	Overhead door contact, track mount
C.	ISN-CMET-200AR	Bosch Armored Contact
D.	ISN-C60-W	Bosch Slim Terminal Connection Contacts

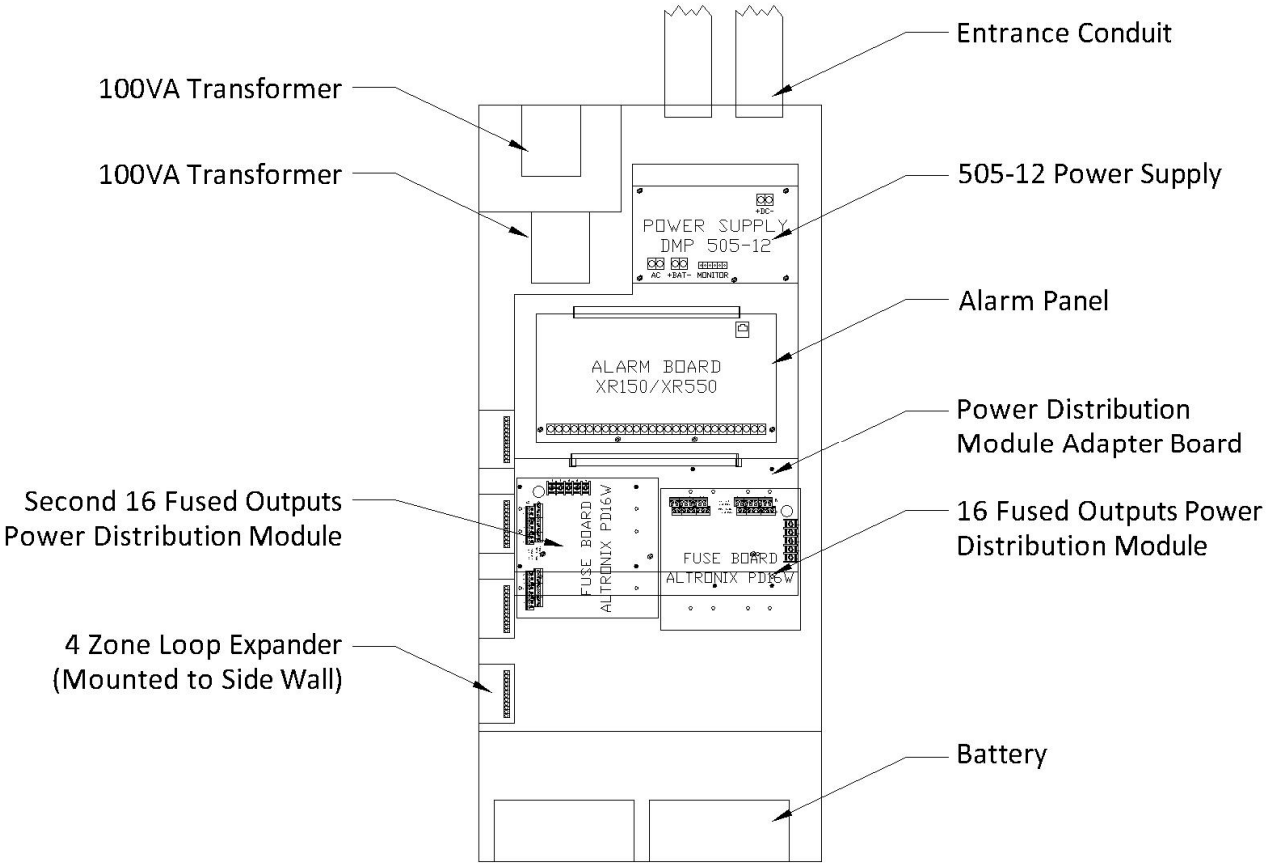
4 Hardware Installation

The contractor shall furnish and install all hardware, devices, and components to meet the performance and functional requirements described in these contract documents. Include all items required, whether or not individually specified, to ensure a completely operational Integrated Alarm System. The contractor must complete all database entry and system programming. No additional costs shall be allowed to make the system operational or to meet specifications.

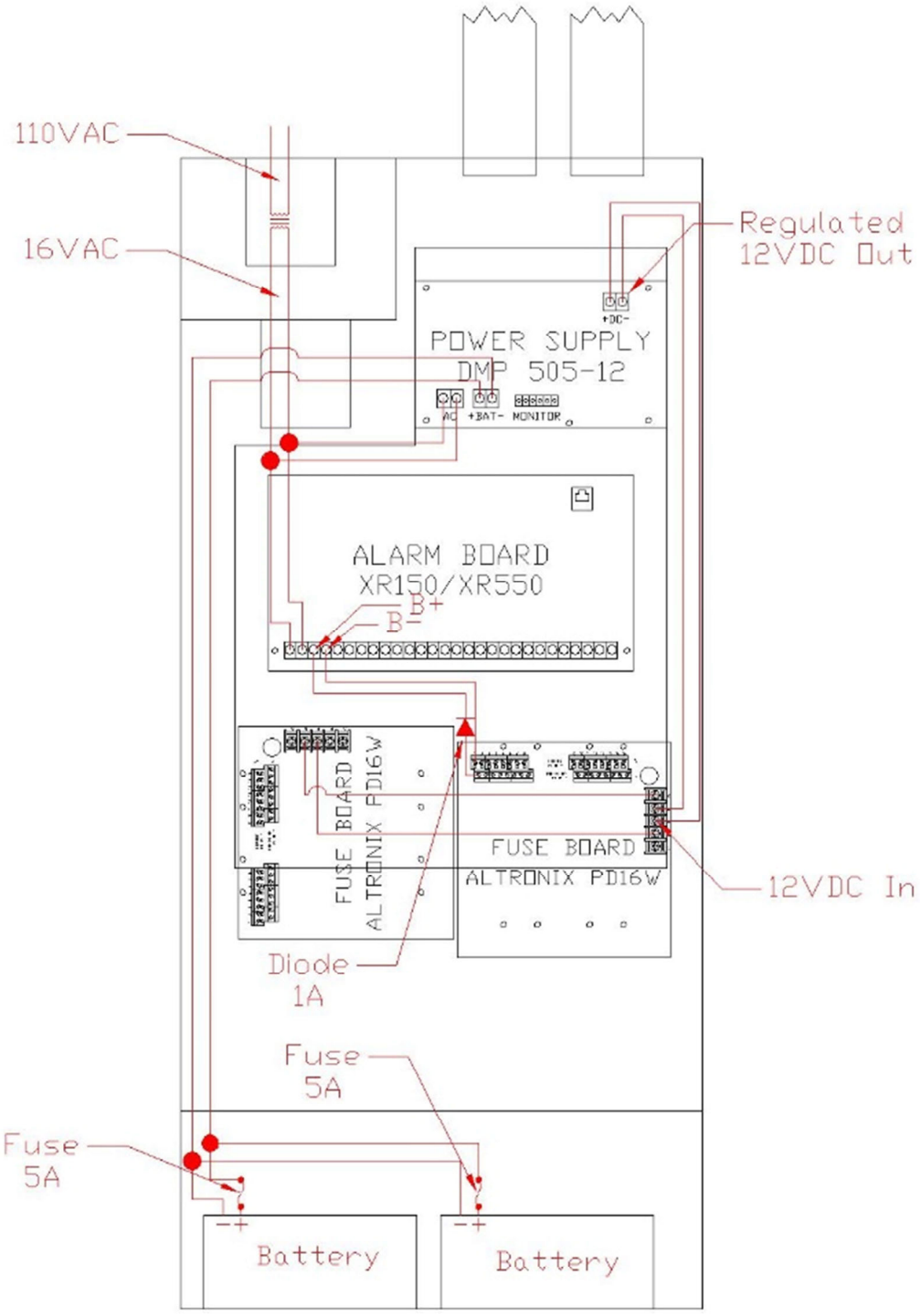
4.1 Low Voltage/Communication Cabling

A. All cabling will be installed to the specifications outlined in the District's Communications Cabling Specification Division 270000 and related sections.
B. All exposed cable must be in conduit. Conduits are optional above 10' in a limited-access room (e.g., Electrical or Mechanical rooms).
C. All cables must have a minimum of a 5' service loop on the Alarm Panel side.
D. All cables must have a minimum of a 10' service loop on the device side (e.g. Motion Detector, Door Contact, Keypad, etc.)
E. Cable Termination
    a. Where wires are to be spliced together, gel-filled bean-type connectors are to be used. Wirenuts are not acceptable.
    b. When connecting to devices that have connectors already on the cable, the corresponding pigtail connector shall be used. Modifying the device cable to remove the connector is not allowed.

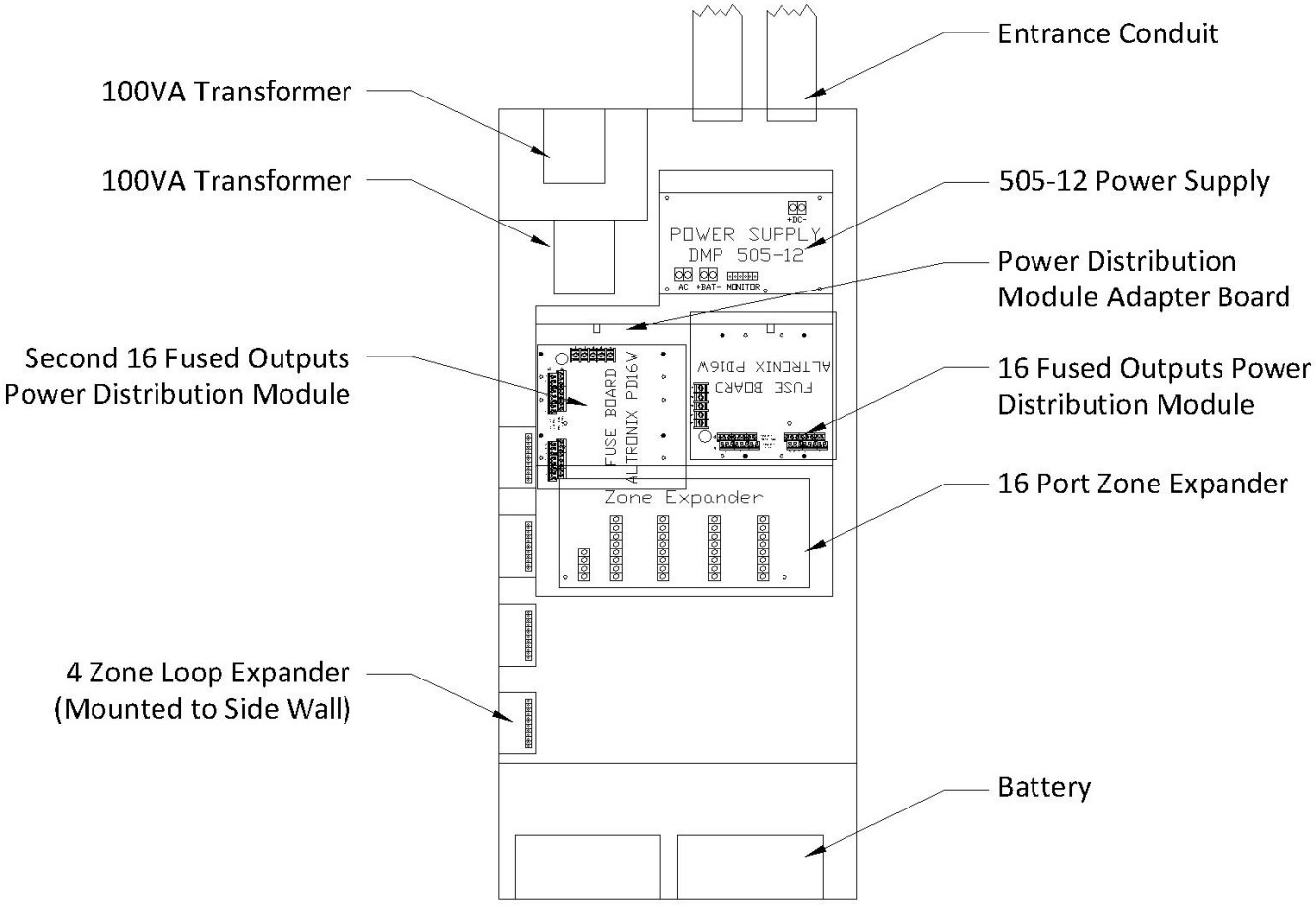
4.2 Alarm Enclosure Layout



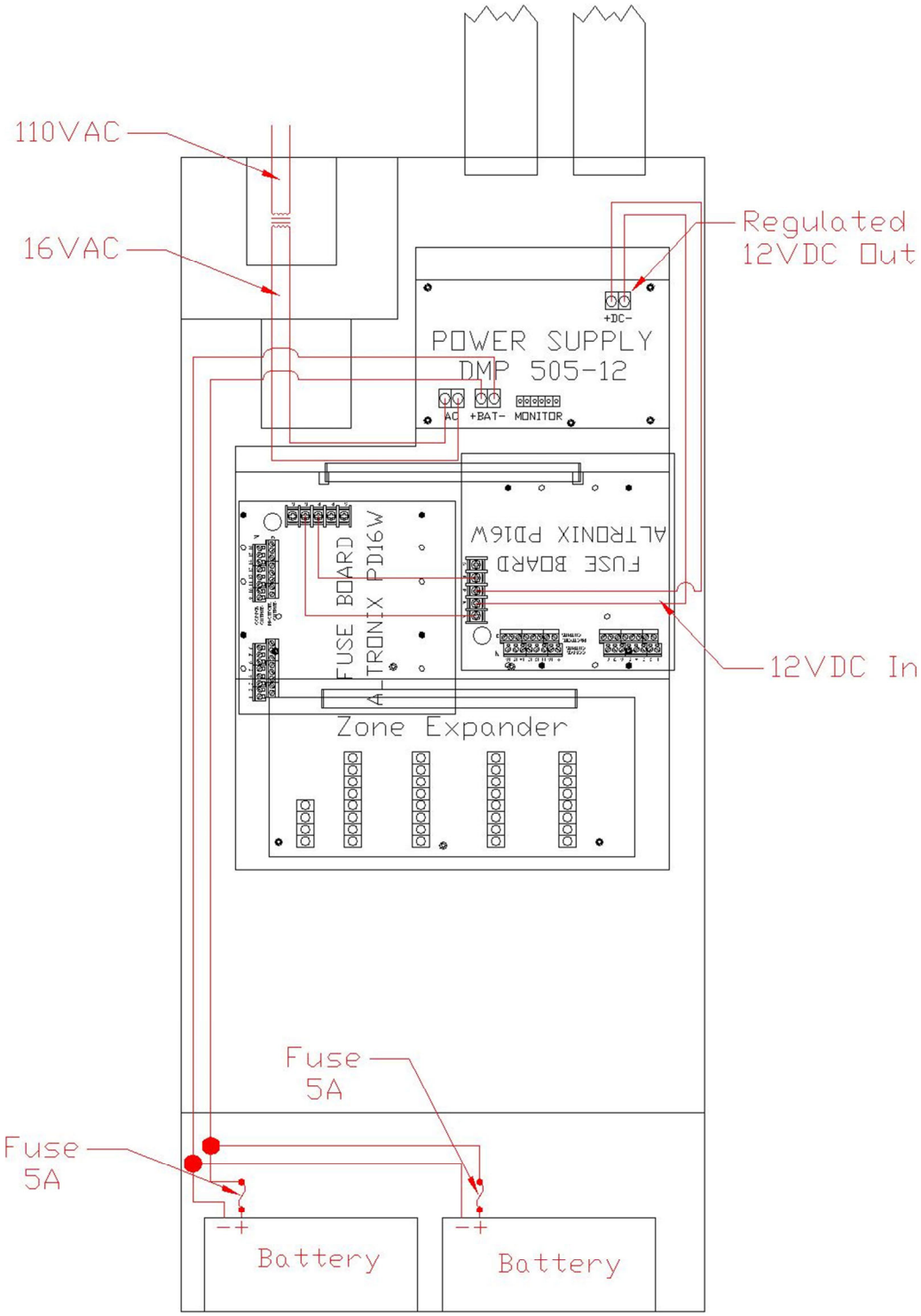
4.3 Alarm Enclosure Power Wiring



4.4 Alarm Expansion Panel Layout



4.5 Alarm Expansion Panel Power Wiring



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4.6 Alarm Enclosure & Power Supply
Power supplies are used to power the Alarm Panel, motion detectors and any accessories, as needed.

A. Enclosure must be installed so that the door to the cabinets can be opened completely (90 degrees or more) and have at least 3' of clearance in front and 1' of clearance on at least one side. Enclosure must not interfere with the opening of any other surrounding equipment.
B. Enclosure must be mounted so the top of the enclosure is less than 10’ off the floor and the bottom of the enclosure is at least 1’ above the floor.
C. Enclosure must be mounted at least 4” below the ceiling.
D. Painted backboards shall be installed for surface-mounted panels. If the backboard is attached to drywall, it must span at least two studs.
E. Enclosure will be installed adjacent the closest IDF unless otherwise directed to by the District’s Systems Administration department.
F. Input power must be hardwired on a dedicated 120V circuit. Load permitting, sharing the circuit used for the IDF and/or Access Control panel is acceptable unless otherwise specified.
G. Exposed conduits and raceways for input power must be EMT or Ridged. Armored Cable, Metal Clad Cable and Flexible Metal Conduit Power are only approved for use above T-bar celling. Conduits and raceways must be secured per California Electrical Code requirements and painted to match wall directly behind them.

