

TECHNICAL SPECIFICATIONS

FOR

CITY OF LA PUENTE ACTIVITY CENTER

At

LA PUENTE CITY PARK

501 Glendora Avenue
La Puente, California 91744



WW Project No. 22008.00

December 18, 2025

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SECTION 01 33 00 SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

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

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- 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. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Document Control Software: The District has implemented a computerized web-accessed document management and control system for the Project referred to herein as "Document Control Software." Use this system for all Project Submittals unless noted otherwise.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list 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

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by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with Baseline Schedule.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled date of fabrication.
 - h. Scheduled dates for purchasing.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL FORMATS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop 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. Digital Drawing Software Program: The Contract Drawings are available in AutoCAD
 - c. Execute a data licensing agreement in form acceptable to District and Architect.
 - d. The Architect's Digital Drawings shall not be used as the Contractor's Shop Drawing submittal, etc. In other words, the Contractor shall not take the Architect's Digital Drawings and just place the Contractor's annotations, designations etc on to it.
- 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.

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2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal timing of submittals for related parts of the Work specified in different Sections 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 15 days 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.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, District, or other parties is indicated, allow 21 days for initial review of each submittal. Structural Systems may require 31 days for initial review.
 5. DSA review: Where submittal must be reviewed by DSA, allow 35 days for review of submittal.
- D. Options: Identify options requiring selection by Architect. Make all submittals electronically using City of La Puente Document Control Software.
- E. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations.
- F. Electronic Submittals: Provide submittals using City of La Puente Document Control Software. Immediately notify Architect, District Construction Manager, Project Inspector, and Document Control Specialist of all submittals made.
- G. [Paper Submittals: Provide paper submittal only where required by individual specification sections. Place a permanent label or title block on each submittal item for identification.
1. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling.
 2. Provide a space approximately [6 by 8 inches] <Insert dimensions> on permanent label or beside title block to record Contractor's review and approval markings and action taken by Architect.

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3. Include the following information:
 - a. Project name.
 - b. Date.
 - c. Transmittal Destination (To:).
 - d. Transmittal Source (From:).
 - e. Name of Architect.
 - f. Name of District Construction Manager.
 - g. Name of Contractor.
 - h. Name of firm or entity that prepared the submittal.
 - i. Names of subcontractor, manufacturer, and supplier.
 - j. Unique submittal number, including revision identifier. Include Specification Section number with sequential identifier; and alphanumeric suffix for resubmittals.
 - k. Number and title of appropriate Specification Section.
 - l. Drawing number and detail references, as appropriate.
 - m. Location(s) where product is to be installed, as appropriate.
 - n. Other necessary identification.
 - o. Remarks.
 4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- H. Resubmittals: Make resubmittals in same manner as initial submittal.
1. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
 2. For paper submittals, note date, content of previous submittal and content of revision in label or title block and clearly indicate extent of revision.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Furnish one copy of each final action submittal marked with approval notation from Architect's action stamp to Project Inspector.
- K. 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 action stamp.

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1.6 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Post electronic submittals as PDF electronic files directly to Document Control Software.
 - a. Architect will post annotated file and notify Contractor of posting.
 - 2. Action Submittals: For paper submittals, submit four paper copies of each submittal for District use and as many copies as Contractor wants returned for Contractor use.
 - 3. Informational Submittals: For paper submittals, submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
 - 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Provide certificates and certifications signed by an officer or other individual authorized to sign documents on behalf of that entity.
- 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.

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5. Submit Product Data before Shop Drawings, and 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.
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. Paper 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.
 4. BIM File Incorporation: Develop and incorporate Shop Drawing files into Building Information Model established for Project.
 - a. Prepare Shop Drawings in the following format: Same digital data software program, version, and operating system as the original Drawings.
- 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: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.

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- f. Specification paragraph number and generic name of each item.
- 3. 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
 - c. 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 two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return one 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 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 three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) 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:

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1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
 5. Submit product schedule in the following format:
 - a. PDF electronic file.
- F. 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.
- G. 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.
- H. 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.
- I. 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.
- J. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- K. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- L. 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.
- M. 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.
- N. 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. Include the following information:
1. Name of evaluation organization.
 2. Date of evaluation.
 3. Time period when report is in effect.

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4. Product and manufacturers' names.
 5. Description of product.
 6. Test procedures and results.
 7. Limitations of use.
- O. 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.
- P. 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.
- Q. 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.
- R. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of applicable codes and regulations, and calculations, list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

1.7 DELEGATED-DESIGN 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 and 3 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.
- C. BIM Incorporation: Incorporate delegated-design drawing and data files into Building Information Model established for Project.

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1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as the original Drawings.

1.8 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.
- B. 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.
 1. Architect will not review submittals that do not have Contractor's review and approval.

1.9 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and post review on Document Control Software. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
 1. "NO EXCEPTION TAKEN" – Product may be used in the project.
 2. "MAKE CORRECTIONS NOTED" – Products may be used in the project after noted corrections have been made.
 3. "REVISE AND RESUBMIT" – Revise submittal to comply with construction documents and resubmit for review.
 4. "REJECTED" – Products do not comply with construction documents and may not be used.
 5. "NOT REVIEWED" – Submittal is be processed for filing purposes only.
- B. Informational Submittals: Architect will review each submittal and will post submittal review on Document Control Software only if it does not comply with requirements.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

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- E. Submittals received from sources other than Contractor will be returned by the Architect without action or may be discarded.
- F. Submittals not required by the Contract Documents will be returned by the Architect without action or may be discarded.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 33 00

SECTION 01 57 25

TEMPORARY WATER POLLUTION CONTROL PLAN (WPCP)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for preparing and implementing Project WPCP.
 - 1. Scope of WPCP Work: Provide all materials, methods, and administrative and procedural actions necessary for preparation and implementation of a complete and compliant WPCP.
- B. Related Requirements:
- C. City of La Puente-Furnished Documents:
 - 1. WPCP.
 - 2. Water Pollution Control Drawings (WPCDs).

1.3 REFERENCES

- A. The following apply to work specified in this Section, including erosion and sediment transport control requirements:
 - 1. CASQA Construction Best Management Practices Handbook, current edition, available as a subscription service at: <https://www.casqa.org/resources/bmp-handbooks>.
 - 2. San Diego Basin Plan available at: http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/basin_plan/index.shtml.
 - 3. RWQCB San Diego Region, Order R9-2015-0013 - NPDES No. CAG919003 - General Waste Discharge Requirements for Groundwater Extraction Discharges to Surface Waters Within the San Diego Region.
 - 4. City of San Diego Stormwater Standards Manual, current edition.
 - 5. NPDES General Permit for Waste Discharge Requirements (WDRs) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) Water Quality (WQ), SWRCB Order 2013-0001-DWQ NPDES No. CAS000004

TEMPORARY WATER POLLUTION CONTROL PLAN (WPCP)

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As Amended By Order WQ 2015-0133-Exec, Order WQ 2016-0069-Exec, WQ Order 2017-Xxxx-DWQ, Order WQ 2018-0001-Exec, And Order WQ 2018-0007-Exec.

6. All applicable state, municipal or regional laws, ordinances, rules or regulations governing discharge of storm water, including applicable municipal storm water management programs.

1.4 DEFINITIONS

- A. BMP: Best Management Practice.
- B. CASQA: California Storm Water Quality Association.
- C. WPCP: Water Pollution Control Plan.
- D. MS4s: Municipal Separate Storm Sewer Systems.
- E. NPDES: National Pollutant Discharge Elimination System.
- F. QSD: Qualified SWPPP Developer.
- G. QSP: Qualified SWPPP Practitioner.
- H. RWQCB: Regional Water Quality Control Board.
- I. San Diego Basin Plan: RWQCB Water Quality Control Plan for the San Diego Basin (9).
- J. SWPPP: Storm Water Pollution Prevention Plan.
- K. SWRCB: State Water Resources Control Board.
- L. WPCM: Water Pollution Control Manager.
- M. WPCP: Water Pollution Control Plan.
 1. Required for construction sites with a disturbed soil area of less than one acre, and not part of a larger common plan of development that is equal to or greater than one acre.

1.5 ACTION SUBMITTALS

- A. WPCP.

1.6 INFORMATIONAL SUBMITTALS

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- A. Qualification Data: For Contractor's WPCM.
- B. Training Records:
 - 1. For all employees and subcontractors who will be working at job site, submit water pollution control training records. Include training subjects and dates for initial training, ongoing training, and tailgate meetings. Submit records for:
 - a. Existing employees within five days of obtaining City of La Puente acceptance of WPCP.
 - b. New employees within five days of receiving training.
 - c. Subcontractors' employees within five days of receiving training and at least five days before each subcontractor starts work.

1.7 CLOSEOUT SUBMITTALS

- A. Final WPCP, including all attachments and appendices.

1.8 QUALITY ASSURANCE

- A. Provide WPCM throughout duration of construction.
- B. Required Qualifications for Contractor's WPCM:
 - 1. QSD or QSP as recognized by CASQA or through California Board for Professional Engineers, Land Surveyors, and Geologists (CBPELSG) process.
 - 2. One of the following:
 - a. Certified Erosion, Sediment and Stormwater Inspector (CESSWI™) registered through Enviro Cert International, Inc.
 - b. Certified Inspector of Sediment and Erosion Control (CISEC™) registered through Certified Inspector of Sediment and Erosion Control, Inc.
 - 3. Certified Professional in Erosion and Sediment Control (CPESC™) registered through Enviro Cert International, Inc.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with material requirements identified on applicable BMP Fact Sheets from CASQA Construction BMPs Handbook.

PART 3 - EXECUTION**3.1 WATER POLLUTION CONTROL PLAN (WPCP)**

- A. Contractor's designated WPCM must prepare a WPCP.
- B. Provide compliant and effective erosion and sediment control BMPs for all active areas of construction, inactive areas, finished slopes, open space, and completed lots in accordance with Contract Documents.
- C. Provide and maintain erosion and sediment control BMPs in compliance with applicable BMP Fact Sheets from CASQA Construction BMPs Handbook.
- D. Do not allow construction activities to cause a discharge that alters physical, thermal, chemical, biological or radioactive properties of any waters of the State, or to discharge a contaminant that is likely to cause a nuisance or to be harmful to public health, wildlife, or other legitimate uses.
 - 1. To the extent practicable, all construction sites must provide on-site methods to prevent sediment from entering the existing storm water systems and to prevent cloudy or sediment-laden water from any construction site from discharging to surface waters, groundwater, and MS4s.
- E. All construction sites must have stabilized construction site ingress and egress points to limit tracking of sediment offsite.
- F. Remove offsite accumulations of sediment by the end of each day. Ensure that sediment does not enter receiving waters.
- G. Do not clean offsite accumulations of sediment by using pressure or power washing.
- H. Preserve existing vegetation where possible to minimize erosion.

3.2 CONTRACTOR'S WATER POLLUTION CONTROL PLAN (WPCP)

- A. Do not start work until a copy of approved WPCP is on-site.
- B. Contractor's WPCM must amend and implement WPCP.
- C. Protect storm water systems and receiving waters from discharge of potential pollutants from project site due to construction activities by using storm water pollution control practices, including the following construction support facilities:
 - 1. Staging areas.
 - 2. Storage yards for equipment and materials.
 - 3. Mobile operations.
 - 4. Batch plants for Portland cement concrete and hot mix asphalt.

TEMPORARY WATER POLLUTION CONTROL PLAN (WPCP)**01 57 25 - 4****CITY OF LA PUENTE ACTIVITY CENTER**

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5. Crushing plants for rock and aggregate.
 6. Other facilities installed for construction-related reasons such as haul roads.
 7. Borrow and disposal sites:
 - a. Storm water pollution due to erosion must be prevented at operated borrow/disposal site(s), during and after completion of construction activities.
 - b. Upon completion of work, borrow/disposal site(s) must be left in a condition where storm water will not collect or stand therein.
 - D. At least five days before operating any construction support facility that is not covered by WPCP, Contractor's WPCM must amend WPCP, showing location and quantity of water pollution control practices associated with that construction support facility.
 - E. Contractor's WPCM must ensure documentation of:
 1. Weekly Inspection. Provide associated site inspection report within 24 hours of completing weekly inspection. Include:
 - a. Date, time, location, and nature of operation, type of discharge and quantity.
 - b. Water pollution control practices in use before discharge.
 - c. Description of water pollution control practices and corrective actions taken to manage discharge or cause of notice.
 - F. Contractor's WPCM is responsible for:
 1. Retaining a printed copy of WPCP at the job site.
 2. Implementing all aspects of WPCP.
 3. Managing work activities in a way that reduces discharge of pollutants to surface waters, groundwater, and MS4s.
 4. Monitoring and inspecting BMPs at job site.
 5. Notifying City of La Puente Construction Manager within six hours when any of the following occur:
 - a. Discharges of sediment laden runoff into receiving waters or drainage systems that are causing or could cause water pollution.
 - b. Receiving a written notice or order from the RWQCB or any other regulatory agency.
 - G. Implement appropriate construction site management and BMPs as required to protect water quality. Discharges from the site must not lead to water quality objective exceedances.
- 3.3 WPCP PREPARATION
- A. Prepare and implement WPCP, including:

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1. Show locations of disturbed soil areas, water bodies, and water conveyances.
 2. Describe work involved in installation, maintenance, repair, and removal of temporary and permanent BMPs.
 3. Show locations and types of temporary BMPs that will be used for each construction phase.
 4. Show locations and types of BMPs that will be installed permanently under the Contract.
- B. Prepare WPCP schedule indicating when:
1. Work activities will be performed that could cause discharge of pollutants into storm water.
 2. Water pollution control practices associated with each construction phase will be implemented.
 3. Soil stabilization and sediment control practices for disturbed soil areas will be implemented.
- C. Provide copies of permits obtained through agencies, such as Fish & Game permits, US Army Corps of Engineers permits, RWQCB 401 certifications, aerially deposited lead variance from the Department of Toxic Substance Control, aerially deposited lead variance notifications, and RWQCB waste discharge requirements for aerially deposited lead reuse.
- D. Amend WPCP whenever:
1. Changes in work activities could affect discharge of pollutants.
 2. BMPs are added by change order.
 3. BMPs are added at Contractor's discretion.
 4. Changes in the amount of disturbed soil are substantial. If changes in disturbed soil area are revised to 1 acre, or more, a SWPPP will need to be prepared and a Waste Discharge Identification Number (WDID#) will need to be obtained.
 5. Objectives for reducing or eliminating pollutants in storm water discharges have not been achieved.
 6. Project receives a written notice or order from RWQCB or another regulatory agency.
- E. WPCP Acceptance Process
1. Within 15 days after project Notice to Proceed, submit a copy of the WPCP to City of La Puente Construction Manager. City of La Puente will provide review comments, will specify date when review stopped, and will specify date when revised WPCP is required.
 2. Resubmit revised WPCP within seven days of receiving City of La Puente's comments. City of La Puente's review will resume when complete revised WPCP has been resubmitted.
 3. After City of La Puente accepts revised WPCP, submit an electronic copy and a printed copy of the accepted revised WPCP.

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- F. WPCP must include procedures regarding:
 - 1. Monitoring of the National Weather Service forecast on a daily basis. For National Weather Service forecast, go to: <https://www.weather.gov/> .
 - 2. Installation of applicable construction BMPs and practices as required to avoid exceedances of water quality objectives defined in Basin Plan. Refer to CASQA Construction BMPs Handbook for guidance in installation, maintenance, or selection of additional BMPs (when necessary).
 - 3. Installation of storm water pollution control practices prior to beginning work activities that disturb soil or before predicted precipitation, as determined necessary for protection of water quality.
- G. Contractor's WPCM must oversee inspections of BMPs identified in WPCP:
 - 1. Before a forecasted storm.
 - 2. After precipitation that causes site runoff.
 - 3. On a pre-determined schedule of at least once a week.
- H. Whenever a deficiency is identified in the implementation of the accepted WPCP:
 - 1. Correct deficiency as soon as possible. Begin correcting deficiency within 72 hours of identification. Complete deficiency correction prior to beginning of precipitation.
 - 2. City of La Puente may correct deficiency and deduct the cost of correcting deficiency from payment when the Contractor fails to correct deficiency by the agreed date or before onset of precipitation.
 - 3. Continue WPCP implementation during any suspension of work activities.
- I. Whenever there is concern that WPCP may be inadequate to comply with applicable water quality objectives or water quality standards as contained in California Toxics Rule, Municipal Permit, or Basin Plan, Contractor's WPCM must request changes to BMPs, or City of La Puente may require changes to BMPs. Changes may include additional or new BMPs.

END OF SECTION 01 57 25

**SECTION 02 41 19
SELECTIVE DEMOLITION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.
- B. Related Requirements:
 - 1. Section 02 41 16 "Structure Demolition".
 - 2. Section 31 11 00 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.
 - 3. Section 32 84 00 "Planting Irrigation"

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to the City of La Puente ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

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- B. Historic items, relics, antiques, and similar objects, including cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to the City of La Puente that may be uncovered during demolition remain the property of the City of La Puente.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to the City of La Puente.

1.5 PRE-INSTALLATION MEETINGS

- A. Pre-demolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.
- D. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure City of La Puente on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of City of La Puente continuing occupancy of portions of existing building and of City of La Puente partial occupancy of completed Work.
 - 6. Locations of proposed dust and noise control temporary partitions and means of egress.
 - 7. Means of protection for items to remain and items in path of waste removal from building.
- E. Pre-demolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces that might be misconstrued as damage caused

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by demolition operations. Comply with Section 01 32 33 "Photographic Documentation." Submit before Work begins.

- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- G. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 QUALITY ASSURANCE

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

1.9 FIELD CONDITIONS

- A. The City of La Puente will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so the City of La Puente operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by the City of La Puente as far as practical.
- C. Notify the City of La Puente Construction Manager 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. If suspected hazardous materials are encountered, do not disturb; immediately notify the City of La Puente Construction Manager. Remove hazardous materials in accordance with Specification Sections 02 82 33, 02 83 33 and 02 84 33. The costs associated with such work shall be paid out of the appropriate Allowance, as approved by the City of La Puente Construction Manager.
- E. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

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1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 3. Hazardous materials and locations are shown in the Drawings. The mitigation of this material is included in the Base Bid.
 4. If hazardous materials are encountered that are not shown in the Drawings, do not disturb; immediately notify the City of La Puente Construction Manager. Remove hazardous materials in accordance with Specification Sections 02 82 33, 02 83 33 and 02 84 33. The costs associated with such work shall be paid out of the appropriate Allowance, as approved by the City of La Puente Construction Manager.
- F. Termite Infestation: It is not expected that active termite infestations will be encountered in the Work.
1. If active termite infestations are encountered, do not disturb; immediately notify the City of La Puente Construction Manager who will have the infestations investigated. Allow three days when no work will be permitted on those portions of the Work suspected of having active termite infestations.
- G. Storage or sale of removed items or materials on-site is not permitted.
- H. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.
- 1.10 COORDINATION
- A. Arrange selective demolition schedule so as not to interfere with the City of La Puente operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI / ASSE A10.6 and NFPA 241.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by the City of La Puente. The City of La Puente does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Perform an engineering survey of 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 building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs or video.
 - 1. Comply with requirements specified in Section 01 32 33 "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
- E. 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 City of La Puente Construction Manager.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off utilities with utility companies.