4.7 Distribution Board
Power Distribution Board will be mounted inside the Alarm Enclosure to an adapter board; see sections 4.2 through 4.5 for mounting location and wiring directions. Mounting Power Distribution Board directly to the Alarm Enclosure & Power Supply is forbidden. Power Distribution Board will receive its power from the regulated 12VDC output of the Power Supply.

4.8 Alarm Panel
Alarm Panel will be mounted inside of the Alarm Enclosure & Power Supply. See section 4.2 for mounting location.

A. Every Alarm Panel must have one Ethernet network port in the enclosure (typically installed in a biscuit) connected to the nearest IDF and terminated on the patch panel.
B. Panel must be connected to the District’s network and have a reserved IP address on the network as provided by the Systems Administration department.
C. Alarm Panel battery terminals will be hooked up to the Power Distribution Board as outlined in section 4.3.
D. Battery trouble on power supply must be wired to contact 10 with a 3.3K resistor

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4.9 Expansion Panel

16 Port Zone Expander Module will be mounted inside of the Alarm Enclosure & Power Supply. See section 4.4 for mounting location.

A. Wiring from 16 Port Zone Expander Module to the Alarm Panel must be one continuous run back to the Alarm Enclosure & Power Supply with at least 22/4 unshielded cable. For runs over 500' a 18/4 unshielded cable will be used. Runs over 1000' are not permitted.
B. Unless otherwise noted every Expansion Panel will be landed on a dedicated LX bus on the Alarm Panel.
C. Battery trouble on power supply must be wired to the last contact on the last zone expander with a 1K resistor

4.10 Keypad

A. Keypad should be mounted so that the center of the keypad is at 52 inches. Keypad must be mounted so that the top of the keypad is no higher than 58 inches and the bottom is no lower than 48 inches.
B. Keypad will be mounted by the door of the nearest classroom or office unless otherwise specified.
A. Wiring for Keypad should be run within the wall whenever possible. When not possible keypad will be mounted to a DMP 695 Conduit Backbox and a raceway will be installed to the point where the cable is no longer exposed.
C. Wiring from Keypad to the Alarm Panel must be at least 22/4 unshielded cable.

4.11 Zone Expander

A. Up to six Zone Expanders will be mounted inside the Alarm Enclosure & Power Supply on the side of the enclosure. See section 4.2 for mounting location.
B. Zone Expander will be secured to the inside the Alarm Enclosure & Power Supply using Velcro with a VHB adhesive backing.
C. If Zone Expander does not have screw terminals, then for every Zone Expander an eight-positon Eurostyle terminal strip will also be installed. The wires from the Zone Expander will be landed on the terminal strip in order of zone number.

4.12 Alarm Sensors

Alarm sensors include any device that is capable of triggering an alarm in the system. Devices include but are not limited to Motion Detectors, Door Contracts, Glass Break Detectors and Leak Detectors.

A. Wiring from Alarm Sensor to the Alarm Panel or Consolidation Point must be one continuous run with at least 22/4 unshielded cable or greater gauge. Heavier gauge wire may be required to reduce voltage drop or higher current needs. It is up to the contractor to identify situations that require heavier gauge wire.

B. Every Alarm Sensor must be configured for its own zone unless otherwise directed by the District's Systems Administration department.
C. Each zone will be terminated with a 1k end of line resistor (EOL) wired in parallel and located at the Alarm Sensor.
D. Alarm Sensors must be landed on the Alarm Panel or Zone Expander in a logical and consistent manor.
E. Devices requiring power such as Motion Detectors or Glass Break Detectors must be landed on a dedicated port on the Power Distribution Board that corresponds to their zone number.

4.12.1 Motion Detector

A. Every room with exterior doors or windows must have a Motion Detector.
B. Motion Detectors will be of the 360 degree celling mount type and mounted in the center of the room unless otherwise specified.

4.12.2 Door Contact

A. Door Contracts may be used in lieu of Motion Detectors in rooms that do not have any windows such as custodial, storage, mechanical, or electrical rooms or as approved by the Systems Administration department.
B. Door Contacts located in areas other than custodial, storage, mechanical, or electrical rooms must be armored cables running back to a J-box where the splice will be made. If cable is unable to be installed in the wall a raceway will be installed to the point where the cable is no longer exposed.

5 Programming

Contractor is responsible for programming all newly-installed hardware and making sure that all devices and panels follow the established naming convention.

5.1 Naming Conventions

A. Areas: <Site> <Location> (e.g., Cortez Building A)
B. Zones: <Site> <Room> (e.g., Cortez Classroom A101)
C. Keypads: <Site> Keypad <Room> (e.g., Cortez Keypad Classroom A101)

5.2 Alarm Panel Configuration

A. New Alarm Panels will be configured with the IP address provided by the Systems Administration Department and added into SMS Enterprise.
B. Account Number provided by District's Systems Administration department.
C. Programing includes setting up Areas, Zones, Remote Options, System Options, Devices, and programing codes.
    - Remote Options:

        - Remote Disarm = Enabled
    - System Options:
        - Reset Swinger Bypass = Enabled
        - Swinger Bypass Trips = 0
        - Power Fail Delay = 0
        - GMT = 8
    - Bell Options:
        - Cuttoff = 5

D. New Zones will be added to the Alarm Panel and follow the Naming Conventions outlined in section 5.2.

5.3 Zone Configuration

- Output Action for Monitored Zones (Motions, Door Contacts, Etc)
    - DO (Disarm Open) = None
    - DS (Disarm Short) = Trouble
    - AO (Armed Open) = Alarm
    - AS (Alarm Short) = Alarm
- Output Action for Supervisory Contacts (Power Supply, Battery Zones, Etc)
    - DO (Disarm Open) = Trouble
    - DS (Disarm Short) = Trouble
    - AO (Armed Open) = Trouble
    - AS (Alarm Short) = Trouble

5.4 Entre Configuration

District's Systems Administration department will be responsible for adding all of the new Zones into Entre once the project has been completed, unless otherwise specified.

6 Labeling

6.1 Wires

A. All wires must be clearly labeled with a typed laminated wraparound label to clearly identify the other end.
B. Labels should be located approximately 6" from the end of the outer jacket of the wire.

6.2 Enclosures

The following information will be clearly labeled on the inside of all enclosures:

A. Any wiring diagram stickers supplied shall be installed on the inside of the enclosure.
B. Alarm Panel: IP Address of Alarm Panel.
C. Power Supply: Electrical panel and circuit that the Power Supply receives power from.

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7 Testing and Acceptance

7.1 Contractor On-Site Testing

Contractor shall functionally test and certify each component in the system after installation to verify proper operation and confirm that the wiring and installation conforms to District's Alarm Specifications or manufacture's best practices, whichever is stricter.

7.2 District Test and Inspection

Once the Contractor has finished the On-Site Testing, the District Systems Administration department will walk the site with the Contractor and functionally test and inspect select components in the system after installation to verify proper operation, confirm that the wiring and installation conforms to District's Alarm Specifications or manufacture's best practices (whichever is stricter), and generate a punch list, if necessary.

7.3 Final Test and Inspection

Once the contractor has finished correcting all of the issues identified on the punch list, the District Systems Administration department will walk the site with the Contractor and perform a final test and inspection of the system.

7.4 Operational Demonstration

At the request of the District, contractor will provide an Operational Demonstration to demonstrate any new features and functionality.

7.5 Acceptance Requirements

A. Receipt of final documentation.
B. Successful Final Test and Inspection.
C. Successful Operational Demonstration Test.
D. Successful training and demonstration, including operation of systems using the manuals.
E. Purging of Contractor User privileges and return of all key card media.

8 Post Installation

8.1 Clean-up

A. Except for necessary modifications directly related to the scope of work, all facilities must be returned to their original condition before work started. Any damages caused by the installation will be repaired at the contractor's expense unless the District is made aware of the likely damage before work and has agreed in writing to waive the contractor from responsibility.
B. Any incidental repair work needed directly related to the work will be carried out at the cost of the contractor unless agreed to in writing before work is performed.

C. Any previous installation marked for demolition as agreed by the contractor and the district must be completed including any patch work and repair to the facility.
D. All new wall outlets must be cleaned of smudges and dust.
E. All Cabinets and Data Closets must be free of debris such as cut wires, metal shavings, and extra parts.
F. Unless otherwise stated, all related unused parts, such as dust-covers, caps, cables, connectors, blanks, and manuals must be returned to the Systems Administration department.
G. All keys that are borrowed for access to the facilities must be returned. If keys are lost, the district has the right to change locks for the affected area at the expense of the contractor.
H. Contractors must assure that all doors are properly closed and locked before leaving.

8.2 Deliverables

8.2.1 Software & Software Licenses

Any and all software and software licenses that were installed/used as part of this project

8.2.2 Parts and Hardware

8.2.2.1 Keys

All of the keys for all hardware with a lock, including power supplies, alarm panels, and reader interface panels.

8.2.2.2 Unused Parts and Hardware

All unused parts and hardware including any parts and hardware that was removed and not reused during the course of the project must be returned to the Systems Administration department.

8.2.2.3 Failed Parts and Hardware

Unless otherwise specified all failed parts and hardware not covered under warranty must be returned to the Systems Administration department.

8.2.3 Documentation

8.2.3.1 Alarm Panels

A spreadsheet including the following:

A. Site and Room where panel is located
B. IP Address Assigned to the Panel

8.2.3.2 Zone Map

A site map outlining the following items for every zone:

A. Location
B. Zone Number

C. Zone Name

8.2.3.3 Manuals

One set of manuals and install guides for each type hardware and equipment installed.

SECTION 28 50 00
PUSD - Specialized Systems

Version 2022.08.25

CONTRACTOR TO FOLLOW THESE SEPECIFICATION FOR ALL PRODUCTS & INSTALLATION REQUIRED FOR THE PROJECT AND TO COORDINATE WITH DISTRICT'S ITS – SYSTEMS ADMINISTRATION PERSONNEL PRIOR TO START OF WORK

1. General

1.1 Introduction

The district utilizes many specialized systems this section is designed to detail requirements for specific systems not covered in other areas and to act as a catch all for special systems not specifically listed within this document.

1.2 General Requirements

A. Any discrepancies between this document, the drawings, and the physical site or any part or method specified that is not optimal for the application listed must be brought to the attention of the District's Systems Administration department. Installation of approved parts in a sub-optimal usage will be considered to not meet these specifications.

B. All of the electronic systems equipment shall be furnished and installed by the authorized manufacturer's distributor or installer of the equipment and shall include evidence of this authorization in their proposal.

C. The entire system shall be installed by a single contractor. If subcontractors are used, they will perform work as an agent of the primary contractor and such work will be the responsibility of and warranted by the primary contractor. Upon notification by the District of a failure, the Contractor shall repair or replace components that no longer fall within the specifications set by the manufacturer.

D. Contractor is responsible for complying with all Division 27, and Division 28 sections and requirements in their entirety. For list of all Division 27, and Division 28 sections see section 1.3 of 27 00 00. If section 27 00 00 was not provided contact Pomona Unified School Districts ITS Systems Administration Department to receive complete copy of the Division 27, and Division 28 sections.

1.3 Substitutions

Parts and software may be substituted with equivalent products providing that the vendor can show that the product is equivalent. If a substitution item is given final acceptance by the Systems Administration department, the contractor shall pay all costs (including travel, lodging, meals, computers, etc.) required to provide factory certification, equal to that of a factory authorized distributor of the substituted item, for at least two selected District representatives. This training will be provided by the manufacture of the substituted item in question and shall allow the selected District representatives to provide any and all factory/manufacturer approved repairs, services, software upgrades, etc., without affecting any available or applicable manufacturer warranties.

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2 Quality Assurance Standards

2.1 Requirements of Regulatory Agencies

A. Furnish security equipment to comply with the requirements of laws, codes, ordinances, and regulations of the governmental authorities having jurisdiction where such requirements exceed. Standards include, but are not limited to:
    a. NEC/NFPA
    b. TIA 568-C
    c. TIA 569
    d. TIA 607
B. Furnish security equipment to comply with the requirements of American National Standards for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People (ICC/ANSI A117.1), the governmental authority having jurisdiction and to comply with Americans with Disabilities Act.

2.2 Contractor qualifications

A. Trained, authorized, and certified to install the specified products.
B. Has a minimum of five years of system design, engineering supervision, and installation experience in the access control industry.
C. Will maintain a fully staffed local office within 60 miles of the work site. The service center will be staffed by factory-trained technicians.
D. The contractor must maintain an inventory of spare parts and other items critical to system operation and as necessary to meet the emergency service requirements for warranty service, within the local service center.
E. Must have engineering and project management capability consistent with the requirements of this project. The contractor shall provide a project manager who is actively involved in the project. This person shall be the same individual throughout the course of the project and shall be the person responsible for the scheduling of the system programming, preparation of the operation and maintenance manuals, training programs, documentation and system testing, maintenance of Drawings and the coordination of all subcontract labor. The District reserves the right to approve the contractor's Project Manager.
F. Must abide by and adhere to all Drug Free School Zone laws and participate in a drug-free workplace program.

2.3 Pre-Installation Conference

Prior to work commencing, a conference between the contractor and the Systems Administration department shall take place to review materials and procedures and to coordinate related work. The locations and orientation of distribution frames, cross-connects, and patch panels in equipment rooms and wiring closets shall also be decided to minimize the impact on other services sharing the space.

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Work done at school sites must be scheduled in advance. Contractors are to inform the ITS department of the scope of work, the area that will be worked in, and the time and date of work. ITS will get authorization from the school administration before the work is scheduled. If contractor attempts to begin work without getting authorization, the school site will be instructed to ask the contractor to leave.

The district will attempt to communicate any safety concerns such as other pending work to the facilities, areas with asbestos, lead or other hazards. If the contractor has such concerns, the district must be notified immediately before the start of work. The District Maintenance and Operations Department shall advise on any needed provisions.

2.4 Warranty

A. All components shall be supplied with a minimum one-year warranty against defects in materials and workmanship, commencing upon approval of the notice of completion of the project.
B. During the system warranty period, system updates are to be made available to District at no charge.

3 Products

3.1 General

Unless otherwise approved in writing by the Districts Systems Administration Department all systems will conform the following minimum standards.

A. Devices will be IP based and comply with established network standards
B. Devices requiring less than 15.4 watts shall have the option to be powered via PoE
C. Device shall utilize a standard RJ45 network connector and shall support auto negotiation of network speed and transfer mode.
D. Device must support external time synchronization from an NTP (Network Time Protocol) server.
E. Device must be covered by a minimum of a 1-year warranty
F. Devices must be in compliance with California's law for IoT device cyber security, California Civil Code Section 1798.91.04.
G. The specified unit shall be of manufacturer's official product line, designed for commercial and/or industrial 24/7/365 use.

3.2 Smoking, Vape Detectors & Noise Detectors

The District utilizes the Halo Smart Sensor 2C manufactured by IPVideo Corporation. Any substitution must be approved in writing by the Districts Systems Administration Department. All devices must meet or exceeded the following requirements:

A. Sensor must be vandal resistant with an IK10 impact rating.
B. All exposed screws must be anti-tamper TORX screws.

C. Must not rely on any form of cloud/hosted service.
D. Must provide adjustable detection and measurement of:
    1. Particulates Size 1 µm particulates µg/m³
    2. Particulates Size 2.5 µm particulates µg/m³
    3. Particulates Size 10 µm particulates µg/m³
    4. Carbon Dioxide
    5. Total Volatile Organic Compounds
    6. Carbon Monoxide
    7. Ammonia
    8. Temperature/Humidity
    9. Sound Levels
    10. Tamper
    11. Vape
    12. Vape THC
    13. Spoken Keyword
    14. Gunshot
    15. Aggression
    16. Masking / Spray Paint
    17. Indoor Air Quality, AQI: Air Quality Index
E. Event functionality
    1. The sensor shall be equipped with an integrated event functionality, which can be triggered by:
        a) Sensor tampering
        b) Manual Trigger/Virtual Inputs
        c) Event threshold met
    2. Response to triggers shall include:
        d) Relays Outputs
            - Wired Normally Open or Closed
            - Rated at 48VDC at 1 amp
        e) Status Light
        f) Speaker
            - Pre-Recorded Files
            - Programmable
        g) Send notification, using API, HTTP, HTTPS, or Email
        h) Identification in data logs

4 Installation

The contractor shall furnish and install all hardware, devices, and components to meet the performance and functional requirements described in these contract documents. Include all items required, whether or not individually specified, to ensure a completely operational integrated Security Management System. No additional costs shall be allowed to make the system operational or to meet specifications.

4.1 General Cabling Requirements

A. All cabling will be installed to the specifications outlined in the District's Communications Cabling Specification Division 27 00 00 and related sections.