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2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to the City of La Puente.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.
4. 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.
 - a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, 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.

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1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

- 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. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. 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. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. 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.
 5. Maintain fire watch and portable fire-suppression devices during and for at least 2 hours after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 74 19 "Construction Waste Management and Disposal."
- B. 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.
- C. 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 the City of La Puente.
 4. Transport items to the City of La Puente storage area on-site.
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:

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1. Clean and repair items to functional condition adequate for intended reuse.
 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.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by City of La Puente Construction Manager, 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.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- D. Air-Conditioning Equipment: Remove equipment without releasing refrigerants. Cap all ducts to remain, if new equipment is not immediately installed.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 4. Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

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3.8 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 02 41 19

SPECIFICATIONS

SECTION 03 10 00

CONCRETE FORMS AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 01 apply to this section
- B. Section Includes:
 - 1. Formwork for cast-in-place concrete as indicated.
 - 2. Installation of items to be embedded in concrete, such as anchor bolts, inserts, embeds, and sleeves.
- C. Related Sections:
 - 2. Section 03 20 00: Concrete Reinforcement.
 - 3. Section 03 30 00: Cast-In-Place Concrete.

1.02 SYSTEM DESCRIPTION

- A. Regulatory Requirements: Except as otherwise specified herein, Work of this section shall be in accordance with CBC, Chapter 19A, Concrete.

1.03 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating locations of forms, joints, embedded items, and accessories.
- B. Product Data: Submit manufacturer's Product Data for form materials and accessories.

1.04 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. Conform to ACI 347, Chapter 1: Design and Chapter 3: Materials for Formwork.
 - 2. Plywood: Conform to tables for form design and strength in APA Form V 345.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Form materials may be reused during progress of the Work provided they are completely cleaned and reconditioned, recoated for each use, capable of producing formwork of required quality, and are structurally sound.

CONCRETE FORMS AND ACCESSORIES

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- B. Form Lumber: WCLIB Construction Grade or Better, WWPA No. 1 or Better.
- C. Plywood: PS 1-95, Group I, Exterior Grade B-B Plyform or better, minimum 5-ply and 3/4 inch thick for exposed locations and at least 5/8 inch thick for unexposed locations, grade marked, not mill oiled. Furnished plywood with medium or high density overlay is permitted.
- D. Form Ties: Prefabricated rod, flat band, wire, internally threaded disconnecting type, not leaving metal within 1-1/2 inch of concrete surface.
- E. Form Coating: Non-staining clear coating free from oil, silicone, wax, not grain-raising, "Formshield" by A.C. Horn, Inc., "Release" by Burke Concrete Accessories, or "Cast-Off" by Sonneborn Building Products. Where form liners are furnished, provide form coatings recommended by form liner manufacturer.

PART 3 - EXECUTION

3.01 GENERAL

- A. Forms shall be constructed so as to shape final concrete structure conforming to shape, lines and dimensions of members required by Drawings and Specifications, and shall be sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together to maintain position and shape. Forms and their supports shall be designed so that previously placed structures will not be damaged. Forms shall be true to line within a tolerance of plus-or-minus 1/250 of the span.

3.02 ERECTION

- A. Plywood shall be installed with horizontal joints level, vertical joints plumb and with joints tight. Back joints by studs or solid blocking, and fill where necessary for smoothness. Reused plywood shall be thoroughly cleaned, damaged edges or surfaces repaired and both sides and edges oiled with colorless form oil. Nail plywood along edges, and to intermediate supports, with common wire nails spaced as necessary to maintain alignment and prevent warping.
- B. Openings for Cleaning: Provide temporary openings at points in formwork to facilitate cleaning and inspection. At base of walls and wide piers, bottom form board on one face for entire length shall be omitted until form has been cleaned and inspected.

3.03 REMOVAL OF FORMS

- A. Forms shall not be removed until concrete has sufficiently hydrated to maintain its integrity and not be damaged by form removal operations. Unless noted otherwise and/or permitted by the Architect, columns and wall forms shall not be removed in less than 5 days, floor slabs in less than 7 days, beams and girders in less than 15 days, metal pan forms for joists may be removed after 3 days, but joist centering shall not be removed until after 15 days, and ramp, landing, steps and floor slabs shall not be removed in less than 7 days. Shoring shall not be removed until member has acquired sufficient strength to support its weight, load upon it, and added load of construction.

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- B. Compressive strength of in-place concrete shall be determined by testing field-cured specimens representative of concrete location or members, as specified in Section 03300: Cast-In-Place Concrete.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.05 CLEAN UP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

END OF SECTION 03 10 00

SPECIFICATIONS

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 01 apply to this section
- B. Section Includes:
 - 1. Concrete steel reinforcement as indicated.
- C. Related Sections:
 - 2. Section 03 10 00: Concrete Formwork.
 - 3. Section 03 30 00: Cast-In-Place Concrete.
 - 4. Section 04 22 00: Concrete Unit Masonry.

1.02 SYSTEM DESCRIPTION

- A. Regulatory Requirements: Fabrication and placement of reinforcing shall be in accordance with requirements of CBC, Chapter 19A.

1.03 SUBMITTALS

- A. Shop Drawings: Submit steel reinforcement Shop Drawings in accordance with ACI 315. Include assembly diagrams, bending charts and slab plans. Indicate lengths and location of splices, size and lengths of reinforcing steel.
- B. Closeout Submittals: Record exact locations of reinforcing that vary from Shop Drawings.

1.04 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice.
 - 2. American Welding Society (AWS).
 - 3. American Concrete Institute (ACI).
 - 4. CBC, Chapter 19A, Concrete.
- B. Source Quality Control: Refer to Division 01 Sections for general requirements and to following paragraphs for specific procedures. Testing laboratory retained by the Owner shall perform following conformance testing, select test Samples of bars, ties, and stirrups from the material at the Project site or from the place of distribution, with each Sample consisting of not less than two 18 inch long pieces, and perform the following tests according to ASTM A 615.

SPECIFICATIONS

1. Identified Bars: If Samples are obtained from bundles as delivered from the mill, identified as to heat number, accompanied by mill analyses and mill test reports, and properly tagged with the identification certificate so as to be readily identified, perform one tensile and one bend test for each 10 tons or fraction thereof of each size of bars. Submit mill reports when Samples are selected.
 2. Unidentified Bars: When positive identification of reinforcing bars cannot be performed and when random Samples are obtained, perform tests for each 2.5 tons or fraction thereof, one tensile and one bend test from each size of bars.
 - C. Certification of Welders: Shop and Project site welding shall be performed by certified welding operators.
- 1.05 DELIVERY, STORAGE AND HANDLING
- A. Avoid exposure to dirt, moisture or conditions harmful to reinforcing.
 - B. Reinforcing steel bars, wire, and wire fabric shall be stored on the Project site to permit easy access for examination and identification of each shipment. Material of each shipment shall be separated for size and shape.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide reinforcing of sizes, gages and lengths indicated, bent to indicated shapes.

2.02 MATERIALS

- A. Steel Reinforcing Bars: ASTM A 615, or ASTM A 706 deformed grade 40 billet steel unless otherwise specified or indicated.
- B. Bars or Rod Mats: ASTM A 184.
- C. Wire Fabric for Reinforcement: ASTM A 185.
- D. Tie Wire: ASTM A 82, fully annealed, copper-bearing steel wire, 16 gage minimum.
- E. Chairs, Spacers, Supports, and Other Accessories: Standard manufacture conforming to ACI-315 fabricated from steel wire of required types and sizes. For reinforcement supported from grade, provide properly sized dense precast blocks of concrete.

2.03 FABRICATION OF REINFORCING BARS:

- A. Comply with CRSI Manual of Standard Practice for Reinforced Concrete Construction for fabrication of reinforcing steel.
- B. Bending and Forming: Fabricate bars of the indicated sizes and bend and form to required shapes and lengths by methods not injurious to materials. Do not heat reinforcement for bending. Bend bars No. 6 size and larger in the shop only. Bars

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SPECIFICATIONS

with unscheduled kinks or bends are not permitted. Provide only tested and permitted bar materials.

- C. Welding: Provide only ASTM A 706 steel where welding is indicated. Perform welding by the direct electric arc process in accordance with AWS D1.4 and specified low-hydrogen electrodes. Preheat 6 inches each side of joint. Protect joints from drafts during the cooling process; accelerated cooling is not permitted. Do not tack weld bars. Clean metal surfaces to be welded of loose scale and foreign material. Clean welds each time electrode is changed and chip burned edges before placing welds. When wire brushed, the completed welds must exhibit uniform section, smooth welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion and penetration into the base metal. Cut out welds or parts of welds deemed defective, using chisel, and replace with proper welding. Prequalification of welds shall be in accordance with CBC requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Bars shall be bent cold. Bars partially embedded in concrete shall not be field bent except as indicated on reviewed Shop Drawings. Before installation, clean reinforcing of loose scale, rust, oil, dirt and any coating that could reduce bond.
- B. Accurately position, install, and secure reinforcing to prevent displacement during the placement of concrete.
- C. Provide metal chairs to hold reinforcement the required distance above form bottoms. In beams and slab construction, provide chairs under top slab reinforcement as well as under bottom reinforcement. Space chairs so that reinforcement will not be displaced during installation. Provide metal spacers to secure proper spacing. Stirrups shall be accurately and securely wired to bars at both top and bottom. At slabs, footings, and beams in contact with earth, provide concrete blocks to support reinforcement at required distance above grade.
- D. Install and secure reinforcement to maintain required clearance between parallel bars and between bars and forms. Lapped splices shall be installed wherever possible in a manner to provide required clearance between sets of bars. Stagger lapped splices. Dowels and bars extending through construction joints shall be secured in position against displacement before concrete is installed and subsequently cleaned of concrete encrustation's while they are still soft.
- E. Use deformed bars unless otherwise indicated, except for spiral reinforcement.