4.2 Smoking, Vape Detectors & Noise Detectors

A. Sensor must be installed per the manufactures specifications and in such a manner that they will not be subject to damage/vandalism.
B. Network Connection
    a. Each sensor must be connected to an RJ45 Ethernet network jack located within 1' of the sensor. Network cabling must comply with PUSD Communications and Security Specification Section 27 20 00.
    b. Terminating the horizontal network cable on an RJ-45 plug is expressly forbidden.
    c. Network jack must be accessible through the cutout required for the sensor.
C. Licensing
    a. A CCTV Camera license must be provided for every sensor. Please refer to Section 28 20 00 for the current camera system licensing requirements.

4.3 Other Specialized Systems

All systems not specifically covered by this specification must follow the standards outlined in the PUSD Communications and Security Specifications Division 27 00 00 & 28 00 00. Device installation and configuration requirements must be approved in writing by a PUSD ITS Supervisor prior to work starting.

5 Programming

5.1 General

A. Contractor is responsible for programming all newly-installed hardware and making sure that all devices and panels follow the established naming convention.
B. Network Connection
    a. Each device must be connected to the District's network and have a reserved IP address on the network as provided by the Systems Administration department.
C. All firmware found in products shall be the latest and most up to date provided by the manufacturer.
D. All equipment requiring users to log on using a password shall be configured with individually unique password/passwords. No system/product default passwords shall be allowed.

5.2 Smoking, Vape Detectors & Noise Detectors

A. Sensor must be programed as described by the project manager. Including:
    a. Event thresholds
    b. Event actions

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6 Labeling

6.1 Wires
All wires must be clearly and permanently labeled on both ends identifying the other end. Labeling must follow standard for specific type of cable used as listed in their relevant sections. Labeling shall be done using printed wraparound label. Handwritten labels are not permitted. Cable

7 Testing and Acceptance

7.1 Contractor On-Site Testing
Contractor shall functionally test and certify each component in the system after installation to verify proper operation and confirm that the wiring and installation conforms to District's Specifications or manufacture's best practices, whichever is stricter.

7.2 District Test and Inspection
Once the Contractor has finished the On-Site Testing, the District Systems Administration department will walk the site with the Contractor and functionally test and inspect select components in the system after installation to verify proper operation, confirm that the wiring and installation conforms to District's Specifications or manufacture's best practices (whichever is stricter), and generate a punch list, if necessary.

7.3 Final Test and Inspection
Once the contractor has finished correcting all of the issues identified on the punch list, the District Systems Administration department will walk the site with the Contractor and perform a final test and inspection of the system.

7.4 Operational Demonstration
At the request of the District, contractor will provide an Operational Demonstration to demonstrate any new features and functionality.

7.5 Acceptance Requirements
A. Receipt of final documentation.
B. Successful Final Test and Inspection.
C. Successful Operational Demonstration Test.

8 Post Installation

8.1 Clean-up
A. Except for necessary modifications directly related to the scope of work, all facilities must be returned to their original condition before work started.

B. Any incidental repair work needed directly related to the work will be carried out at the cost of the contractor unless agreed to in writing before work is performed.
C. Any previous installation marked for demolition as agreed by the contractor and the district must be completed including any patch work and repair to the facility.
D. All new wall outlets must be cleaned.
E. All Cabinets and Data Closets must be free of debris such as cut wires, metal shavings, extra part, etc.
F. Unless otherwise stated, all related unused parts, such as dust-covers, caps, cables, connectors, blanks, and manuals must be returned to the Systems Administration department.
G. All keys that are borrowed for access to the facilities must be returned. If keys are lost, the district has the right to change locks for the affected area at the expense of the contractor.
H. Missing items from facilities after jobs will be investigated at the Districts discretion.
I. Contractors must assure facility is secure before leaving.
J. Any damages caused by the installation will be repaired at the contractor's expense unless the District is made aware of the likely damage before work and has agreed in writing to waive the contractor from responsibility.

8.2 Deliverables

8.2.1 Software & Software Licenses

Any and all software and software licenses that were installed/used as part of this project

8.2.2 Parts and Hardware

8.2.2.1 Unused Parts and Hardware

All unused parts and hardware including any parts and hardware that was removed and not reused during the course of the project need to be returned to the Systems Administration department.

8.2.2.2 Failed Parts and Hardware

Unless otherwise specified all failed parts and hardware not covered under warranty need to be returned to the Systems Administration department.

8.2.3 Documentation

8.2.3.1 Manuals

One set of manuals and install guides for each type hardware and equipment installed.

8.2.3.2 As-built Drawings

As-built drawings showing path used and switch port information required.

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SECTION 28 60 00
FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 REQUIREMENTS

A. This performance specification provides the minimum requirements for the Fire Life Safety System. The work provided shall include, but not limited to furnishing all equipment, materials, delivery, labor, documentation, testing, inspections by Inspector of Record (IOR) and services necessary to furnish and install a complete, operational Fire Alarm System.

B. At the time of bid, all exceptions taken to these Specifications, all variances from these Specification and all substitutions of operating capabilities or equipment called for in these Specification shall be listed in writing and forwarded to the District and Engineer. Any such exception, variances or substitutions that were not listed at the time of bid and are identified in the submittal, shall be grounds for immediate disapproval without comment.

1.02 REFERENCES

A. All work and materials shall conform to all applicable Federal, State, and local codes and regulations governing the installation.

B. Fire alarm system, equipment, installation, and wiring materials and methods used shall comply with the following codes and standards:

1. System components proposed in this specification shall be UL listed for its intended use.
2. California State Fire Marshall Listed Components
3. CALIFORNIA CODE OF REGULATIONS (C.C.R.) APPLICABLE CODES AS OF January 1st, 2023

1.03 CONTRACTOR QUALIFICATIONS

A. All work specified in this Section shall be performed (furnished, installed, and connected) by a qualified fire alarm contractor. The fire alarm contractor shall provide the following documentation to show compliance with the contractor qualifications within 7 days after notice of award of contractor.

1. Contractor's License: A copy of the contractor's valid State of California License. The contractor must be licensed in the state of project location and have been incorporated in the business in that state for a minimum of 5 years.
2. Proof of Experience: Proof that the fire alarm contractor has successfully installed a similar system fire detection, evacuation voice and visual signaling control components on a previous project of comparable size and complexity. Provide a statement summarizing any pending litigation involving an officer or principal of /or the company, the nature of the litigation and what effect the litigation may carry as it relates to this work in the worst-case scenario. Non-disclosure of this item, if later discovered, may result, at the owner's discretion, in the contractor bearing all costs and any cost related to associated delays in the progress of the work.
3. Insurance Certificates: Copy of fire alarm contractor's current liability insurance and state industrial insurance certificates in conformance with the contract document.
4. Service Capability: The fire alarm contractor shall have in-house engineering, installation, and service personnel with a maintenance office within 50 miles of the project location.
5. Authorization Letters: Letters from the fire alarm equipment manufacturer (EST) stating that the fire alarm contractor is a Factory Authorized Distributor and is trained and certified

for the equipment proposed on this project and is licensed to purchase and install the software and programming required to provide the specified functions.

6. Certifications:

    a. Documentation that the fire alarm contractor has on staff personnel factory-trained and certified for the EST equipment proposed for this project.

1.04 SCOPE OF WORK

A. Provide new FA devices & programming to existing EST -3 FA system as indicated on the drawings and specifications related to HVAC Retrofit project. The existing EST-3 system is DSA approved & certified. New Devices added to existing system are as identified on the drawings and Fire Alarm Submittals. Provide complete programming and update existing EST -3 FACP program with hardware & software updates as required at school control panel's & Fire Works at District Security office. Validate & confirm that entire system is programmed and annunciated. Provide NFPA 72 completion certificate (all forms are attached to the specifications).

B. Fire Watch Provisions

1. Fire watch will be provided by the District in accordance with specific requirements by the State Fire Marshall Guidelines.

C. Operation of buildings. All buildings are provided with existing EST-3 fire control panels installed as specified on the drawings and specifications. All peripherals connected to the EST-3 Fire Alarm Control Panels(s) communicates on the District's LAN network to existing EST Graphics works station located at District's security office. Provide all programming required for EST-3 control panel(s) and all peripherals to communicate with the existing EST Fireworks system via District's LAN network.

D. The system supplied under this specification shall be a microprocessor-based direct wired, multi-priority peer-to-peer networked system. The system shall utilize independently addressed microprocessor-based smoke detectors, heat detectors, and modules as described in this specification. It shall be complete with all necessary hardware, software and memory specifically tailored for this installation. It shall be possible to permanently modify the software on site by using a plug-in programmer.

E. The fire alarm scope of work shall consist of the following minimum requirements.

1. Fire Control Panels and Annunciators **(Re Use Existing System)**

    a. Existing Fire alarm control panel is provided at location as indicated on the drawings.
    b. A remote LCD annunciator are provided at the main office as indicated. The annunciator reports the activity of all buildings.
    c. All existing FACP and remote data gathering panels completes the "network" between all areas of the School building(s) allowing for common monitoring and control by the EST-3 system.

2. Initiating Devices

    a. All initiating devices shall be new addressable devices as specified. Any conventional initiating devices utilized shall have individual addressable monitor modules provided for each conventional device for unique addressing and annunciation.
    b. Smoke detectors (Existing).
    c. Multi sensor Smoke & CO detectors where indicated on the drawings: EST SIGA -OSCD with SIGA -AB4GT Audible (sounder) base for CO & Fire Detectors) & SIGA TCDR (temporal Pattern Generator). (Existing).
    d. Multi sensor Heat & CO detectors where indicated on the drawings: EST SIGA - HCD with SIGA -AB4GT Audible (sounder) base for CO & Fire Detectors) & SIGA TCDR

(temporal Pattern Generator). (Existing).
e. Manual pull stations (Existing).
f. Shut down of HVAC units activated by the RIBU1C 10-amp relays rated for 30VAC/DC/120VAC, relay activated by the full coverage area smoke detection system. (existing)
g. SIGA CR Control Relay modules where indicated on the drawings. (Existing)
h. Provide new monitor modules for Fire Sprinkler system PIV/DDCV, Flow & Tamper switches Model EST-3 SIGA CT2 and connect to FA system.
i. Provide 10" 24 V fire sprinkler bell EST 439D-10 AWR (Red) with EST- 3 SIGA CC1 Input Signal module and connect to FA system.

3. Notifications Devices: **Re Use Existing.**

   a. Temporal Horns.
   b. Strobes.

4. Booster Power Supplies **Re Use Existing**
5. Other device/controls shall be added as follows.

   a. Interface and provide air-handling systems shutdown control. An addressable control relay shall be provided for each air handler unit.
   b. Interface and provide non-managed smoke damper shutdown. Provide addressable control relays at each electrical panel where smoke dampers are powered.

1.05 SEQUENCE OF OPERATIONS

A. General Alarm Operation: Upon alarm activation of any area smoke detector, duct smoke detector, heat detector, manual pull station, sprinkler water flow, the following functions shall automatically occur:

1. The internal audible device shall sound at the control panel or command center.
2. The LCD Display shall indicate all applicable information associated with the alarm condition including zone, device type, device location and time/date.
3. All system activity/events shall be documented on the system printer.
4. Any remote or local annunciator LCD/LED's associated with the alarm zone shall be illuminated.
5. EST Fireworks (Provide programming of EST-3 control panel at each school site to annunciate and monitor at existing District remote Fireworks station.

   a. Display the address of the alarm or off normal point with type and description and time of the event in a prioritized color-coded event list. Highlighting an event in the event list shall automatically cause the other three quadrants (described below) to display information relating to the highlighted event.
   b. Display color graphical representation of the area in which the alarm or off normal device is located. It shall be possible for the operator to manually zoom down to any portion of a vector-based graphic without aliening, artificing, or pixilation of the image. Preset zoom levels shall not be considered equal.
   c. Display a set of written operator instructions for each point.
   d. Log operator's comments for each event to history with time and date.
   e. Log all events and operator actions to history for future review.

6. The following notification signals and actions shall occur simultaneously:

   a. A signal shall be sounded on fire floors (zones). The signal shall be a Temporal 3 tone.
   b. Activate visual strobes on the fire floors (zones). The visual strobe shall stop operating when the "Alarm Silence" is pressed.

7. Transmit signal to the building automation system (if applicable) and/or shutdown all HVAC units serving the floor of alarm.

8. Transmit signal to the central station with point identification.
9. All self-closing fire/smoke doors held open shall be released.
10. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.

B. Supervisory Operation: Upon supervisory activation of any sprinkler valve supervisory switch, fire pump off-normal, clean agent fire suppression system trouble, the following functions shall automatically occur:

1. The internal audible device shall sound at the control panel or command center.
2. The LCD display shall indicate all applicable information associated with the supervisory condition including zone, device type, device location and time/date.
3. All system activity/events shall be documented on the system printer.
4. Any remote or local annunciator LCD/LED's associated with the supervisory zone shall be illuminated.
5. Transmit signal to the central station with point identification.

C. Monitor Activation: Upon activation of any device connected to a monitor circuit (fire pump/emergency generator status), the following functions shall automatically occur:

1. The LCD display shall indicate all applicable information associated with the status condition including zone, device type, device location and time/date.
2. All system activity/events shall be documented on the system printer.
3. Any remote or local annunciator LCD/LED's associated with the status zone shall be illuminated.

1.06 SYSTEM PARAMETERS

A. Standby power (Re Use Existing)

1. The standby power supply shall be an electrical battery with capacity to operate the system under maximum supervisory load for twenty-four (24) hours and capable of operating the system for five (5) minutes of evacuation alarm on all devices, operating at maximum load. The system shall include a charging circuit to automatically maintain the electrical charge of the battery. The system shall automatically adjust the charging of the battery to compensate for temperature.

B. Voltage Drop

1. The point-to-point Ohm’s Law voltage drop calculations of all alarm system circuits shall not exceed 8%.

C. Spare Capacity (existing)

1. The system shall be engineered to accommodate 25% spare capacity on each individual loop, and 25% spare on system power supplies.

D. Circuiting

1. Initiating Device Circuits

a. Where necessary, conventional initiating device circuits (i.e., water flow switches, valve supervisory switches, fire pump functions, etc.) shall be Class B (Style "B").

2. Notification Appliance Circuits

a. All notification appliance circuits shall be Class B (Style "Y"). The notification circuits shall be power limited. Non-power limited circuits are not acceptable.

3. Signaling Line Circuits: Addressable Analog Devices

    a. The signaling line circuit connecting to addressable/analog devices including, detectors, monitor modules, control modules, isolation modules, intrusion detection modules and notification circuit modules shall be Class B (style 4).
    b. Each addressable analog loop shall be circuited so device loading is not to exceed 80% of loop capacity in order to leave for space for future devices.

4. Signaling Line Circuits: Data & Audio for FACP & Annunciator Network

    a. The signaling line circuit connecting network panel/nodes, annunciators, command centers, shall be Class A (style 7). The media shall be copper except where fiber optic cable is specified on the drawings.

1.07 SUBMITTALS

A. General

1. It is the responsibility of the contractor to meet the entire intent and functional performance detailed in these specifications.
2. The proposed equipment shall be subject to the approval of the Engineer/District.
3. Approved submittals shall only allow the contractor to proceed with the installation and shall not be construed to mean that the contractor has satisfied the requirements of these specifications.

B. Equipment Submittal

1. Provide a list of all types of equipment and components provided. This shall be incorporated as part of a Table of Contents, which will also indicate the manufacturer’s part number, the description of the part, and the part number of the manufacturer’s product datasheet on which the information can be found.
2. Provide manufacturer's ORIGINAL printed data sheets with the printed logo or trademark of the manufacturer for all equipment. Photocopied and/or illegible product data sheets shall not be acceptable.
3. Indicated in the documentation will be the type, size, rating, style, and catalog number for all items proposed to meet the system performance detailed in this specification.
4. Current CSFM listing sheet for each component.
5. Letter or Certificate from the fire alarm manufacturer stating that the fire alarm contractor is an authorized distributor of the specified product.
6. Submit a copy of the system supplier's training certification for the specified product issued by the manufacturer of the integrated life safety system.
7. Equipment submittals and other documentation shall be incorporated bound with the above information indexed and tabbed for quick reference.

C. Shop Drawings

1. A complete set of shop drawings shall be supplied. The shop drawings shall be reproduced electronically in digital format. This package shall include but not be limited to:

    a. All drawings and diagrams shall include the contractor's title block, complete with drawing title, contractor's name, address, date including revisions, and preparer's and reviewer's initials and DSA application number and District File Number.
    b. Classification per building Ex: Manual, Automatic, etc.,
    c. Sequence of Operations Schedule.
    d. Typical Fire Penetration detail showing methods and codes used.
    e. Complete system bill of material with peripheral device back box size information, part numbers, device mounting height information.
    f. Detailed system operational description. Any Specification differences and deviations

shall be clearly noted and marked.

g. A riser diagram that individually depicts all control panels, annunciators, addressable devices and notification appliances. Field addressable devices and notification appliances may be grouped together by specific type per loop or circuit if allowed by AHJ.
h. Complete 1/8" = 1'-0 scale floor plan drawing locating all system devices and elevation of all equipment at the Fire Command Station. Floor plans shall indicate accurate locations for all control and peripheral devices as well as raceway size and routing, junction boxes, conductor size, and quantity in each raceway. All notification appliances shall be provided with a candela rating and circuit address that corresponds to that depicted on the Riser Diagram. If individual floors need to be segmented to accommodate the 1/8" scale requirements, KEY PLANS and BREAK-LINES shall be provided on the plans in an orderly and professional manner. End-of-line resistors (and values) shall be depicted.
i. All drawings shall be reviewed and signed off by Contractor's individual who is licensed by the State of California for Installation of Fire alarm systems with NICET Level 3 or higher.
j. Control panel wiring and interconnection schematics. The drawing(s) shall depict internal component placement and all internal and field termination points. Drawing shall provide a detail indicating where conduit penetrations shall be made, so as to avoid conflicts with internally mounted batteries. For each additional data-gathering panel, a separate control panel drawing shall be provided, which clearly indicated the designation, service and location of the control enclosure.
k. Any additional requirements if required by AHJ for approval.
l. Complete calculations shall clearly indicate the quantity of devices, the device part numbers, the supervisory current draw, the alarm current draw, totals for all categories, and the calculated battery requirements. Battery calculations shall also reflect all control panel component, remote annunciator, and auxiliary relay current draws.
m. System (Load & Battery) calculations shall be provided for each system power supply, each notification appliance circuit and each auxiliary control circuit that draws power from any system power supply.

2. The following shall be included in the submittal book:

a. Cover Sheet: Project Name, Project Location, Architect/Engineer of record, System Supplier/System Installer with C-10 License Number, and UL Listing Number with Expiration Dates.
b. Table of Contents: Page numbers of all specification sheets and CSFM Listing Numbers.
c. Specification Sheets for each piece of equipment.
d. CSFM Listing Sheets.

1.08 EQUIPMENT QUALIFICATION

A. The specification is based upon equipment manufactured by GE Security (Formerly Edwards Systems Technology) as approved by the District. The equipment specified is a District Standard and therefore **NO SUBSTITUTIONS** will be allowed on this project. The equipment specified (per Public Contract Code 3400), is established, in order to communicate with the **EXISTING Fire Works C**entral Monitoring System at the District School Facilities/School Police/Security monitoring Center. There is no known equal.

B. All equipment shall conform to all applicable codes and ordinances and shall be listed by Underwriters Laboratories and the California State Fire Marshall.

C. A pre-approved equipment supplier, installation and service organization for the equipment specified are the authorized installer and distributor from the manufacturer.

1.09 OPERATING AND MAINTENANCE MANUALS

A. The manual shall contain a detailed narrative description of the system architecture, inputs, notification signaling, auxiliary functions, annunciation, and sequence of operations, expansion capability, application considerations and limitations.

B. Manufacturer's data sheets and installation manuals/instructions for all equipment supplied.

C. Minimum two (2) copies of the closeout documents shall be delivered to the building owner's representative at the time of system acceptance.

D. Provide the name, address, and telephone number of the authorized factory representative.

1.10 QUALIFICATION OF BIDDERS

A. To qualify as an acceptable bidder, whether the bid is submitted to the Owner, his agent, a general contractor or a sub-contractor, the system bidder or contractor shall be a qualified U.L. Listed Fire Alarm contractor (at time of bid) and shall hold a valid C-10 License issued by the Contractors State License Board of California. The system bidder or installation contractor shall herein be referred to as the Contractor. The Contractor shall also hold a State of California Consumer Affairs License - Bureau of Collection and Investigative Services. The Contractor shall also have on staff State Licensed installer for alarm systems under whose supervision the systems will be installed, programmed, and tested in accordance with the DSA regulations and Inspector of Record (I.O. R). This is to ensure that licensed installers familiar with this type of installation will be used on this project. The Contractor shall be the factory authorized distributor (at time of bid), for the brand of equipment being installed. The Contractor shall have been in the business of supplying, installing, and servicing Addressable Fire Alarm Systems for the past 10 years, in the State of California. The Contractor shall be able to refer to at least 20 projects of this nature rendering satisfactory service with contact persons, phone numbers and addresses. The Contractor shall maintain a fully equipped service organization capable of furnishing adequate repair service to the equipment. The Contractor shall maintain an inventory of all major components in stock at all times. The Contractor’s Office shall be located within 50 miles of the jobsite. This will ensure an adequate service response, in a timely matter. The Contractor shall maintain on staff for the duration of the project a minimum of two EST-3 and Fire Works Certified Installers. Contractors not pre-approved in writing 21 days prior to bid hour and date will not be considered for this project. Contractors named in 1.08 C above are considered to be pre-approved for this project and will be able to satisfy warranties already in place, when adding onto the Fire Works Central Monitoring System Program.

B. The responsibility of the installation Contractor is to provide all drawings, submittals, wire, devices, equipment, installation to conduit system furnished and installed under this contract, programming, final test out and certification. Installation of all specialty Fire Alarm Back-boxes for the conduit system, Terminal cabinets, pull boxes, etc. provided shall conform to Division16 shall be provided under this section.

1.11 AS-BUILT PROJECT DRAWINGS AND DATA

A. Drawings consisting of a scaled plan of each building showing the placement of each individual item of the Integrated Life Safety System equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.

B. All drawings must reflect point to point wiring, device address and programmed characteristics as verified in the presence of the engineer and/or the end user unless device addressing is electronically generated, and automatically graphically self-documented by the system.

C. All drawings shall be provided in standard .DXF or AutoCAD format exportable to EST fireworks station.

1.12 WARRANTY

A. The contractor shall warranty all materials, installation, and workmanship for one (3) year from date of acceptance, unless otherwise specified.

B. A copy of the manufacturer's warranty shall be provided with closeout documentation and included with the operation and installation manuals.

C. The System Supplier shall maintain a service organization with adequate spare parts stock within 50 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the owner notifying the contractor.

1.13 EXTRA MATERIALS

A. Provide10% of each type of new devices provided.

1.14 SYSTEM LAYOUT

A. SYSTEM DESCRIPTION

1. The Fire Alarm System as outlined in the drawings shall be a Life Safety System as manufactured by GE Security EST-3 system. It shall be complete with all necessary hardware, software and memory specifically tailored for this project.
2. Provide a new Network System, Remote Panels, Remote Annunciators, Printers, Devices, etc. in accordance with specifications and drawings. Counts for devices to be in accordance with submitted shop drawings and approved by the Engineer.
3. All equipment needed for a complete operable system, (whether specifically indicated or not) shall be included in this section. It shall be the Installing Contractors responsibility for a COMPLETE AND OPERABLE SYSTEM upon completion of this project.

1.15 AUTOMATIC ALARM OPERATIONS

A. The fire alarm system operation subsequent to the alarm initiation via pull station, smoke detector, heat detector, sprinkler flow switch, etc., shall be as follows:

1. All audible alarm indicating devices shall sound the Temporal Signal Code in synchronization with each other, until silenced at the control panel or at the remote annunciator.
2. All visual alarm indicating devices shall flash per NFPA requirements in synchronization with each other, until reset at the control panel or at the remote annunciator.
3. Alarm audible devices and alarm visual devices shall operate on the same circuit.
4. The alarm signals shall be inhibited from being silenced for a period of at least 1 minute after commencing operation. This rate is to be field programmable for actual AHJ requirements.
5. Display type and location of alarm per point on the Main Control Panel LCD display.
6. Display type and location of alarm per point on Remote LCD Annunciator.
7. List on printer the time, date, type and user defined message for each event printed.
8. Graphically display on the Fire Works Station, school diagram showing whole school, with graphic scrolling thru system prompts, down to point of alarm activation.
9. Subsequent alarms are to report to the Main Control Panel and Fire Works, shall indicate to the operator that a subsequent alarm is present, and also indicate the number of subsequent alarms.
10. Shut down all associated air handlers in Alarm Zone.

1.16 AUTOMATIC SUPERVISORY OPERATION

A. All data, initiating, indicating and supervisory lines shall be constantly monitored for integrity. Indicate opens, shorts, grounds, at Main Control Panel, Remote Annunciator and Fire Works Station.

1.17 OPERATION

A. During the normal state, the NORMAL LED (green) shall flash. The first line of the LCD shall display the time in (HH:MM: SS) as well as the number of active points (AP) and the number of disabled points (DP) in the system.

B. When the control panel goes into alarm condition, the NORMAL LED (green) extinguishes and the ALARM LED (red) shall light, the buzzer pulsates and the LCD indicates the time, the number of messages waiting, the type of alarm, the point ID number of device, and the time that the alarm occurred. The second line is dedicated to the user specified message.

C. To silence the panel buzzer, the operator shall press the LOCAL SILENCE button and the buzzer will silence.

D. To silence the audible devices, the operator press the ALARM SILENCE button. A new alarm shall cause the audible to resound.

E. During the TROUBLE condition, the amber TROUBLE LED shall light, the NORMAL LED shall go out, and the buzzer shall pulsate. The display shall indicate the point ID number of the device, the time the event occurred and up to a 40-character custom user description.

F. During the MONITOR or SUPERVISORY condition, the appropriate LED shall light, the NORMAL LED shall go out, and the buzzer shall pulsate. The display shall indicate the point ID number of the device, the time the event occurred and up to a 40-character custom user description.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. GE Security: EST Fire & Life Safety – EST3 (District Standards, No Substitutions are acceptable).

2.02 GENERAL

A. All FACP and remote data gathering panels shall complete the “network” between all areas of the School site and building(s) allowing for common monitoring and control by the EST Fireworks system at Maintenance & Operations/District Security building via LAN Network.

B. All equipment and components shall be the manufacturer's current model. The materials, appliances, equipment, and devices shall be tested and listed by a nationally recognized approval agency for use as part of a protected premises (fire alarm) system.

C. The contractor shall provide, from the acceptable manufacturer's current product lines, equipment, software, and components, which comply with the requirements of these specifications. Equipment or components which do not provide the performance and features required by these specifications are not acceptable, regardless of manufacturer.

D. All System components shall be the cataloged products of a single supplier. All products shall be UL and CSFM listed by the manufacturer for their intended purpose.

E. All control panel assemblies and connected field appliances shall be both designed and manufactured by the same company and shall be tested and cross-listed to ensure that a fully functioning system is designed and installed.

2.03 **RE USE EXISTING:** FIRE ALARM CONTROL PANEL EST-3/CAB7/CAB14/CAB21:

A. General

1. The fire alarm control panel or panels and all system devices (Horn-strobes, strobes, pull stations, smoke and heat detectors, etc. shall be GE Security (EST) type EST3 series. All under one label “UL/UOJZ listed and CSFM approved” for the use of fire alarm systems in the State of California.
2. The operating controls shall be located behind locked door with viewing window. All control modules shall be labeled, and all zone locations shall be identified.
3. The main controller 3-CPU shall be supervised, site programmable, and of modular design supporting up to 64 network nodes. The peer-to-peer network shall contain multiple nodes consisting of the command center, main controller, remote control panels, LCD/LED annunciation nodes, and workstations. Each node is an equal, active functional node of the network, which is capable of making all local decisions and generating network tasks to other nodes in the event of node failure or communications failure between nodes. When utilizing a network and multiple wiring faults occur, the network shall re-configure into many sub-networks and continue to respond to alarm events from every panel that can transmit and receive network messages.
4. The Main Controller Module shall control and monitor all local or remote peripherals. It shall support a large 168-character LCD, power supply, remote LCD and zone display annunciators, printers, and support communication interface standard protocol (CSI) devices such as color computer annunciators and color graphic displays.
5. The programmer shall be able to download all network and firmware applications from the configuration computer to all the network panels from a single location on the system.
6. The panels shall have the ability to add an operator interface control/display at each node that shall annunciate command and control system functions.
7. The system shall store all basic system functionality and job specific data in non-volatile memory. All site specific and operating data shall survive a complete power failure intact. Passwords shall protect any changes to system operations.
8. The control panel shall contain a standby power supply that automatically supplies electrical energy to the system upon primary power supply failure. The system shall include a charging circuit to automatically maintain the electrical charge of the battery.

B. Signaling Line Circuits

1. The main controller 3-CPU shall be supervised, site programmable, and of modular design supporting up to 125 detectors and 125 remote modules per addressable Signaling line Circuit (SLC). The CPU shall support up to 10 SLC's per panel for a total system capacity of 2500 Intelligent Addressable points. Provide additional signaling line circuit modules as required for the number of detectors and modules provided. The system shall be designed with peer-to-peer networking capability for enhanced survivability, with support for up to 64 nodes, each with up to 2500 points and an overall capacity of 160,000 points.
2. The system shall provide electronic addressing of analog/addressable devices.
3. The system shall have built-in automatic system programming to automatically address and map all system devices attached to the main controller.
4. The system shall use full digital communications to supervise all addressable loop devices for placement, correct location, and operation. It shall allow swapping of “same type”

devices without the need of addressing and impose the “location” parameters on replacement device. It shall initiate and maintain a trouble if a device is added to a loop and clear the trouble when the new device is mapped and defined into the system.

5. The system shall have a UL Listed Detector Sensitivity test feature, which will be a function of the smoke detectors and performed automatically every 4 hours.
6. The Master Controller shall have the following additional features without any changes in hardware or firmware:

    a. Auto Programming and Electronic Addressing of Field Devices.
    b. Logic Statements.
    c. Time Controls.
    d. Sequences.
    e. Actions.
    f. Analog Value reporting of all analog sensors and traditional zones.
    g. Maintenance Reporting by Intelligent Sensor.
    h. Sensitivity Setting by Sensor (Within UL Limits).
    i. Sensitivity Setting changed by time (Day/Night Mode).
    j. Alarm Verification by point or zone. (0-60 Seconds).
    k. Print a history of Sensors Activating the Verification Cycle.
    l. On demand system condition printouts (status).
    m. Enabling and disabling of any system device or function.
    n. Ground Fault Detection by Panel, by Signature Data Circuit, and by Device Module.
    o. Normal and Silent One Man Test.
    p. Windows Based Programming.
    q. Network Response Time Under 3 Seconds.
    r. Loop Response Time Under 750 Milliseconds.
    s. Device Mapping Feature for As-Builts.
    t. Up to 1750 History Events
    u. Remote Systems Diagnostic via Phone Line

C. DACT: RE USE EXISTING

1. The system shall provide off-premises communications capability (DACT) for transmitting system events to multiple Central Monitoring Station (CMS) receivers.
2. The system shall be capable of providing the CMS(s) with point identification of system events using Contact ID or SIA DCS protocols.
3. In the event of a panel CPU failure during a fire alarm condition, the DACT degrade mode shall transmit a general fire alarm signal to the CMS.

D. User Interfere

1. Main Control & Display

    a. The main display shall be a large 168-character LCD with normal, alarm, trouble, supervisory, disabled point and ground fault indicators.
    b. The interface shall show the first and most recent highest priority system events without any operator intervention. All system events shall be directed to one of four message queues. Messages of different types shall never intermix to eliminate operator confusion. A "Details" switch shall provide additional information about any device highlighted by the operator.
    c. Receipt of alarm, trouble, and supervisory signals shall activate integral audible devices at the control panel(s) and at each remote annunciation device. The integral audible devices shall produce a sound output upon activation of not less than 85 dBA at 10 feet.
    d. The internal audible signal shall have different programmable patterns to distinguish between alarm, supervisory, trouble and monitor conditions.
    e. The annunciator shall contain the following controls:

1) System Reset Switch with Indicator
2) System Alarm Silence Switch with Indicator
3) System Panel Silence Switch with Indicator
4) Programmable Switch with Indicator
5) Details Switch
6) System Message Queue Scroll Switches.

2. 10-Digit Keypad to Enable/Disable System and Functions.

   a. An authorized operator shall have the ability to operate or modify system functions like system time, date, passwords, holiday dates, restart the system and clear control panel event history file.
   b. An authorized operator shall be capable of performing test functions within the installed system.

3. Additional Annunciation & Control:

   a. The system shall be capable of receiving, monitoring, and annunciating signals from individual devices and circuits installed throughout the building.
   b. Manufacturers' standard control switches shall be acceptable if they provide the required operation, including performance, supervision, and position indication. If the manufacturers' standard switches do not comply with these requirements, fabrication of custom manual controls acceptable to the Owner is required.

E. Internal Modular Power Supply

1. System power supply(s) shall provide multiple power limited to 24 VDC output circuits as required by the panel.
2. Upon failure of normal (AC) power, the affected portion(s) of the system shall automatically switch over to secondary power without losing any system functions.
3. Each system power supply shall be individually supervised. Power supply trouble signals shall identify the specific supply and the nature of the trouble condition.
4. All standby batteries shall be continuously monitored by the power supply. Low battery and disconnection of battery power supply conditions shall immediately annunciate as battery trouble and identify the specific power supply affected.
5. All system power supplies shall be capable of recharging their associated batteries, from a fully discharged condition to a capacity sufficient to allow the system to perform consistent with the requirements of this section, in 48 hours maximum.
6. All AC power connections shall be to the building's designated emergency electrical power circuit and shall meet the requirements of NFPA 72 - The AC power circuit shall be installed in conduit raceway. The power circuit disconnect means shall be clearly labeled FIRE ALARM CIRCUIT CONTROL and shall have a red marking. The location of the circuit disconnect shall be labeled permanently inside each control panel the disconnect serves.