3.02 CLEAN UP

- A. Remove and legally dispose of rubbish, debris and waste materials off the Project site.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

SPECIFICATIONS

END OF SECTION 03 20 00

SPECIFICATIONS

SECTION 03 30 00 CAST-IN-PLACE CONCRETE

GENERAL

1.01 RELATED DOCUMENTS

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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

Related Requirements:

Section 31 20 00 "Earth Moving" for drainage fill under slabs-on-grade.
Section 32 13 13 "Concrete Paving" for concrete pavement and walks.

1.03 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

W/C Ratio: The ratio by weight of water to cementitious materials.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
 - 2. Include Vapor Emissions Control System.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

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- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

Location of construction joints is subject to approval of the Project Inspector.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer testing agency
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Curing compounds.
 - 6. Floor and slab treatments.
 - 7. Bonding agents.
 - 8. Adhesives.
 - 9. Vapor retarders.
 - 10. Semi-rigid joint filler.
 - 11. Joint-filler strips.
 - 12. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency:
 - 1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.
 - 1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.
- C. Regulatory Requirements: Concrete construction shall conform with the CBC, and requirements specified herein.

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1.07 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: District will engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.09 FIELD CONDITIONS

- A. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- B. Cold-Weather Placement: Comply with ACI 306

1.10 WARRANTY

- A. Standard Vapor Emissions Control System Warranty: Manufacturer's standard warranty, applicable regardless of vapor emissions (CC/Rh) test results, without the use of vapor retarder, executed by an authorized company official, in which manufacturer agrees to completely repair or replace all floor finishes that are completely or partially damaged as a result of failure of vapor emissions control system within specified warranty period.
 - 1. Failures include:
 - a. Moisture related failures, including failures due to moisture vapor emissions, and including failures at cracks, expansion joints, saw cuts, and similar features.
 - 2. Warranty Period
 - a. Vapor Emissions Control System, including admixture, curing agent, crack fill binder: Lifetime
 - b. Floor Coverings and Coatings (materials and installation): Lifetime

SPECIFICATIONS

PART 2 - PRODUCTS

2.01 CONCRETE, GENERAL

- B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301. "Specifications for Structural Concrete".
 - 2. ACI 117. "Specifications for Tolerances for Concrete Construction and Materials".

2.02 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
 - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4-by-3/4-inch, minimum.
- F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- G. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- H. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

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1. Furnish units that leave no corrodible metal closer than 1-inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1-inch in diameter in concrete surface.

2.03 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Plain-Steel Wire: ASTM A 1064/A 1064M.
- D. Deformed-Steel Wire: ASTM A 1064/A 1064M.
- E. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A, Type 1 coated, as-drawn, plain - steel wire, with less than 2 percent damaged coating in each 12-inch wire length.
- F. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- G. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.
- H. Galvanized-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from galvanized-steel wire into flat sheets.
- I. Epoxy-Coated Welded-Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, plain steel.

2.04 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, ASTM A 775/A 775M epoxy coated.
- C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.
- D. Zinc Repair Material: ASTM A 780/A 780M.
- E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

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1. For concrete surfaces exposed to view, where legs of wire bar support contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
- F. Mechanical Couplers shall be capable of developing 160 percent of the specified yield strength of the bar and shall develop a minimum of 10 times the yield point strain in the connected reinforcing bars.

2.05 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
2. Obtain aggregate from single source.
3. Obtain Vapor Emission Control System components (admixture, curing agent, crack fill binder) from single source from single manufacturer.
4. Obtain all other admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I/II
2. Fly Ash: ASTM C 618, Class F.
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.

C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal, nor one third of the slab depth, not three-fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
3. Do not use aggregates containing spalling causing deleterious substances.

D. Lightweight Aggregate: ASTM C 330/C 330M, 3/4-inch nominal maximum aggregate size.

1. Use expanded shale only.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures, flooring materials and adhesives, and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

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2. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
3. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
4. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

F. Water: ASTM C 94/C 94M and potable.

2.06 VAPOR RETARDERS

A. Vapor Retarder: Plastic sheet, ASTM E 1745, Class A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fortifiber Building Systems Group.
 - b. Raven Industries, Inc.
 - c. Reef Industries, Inc.
 - d. Stego Industries, LLC.
 - e. W.R. Meadows, Inc.
 - f. Or Equal.
2. Vapor barrier shall be 15 Mil and have a water transmission rate of less than 0.01 Perms

2.07 FLOOR AND SLAB TREATMENTS

- A. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive, 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 with 100 percent passing No. 4 sieve.

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

- a. Dayton Superior.
 - b. L&M Construction Chemicals, Inc.
 - c. Metalcrete Industries.
 - d. Or Equal.
- B. Slip-Resistive Aluminum Granule Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of not less than 95 percent fused aluminum-oxide granules.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anti-Hydro International, Inc.
 - b. BASF Corporation-Construction Systems.

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- c. L&M Construction Chemicals, Inc.
 - d. Or Equal.
- C. Emery Dry-Shake Floor Hardener: Unpigmented, factory-packaged, dry combination of Portland cement, graded emery aggregate, and plasticizing admixture; with emery aggregate consisting of no less than 60 percent of total aggregate content.
 - 1. Color: As selected by Architect from manufacturer's full range.
- D. Metallic Dry-Shake Floor Hardener: Unpigmented, factory-packaged, dry combination of Portland cement, graded metallic aggregate, rust inhibitors, and plasticizing admixture; with metallic aggregate consisting of no less than 65 percent of total aggregate content.
 - 1. Color: As selected by Architect from manufacturer's full range.
- E. Unpigmented Mineral Dry-Shake Floor Hardener: Factory-packaged dry combination of Portland cement, graded quartz aggregate, and plasticizing admixture.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation-Construction Systems.
 - b. Euclid Chemical Company (The); an RPM company.
 - c. Kaufman Products, Inc.
 - d. Or Equal.
- F. Pigmented Mineral Dry-Shake Floor Hardener: Factory-packaged, dry combination of Portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides inter-ground with cement.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation-Construction Systems.
 - b. Euclid Chemical Company (The); an RPM company.
 - c. Kaufman Products, Inc.
 - d. Or Equal.
 - 2. Color: As selected by Architect from manufacturer's full range.

2.09 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Euclid Chemical Company (The); an RPM company.
 - b. Kaufman Products, Inc.
 - c. W.R. Meadows, Inc
 - d. Or Equal.

2.10 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Corporation-Construction Systems.
 - b. Euclid Chemical Company (The); an RPM company.
 - c. Sika Corporation.
 - d. Or Equal.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating, conforming to VOC requirements of the San Diego Air Pollution Control District.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, conforming to VOC requirements of the San Diego Air Pollution Control District.
- G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, conforming to VOC requirements of the San Diego Air Pollution Control District.
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A, conforming to VOC requirements of the San Diego Air Pollution Control District.

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2.11 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or self-expanding cork.
- B. Semi-rigid Joint Filler: Two-component, semi-rigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D 2240.
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Reglets: Fabricate reglets of not less than 0.022-inch-thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034-inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.12 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8-inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, Portland cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8- to 1/4-inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4-inch and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, Portland cement as defined in ASTM C 219.

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2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8- to 1/4-inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.13 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials:
 1. Fly Ash: 15 percent.
 2. Combined Fly Ash and Pozzolan: 15 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.1 percent by weight of cement.
- D. Admixtures: Use admixtures certified by manufacturer to be compatible with other admixtures, flooring materials and adhesives. Use admixtures according to manufacturer's written instructions.
 1. Use high-range water-reducing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.45.

2.14 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Normal-weight concrete.
 1. Minimum Compressive Strength: 4000 psi at 28 days.
 2. Maximum W/C Ratio: 0.45.
 3. Slump Limit: 8 inches for concrete with verified slump of 4 inches before adding high-range water-reducing admixture or plasticizing admixture.
 4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

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B. Slabs-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Minimum Cementitious Materials Content: 520 lb/cu. yd.
4. Slump Limit: 4 inches, plus or minus 1/2-inch.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.
6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

C. Floor Slabs: Lightweight concrete.

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Calculated Equilibrium Unit Weight: 115 lb/cu. Ft plus or minus 3 lb/cu. ft. as determined by ASTM C 567/C 567M.
3. Slump Limit: 4 inches plus or minus 1-inch.
4. Air Content: 6 percent, plus or minus 2 percent at point of delivery for nominal maximum aggregate size greater than 3/8-inch.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.15 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.16 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Batch Plant Inspection may be waived provided the concrete plant complies fully with the requirements of ASTM C94, Sections 819, and has been certified by an agency acceptable to O.S.H.P.D. to comply with the requirements of the "National Ready Mixed Concrete Association". The plant must be equipped with an automatic batcher in which the total batching cycle, except for measuring and introduction of an admixture, is completed by activating a single starter device.