F. Reports

1. The system shall provide the operator with system reports that give detailed description of the status of system parameters for corrective action, or for preventative maintenance programs. The system shall provide these reports via the main LCD and shall be capable of being printed on any system printer.
2. The system shall provide a report that gives a sensitivity listing of all detectors that have less than 75% environmental compensation remaining. The system shall provide a report that provides a sensitivity (% Obscuration per foot) listing of any particular detector.
3. The system shall provide a report that gives a listing of the sensitivity of all of the detectors on any given panel in the system, or any given analog/addressable device loop within any given panel.
4. The system shall provide a report that gives a chronological listing of up to the last 1740

system events.

5. The system shall provide a listing of all of the firmware revision listings for all of the installed network components in the system.

2.04 ANNUNCIATORS: RE USE EXISTING

A. General

1. The system shall have the capacity to support 64 network annunciators or EST3 network panel nodes.

B. Remote LCD Annunciator, 3-LCDANN

1. Remote LCD annunciators shall display each and every point in the system and be sized with the same number of characters as in the main FACP display. Annunciators not capable of displaying each point will not be considered equal. Grouping points to “zones” will not be acceptable.
2. Network alphanumeric annunciators shall be located throughout the facility as indicated on the plans and in the fire safety director's office. This annunciator shall be an Integral part of the Peer-to-Peer Network for survivability. Systems that require a “host” Network Node to control remote annunciators shall not be considered acceptable.
3. Each annunciator shall contain a supervised; back lit, liquid crystal with a minimum of 8 line with 21 characters per line. Where required, the annunciator shall include additional zonal annunciation and manual control without additional enclosures. The annunciator shall support full ability to serve as the operating interface to the system and shall include the following features.

    a. Matched the appearance with other system displays.
    b. Each LCD Display on each node (cabinet) in the system shall be configurable to show the status of any or all of the following functions anywhere in the system:

        1) Alarm
        2) Supervisory
        3) Trouble
        4) Monitor

4. Each annunciator must be capable of supporting custom messages as well as system event annunciation. It must be possible to filter unwanted annunciation of trouble, alarm or supervisory functions on a by point or by geographic area. The annunciators shall be mounted in stand-alone enclosures or integrated into the network panels as indicated on the plans.

2.05 INTELLIGENT ADDRESSABLE DETECTORS

A. General

1. Each remote device shall have a microprocessor with non-volatile memory to support its functionality and serviceability. Each device shall store as required for its functionality the following data: device serial number, device address, device type, personality code, date of manufacture, hours in use, time and date of last alarm, amount of environmental compensation left/used, last maintenance date, job/project number, current detector sensitivity values, diagnostic information (trouble codes) and algorithms required to process sensor data and perform communications with the loop controller.
2. Each device shall be capable of electronic addressing, either automatically or application programmed assigned, to support physical/electrical mapping and supervision by location. Setting a device’s address by physical means shall not be necessary.
3. The System Intelligent Detectors shall be capable of full digital communications using both

broadcast and polling protocol. Each detector shall be capable of performing independent fire detection algorithms. The fire detection algorithm shall measure sensor signal dimensions, time patterns and combine different fire parameters to increase reliability and distinguish real fire conditions from unwanted deceptive nuisance alarms. Signal patterns that are not typical of fires shall be eliminated by digital filters. Devices not capable of combining different fire parameters or employing digital filters shall not be acceptable.

4. Each detector shall have an integral microprocessor capable of making alarm decisions based on fire parameter information stored in the detector head. Distributed intelligence shall improve response time by decreasing the data flow between detector and analog loop controller. Detectors not capable of making independent alarm decisions shall not be acceptable. The maximum total analog loop response time for detectors changing state shall be 0.75 seconds.
5. Each detector shall have a separate means of displaying communication and alarm status. A green LED shall flash to confirm communication with the analog loop controller. A red LED shall flash to display alarm status.
6. The detector shall be capable of identifying up to 32 diagnostic codes. This information shall be available for system maintenance. The diagnostic code shall be stored at the detector.
7. Each smoke detector shall be capable of transmitting pre-alarm and alarm signals in addition to the normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings.
8. Each detector microprocessor shall contain an environmental compensation algorithm, which identifies and sets ambient “Environmental Thresholds” approximately six times an hour. The microprocessor shall continually monitor the environmental impact of temperature, humidity, other contaminates as well as detector aging. The process shall employ digital compensation to adapt the detector to both 24-hour long-term and 4-hour short-term environmental changes. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 80% and 100% of the allowable environmental compensation value. Differential sensing algorithms shall maintain a constant differential between selected detector sensitivity and the “learned” base line sensitivity. The base line sensitivity information shall be updated and permanently stored at the detector approximately once every hour.
9. The intelligent analog detectors shall be suitable for mounting on any Signature Series detector mounting base.
10. The Fire alarm system shall have the ability to set individual smoke detectors for alarm verification. Detector in the alarm verification mode shall indicate, by point in a text format at the main control and at the remote LCD annunciators.

B. Photoelectric Smoke Detector, SIGA-PS (Existing)

1. Provide intelligent photoelectric smoke detectors SIGA-PS. The analog photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to sense changes in air samples from its surroundings. The integral microprocessor shall dynamically examine values from the sensor and initiate an alarm based on the analysis of data. Systems using central intelligence for alarm decisions shall not be acceptable. The detector shall continually monitor any changes in sensitivity due to the environmental effects of dirt, smoke, temperature, aging and humidity. The information shall be stored in the integral processor and transferred to the analog loop controller for retrieval using a laptop PC or the SIGA-PRO Signature Program/Service Tool. The photo detector shall be rated for ceiling installation at a minimum of 30 ft centers and be suitable for wall mount applications. The photoelectric smoke detector shall be suitable for direct insertion into air ducts up to 3 ft high and 3 ft wide with air velocities up to 5,000 ft/min. (0-25.39 m/sec) without requiring specific duct detector housings or supply tubes.
2. The percent smoke obscuration per foot alarm set point shall be field selectable to any of

five sensitivity settings ranging from 1.0% to 3.5%. The photo detector shall be suitable for operation in the following environment:

a. Temperature: 32°F to 120°F (0°C to 49°C)
b. Humidity: 0-93% RH, non-condensing
c. Elevation: no limit

C. Existing: Fixed Temp/Rate of Rise Heat Detector, SIGA-HFS OR SIGA –HRS.

1. Provide intelligent combination fixed temperature/rate-of-rise heat detectors SIGA-HRS. The heat detector shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable. The intelligent heat detector shall have a nominal fixed temperature alarm point rating of 135°F (57°C) and a rate-of-rise alarm point of 15°F (9°C) per minute. The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications.

D. Existing: Standard Detector Bases, SIGA-SB/SIGA-SB4,

1. Provide standard detector mounting bases SIGA-SB suitable for mounting on North American 1-gang, 3½" or 4" octagon box and 4" square box. The base shall, contain no electronics, support all Signature Series detector types and have the following minimum requirements:

a. Removal of the respective detector shall not affect communications with other detectors.
b. Terminal connections shall be made on the room side of the base. Bases, which must be removed to gain access to the terminals, shall not be acceptable.
c. The base shall be capable of supporting one (1) Signature Series SIGA-LED Remote Alarm LED Indicator. Provide remote LED alarm indicators where shown on the plans.

2.06 CONVENTIONAL INITIATING DEVICES

A. General

1. All initiating devices shall be UL Listed for Fire Protective Service.
2. All initiating devices shall be of the same manufacturer as the Fire Alarm Control Panel specified to assure absolute compatibility between the devices and the control panels, and to assure that the application of the initiating devices is done in accordance with the single manufacturer's instructions.

B. Existing: Fixed Temperature Low Profile Attic Heat Detectors, 284B-PL WITH SIGA CT-1

1. Detectors shall be rated for a maximum smooth ceiling rating of 2,500 sq. ft.
2. The detector shall have a white finish and positive identification for the operation of the fixed temperature element.
3. The detectors shall be rated at 194°F fixed temperature.
4. Detectors shall be suitable for mounting to 1-gang, 4" square, octagonal, BESA, or European single-gang.

C. Existing: Projected Beam Smoke Detector, EC-50R/100R,

1. The projected beam type smoke detector shall be a 4-wire 12/24 Vdc device used with UL listed separately supplied 4-wire control panels only.
2. The unit shall be listed to UL 268 and shall consist of an integrated transmitter and receiver.

3. The detector shall operate between a range of 15 and 330 ft.
4. The temperature range of the beam shall be -22 °F to 131 °F.
5. The beam detector shall feature automatic gain control, which will compensate for gradual signal deterioration caused by dirt accumulation on the lenses.
6. The unit shall include a wall mounting bracket.
7. Testing shall be carried out using a calibrated test filter.
8. Provide wall mounted, EC-LLT, test station at ground level. Test stations shall include Power and Alarm LEDs with a key activated test switch on a single gang plate.

2.07 INTELLIGENT ADDRESSABLE MODULES

A. General

1. Each remote device shall have a microprocessor with non-volatile memory to support its functionality and serviceability. Each device shall store as required for its functionality the following data: device serial number, device address, device type, personality code, date of manufacture, hours in use, time and date of last alarm, amount of environmental compensation left/used, last maintenance date, job/project number, current detector sensitivity values, diagnostic information (trouble codes) and algorithms required to process sensor data and perform communications with the loop controller.
2. Each device shall be capable of electronic addressing, either automatically or application programmed assigned, to support physical/electrical mapping and supervision by location. Setting a device's address by physical means shall not be necessary.
3. It shall be possible to address each Intelligent Signature Series module without the use of DIP or rotary switches. Devices using DIP switches for addressing shall not be acceptable. The personality of multifunction modules shall be programmable at site to suit conditions and may be changed at any time using a personality code downloaded from the Analog Loop Controller. Modules requiring EPROM, PROM, ROM changes or DIP switch and/or jumper changes shall not be acceptable. The modules shall have a minimum of 2 diagnostic LEDs mounted behind a finished cover plate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing up to 24 diagnostic codes, which can be retrieved for troubleshooting assistance. Input and output circuit wiring shall be supervised for open and ground faults.
4. The module shall be suitable for operation in the following environment:

    a. Temperature: 32^{o}F to 120^{o}F (0^{o}C to 49^{o}C)
    b. Humidity: 0-93% RH, non-condensing

B. Single Input Module, SIGA-CT1,

1. Provide intelligent single input modules SIGA-CT1 for monitoring of PIV's, Fan Status, Tamper Switches, Flow Switches, Generator & Fire Pump Status, Pre-action System Alarm or Trouble or any other dry contact required to be monitored.
2. The Single Input Module shall provide one (1) supervised Class B input circuit capable of a minimum of 4 personalities, each with a distinct operation.
3. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square box with 1-gang covers.
4. The single input module shall support the following circuit types:

    a. Normally Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
    b. Normally Open Alarm Delayed Latching (Waterflow Switches)
    c. Normally Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
    d. Normally Open Active Latching (Supervisory, Tamper Switches)

C. Dual Input Module, SIGA-CT2,

1. Provide intelligent dual input modules SIGA-CT2 for monitoring of sets of PIV's, Fan/Damper Status, Tamper Switches, Flow Switches, Pre-action System Alarm or Trouble or any other sets of dry contacts required to be monitored.
2. The Dual Input Module shall provide two (2) supervised Class B input circuits each capable of a minimum of 4 personalities, each with a distinct operation.
3. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers.
4. The dual input module shall support the following circuit types:

    a. Normally Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
    b. Normally Open Alarm Delayed Latching (Water flow Switches)
    c. Normally Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
    d. Normally Open Active Latching (Supervisory, Tamper Switches)

D. Signal Module, SIGA-CC1,

1. Provide intelligent single input signal modules SIGA-CC1 for activation of booster power supplies, audible/visual circuits, speaker circuits or for monitoring and communication of phone jacks.
2. The Single Input (Single Riser Select) Signal Module shall provide one (1) supervised Class B output circuit capable of a minimum of 2 personalities, each with a distinct operation.
3. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 2-gang boxes and 1 ½" (38mm) deep 4" square boxes with 2-gang covers, or European 100mm square boxes.
4. The single input signal module shall support the following operations:

    a. Audible/Visible Signal Power Selector (Polarized 24 Vdc @ 2A, 25Vrms @50w or 70 Vrms @ 35 Watts of Audio)
    b. Telephone Power Selector with Ring Tone (Fire Fighter's Telephone)

5. When selected as a telephone power selector, the module shall be capable of generating its own "ring tone".

E. Existing: Synchronized Signal Module, SIGA-CC1S,

1. Provide intelligent single input signal modules SIGA-CC1S for activation of booster power supplies and/or audible/visual circuits that require synchronization.
2. The Single Input (Single Riser Select) Signal Module shall provide one (1) supervised Class B output circuit capable of a minimum of 2 personalities, each with a distinct operation.
3. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 2-gang boxes and 1 ½" (38mm) deep 4" square boxes with 2-gang covers, or European 100mm square boxes.
4. The single input signal module shall support the following operations:

    a. Audible/Visible Signal Power Selector (Polarized 24 Vdc @ 2A, 25Vrms @50w or 70 Vrms @ 35 Watts of Audio)
    b. Telephone Power Selector with Ring Tone (Fire Fighter's Telephone)

5. Provides UL1971 auto-sync output for synchronizing multiple notification appliance circuits.

F. Existing: Control Relay Module, SIGA-CR, CSFM 7300-1657:0121

1. Provide new where indicated on the drawings: Intelligent control relay modules SIGA-CR for activation and/or shutdown of fans, dampers, door holder circuits, door locks, shunt trip, elevator recall or any other fail-safe system requiring control or activation.
2. The Control Relay Module shall provide one form "R" dry relay contact rated at 2 amps @ 24 Vdc to control external appliances or equipment shutdown.

3. The control relay shall be rated for pilot duty and releasing systems.
4. The position of the relay contact shall be confirmed by the system firmware.
5. The control relay module shall be suitable for mounting on North American 4S -2 ½" deep 1or 2 gang boxes as required with 1 ½" deep 4" square boxes with 1-gang covers.

G. Existing: Manual Pull Station, SIGA-270

1. Provide intelligent single action, single stage fire alarm stations SIGA-278. The fire alarm station shall be of metal construction with an internal toggle switch. Provide a locked test feature. Finish the station in red with silver "PULL IN CASE OF FIRE" English lettering.
2. The manual station shall be suitable for mounting on North American 2 1/8" deep ½"1-gang boxes and 1 ½" (38mm) deep 4" square box with 1-gang covers.
3. Provide compatible surface mount red box, 276B-RSB with STI-3100 conduit spacer at all surface mount locations. Standard electrical boxes are not acceptable.
4. The manual stations shall be complied with CBC section 1117B.6 and 1118B.

H. Provide the following new devices wired & programmed as shown on drawings:

1. EST # SIGA-OSCD : Multisensor Smoke and CO Detector (Existing)

EST # SIGA-AB4GT: Audible (Sounder) Base for CO and Fire Detectors
EST # SIGA-TCDR : Temporal Pattern Generator
CSFM # 7275-1657:0334
CSFM # 7300-1657:0307
CSFM # 7300-1657:0308

2. EST # SIGA-HCD : Multisensor Heat and CO Detector (Existing)

EST # SIGA-AB4GT: Audible (Sounder) Base for CO and Fire Detectors
EST # SIGA-TCDR : Temporal Pattern Generator
CSFM # 7270-1657:0336
CSFM # 7300-1657:0307
CSFM # 7300-1657:0308

2.08 NOTIFICATION APPLIANCES; **RE USE EXISTING**

A. General

1. All appliances shall be UL Listed for Fire Protective Service.
2. All strobe appliances or combination appliances with strobes shall be capable of providing the "Equivalent Facilitation" which is allowed under the Americans with Disabilities Act accessibly guidelines (ADA (AG)) and shall be UL 1971.
3. All appliances shall be of the same manufacturer as the Fire Alarm Control Panel specified to insure absolute compatibility between the appliances and the control panels, and to insure that the application of the appliances are done in accordance with the single manufacturers' instructions.
4. Any appliances which do not meet the above requirements, and are submitted, for use must show written proof of their compatibility for the purposes intended. Such proof shall be in the form of documentation from all manufacturers which clearly states that their equipment (as submitted) are 100% compatible with each other for the purposes intended.

B. Wall Strobes, Genesis G1RF -VM Series, **Re Use Existing**

1. Strobes provide synchronized flash outputs. The light output shall be an even "Full Light" pattern with no hot spots. Strobes using specular reflectors are not acceptable.
2. It shall be possible to flash the strobe at a temporal flash rate to match the Chime and meet the intent of UL Private Mode signaling.

3. The strobe shall have selectable 15, 30, 75 or 110 cd settings.
4. It shall be possible to change the strobe setting without removing the device from the wall
5. The strobe shall be a low-profile design, finished in neutral white and shall not protrude more than 1" off the wall. In-out screw terminals shall be provided for wiring.
6. The strobe shall be suitable for wall mounting and shall mount in a standard North American 4S box 2 1/8" deep with 1-gang ring. All mounting hardware shall be captive and there shall be no mounting screws visible after the device is installed.
7. For Surface mount applications, use single gang Wiremold box V5748.

C. Ceiling Strobes, Genesis GCF-VM Series, **Re Use Existing**

1. Strobes provide synchronized flash outputs. The light output shall be an even "Full Light" pattern with no hot spots. Strobes using specular reflectors are not acceptable.
2. It shall be possible to flash the strobe at a temporal flash rate to match the Chime and meet the intent of UL Private Mode signaling.
3. The standard ceiling strobe shall have selectable 15, 30, 75 or 95 cd settings.
4. The high output ceiling strobe shall have selectable 95, 115, 150 or 177 cd settings.
5. It shall be possible to change the strobe setting without removing the device from the ceiling.
6. The strobe shall be a low-profile design, finished in neutral white and shall not protrude more than 1.6" off the ceiling. In-out screw terminals shall be provided for wiring.
7. The strobe shall be suitable for ceiling mounting and shall mount in a standard North American 4S box 2 1/8" deep with 4-S extension ring. All mounting hardware shall be captive and there shall be no mounting screws visible after the device is installed.
8. For Surface mount applications, use single gang Wiremold box V5753.

D. Wall Horn-Strobes, Genesis G1RF-HDVM Series, **Re Use Existing**

1. Strobes provide synchronized flash outputs. The light output shall be an even "Full Light" pattern with no hot spots. Strobes using specular reflectors are not acceptable.
2. It shall be possible to flash the strobe at a temporal flash rate to match the horn and meet the intent of UL Private Mode signaling.
3. The strobe shall have selectable 15, 30, 75 or 110 cd settings.
4. It shall be possible to change the strobe setting without removing the device from the wall.
5. The horn shall provide an 84 dBA sound output at 10 ft. when measured in reverberation room per UL-464.
6. The horn can also be set for low dB output with a jumper cut that reduces horn output by about 5 dB.
7. The horn shall have a selectable steady or synchronized temporal output.
8. It shall be a low-profile design, finished in neutral white and shall not protrude more than 1" off the wall. In-out screw terminals shall be provided for wiring.
9. The Horn/strobe shall be suitable for wall mounting and shall mount in a standard North American 4S box 2 1/8" deep with 1-gang ring.
10. For Surface mount applications, use single gang Wiremold box V5748.

E. Ceiling Horn-Strobes, Genesis GCF-VM Series **Re Use Existing**

1. Strobes provide synchronized flash outputs. The light output shall be an even "Full Light" pattern with no hot spots. Strobes using specular reflectors are not acceptable.
2. It shall be possible to flash the strobe at a temporal flash rate to match the horn and meet the intent of UL Private Mode signaling.
3. The standard ceiling strobe shall have selectable 15, 30, 75 or 95 cd settings.
4. The high output ceiling strobe shall have selectable 95, 115, 150 or 177 cd settings.
5. It shall be possible to change the strobe setting without removing the device from the ceiling.
6. The horn shall provide an 84 dBA sound output at 10 ft. when measured in reverberation

room per UL-464.

7. The horn can also be set for low dB output with a jumper cut that reduces horn output by about 5 db.
8. The horn shall have a selectable steady or synchronized temporal output.
9. The strobe shall be a low-profile design, finished in neutral white and shall not protrude more than 1.6” off the ceiling. In-out screw terminals shall be provided for wiring.
10. The Horn/strobe shall be suitable for ceiling mounting and shall mount in a standard North American 4S box 2 1/8” deep with 4-S extension ring. All mounting hardware shall be captive and there shall be no mounting screws visible after the device is installed.
11. For Surface mount applications, use single gang Wiremold box V5753.

F. Weatherproof Horn, 757 -1A-T Series, **Re Use Existing**

1. Horns shall be selectable for high or low dBA output and steady or temporal output.
2. At the high output setting, the horn shall provide a 85 dBA continuous sound output or a 82 dBA temporal sound output, when measured in reverberation room per UL-464.
3. In and out screw terminals shall be provided for wiring.
4. Weatherproof wall boxes (757A-WB) shall be provided for outdoor applications.
5. For flush mount applications indoor - Use 4S 2-1/8" boxes with 2-Gang Ring
6. For surface mount applications indoor - Use 757A-SB Back-box
7. For surface mount applications outdoor - Use 757A-WB Back-box

2.09 ACCESSORY EQUIPMENT

A. Multi-Voltage Control Relays: **Re Use Existing**

1. Functional Devices, Inc. # RIBU1C: Relay 10 Amp SPDT with 10-30 Vac/Dc/120 Vac Coil CSFM # 7300-1555:0100
2. General

   a. Provide remote control relays connected to supervised ancillary circuits for control of fans, dampers, door releases, etc.
   b. Relay contact ratings shall be SPDT and rated for 10 amperes at 115 Vac.
   c. A single relay may be energized from a voltage source of 24 Vdc, 24 Vac, 115 Vac,
   d. A red LED shall indicate the relay is energized.
   e. A metal enclosure shall be provided.

B. Remote Booster Power Supplies, BPS6A, **Re Use Existing**

1. The unit shall be a self-contained with 24Vdc power supply and batteries housed in its own locked enclosure. The keys provided shall be identical to the keys provided for all other fire alarm equipment provided.
2. Power supply shall be available in both 10 Amp or 6.5 Amp models and 110 Vac or 220Vac.
3. On board LED indicators for each resident NAC, battery supervision, ground fault and AC power.
4. The power supply shall provide four (4) independent 3Amp NACs. Each circuit can be configurable as an auxiliary output.
5. Configurable for any one of three signaling rates: 120SPM; 3-3-3 temporal; or, continuous.
6. Two independent and configurable inputs switch selectable to allow correlation of the two (2) inputs and the four (4) outputs.
7. NAC’s shall be configurable for four Class B circuits.
8. The unit shall be compatible with SIGA-CC1S for synchronization of multiple power supplies without inter-connects wiring.
9. Brackets shall be provided inside the enclosure to allow mounting the signaling modules. All signaling modules shall be listed to be located inside the booster power supply enclosure.
10. A selectable dip switch shall enable built in synchronization for horns and strobes which

may be used to synchronize downstream devices, as well as other boosters and their connected devices.

2.10 CONDUCTORS

A. The requirement of this section apply to all system conductors, including all signaling line, initiating device, notification appliance, auxiliary function, remote signaling, AC and DC power and grounding/shield drain circuits, and any other wiring installed by the Contractor pursuant to the requirements of these Specifications.

B. All circuits shall be rated power limited in accordance with NEC Article 760.

C. Installed in conduit or enclosed raceway.

D. All new system conductors shall be of the type(s) specified herein.

1. All initiating circuit, signaling line circuit, AC power conductors, shield drain conductors and grounding conductors, shall be solid copper, stranded or bunch tinned (bonded) stranded copper.
2. All signaling line circuits, including all addressable initiating device circuits shall be 18 AWG minimum multi-conductor jacketed twisted cables or as per manufacturer's requirements.
3. All non-addressable initiating device circuits, 24 VDC auxiliary function circuits shall be 18 AWG minimum or per manufacturer's requirements.
4. All notification appliance circuit conductors shall be solid copper or bunch tinned (bonded) stranded copper. Where stranded conductors are utilized, a maximum of 7 strands shall be permitted for No. 16 and No. 18 conductors, and a maximum of 19 strands shall be permitted for No. 14 and larger conductors.
5. All audible notification appliance circuits shall be 12 AWG THHN minimum twisted pairs or per manufacturer's requirements.
6. All visual notification appliance circuits shall be 12 AWG minimum THHN twisted pairs or per manufacturer's requirements.
7. All wiring shall be color-coded throughout, to California Electrical Code standards.

2.11 CONDUIT RACEWAY

A. All systems and system components listed to UL864 Control Units for Fire Protective Signaling Systems may be installed within a common conduit raceway system, in accordance with the manufacture's recommendations. System(s)or system components not listed to the UL864 standard shall utilize a separate conduit raceway system for each of the sub-systems.

B. The requirements of this section apply to all system conduits, raceways, electrical enclosures, junction boxes, pull boxes and device back boxes.

C. All system conduits shall be of the sizes and types specified.

D. All system conduits shall be EMT, 3/4 -inch minimum, except for flexible metallic conduit used for whips to devices only, maximum length 6 feet, 3/4-inch diameter, minimum.

E. All system conduits, which are installed in areas which may be subject to physical damage or weather, shall be IMC or rigid steel, 3/4 -inch minimum.

F. Conduits shall be sized according to the conductors contained therein. Cross sectional area percentage fill for system conduits shall not exceed 40%.

G. The existing conduit raceway system may be re-used where possible.

H. All fire alarm conduit systems shall be routed and installed to minimize the potential for physical, mechanical or by fire damage, and so as not to interfere with existing building systems, facilities or equipment, and to facilitate service and minimize maintenance.

I. All conduits, except flexible conduit whips to devices, shall be solidly attached to building structural members, ceiling slabs or permanent walls. Conduits shall not be attached to existing conduit, duct work, cable trays, other ceiling equipment, drop ceiling hangers/grids or partition walls, except where necessary to connect to initiating, notification, or auxiliary function devices.

J. All system conduits, junction boxes, pull boxes, terminal cabinets, electrical enclosures and device back boxes shall be readily accessible for inspection, testing, service and maintenance.

K. All penetration of floor slabs and firewalls shall be sleeved (1" conduit minimum) fire stopped in accordance with all local fire codes.

L. All junction box covers shall be painted red.

2.12 INSTALLATION

2.13 INSTALLATION CONDITIONS

A. All equipment and components shall be installed in strict compliance with each manufacturer's recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc. before beginning system installation.

B. The entire system shall be installed in a workmanlike manner, in accordance with approved manufacturer's wiring diagram.

2.14 INSTALLATION REQUIREMENTS

A. All pull stations shall be mounted 48 inches above the finished floor, as measured on handle.

B. Pull stations currently mounted at the incorrect height shall be lowered accordingly when replaced.

C. All new audio/visual devices shall be mounted at a minimum of 80 inches above the finished floor, as measured on strobe center. Devices shall be mounted no less than 6 inches from the ceiling.

D. No area smoke detectors shall be mounted within 36 inches of any HVAC supply, return air register or lighting fixture.

E. No area smoke or heat detector shall be mounted within 12 inches of any wall.

F. All fire alarm devices shall be accessible for periodic maintenance. Should a device location indicated on the Contract Drawings not meet this requirement, it shall be the responsibility of the installing contractor to bring it, in writing, to the attention of the Project Engineer. Failure to bring such issues to the attention of the Project Engineer shall be the exclusive liability of the installing Electrical Contractor.

G. End of Line Resistors shall be furnished as required for mounting as directed by the manufacturer. Devices containing end-of-line resistors shall be appropriately labeled. Devices should be labeled so removal of the device is not required to identify the EOL device.

H. All addressable modules shall be mounted within 36 inches of the monitored or controlled point of termination. This shall include, but is not necessarily limited to, fan shutdown, elevator recall, shunt trip, sprinkler status points, or door release. Label all addressable modules as to their function.

I. Power-limited/Non-power-limited NEC wiring standards SHALL BE OBSERVED.

J. Auxiliary relays shall be appropriately labeled to indicate “FIRE ALARM SYSTEM” and their specific function (i.e., FAN S-1 SHUTDOWN).

2.15 SYSTEM VERIFICATION

A. Upon completion of the installation, the fire alarm contractor shall place into operation and test all operational features, functions and devices.

B. The system shall be pre-tested and documented prior to the final inspection by the AHJ. The owner shall be notified of the pretest 48 hours in advance and shall witness this test if desired.

C. The pre-test shall include the following:

1. All intelligent analog addressable devices shall be tested for current address, sensitivity, and user defined message.
2. All wiring shall be tested for continuity, shorts, and grounds before the system is activated.
3. Proper operation and execution of all its sequences.
4. Prior to scheduling field acceptance, the fire alarm system contractor shall certify in writing, and record the method of testing, the results of all tests and certify that the system has been in operation a minimum of 5 days.

D. Upon completion of testing and after the system has been in operation for a minimum of 5 days without failure, the fire alarm contractor shall schedule with the Authority Having Jurisdiction (DSA INSPECTOR), District and Engineer, a demonstration and field acceptance test.

E. Field acceptance and approval of the fire alarm system shall be evidenced in writing by the Authority Having Jurisdiction.

F. All testing shall be conducted in accordance with NFPA-72, contract document manufacturer's instructions and per the requirements of the Authority Having Jurisdiction.

2.16 GUARANTEE AND SERVICE

A. The fire alarm system contractor shall provide written guarantees for all fire alarm equipment and devices used on this project for a period of THREE (3) YEARS from the date of final acceptance.

B. During the guarantee period the contractor shall repair or replace any defective material at no additional cost to the Owner.

2.17 OPERATION MAINTENANCE MANUALS

A. The fire alarm contractor shall provide to the Engineer, three (3) weeks after the field acceptance test, two (2) sets of operating/maintenance manuals and TWO (2) sets of as-built drawings.

B. As-built drawings shall indicate the location of all devices, appliances, coding, zoning, wiring sequences, wiring methods, color coding, identification, labeling and connections of the

components of the fire alarm system as installed. The as-builts shall include a mapping sequence as generated by the Fire Alarm Control Panel and connected computer. Systems not capable of this feature shall generate TRUE Device mapping sequences as-builts on Auto Cad 2006. These as-builts shall show the physical layout of all addressable devices as they were actually installed on the loop.

2.18 TRAINING

A. The System Supplier shall schedule and present a minimum of (1) 4-hour segments of documented formalized instruction for the building owner, detailing the proper operation of the installed System. One training segment shall be available at the completion of the project. The second training segment may be required within the warranty period.

B. The instruction shall be presented in an organized and professional manner by person factory trained in the operation and maintenance of the equipment who is also thoroughly familiar with the installation.

C. The instruction shall cover the schedule of maintenance required by NFPA 72 and any additional maintenance recommended by the system manufacturer.

D. Instruction shall be made available to the Local Fire Department if requested by the Local Authority Having Jurisdiction.

END OF SECTION

SYSTEM RECORD OF COMPLETION

This form is to be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.
Attach additional sheets, data, or calculations as necessary to provide a complete record.

Form Completion Date: _____ Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

Description of property: _____

Name of property representative: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

2. INSTALLATION, SERVICE, TESTING, AND MONITORING INFORMATION

Installation contractor: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Service organization: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Testing organization: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Effective date for test and inspection contract: _____

Monitoring organization: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Account number: _____ Phone line 1: _____ Phone line 2: _____

Means of transmission: _____

Entity to which alarms are retransmitted: _____ Phone: _____

3. DOCUMENTATION

On-site location of the required record documents and site-specific software: _____

4. DESCRIPTION OF SYSTEM OR SERVICE

This is a: ☐ New system ☐ Modification to existing system Permit number: _____

NFPA 72 edition: _____

4.1 Control Unit

Manufacturer: _____ Model number: _____

4.2 Software and Firmware

Firmware revision number: _____

4.3 Alarm Verification

☐ This system does not incorporate alarm verification.

Number of devices subject to alarm verification: _____ Alarm verification set for _____ seconds

5. SYSTEM POWER

5.1 Control Unit

5.1.1 Primary Power

Input voltage of control panel: _____ Control panel amps: _____

Overcurrent protection: Type: _____ Amps: _____

Branch circuit disconnecting means location: _____ Number: _____

5.1.2 Secondary Power

Type of secondary power: _____

Location, if remote from the plant: _____

Calculated capacity of secondary power to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

5.2 Control Unit

☐ This system does not have power extender panels

☐ Power extender panels are listed on supplementary sheet A

6. CIRCUITS AND PATHWAYS

Pathway Type	Dual Media Pathway	Separate Pathway	Class	Survivability Level
Signaling Line				
Device Power				
Initiating Device				
Notification Appliance				
Other (specify):				

7. REMOTE ANNUNCIATORS

Type	Location

8. INITIATING DEVICES

Type	Quantity	Addressable or Conventional	Alarm or Supervisory	Sensing Technology
Manual Pull Stations				
Smoke Detectors				
Duct Smoke Detectors				
Heat Detectors				
Gas Detectors				
Waterflow Switches				
Tamper Switches				

9. NOTIFICATION APPLIANCES

Type	Quantity	Description
Audible		
Visible		
Combination Audible and Visible		

10. SYSTEM CONTROL FUNCTIONS

Type	Quantity
Hold-Open Door Releasing Devices	
HVAC Shutdown	
Fire/Smoke Dampers	
Door Unlocking	
Elevator Recall	
Elevator Shunt Trip	

11. INTERCONNECTED SYSTEMS

☐ This system does not have interconnected systems.

☐ Interconnected systems are listed on supplementary sheet _____ .