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PART 3 - EXECUTION

3.01 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, 1/8-inch for smooth-formed finished surfaces.
 - 2. Class C, 1/2-inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

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3.02 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.03 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
 - 3. Determine compressive strength of in-place concrete by testing representative field or laboratory-cured test specimens according to ACI 301.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.04 SHORING AND RESHORING INSTALLATION

- A. *Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.*
 - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

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3.05 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.06 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.07 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Project Inspector.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

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5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2-inch or more than 1-inch below finished concrete surface where joint sealants, specified in Section 07 92 00 "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.08 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by the Project Inspector.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.

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2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.09 FINISHING FORMED SURFACES

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- B. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part Portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

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- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4-inch in one direction.
 - 1. Apply scratch finish to surfaces indicated.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces indicated.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - 2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
 - b. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
 - c. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
 - d. Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24.
 - 3. Finish and measure surface, so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4-inch.

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- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
- G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
 - 1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
 - 2. After broadcasting and tamping, apply float finish.
 - 3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.
- H. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:
 - 1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. unless greater amount is recommended by manufacturer.
 - 2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
 - 3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.11 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- B. Equipment Bases and Foundations:
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases 4 inches high unless otherwise indicated and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.

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3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
 4. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 5. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.
- C. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.12 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed 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 float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

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Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 LIQUID FLOOR TREATMENT APPLICATION

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 2. Do not apply to concrete that is less than seven days' old.
 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

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1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semi-rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by the District Construction Manager. Remove and replace concrete that cannot be repaired and patched to District Construction Manager's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2-inch in any dimension to solid concrete. Limit cut depth to 3/4-inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by the District Construction Manager.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01-inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.

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3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4- inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas and test cores, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Cracks
 - a. Repair random cracks and single holes 1 inch or less in diameter.
 - b. General: Repair with patching mortar.
 - c. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place crack repair material before bonding agent has dried. Compact crack repair material and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to District Construction Manager's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to District Construction Manager's approval.

3.16 FIELD QUALITY CONTROL

- A. Special Inspections: District will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Concrete Slab Vapor Emissions Tests: Before installation of flooring finishes over interior concrete slabs, District will have concrete floor slab moisture content tests performed by an independent laboratory to determine the level of vapor transmission in the concrete slabs, slab strength, permeability, pH level and relative humidity. District

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will submit copies of the test results to the Architect, Project Inspector, and Contractor prior to the installation of the flooring finishes.

D. Testing Inspections:

1. See DSA Form 103 for required testing and inspections.

3.17 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 03 30 00

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SECTION 03 35 43

POLISHED CONCRETE FINISHING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Grinding and honing of existing concrete slab surface to receive clear reactive, penetrating liquid hardener/densifier to interior concrete.
 - 2. Application of clear reactive, penetrating liquid hardener.
 - 3. Progressively polishing and burnishing of existing concrete slab surface to achieve required finish.
 - 4. Application of stain resistant surface treatment.
- B. Related Sections:
 - 1. Section 01 33 00: Submittal Procedures
 - 2. Section 07 92 00: Joint Sealants

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 310.1 – Specification for Polished Concrete Slab Finishes
- B. American National Standard Institute/National Floor Safety Institute (ANSI/NSFI):
 - 1. ANSI/NSFI B101.1 – Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Materials.
 - 2. ANSI B101.3 – Test Method for Measuring Wet DCOF of Common Hard-Surface Floor Materials.
- C. ASTM International (ASTM):
 - 1. ASTM C1028 – Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
 - 2. ASTM C1353 – Standard Test Method for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform, Double-Head Abraser
 - 3. ASTM D523 – Standard Test Method for Specular Gloss.
 - 4. ASTM D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
 - 5. ASTM D4541 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
 - 6. ASTM D 5767 – Standard Test Method for Instrumental Measurement of Distinctness-of-Image (DOI) Gloss of Coated Surfaces
Image
 - 7. ASTM E96/96M Method B (Water Method) – Standard Test Methods for Water Vapor Transmission of Materials.
 - 8. ASTM G154 – Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.

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1.03 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's product data sheets and tested physical and performance properties on products to be used for the work.
- B. Samples:
 - 1. Selection Samples:
 - a. Based on conditions of existing floor slab, perform minimum 4 square foot test area to determine expected aggregate exposure class for selection by Architect.
 - 1) Perform test in area as directed by Architect.
 - b. Submit minimum of two 12 inch x 12 inch samples of each level of Distinctness-of-Image (DOI) Gloss Images of objects being reflected.
 - 2. Verification Samples:
 - a. Provide sample of selected aggregate exposure class and DOI gloss level accepted by Architect to be used to construct mock-up specified in Article 1.04 C.
- C. VOC Certification:
 - 1. Submit certification that products furnished comply with regulations controlling use of volatile organic compounds (VOC).
- D. Certificates:
 - 1. Certificates by manufacturer stating that installer is listed applicator of special concrete finishes, and has completed necessary training programs.
- E. Floor Protection Plan.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Concrete Polishing Council (CPC) Craftsman Supervisor or equivalent on Site during Work.
 - 2. Applicator to be familiar with specified requirements and methods needed for proper performance of work of this Section.
 - 3. Applicator must have availability of proper equipment to perform work within scope of this project on timely basis.
 - 4. Applicator should have successfully performed minimum of 5 projects of similar scope and complexity.
 - 5. Only approved applicators may apply specified high performance concrete floor system.
 - a. Contact PROSOCO, Inc. Customer Care at 800-255-4255 for listed applicators.
- B. Inspection and Testing:
 - 1. Cooperate and coordinate with Owner's inspection and testing agency.
 - 2. Personnel performing field tests shall conform to ACI 310.1.
 - 3. Dynamic Coefficient of Friction Testing:
 - a. Preparation:

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- 1) Begin DCOF testing only after cleaning floor surface with non-etching cleaner to remove topical coatings and contaminants.
 - 2) Allow test surfaces to dry completely.
 - b. Test Method:
 - 1) Test DCOF on wet slab surface with 0.05% surfactant in accordance with the requirements of ANSI A 326.3 using BOT3000E equipment.
 4. Slab Aesthetics Testing:
 - a. Record measurements of Distinction of Image (DOI), Gloss, and Haze at time of mock-up and after completion of Work but before slab is protected for remainder of Project construction.
 - b. Test Methods:
 - 1) Test DOI in accordance with requirements of ASTM D 5767 using Rhopoint IQ GM14400 instrumentation.
 - c. Measure DOI in locations adjacent to the location of the DCOF measurement.
- C. Mock-up:
1. On-site, prior to start of polished concrete finishing process.
 - a. Require attendance of parties directly affecting Work of this Section, including Contractor, Architect, applicator, and Owner's Representative.
 2. Notify above parties one week in advance of date and time when mock-up will be completed.
 3. Based on acceptance of Verification Sample specified in Article 1.03 B 2, demonstrate materials, equipment and application methods to be used for specified work in pre-approved location of approximately 50 sq. ft. in area as directed by Architect.
 4. Maintain approved mock-up during construction as standard for judging completed work.
 - a. Areas may remain as part of completed work.
- D. Pre-Installation Meeting:
1. Convene before start of work on concrete slabs, patching of existing concrete slabs and start of application of concrete finish system.
 2. Require attendance of parties directly affecting work of this Section, including Owner's Representative, Contractor, Architect, concrete installer, and applicator.
 3. Meeting should only convene when required parties are present.
 - a. Review following:
 - 1) Physical requirements of completed concrete slab and slab finish.
 - 2) Locations and time of test areas.
 - 3) Protection of surfaces not scheduled for finish application.
 - 4) Surface preparation.
 - 5) Application procedure.
 - 6) Quality control.
 - 7) Cleaning.
 - 8) Protection of finish system.
 - 9) Coordination with other work.

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1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original containers, with seals unbroken, bearing manufacturer labels indicating brand names and directions for storage.
- B. Store concrete hardener/densifier and surface protectant treatment in environment recommended on published manufacturer's product data sheets.
 - 1. Store containers upright in a cool, dry, well-ventilated place, out of the sun, with temperature between 40 and 100 degrees Fahrenheit.
 - 2. Protect from freezing.
 - 3. Store away from other chemicals and potential sources of contamination.
 - 4. Keep lights, fire, sparks, and heat away from containers.
 - 5. Do not drop containers or slide across sharp objects.
 - 6. Do not stack pallets more than three high.
 - 7. Keep containers tightly closed when not in use.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations:
 - 1. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting performance and finishing requirements.
- B. Close areas to traffic during floor application and after application for time period recommended in writing by manufacturer.
- C. Protect the completed slab to prevent damage by other trades during floor completion.
- D. Temperature Limitations:
 - 1. Apply when surface and air temperature are between 40 degrees Fahrenheit and 95 degrees Fahrenheit, unless otherwise indicated by manufacturer's written instructions.
 - 2. Apply when surface and air temperatures are expected to remain above 40 degrees Fahrenheit for minimum of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
- E. Apply when air conditions are calm to minimize surface treatment contacting surface not intended to be finished.
- F. Do not apply to frozen substrate.
 - 1. Allow adequate time for substrate to thaw if freezing conditions exist before application.
- G. Apply minimum of 24 hours after rain event.
 - 1. Suspend application when rain is anticipated for period of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
- H. Temporary Heat:
 - 1. Ambient temperature of 50 degrees Fahrenheit minimum.

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**POLISHED CONCRETE FINISHING
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LA PUENTE ACTIVITY CENTER**

SPECIFICATIONS

- I. Ventilation:
 - 1. Provide adequate ventilation in confined or enclosed areas in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design:
 - 1. Design for polished concrete finishing is based on products as manufactured by PROSOCO, Inc., Lawrence, KS.

2.02 MATERIALS

- A. Clear, water-based, blended surfactant cutting aid:
 - 1. Product is used to extend life of diamond tooling and minimize concrete surface scratches during wet-grinding process.
 - 2. Product and Manufacturer:
 - a. Consolideck First Cut as manufactured by PROSOCO, Inc.
 - 3. Subject to compliance with following requirements:
 - a. Comply with CARB and SCAQMD VOC regulations.
 - b. Contains 0.5 g/L or less.
- B. Liquid Concrete Repair Material:
 - 1. Low-odor, liquid fill material used to fill pinholes, small air voids and pop-outs, micro-cracks, and other gaps in concrete surface during grinding.
 - 2. Product and Manufacturer:
 - a. Consolideck Grind-N-Fill as manufactured by PROSOCO, Inc.
 - 3. Subject to compliance with following requirements:
 - a. Comply with CARB and SCAQMD VOC regulations.
 - b. Contains 100 g/L or less.
- C. Pre-Densifier Concrete Cleaner:
 - 1. Cleaner used to remove dirt, oil, grease, and other stains from existing slab surface.
 - 2. Product and Manufacturer:
 - a. Consolideck Cleaner/Degreaser as manufactured by PROSOCO, Inc.
- D. Penetrating Concrete Hardener/Densifier:
 - 1. Lithium silicate hardener/densifier.
 - 2. Product and Manufacturer:
 - a. Consolideck LS as manufactured by PROSOCO, Inc
 - b. Subject to compliance with following requirements:
 - 1) Comply with CARB and SCAQMD VOC regulations.
 - 2) Contains 0 g/L.
 - 3) Registered as an approved NSF International/Nonfood Compound Registration.
 - 4) Abrasion Resistance:
 - a) Greater than 50 percent improvement over untreated samples when tested in accordance with ASTM C1353.

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- 5) Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1 and ANSI B101.3.
 - 6) Coefficient of Friction:
 - a) Greater than 0.60 dry and greater than 0.60 wet ,when tested in accordance with ASTM C1028.
 - 7) Adhesion:
 - a) Greater than 10 percent increase in pull-off strength when compared to untreated sample when tested in accordance with ASTM D4541.
 - 8) Water Vapor Transmission:
 - a) 100 percent retained when compared to untreated samples when tested in accordance with ASTM E96/96M Method B (Water Method).
 - 9) UV Stability:
 - a) No degradation or yellowing of material when tested in accordance with ASTM G154.
- E. Interior Concrete Protective Treatments:
1. General Purpose high-gloss film forming premium sealer, lithium silicate hardener/densifier.
 2. Product and Manufacturer:
 - a. Consolideck LS Guard as manufactured by PROSOCO, Inc
 - b. Subject to compliance with following requirements:
 - 1) Comply with CARB and SCAQMD VOC regulations.
 - 2) Contains less than 100 g/L.
 - 3) Registered as an approved NSF International/Nonfood Compound Registration.
 - 4) Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1 and ANSI B101.3.
 - 5) Coefficient of Friction:
 - a) Greater than 0.60 dry and greater than 0.60 wet ,when tested in accordance with ASTM C1028.
 - 6) Adhesion:
 - a) Greater than 10 percent increase in pull-off strength when compared to untreated sample, when tested in accordance with ASTM D4541.
 - 7) Stain Resistance:
 - a) Achieve limited or no adverse effects when tested in accordance with ASTM D1308
 - 8) UV Stability:
 - a) No degradation or yellowing of material when tested in accordance with ASTM G154.
 3. General Purpose medium gloss, film forming sealer.
 - a. Product Manufacturer:
 - 1) Consolideck PolishGuard as manufactured by PROSOCO, Inc.
 - b. Subject to compliance with following requirements:
 - 1) Comply with CARB and SCAQMD VOC regulations.
 - 2) Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1 and ANSI B101.3.
 - 3) Coefficient of Friction:

SPECIFICATIONS

- a) Greater than 0.60 dry and greater than 0.60 wet, when tested in accordance with ASTM C1028.
- 4) Stain Resistance:
 - a) Achieve limited or no adverse effects when tested in accordance with ASTM D1308.
- 5) UV Stability:
 - a) No degradation or yellowing of material when tested in accordance with ASTM G154.
- 4. Solvent-based, penetrating clear sealer.
 - a. Able to resist oil and food stains and repel water and water-related stains.
 - b. Product and Manufacturer:
 - 1) Consolideck Concrete Protector SB as manufactured by PROSOCO, Inc
 - c. Subject to compliance with following requirements:
 - 1) Comply with CARB and SCAQMD VOC regulations.
 - 2) Contains less than 100 g/L.
 - d. Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1 and ANSI B101.3.
 - e. Stain Resistance:
 - 1) Achieve limited or no adverse effects when tested in accordance with ASTM D 1308.
 - f. UV Stability:
 - 1) No degradation or yellowing of material when tested in accordance with ASTM G154.

2.03 EQUIPMENT

- A. Conform to ACI 310.1 Part 2.2, except where more stringent requirements are specified below.
- B. Auto Scrubber Machine: For cleaning operations.
- C. Hand Grinder or Stand-Up Edger: For edge grinding/polishing.
- D. Grinding/Polishing Equipment:
 - 1. Dry grinding/polishing machines:
 - a. Include dust extraction system with HEPA filtration vacuum.
- E. Diamond Segments:
 - 1. Use heads from same manufacturers throughout entirety of Project.
- F. Diamond Heads Types:
 - 2. Metal Diamonds: 80 or 150.
 - 3. Hybrid Style Diamonds: 50 or 100.
 - 4. Resin Bonded, Phenolic Diamonds: 100, 200, 400, 800, 1500, and 3000 (if necessary).
- G. Burnishing Machine and Burnishing Pads:
 - 1. To produce specified results:
 - a. Burnishing Machine:

SPECIFICATIONS

- 1) High speed burnisher, generating pad speeds of 1,500 RPM or higher, as recommended by protective treatment manufacturer.
- 2) Dust skirt must be installed at time of work.
- b. Burnishing Pads:
 - 1) As recommended by protective treatment manufacturer.
 - 2) White Burnishing Pad, non-abrasive.
 - 3) Product and Manufacturer:
 - a) Consolideck Heat Pad as manufactured by PROSOCO, Inc.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate with installer present for conditions affecting performance of finish.
 1. Correct conditions detrimental to timely and proper work.
 2. Notify Architect and Owner's Representative in writing of conditions detrimental to proper and timely completion of Work.
- B. Do not begin installation until unsatisfactory conditions are resolved.
 1. Beginning Work constitutes acceptance of site conditions and responsibility for defective installation caused by prior observable conditions.

3.02 PREPARATION

- A. Remove from surfaces, dirt, dust, oil, grease, and other contaminants that would interfere with penetration or performance of specified product.
 1. Use appropriate concrete cleaners approved by concrete surface treatment manufacturer where necessary.
 2. Rinse thoroughly using pressure water spray to remove cleaner residues.
 3. Allow surfaces to dry completely before application of product.
- B. Repair, patch and fill cracks, voids, defects, and damaged areas in surface to acceptance of Architect.
 1. Allow repair materials to cure completely before application of product.
- C. Variations in substrate texture and color that will affect final appearance are to be corrected prior to application of sealer/hardener system and polishing steps.
- D. Protect surrounding areas prior to application.
 1. If product is accidentally misapplied to adjacent surfaces, flush with water immediately before material dries.
- E. Avoid contact in areas indicated as not to be treated.
 1. Avoid contact with metal, glass and painted surfaces.
- F. Seal open joints in accordance with Section 07 9200.
- G. Apply specified sealants and allow complete curing before application of penetrating concrete hardener/densifier.

SPECIFICATIONS

- H. Do not proceed until unsatisfactory conditions have been corrected.

SPECIFICATIONS

3.03 CONCRETE GRINDING, HONING, AND POLISHING

- A. Adhere to industry standard and conform to ACI 310.1 for grinding, honing, and polishing procedures for dry and wet grinding and honing, except where more stringent requirements are specified below.
- B. Scrub and rinse slab surface with clean water and vacuum with auto-scrubber between and after final passes.
- C. Sequential progression of diamond tooling steps shall be required and limited to no more than double grit value of previous diamonds used.
- D. Overlap adjacent passes by 25 percent.
- E. Perform each pass perpendicular to the other pass north/south then east/west; multiple passes may be needed.
- F. Progressively grind, hone and polish the slab surface utilizing approved diamond segments as necessary to produce finish in accordance with specified finish requirements.
 - 1. Apply liquid concrete repair material to fill gaps, voids, and pop-outs during grinding operation in accordance with manufacturer's published recommendations.
 - 2. Apply cutting aid chemical during initial wet grinding process in accordance with manufacturer's published recommendations.
 - a. Typically before 200 grit resin or lower.

3.04 APPLICATION OF PENETRATING CONCRETE HARDENER/DENSIFIER

- A. Apply hardener/densifier at rate of 500 to 700 square feet per gallon with low pressure sprayer fitted with 0.5 gpm spray tip.
 - 1. Typically after 200-grit and no later than 400 grit.
- B. Apply sufficient material to keep concrete surface wet for 5 to 10 minute period, without producing puddles.
- C. Allow treated surface to dry.
- D. Continue progressively polishing floor with required resin diamonds as necessary to produce desired final finish.