12. CERTIFICATION AND APPROVALS

12.1 System Installation Contractor

This system as specified herein has been installed according to all NFPA standards cited herein.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

12.2 System Operational Test

This system as specified herein has tested according to all NFPA standards cited herein.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

12.3 Acceptance Test

Date and time of acceptance test: _____

Installing contractor representative: _____

Testing contractor representative: _____

Property representative: _____

AHJ representative: _____

EMERGENCY COMMUNICATIONS SYSTEMS
SUPPLEMENTARY RECORD OF COMPLETION

This form is a supplement to the System Record of Completion. It includes systems and components specific to emergency communications systems.
This form is to be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

2. DESCRIPTION OF SYSTEM OR SERVICE

☐ Fire alarm with in-building fire emergency voice alarm communication system (EVAC)

☐ Mass notification system

☐ Combination system, with the following components:

☐ Fire alarm ☐ EVACS ☐ MNS ☐ Two-way, in-building, emergency communications system

☐ Other (specify): _____

NFPA 72 edition: _____ Additional description of system(s): _____

2.1 In-Building Fire Emergency Voice Alarm Communications System

Manufacturer: _____ Model number: _____

Number of single voice alarm channels: _____ Number of multiple voice alarm channels: _____

Number of speakers: _____ Number of speaker circuits: _____

Location of amplification and sound processing equipment:

_____

Location of paging microphone stations:

Location 1: _____

Location 2: _____

Location 3: _____

2.2 Mass Notification System

2.2.1 System Type:

☐ In-building MNS–combination

☐ In-building MNS ☐ Wide-area MNS ☐ Distributed recipient MNS

☐ Other (specify): _____

2. DESCRIPTION OF SYSTEM OR SERVICE *(continued)*

2.2.2 System Features:

☐ Combination fire alarm/MNS ☐ MNS autonomous control unit ☐ Wide-area MNS to regional national alerting interface

☐ Local operating console (LOC) ☐ Distributed-recipient MNS (DRMNS) ☐ Wide-area MNS to DRMNS interface

☐ Wide-area MNS to high power speaker array (HPSA) interface ☐ In-building MNS to wide-area MNS interface

☐ Other (specify): _____

2.2.3 MNS Local Operating Consoles

Location 1: _____

Location 2: _____

Location 3: _____

2.2.4 High Power Speaker Arrays

Number of HPSA speaker initiation zones: _____

Location 1: _____

Location 2: _____

Location 3: _____

2.2.5 Mass Notification Devices

Combination fire alarm/MNS visual devices: _____ MNS-only visual devices: _____

Textual signs: _____ Other (describe): _____

Supervision class: _____

2.2.6 Special Hazard Notification

☐ This system does not have special suppression predischarge notification.

☐ MNS systems DO NOT override notification appliances required to provide special suppression predischarge notification.

3. TWO-WAY EMERGENCY COMMUNICATIONS SYSTEMS

3.1 Telephone System

Number of telephone jacks installed: _____ Number of warden stations installed: _____

Number of telephone handsets stored on site: _____

Type of telephone system installed: ☐ Electrically powered ☐ Sound powered

3.2 Two-Way Radio Communications Enhancement System

Percentage of area covered by two-way radio service: Critical areas _____ % General building areas _____ %

Amplification component locations: _____

Inbound signal strength _____ dBm Outbound signal strength _____ dBm

Donor antenna isolation is _____ dB above the signal booster gain.

Radio frequencies covered: _____

Radio system monitor panel location: _____

3. TWO-WAY EMERGENCY COMMUNICATIONS SYSTEMS *(continued)*

3.3 Area of Refuge (Area of Rescue Assistance) Emergency Communications Systems

Number of stations: _____ Location of central control point: _____

Days and hours when central control point is attended: _____

Location of alternate control point: _____

Days and hours when alternate control point is attended: _____

3.4 Elevator Emergency Communications Systems

Number of elevators with stations: _____ Location of central control point: _____

Days and hours when central control point is attended: _____

Location of alternate control point: _____

Days and hours when alternate control point is attended: _____

3.5 Other Two-Way Communications System

Describe: _____

4. CONTROL FUNCTIONS

This system activates the following control functions specific to emergency communications systems:

Type	Quantity
Mass Notification Override of Alarm Signaling Systems or Appliances	

See Main System Record of Completion for additional information, certifications, and approvals.

POWER SYSTEMS
SUPPLEMENTARY RECORD OF COMPLETION

This form is a supplement to the System Record of Completion. It includes systems and components specific to power systems that incorporate generators, UPS systems, remote battery systems, or other complex power systems. This form is to be completed by the system installation contractor at the time of system acceptance and approval. It shall be permitted to modify this form as needed to provide a more complete and/or clear record. Insert N/A in all unused lines.

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

2. SYSTEM POWER

2.1 Control Unit

2.1.1 Primary Power

Input voltage of control panel: _____ Control panel amps: _____

Overcurrent protection: Type: _____ Amps: _____

Location (of primary supply panelboard): _____

Disconnecting means location: _____

2.1.2 Engine-Driven Generator

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

2.1.3 Uninterruptible Power System

Equipment powered by UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

2.1.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

2.2 In-Building Fire Emergency Voice Alarm Communications System or Mass Notification System

2.2.1 Primary Power

Input voltage of EVACS or MNS panel: _____ EVACS or MNS amps: _____

Overcurrent protection: Type: _____ Amps: _____

Location (of primary supply panelboard): _____

Disconnecting means location: _____

2. SYSTEM POWER *(continued)*

2.2.2 Engine-Driven Generator

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

2.2.3 Uninterruptible Power System

Equipment powered by UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

2.2.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

2.3 Notification Appliance Power Extender Panels

☐ This system does not have power extender panels.

2.3.1 Primary Power

Input voltage of power extender panel(s): _____ Power extender panel amps: _____

Overcurrent protection: Type: _____ Amps: _____

Location (of primary supply panelboard): _____

Disconnecting means location: _____

2.3.2 Engine-Driven Generator

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

2.3.3 Uninterruptible Power System

Equipment powered by UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

2.3.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

See Main System Record of Completion for additional information, certifications, and approvals.

NOTIFICATION APPLIANCE POWER PANEL
SUPPLEMENTARY RECORD OF COMPLETION

This form is a supplement to the System Record of Completion. It includes a list of types and locations of notification appliance power extender panels.
This form is to be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

2. NOTIFICATION APPLIANCE POWER EXTENDER PANELS

Make and Model	Location	Area Served	Power Source

See Main System Record of Completion for additional information, certifications, and approvals.

INTERCONNECTED SYSTEMS
SUPPLEMENTARY RECORD OF COMPLETION

This form is a supplement to the System Record of Completion. It includes a list of types and locations of systems that are interconnected to the main system.
This form is to be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

2. INTERCONNECTED SYSTEMS

Description	Location	Purpose

See Main System Record of Completion for additional information, certifications, and approvals.

DEVIATIONS FROM ADOPTED CODES AND STANDARDS
SUPPLEMENTARY RECORD OF COMPLETION

This form is a supplement to the System Record of Completion. It enables the designer and/or installer to document and justify deviations from accepted codes or standards.
This form is to be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

2. DEVIATIONS FROM ADOPTED CODES OR STANDARDS

Description	Purpose

See Main System Record of Completion for additional information, certifications, and approvals.

SYSTEM RECORD OF INSPECTION AND TESTING

This form is to be completed by the system inspection and testing contractor at the time of a system test.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.
Attach additional sheets, data, or calculations as necessary to provide a complete record.

Inspection/Test Start Date/Time: _____ Inspection/Test Completion Date/Time: _____

Supplemental Form(s) Attached: _____ (yes/no)

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

Description of property: _____

Name of property representative: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

2. TESTING AND MONITORING INFORMATION

Testing organization: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Monitoring organization: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Account number: _____ Phone line 1: _____ Phone line 2: _____

Means of transmission: _____

Entity to which alarms are retransmitted: _____ Phone: _____

3. DOCUMENTATION

On-site location of the required record documents and site-specific software: _____

4. DESCRIPTION OF SYSTEM OR SERVICE

4.1 Control Unit

Manufacturer: _____ Model number: _____

4.2 Software and Firmware

Firmware revision number: _____

4.3 System Power

4.3.1 Primary (Main) Power

Nominal voltage: _____ Amps: _____ Location: _____

Overcurrent protection type: _____ Amps: _____ Disconnecting means location: _____

4. DESCRIPTION OF SYSTEM OR SERVICE *(continued)*

4.3.2 Secondary Power

Type: _____ Location: _____

Battery type (if applicable): _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

5. NOTIFICATIONS MADE PRIOR TO TESTING

Monitoring organization	Contact:	_____	Time:	_____
Building management	Contact:	_____	Time:	_____
Building occupants	Contact:	_____	Time:	_____
Authority having jurisdiction	Contact:	_____	Time:	_____
Other, if required	Contact:	_____	Time:	_____

6. TESTING RESULTS

6.1 Control Unit and Related Equipment

Description	Visual Inspection	Functional Test	Comments
Control unit	☐	☐	
Lamps/LEDs/LCDs	☐	☐	
Fuses	☐	☐	
Trouble signals	☐	☐	
Disconnect switches	☐	☐	
Ground-fault monitoring	☐	☐	
Supervision	☐	☐	
Local annunciator	☐	☐	
Remote annunciators	☐	☐	
Remote power panels	☐	☐	
	☐	☐	

6.2 Secondary Power

Description	Visual Inspection	Functional Test	Comments
Battery condition	☐	☐	
Load voltage	☐	☐	
Discharge test	☐	☐	
Charger test	☐	☐	
Remote panel batteries	☐	☐	

6. TESTING RESULTS *(continued)*

6.3 Alarm and Supervisory Alarm Initiating Device

Attach supplementary device test sheets for all initiating devices.

6.4 Notification Appliances

Attach supplementary appliance test sheets for all notification appliances.

6.5 Interface Equipment

Attach supplementary interface component test sheets for all interface components.

Circuit Interface / Signaling Line Circuit Interface / Fire Alarm Control Interface

6.6 Supervising Station Monitoring

Description	Yes	No	Time	Comments
Alarm signal	☐	☐		
Alarm restoration	☐	☐		
Trouble signal	☐	☐		
Trouble restoration	☐	☐		
Supervisory signal	☐	☐		
Supervisory restoration	☐	☐		

6.7 Public Emergency Alarm Reporting System

Description	Yes	No	Time	Comments
Alarm signal	☐	☐		
Alarm restoration	☐	☐		
Trouble signal	☐	☐		
Trouble restoration	☐	☐		
Supervisory signal	☐	☐		
Supervisory restoration	☐	☐		

7. NOTIFICATIONS THAT TESTING IS COMPLETE

Monitoring organization	Contact:	_____	Time:	_____
Building management	Contact:	_____	Time:	_____
Building occupants	Contact:	_____	Time:	_____
Authority having jurisdiction	Contact:	_____	Time:	_____
Other, if required	Contact:	_____	Time:	_____

8. SYSTEM RESTORED TO NORMAL OPERATION

Date: _____ Time: _____

9. CERTIFICATION

This system as specified herein has been inspected and tested according to NFPA 72, 2013 edition, Chapter 14.

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

Qualifications (refer to 10.5.3): _____

10. DEFECTS OR MALFUNCTIONS NOT CORRECTED AT CONCLUSION OF SYSTEM INSPECTION, TESTING, OR MAINTENANCE

_____

_____

_____

_____

_____

_____

_____

10.1 Acceptance by Owner or Owner's Representative:

The undersigned accepted the test report for the system as specified herein:

Signed: _____ Printed name: _____ Date: _____

Organization: _____ Title: _____ Phone: _____

NOTIFICATION APPLIANCE
SUPPLEMENTARY RECORD OF INSPECTION AND TESTING

This form is a supplement to the System Record of Inspection and Testing.
It includes a notification appliance test record.
This form is to be completed by the system inspection and testing contractor at the time of the inspection and/or test.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.

Inspection/Test Start Date/Time: _____ Inspection/Test Completion Date/Time: _____

Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

2. NOTIFICATION APPLIANCE TEST RESULTS

Appliance Type	Location/Identifier	Test Results

NOTIFICATION APPLIANCE
SUPPLEMENTARY RECORD OF INSPECTION AND TESTING *(continued)*

2. NOTIFICATION APPLIANCE TEST RESULTS *(continued)*

Appliance Type	Location/Identifier	Test Results

See main System Record of Inspection and Testing for additional information, certifications, and approvals.

State of California - Resources Agency
OFFICE OF THE STATE FIRE MARSHAL
Fire & Life Safety Division

Fire Watch Guideline

INSTRUCTIONS:

The owner, manager, or person in charge or control of the building/premises shall assign to the fire watch as many personnel as are required by the Deputy and shall instruct fire watch personnel as to:

- The procedure for notifying the State Fire Marshal
- The area(s) to be patrolled
- Training necessary to insure Fire Watch personnel are capable of activating fire alarm/sprinkler systems when required or necessary
- Any special instructions required by the State Fire Marshal
- Procedures for notifying the building or facility occupants
- A method of calling or notifing the fire service of an emergency

LOG BOOK:

- The owner, manager, person in charge, or in control of the premises shall provide a log book which contains a directory of names, telephone numbers and other information to assist in making emergency calls.

- The log book shall be the official document used to record a history of patrol rounds.

- The log book shall be maintained on the premises and be available for inspection by the Deputy State Fire Marshal.

Fire Watch log

Visually inspect each room and/or space in the facility at _____ minute intervals.

Visually inspect the perimeter (outside) of the facility when directed by the Deputy State Fire Marshal, which may include mechanical/electrical rooms and outbuildings at _____ minute intervals.

DATE	TIME	PERSON COMPLETING INSPECTION (Signature required)	COMMENTS (Upon visual inspection no evidence of a any smok or fire noted)

Fire Watch Guideline

(Complete and return to the Deputy State Fire Marshal)

Assigned fire watch personnel shall:

1. Be thoroughly familiar with the area they are patrolling.
2. Perform patrol operations according to instructions from State Fire Marshal.
3. Utilized the attached fire watch log to document patrol rounds any significant findings.
4. Assigned fire watch personnel shall perform fire watch duties only and have no other responsibility.
5. Relay any special orders or pertinent information to relief personnel and management.

NOTE: The fire watch conditions shall not be terminated without the Deputy State Fire Marshal's written authorization.

FACILITY:

_____

_____

_____

_____

FIRE WATCH FOR ENTIRE BUILDING:

[ ] YES

[ ] NO

SPECIFIC AREAS _____

PERSON RESPONSIBLE TO OVERSEE FIRE WATCH:

Name: _____

Title: _____

Date: _____

FIRE WATCH REQUIREMENTS DURING SCHOOL CONSTRUCTION PROJECTS

Disciplines: Fire & Life Safety, Structural **History:** Issued 12-20-17

PURPOSE: This Interpretation of Regulations (IR) clarifies code requirements based on the California Building Code (CBC), California Fire Code (CFC) and California Code of Regulations (CCR) Title 19 as related to non-operable fire protection/life safety systems requiring a fire watch.

BACKGROUND: 2016 CFC section 901.7 and CCR Title 19 section 1.14 require fire detection and alarm systems, fire hydrant systems, extinguishing systems, mechanical smoke exhaust systems, and smoke and heat vents to be maintained in an operative condition at all times. CFC section 901.7 directs that when a fire protection system is out of service, the fire department and fire code official be notified immediately and the school district shall establish a fire watch. For purposes of application, the Division of the State Architect (DSA) is the fire code official.

SCOPE: During the course of a construction project under the jurisdiction of DSA, DSA is the fire code official. The scope of this IR is confined to those situations where DSA has jurisdiction.

GENERAL: It is the intent of the CFC that fire protection/life safety systems in schools be maintained and fully operable at all times. In the event that a public school (grades K–12 or community colleges) within the jurisdiction of DSA has a fire protection/life safety system that is not operating in a dependable manner, that campus, or the affected portion of the campus, shall be provided a “fire watch.”

A fire watch is intended as a temporary alternate to a fire protection/life safety system and allows a building to be temporarily occupied while the fire protection system is out of service. The purpose of a fire watch is to protect human life and property and transmit an immediate alarm to the building occupants and fire department. 2016 CFC, Chapter 9, Section 901.7, directs that where utilized, fire watches shall be provided with at least one approved means for notifying the fire department. The sole duty of the fire watch shall be dedicated to performing constant patrols of the protected premises and keep watch for evidence of fires such as smoke or flames.

1. REQUIRED FIRE WATCH: When, as part of an alteration or modernization project or construction of a new building a fire protection/life safety system is placed out of service and affects any occupied portion of an existing building undergoing renovation or occupied buildings or portions of the campus, then the school district, DSA, and the Architect/Engineer in general responsible charge of the construction project shall be notified immediately by the project inspector. It will be the school district’s responsibility to establish, instruct and maintain fire watch personnel in/at the affected building(s).

Where a fire alarm system is out of service, warning signs shall be posted at all entrances to any building to inform the occupants (see paragraph 1.3).

FIRE WATCH REQUIREMENTS DURING SCHOOL CONSTRUCTION PROJECTS

Modernizations of existing buildings or construction of new buildings that are not occupied by the public, staff or students during construction, shall not require a fire watch as long as the construction efforts do not affect other occupied areas of the building.