3.05 APPLICATION OF INTERIOR CONCRETE PROTECTIVE TREATMENT

- A. Application of general purpose, medium gloss protective treatment:
 - 1. Apply in accordance with manufacturer's published recommendations to clean, dry slab at completion of mechanically polishing slab surface.
 - 2. Lightly wet clean microfiber pad with general purpose, medium gloss protective treatment and wring out excess, leaving pad damp.

SPECIFICATIONS

3. Spray-apply protective treatment using clean, pump-up sprayer fitted with 0.5 gpm conical or fan spray tip at estimated coverage rate of 400 to 800 square feet per gallon.
 - a. Work from one control joint to another.
4. Spread with damp microfiber pad.
 - a. Maintain thin, even coating and wet edge.
 - b. Stop spreading once drying begins.
 - c. Do not overlap.
 - d. Repeat steps 1 through 4.
 - 1) Two coats are recommended for maximum protection.
5. To increase gloss, wait at least 60 minutes after final coat is applied, then use high- speed burnisher fitted with white polishing pad.
 - a. Burnish at fast walking pace.

3.06 SLAB PROTECTION

- A. Comply with provisions of ACI 310.1 specification for slab protection, except where more stringent requirements are specified below.
- B. Protect finished floors to prevent damage including staining, gouges and scratching by construction traffic and activities until possession.
- C. Do not drag or drop equipment or material across slab which will scratch or chip it.
- D. Inspect tires of equipment to be used for debris removal prior to use on slab.
 1. Remove embedded items which may cause damage to floor slab.
- E. Clean up spills on slab immediately.
 1. Provide cleaning chemicals and absorptive materials.
- F. Develop concrete protection procedure which addresses following requirements:
 1. Communication of protection plan to subcontractors and vendors.
 2. Procedures for cleaning up slab spills, including use of and availability of cleaning chemicals and absorptive materials at Site.
- G. Provide clean slab surface using concrete maintenance cleaner within auto scrubber, equipped with soft nylon brushes, in accordance with manufacturer's published recommendations.

3.07 FINISHING REQUIREMENTS

- A. Appearance:
 1. Interior exposed finished slab areas must consist of following:
 - a. Slab surface must meet the desired sheen, as discussed in Pre-Installation meeting and be consistent with approved Mock-up.
 - b. Slab surface must have consistent look and exhibit finish that has no evidence of streaking or burnish marks.
 - c. White residue or hazy appearance is not acceptable.
 - d. Exposure of aggregate ACI 310.1 Table 3.2.3.1:
 - 1) Aggregate Exposure Class:

SPECIFICATIONS

- a) Refer to selection samples referenced in Article 1.03 B, 1, a, for determination.
- 2. Interior exposed finished slab areas must consist of following CPAA Gloss Level:
 - a. Interior exposed finished slab areas must meet ACI 310.1 Table 3.2.4.1- Appearance levels for distinctness of image (DOI) Level:
 - 1) Refer to selection samples referenced in Article 1.03 B, 1, b, for determination.
 - 2) Refer to Mock-Up for accepted polished concrete finish.

3.08 MAINTENANCE

- A. Refer to chemical manufacturer's maintenance recommendations furnished to Owner at completion of Project.

END OF SECTION 03 35 43

SPECIFICATIONS

SPECIFICATIONS

SECTION 05 12 00 STRUCTURAL STEEL FRAMING

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. Structural steel.
 - 2. Field-installed shear connectors.
 - 3. Grout.
- B. Related Requirements:
 - 1. Section 05 31 00 "Steel Decking" for field installation of shear connectors through deck.
 - 2. Section 05 50 00 "Metal Fabrications"

1.03 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "LFRS" or along grid lines designated as "LFRS" on Drawings, including columns, beams, and braces and their connections.
- C. Heavy Sections: Rolled and built-up sections as follows:
 - 1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches.
 - 2. Welded built-up members with plates thicker than 2 inches.
 - 3. Column base plates thicker than 2 inches.
- D. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

SPECIFICATIONS

- E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.04 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.05 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.06 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment Drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
 - 5. Identify members and connections of the Seismic-Load-Resisting System.
 - 6. Indicate locations and dimensions of protected zones.
 - 7. Identify demand critical welds.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint, including the following:
 - 1. Power source (constant current or constant voltage).
 - 2. Electrode manufacturer and trade name, for demand critical welds.

1.07 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, Shop-painting applicators and testing agency.

SPECIFICATIONS

- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
 - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 2. Direct-tension indicators.
 - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 - 4. Shear stud connectors.
 - 5. Shop primers.
 - 6. Nonshrink grout.

1.08 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator shall have a minimum of five years experience in similar types of fabrication, and one of the following:
 - 1. Participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
 - 2. Is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).
 - 3. Is approved by the Los Angeles Department of Building and Safety.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- D. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.
 - 3. AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

SPECIFICATIONS

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver structural steel to the Project Site in such quantities and at such times to ensure continuity of installation.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- C. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided District's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 572/A 572M, Grade 50.
- B. Channels, Angles-Shapes: ASTM A 36/A 36M .
- C. Plate and Bar: ASTM A 36/A 36M, u.o.n. ASTM A 572/A 572M, Grade 50 as noted on drawings.
- D. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50.
- E. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.
- F. Corrosion-Resisting, Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.
- G. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
 - 1. Weight Class: as noted on drawings.
 - 2. Finish: Black except where indicated to be galvanized.

SPECIFICATIONS

- H. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.
- I. Carbon-Steel Castings: ASTM A 27, Grade 65-35, medium-strength carbon steel.
- J. High-Strength Steel Castings: ASTM A 148, Grade 80-50.
- K. Steel Forgings: ASTM A 668/A 668M.
- L. Welding Electrodes: Comply with AWS requirements.

2.02 BOLTS, CONNECTORS, AND ANCHORS

- A. Non-High-Strength Bolts, Nuts, and Washers: Provide unless otherwise noted. ASTM A 307, Grade A carbon-steel, hex-headed bolts, carbon-steel nuts, and flat, unhardened steel washers.
 - 1. Finish: Plain, uncoated.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.
- C. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.
- D. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip zinc coating.
 - 2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.
- E. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Plain
- F. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

SPECIFICATIONS

- G. Unheaded Anchor Rods: ASTM F 1554, Grade 50, supplement 1.
 - 1. Configuration: Straight.
 - 2. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 5. Finish: Plain except as indicated.
- H. Headed Anchor Rods: ASTM F 1554, Grade 55, supplement 1, weldable
 - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- I. Threaded Rods: ASTM A 193/A 193M, Grade B7 or ASTM A 354, Grade BD.
 - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 2. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 3. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- J. Clevises and] Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.
- K. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.
- L. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.03 PRIMER

- A. Primer: Comply with Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."
- B. Primer: SSPC-Paint 25 Type II, zinc oxide, alkyd, linseed oil primer.
- C. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer compatible with topcoat.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds and repair painting galvanized steel, with dry film containing not less than 93 percent zinc dust by weight, and complying with ASTM A 780/A 780M.

2.04 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

SPECIFICATIONS

- B. Minimum 28-day compressive strength of 5000psi
- C. For thick grout layers follow manufacturer's guidelines to attain required strength, which may include the addition of pea gravel.

2.05 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
 - 6. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
- B. Fabricate architecturally exposed structural steel with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.
 - 1. Remove blemishes by filling, grinding, or by welding and grinding prior to cleaning, treating and shop priming.
 - 2. Comply with fabrication requirements, including tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- D. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- E. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- F. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning".
- G. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

SPECIFICATIONS

- H. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural-steel frame. Straighten as required to provide uniform, square, and true members in completed wall framing. Build up welded framing, weld exposed joints continuously, and grind smooth.
- I. Welded Door Frames: Build up welded door frames attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated.
- J. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.06 SHOP CONNECTIONS

- A. Shop install and tighten non-high-strength bolts.
- B. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type:
 - a. Snug tightened unless specifically noted otherwise.
 - b. Pretensioned for members labeled "LFRS" on the plans.
- C. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.
 - 2. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2-inch and larger. Grind flush butt welds. Dress exposed welds.

2.07 SHOP PRIMING

- A. Shop prime steel surfaces except the following:

SPECIFICATIONS

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 2. Surfaces to be field welded.
 3. Surfaces of high-strength bolted, slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces.
 6. Surfaces enclosed in interior construction.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 2, "Hand Tool Cleaning."
 2. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.08 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural-steel according to ASTM A 123/A 123M.
1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
 2. Galvanize lintels, shelf angles, and welded door frames attached to structural-steel frame and located in exterior walls.

2.09 SOURCE QUALITY CONTROL

- A. Testing Agency: The District will engage a qualified testing agency to perform shop tests and inspections.
1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

SPECIFICATIONS

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.03 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Maintain erection tolerances of architecturally exposed structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

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- E. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- F. Splice members only where indicated.
- G. Do not use thermal cutting during erection unless approved by the District Construction Manager. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
 - 1. Finish sections thermally cut during erection equal to a sheared appearance.
- H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- I. Remove erection bolts on welded, architecturally exposed structural steel. Fill holes with plug welds, and grind smooth at exposed surfaces.
- J. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.04 FIELD CONNECTIONS

- A. Non-high-strength bolts: Install and tighten non-high-strength bolts, except where high-strength bolts are indicated.
- B. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: [Snug tightened unless noted otherwise. Pretensioned where indicated.
- C. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.