1.1 Fire Watch Plan: The school district shall develop a fire watch plan with the applicable building(s) identified on a site and building plan, and coordinate with the local fire department.

When requested, the school district shall provide a copy of the fire watch plan to the DSA Field Engineer for the region in which the construction is taking place.

A copy of the fire watch plan shall be made available to the local fire authority upon request.

1.2 Requirements of a Fire Watch Plan:

- Include a procedure for notifying the fire department and other contacts deemed necessary by the school district for notification.
- Indicate area(s) to be patrolled and locations of portable fire extinguishers, means of egress and areas of special hazards. If a kitchen hood extinguishing system is included in the non-operable alarm system, the kitchen shall be included in the patrol route during cooking activities.
- The method of sounding an alarm shall be described to initiate the evacuation of building(s). The manner of alarm shall be conveyed to staff and students.
- Determine at least one means of direct communication with the local fire department; a telephone/cell phone is acceptable provided that a test run of the designated routes verifies signal strength of the cell phone at all locations.

1.3 Posting: Signs shall state,

"WARNING, FIRE ALARM SYSTEM IS CURRENTLY INOPERABLE.

A FIRE WATCH IS BEING CONDUCTED.

FIRE WATCH PERSONNEL WILL NOTIFY YOU BY

_____

(State means of notification.)

IN THE EVENT THAT BUILDING EVACUATION IS REQUIRED."

1.4 Fire Watch Personnel: The school district shall designate the fire watch personnel who are familiar with and are able to perform the duties as described in the fire watch plan.

The fire watch personnel shall not perform firefighting duties beyond the scope of an ordinary citizen. (Use of portable fire extinguishers is permitted, provided proper training in the use of fire extinguishers has been received and fire watch personnel feel confident in their ability to suppress a fire.)

1.5 The Fire Watch Personnel Duties: Duties shall include, but not be limited to, the following:

- Fire watch personnel are to be thoroughly familiar with facilities and areas they are patrolling. Route shall be a roving and continuous observation of the entire facility at least once each hour. Where hazardous operations (welding, use of open flame) are occurring, the frequency shall be every thirty minutes.
- Identify any fire, life or property hazards to appropriate contact per the fire watch plan.
- If a fire is discovered, the fire watch shall immediately:
  - Notify the fire department.
  - Notify occupants of the facility of the need to evacuate by a pre-described signal as outlined in 1.2 above. If the horns or public address function of the alarm system are still functional, use them to assist with evacuation of the building.
- Follow the provisions of the fire watch plan.
- Have knowledge of the location and use of fire protection equipment such as fire extinguishers.
- Be familiar with and manually activate fire door releases and/or stage roof vents or stage fire curtain as necessary when, in the judgment of the fire watch personnel, those portions of the building are affected.
- Update the fire watch log at the conclusion of each fire watch route.

1.6 Fire Watch Log: A fire watch log should be maintained at the facility and available to the local fire department and DSA field staff at all times during the fire watch. The school district shall determine the specific hours the fire watch will be on duty. At a minimum, the fire watch shall be on duty during all periods when the building(s) is/are occupied.

The log shall contain a directory of contact names, telephone numbers and other information necessary for making emergency calls.

The log shall indicate the following:

- Address of the facility.
- Name of the person conducting the fire watch.
- Times that the patrol has completed each tour of the facility.
- Record of communication(s) to the fire department.

2. TERMINATION OF FIRE WATCH: Where the fire watch is required due to a fire alarm system installation or modification, the completed or repaired fire alarm system shall be tested per National Fire Protection (NFPA) standard 72 and the system manufacturer's installation requirements. Testing and inspection of the system shall be documented utilizing the NFPA 72 Testing and Inspection Form. The project inspector

shall submit to the school district, A/E in general responsible charge, the local fire authority and DSA, as applicable, copies of the NFPA 72 "Record of Completion."

- It is the school district's responsibility to cancel the fire watch once the fire protection system has been deemed operable as communicated by the project inspector.
- Once the fire watch has been cancelled, the project inspector shall:
  - Notify the local fire department.
  - Notify DSA field engineer.
  - Verify removal of signs.

REFERENCES:

California Code of Regulations Title 19, Section 1.14

California Code of Regulations Title 24

Part 1, California Administrative Code, Section 4-304

Part 9, California Fire Code, Section 901.7

SECTION 32 12 16
ASPHALT PAVING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Hot-mix asphalt paving.
2. Hot-mix asphalt patching.

B. Related Requirements:

1. Section 321313 "Concrete Paving" for concrete pavement and for separate concrete curbs, gutters, and driveway aprons.

1.02 ACTION SUBMITTALS

A. Product Data:

1. Herbicide.

B. Hot-mix asphalt designs.

1.03 INFORMATIONAL SUBMITTALS

A. Material Certificates: Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.

1. Aggregates.
2. Asphalt binder.
3. Tack coat.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements for asphalt paving work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

PART 2 - PRODUCTS

2.01 AGGREGATES

A. Coarse Aggregate: ASTM D692/D692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

B. Fine Aggregate: AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

2.02 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320 binder designation **PG 64-10**

B. Tack Coat: ASTM D977 emulsified asphalt suitable grade and consistency for application.

PART 3 - EXECUTION

A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Placing Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.02 SURFACE PREPARATION

A. Ensure that prepared subgrade is ready to receive paving. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.

B. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.03 HOT-MIX ASPHALT PLACEMENT

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course and binder course in number of lifts and thicknesses to match existing AC pavement.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at a minimum temperature of 250 deg F.
4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.04 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct

joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where the paper ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method in accordance with AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations**.**

3.05 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density, Rice Test Method: 92 percent of reference maximum theoretical density in accordance with ASTM D2041/D2041M, but not less than 90 percent or greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.06 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce thickness indicated within the following tolerances:

1. Base Course and Binder Course: Plus, or minus 1/2 inch.
2. Surface Course: Plus 1/4 inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course**1/4 inch.**
2. Surface Course: **1/8 inch**.

3.07 QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Replace and compact hot-mix asphalt where core tests were taken.

C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

END OF SECTION

SECTION 32 13 13
CONCRETE PAVING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes concrete paving.

1. Driveways.
2. Roadways.
3. Parking lots.
4. Curbs and gutters.
5. Walks.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of product, ingredient, or admixture requiring color selection.

C. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.03 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

1.04 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on concrete paving mixtures.

PART 2 - PRODUCTS

2.01 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.02 STEEL REINFORCEMENT

A. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

C. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fas

tening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified.

2.03 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C150/C150M, **gray** Portland cement **Type I**.
2. Fly Ash: ASTM C618, Class C.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.

B. Air-Entraining Admixture: ASTM C260/C260M.

C. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

D. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

2.04 RELATED MATERIALS

A. Joint Fillers: ASTM D1751, asphalt-saturated cellulosic fiber ASTM D1752, cork or self-expanding cork.

B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

2.05 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301 for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

B. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 4-1/2 percent plus or minus 1-1/2 percent.

C. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

D. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd.

E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

F. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength 28 Days 3000 psi.

PART 3 - EXECUTION

3.01 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.02 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

3.03 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness**,** to match jointing of existing adjacent concrete paving.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface

3.04 CONCRETE PLACEMENT

A. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

B. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

D. Screed paving surface with a straightedge and strike off.

E. Commence initial floating using bull floats or derbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.05 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.
3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
4. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.
5. After curing, lightly work surface with a steel-wire brush or abrasive stone and water to expose nonslip aggregate.

3.06 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before floating finishes.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

3.07 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch
2. Thickness: Plus 3/8 inch.
3. Surface: Gap below 10-feet long; unleveled straightedge not to exceed 1/2 inch
4. Joint Spacing: 3 inches
5. Contraction Joint Depth: Plus 1/4 inch, no minus.
6. Joint Width: Plus 1/8 inch, no minus.

3.08 REPAIR AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep

paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 33 14 15
SITE WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Water-distribution piping and related components outside the building.

B. Related Requirements:

1. Section 321313 "Concrete Paving".
2. Section 321216 "Asphalt Paving".
3.

C. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.

D. Field Quality-Control Submittals:

1. Field quality-control reports.

1.02 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.03 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service in accordance with requirements indicated:

1. Notify **District** no fewer than **two** days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without Owner**'s** written permission.

1.04 COORDINATION

A. Coordinate connection to water main with utility company.

B. Content includes water-distribution piping and related components inside the building for fire-suppression water service water service and service entrance piping to a point 6" ft. above finished floor wall.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.

B. Comply with standards of authorities having jurisdiction for domestic water-service piping, in

cluding materials, installation, testing, and disinfection.

C. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

D. Piping materials to bear label, stamp, or other markings of specified testing agency.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

F. Comply with ASTM F645 for selection, design, and installation of thermoplastic water piping.

G. Comply with FM Approvals' "Approval Guide" and/or UL's "Fire Protection Equipment Directory" for fire-suppression water-service products.

H. Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-suppression water-service piping.

2.02 PIPING MATERIALS

DUCTILE-IRON PIPE AND FITTINGS
Pipe in "Mechanical-Joint, Ductile-Iron Pipe" Paragraph below is available in NPS 3 to NPS 24 (DN 80 to DN 600).

A. Mechanical-Joint, Ductile-Iron Pipe:

1. AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.

B. Mechanical-Joint, Ductile-Iron Fittings:

1. AWWA C110, ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
3. AWWA C104/A21.4 cement mortar lined.

C. Push-on-Joint, Ductile-Iron Pipe:

1. AWWA C151/A21.51, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. AWWA C104/A21.4 cement mortar lined.

D. Push-on-Joint, Ductile-Iron Fittings:

1. AWWA C110, ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
2. Gaskets: AWWA C111/A21.11, rubber.
3. AWWA C104/A21.4 cement mortar lined.

E. Grooved-End, Ductile-Iron Pipe:

1. AWWA C151/A21.51, with cut, rounded-grooved ends.
2. AWWA C104/A21.4 cement mortar lined.

F. Grooved-End, Ductile-Iron Pipe Appurtenances:

1. Grooved-End, Ductile-Iron Fittings:

a. ASTM A536, ductile-iron castings with dimensions matching pipe.

2. Grooved-End, Ductile-Iron-Piping Mechanical Couplings:

a. AWWA C606, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.

G. Flanges: ASME 16.1, Class 125, cast iron.

2.03 PIPING JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series.

B. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.

C. Gaskets for Ferrous Piping and Copper-Alloy Tubing: ASME B16.21, asbestos free.

D. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.04 PIPING SPECIALTIES

A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

B. Tubular-Sleeve Pipe Couplings: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.

1. Standard: AWWA C219.
2. Center-Sleeve Material: **Manufacturer's standard**..
3. Gasket Material: Natural or synthetic rubber.
4. Pressure Rating: 150 psig minimum.
5. Metal Component Finish: Corrosion-resistant coating or material.

C. Split-Sleeve Pipe Couplings: Metal, bolted, split-sleeve-type, reducing or transition coupling with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.

1. Standard: AWWA C227.
2. Sleeve Material: Manufacturer's standard.
3. Sleeve Dimensions: Of thickness and width required to provide pressure rating.
4. Gasket Material: O-rings made of EPDM rubber unless otherwise indicated.
5. Pressure Rating: 150 psig minimum.
6. Metal Component Finish: Corrosion-resistant coating or material.

D. Flexible Connectors:

1. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
2. Ferrous-Metal Piping: Stainless steel hose covered with stainless steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.

E. Dielectric Fittings: Assembly of copper alloy and ferrous materials with separating noncon

ductive insulating material. Include end connections compatible with pipes to be joined.

1. Dielectric Unions:

    a. Standard: ASSE 1079.
    b. Pressure Rating: 125 psig minimum at 180 deg F
    c. End Connections: Solder-joint copper alloy and threaded ferrous.
    d. Standard: ASSE 1079.
    e. Factory-fabricated, bolted, companion-flange assembly.
    f. Pressure Rating: 150 psig minimum at 180 deg F
    g. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

2. Dielectric-Flange Insulating Kits: Nonconducting materials for field assembly of companion flanges.

    a. Pressure Rating: 150 psig minimum.
    b. Gasket: Neoprene or phenolic.
    c. Bolt Sleeves: Phenolic or PE.
    d. Washers: Phenolic with steel backing washers.

3. Dielectric Nipples:

    a. Standard: IAPMO PS 66.
    b. Electroplated steel nipple complying with ASTM F1545.
    c. Pressure Rating: 300 psig at 225 deg.
    d. End Connections: Male threaded or grooved.
    e. Lining: Inert and noncorrosive, PP.

2.05 GATE VALVES

A. Gate Valves - AWWA, Cast Iron:

    a. Standards: AWWA C509 or AWWA C515.
    b. Minimum Pressure Rating: 200 psig.
    c. End Connections: Mechanical joint, flanged, threaded, or push on.
    d. Interior Coating: Complying with AWWA C550.

2. Gate Valves - OS&Y, Rising Stem, Resilient Seated: Cast- or ductile-iron body and bonnet, with bronze or cast- or ductile-iron gate, resilient seats, and bronze stem.

    a. Standard: AWWA C509 or AWWA C515.
    b. Minimum Pressure Rating: 200 psig
    c. End Connections: Mechanical joint, flanged, threaded, or push on.

B. Gate Valves - UL/FM Global, Cast Iron:

1. Gate Valves - OS&Y, Rising Stem, Resilient Seated: Cast- or ductile-iron body and bonnet and bronze seating material.

    a. Standards: AWWA C509 or AWWA C515, UL listed and FM Global approved.
    b. Minimum Pressure Rating: 175 deg.
    c. End Connections: Mechanical joint or flanged.
    d. Interior Coating: Complying with AWWA C550.
    e. .
    f. Handwheel: Malleable iron.

2.06 GATE VALVE ACCESSORIES AND SPECIALTIES

A. **Tapping-Sleeve Assemblies**: Sleeve and valve compatible with drilling machine.

1. Standard: MSS SP-60.
2. Tapping Sleeve: Cast- or ductile-iron or stainless steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
3. Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.

B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.

1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

C. **Indicator Posts**: UL 789, FM Global approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

D. Backflow Preventers - Double-Check Assembly:

1. Standard: **AWWA C510**.
2. Operation: Continuous-pressure applications unless otherwise indicated.
3. Pressure Loss: **5 psig** maximum, through middle one-third of flow range.
4. Body: Bronze for NPS 2 and smaller; [cast iron with interior lining complying with AWWA C550 or that is FDA approved] [steel with interior lining complying with AWWA C550 or that is FDA approved] [stainless steel] for NPS 2-1/2 (DN 65) and larger.
5. Configuration: Designed for horizontal, flow.
6. Accessories: Ball valves with threaded ends on inlet and outlet of NPS 2 and smaller; OS&Y gate valves with flanged ends on inlet and outlet of NPS 2-1/2 and larger.
7. clapper-type backwater valve.

a. Direction of Opening: Open hydrant valve by turning operating nut to left or counterclockwise.
b. Exterior Finish: Red alkyd-gloss enamel paint unless otherwise indicated.

2.07 FIRE DEPARTMENT CONNECTIONS

A. Fire Department Connections:

1. Standard: UL 405.
2. Configuration: Freestanding, with cast-bronze body, thread inlets in accordance with NFPA 1963 and matching local fire department hose threads and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; 36-inch- high, brass sleeve; and round escutcheon plate.
3. Connections:

a. **Two** NPS 2-1/2 inlets and one 6” outlet.

4. Inlet Alignment: Inline
5. Finish Including Sleeve: Polished bronze.
6. Escutcheon Plate Marking: AUTO SPKR

B. factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal when cover is removed.

PART 3 - EXECUTION

3.01 EARTHWORK

A. Transition couplings with pressure ratings at least equal to piping pressure rating may be used unless otherwise indicated.

B. Do not use flanges or unions for underground piping.

C. Flanges, unions, and grooved-end-pipe couplings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

D. Underground water-service piping **NPS 4 to NPS 12**

1. Ductile-iron, ductile-iron, push-on-joint fittings; and gasketed joints.

E. Underground fire-service-main piping 4" to 12" to be any of] the following:

1. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed.

F. Aboveground fire-service-main piping 4" to 12" to be ductile-iron, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.

3.02 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FM Global, cast-iron, nonrising-stem gate valves with indicator post.
2. Use the following for valves in vaults and aboveground:
    a. Gate Valves, NPS 3 and Larger: [AWWA, cast iron, OS&Y rising stem, rising stem, resilient seated.
    b. Check Valves: AWWA C508 UL/FM Global, swing type.
3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
6. On PVC piping, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.

3.03 INSTALLATION OF BACKFLOW PREVENTERS

A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install in accordance with requirements of plumbing and health department and authorities having jurisdiction.

3.04 INSTALLATION OF FIRE DEPARTMENT CONNECTIONS

A. Install wafer valves at each fire department connection to mains.

B. Install protective pipe bollards on three sides of fire department connection.

3.05 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.

1. Increase pressure in 50 increments and inspect each joint between increments. Hold at test pressure for one hour; decrease to 0 psig. Slowly increase again to test pressure and hold for one more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.06 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Delete paragraph below if metallic water-service piping without electrically insulated fittings will be used.

3.07 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.

END OF SECTION