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3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.
4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2-inch and larger. Grind flush butt welds. Dress exposed welds.

3.05 FIELD QUALITY CONTROL

- A. Special Inspections: The District will engage a qualified special inspector to perform the following special inspections:
 1. Verify structural-steel materials and inspect steel frame joint details.
 2. Verify weld materials and inspect welds.
 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: The District will engage a qualified testing agency to perform tests.
- C. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

3.06 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."

END OF SECTION 05 12 00

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SPECIFICATIONS

SECTION 05 40 00 COLD-FORMED METAL FRAMING

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. Load-bearing wall framing.
 - 2. Exterior non-load-bearing wall framing.
 - 3. Interior non-load-bearing wall framing.
 - 4. Roof rafter framing.
 - 5. Ceiling joist framing.
 - 6. Soffit framing.

1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.

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- A. Welding certificates.
- B. Product Certificates: For each type of code-compliance certification for studs and tracks.
- C. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.
 - 1. Expansion anchors.
 - 2. Power-actuated anchors.
 - 3. Mechanical fasteners.
 - 4. Vertical deflection clips.
 - 5. Horizontal drift deflection clips
 - 6. Miscellaneous structural clips and accessories.
- D. Evaluation Reports: For nonstandard cold-formed steel framing post-installed anchors and [power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.
- E. Manufacturer's installation instructions.

1.06 QUALITY ASSURANCE

- A. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

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1. CEMCO; California Expanded Metal Products Co.
2. ClarkDietrich Building Systems.
3. United Metal Products, Inc.

2.02 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.03 COLD-FORMED STEEL FRAMING MATERIALS

- A. Steel Sheet: ASTM, A653/A653M, Structural steel, zinc coated, of grade and coating designation as follows:
 1. Grade: as indicated on the drawings
 2. Coating: G90.
- B. Steel Sheet for Vertical DeflectionnnClips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
 1. Grade: as indicated on the drawings
 2. Coating: G90.

2.04 LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: As indicated.
 2. Flange Width: As indicated.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
 1. Minimum Base-Metal Thickness: As indicated.
 2. Flange Width: As indicated.
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: As indicated.
 2. Flange Width: As indicated.

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- D. Steel Single- or Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated.
 - 2. Top Flange Width: As indicated.

2.05 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated.
 - 2. Flange Width: As indicated.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated.
 - 2. Flange Width: As indicated.
- C. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ClarkDietrich Building Systems.
 - b. Simpson Strong-Tie Co., Inc.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated.
 - 2. Flange Width: As indicated
- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
 - 1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - a. Minimum Base-Metal Thickness: As indicated.
 - b. Flange Width: As indicated
 - 2. Inner Track: Of web depth indicated, and as follows:

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- a. Minimum Base-Metal Thickness: As indicated.
 - b. Flange Width: As indicated.
- F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.06 INTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated.
 - 2. Flange Width: As indicated.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated.
 - 2. Flange Width: As indicated.
- C. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ClarkDietrich Building Systems.
 - 2. Simpson Strong-Tie Co., Inc.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - 1. Minimum Base-Metal Thickness As indicated.
 - 2. Flange Width: 1-inch plus the design gap for one-story structures and 1-inch plus twice the design gap for other applications.
- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
 - 1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - a. Minimum Base-Metal Thickness: As indicated.
 - b. Flange Width: As indicated.

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2. Inner Track: Of web depth indicated, and as follows:

- a. Minimum Base-Metal Thickness: As indicated.
- b. Flange Width: As indicated.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.07 ROOF-RAFTER FRAMING

A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: As indicated.
2. Flange Width: As indicated.

2.08 CEILING JOIST FRAMING

A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: As indicated.
2. Flange Width: As indicated.

2.09 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: As indicated.
2. Flange Width: As indicated.

2.10 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.

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5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.11 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.12 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or ASTM A 780.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.

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- D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4-inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.13 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
 - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8-inch in 10 feet and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8-inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8-inch.

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PART 3 - EXECUTION

3.01 EXAMINATION

- D. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
- C. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/8 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.03 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16-inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.

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2. Do not cut or notch framing member lips or flanges.
3. Holes are permitted according to the following requirements:
 - a. Along web centerline.
 - b. Maximum hole diameter: Half web depth or 2-1/2", whichever is smaller.
 - c. Maximum hole length: 4"
 - d. Minimum center-to-center spacing: 24", including punch-outs.
 - e. Minimum distance from end of member to near edge of hole: 10"
4. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Do not fasten studs to deflection track.
- I. Install insulation, specified in Section 07 21 00 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- J. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- K. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8-inch in 10 feet and as follows:
 1. Space individual framing members no more than plus or minus 1/8-inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

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3.04 LOAD-BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
 - 1. Anchor Spacing: As indicated, but not greater than 48 inches.
- B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8-inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
 - 1. Stud Spacing: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F. Anchor studs abutting structural columns or walls, including masonry and concrete walls, to supporting structure as indicated.
- G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 - 1. Frame all wall openings with not less than a double stud at each jamb of frame or as indicated. Fasten jamb members together to uniformly distribute loads.
 - 2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- I. *Install horizontal bridging in stud system, spaced vertically as indicated.* Fasten at each stud intersection.

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1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.
 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 3. Bar Bridging: Manufacturer's corresponding bridging bars, with current corresponding ICC-ES Evaluation Report, installed according to manufacturer's written instructions.
- J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.
- K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.05 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
1. Stud Spacing: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure as indicated to prevent transfer of vertical loads while providing lateral support.
1. Install single deep-leg deflection tracks and anchor to building structure.
 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 3. Connect vertical deflection clips to bypassing studs and anchor to building structure.
 4. Connect drift clips to cold-formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows as indicated but not more than 48 inches apart. Fasten at each stud intersection.
1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or

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stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

- a. Install solid blocking at centers indicated.
 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 4. Bar Bridging: Manufacturer's corresponding bridging bars, with current corresponding ICC-ES Evaluation Report, installed according to manufacturer's written instructions.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.06 INTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 1. Stud Spacing: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 1. Install single deep-leg deflection tracks and anchor to building structure.
 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 3. Connect vertical deflection clips to studs and anchor to building structure.
 4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated, but not more than 48 inches apart. Fasten at each stud intersection.
 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

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2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 3. Bar Bridging: Manufacturer's corresponding bridging bars, with current corresponding ICC-ES Evaluation Report, installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
1. Install solid blocking at indicated.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.07 JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
 2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections.
- C. Space joists as indicated.
- D. Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.
- E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated.
1. Install web stiffeners to transfer axial loads of walls above.
- F. Install bridging at intervals indicated. Fasten bridging at each joist intersection as follows:
1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.

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- 2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
- G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.08 FIELD QUALITY CONTROL

- A. Testing: The District will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Remove and replace work where test results indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.09 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

SPECIFICATIONS

SECTION 06 10 00 ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Framing with timber.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Wood blocking and nailers.
 - 5. Wood furring.
 - 6. Wood sleepers.
 - 7. Plywood backing panels.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. OSB: Oriented strand board.
- E. Timber: Lumber of 5 inches nominal size or greater in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with

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- requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 - 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
- 1. Wood-preservative-treated wood.
 - 2. Fire-retardant-treated wood.
 - 3. Engineered wood products.
 - 4. Shear panels.
 - 5. Power-driven fasteners.
 - 6. Post-installed anchors.
 - 7. Metal framing anchors.
- B. Material test reports from a qualified independent testing agency indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- B. Inspection Agencies: Inspection agencies, and the reference abbreviations include the following:
- 1. WCLIB: West Coast Lumber Inspection Bureau.
 - 2. WWPA: Western Woods Products Association.

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1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
 - 3. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent.
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current ICC-ES research or evaluation reports exist that show compliance with CBC.
 - 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 - 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

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- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- D. onApplication: Pressure treat above ground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat items indicated on Drawings, and the following:
 - 1. Wood nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Treatment shall not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 684.
- C. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

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1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- D. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.

2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade, unless indicated otherwise.
 1. Application: Interior partitions not indicated as load bearing.
 2. Species:
 - a. Hem-fir; WCLIB, or WWPA.
 - b. Western woods; WCLIB or WWPA.
- B. Ceiling Joists:[Construction or No. 2 grade, unless indicated otherwise.
 1. Species:
 - a. Douglas fir-larch; WCLIB or WWPA.
 - b. Douglas fir-south; WWPA.
 - c. Western woods; WCLIB or WWPA.
- C. Joists, Rafters, and Other Framing Not Listed Above: As indicated.
 1. Species:
 - a. Douglas fir-larch; WCLIB or WWPA.
 - b. Douglas fir-south; WWPA.
- D. Joists, Rafters, and Other Framing Not Listed Above: Any species of machine stress-rated dimension lumber with a grade of not less than 1650f-1.5E, unless noted otherwise.

2.5 TIMBER FRAMING

- A. Comply with the following requirements, according to grading rules of grading agency indicated:
 1. Species and Grade: Douglas fir-larch, or Douglas fir-south No. 1 grade unless noted otherwise; WCLIB, or WWPA.
 2. Maximum Moisture Content: 20 percent.
 3. Additional Restriction: Free of heart centers.

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2.6 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Furring.
 - 5. Grounds.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of the following species:
 - 1. Hem-fir; WCLIB or WWPA.
 - 2. Western woods; WCLIB or WWPA.
- C. Concealed Boards: 19 percent maximum moisture content and any of the following species and grades:
 - 1. Hem-fir; Construction or No. 2 Common grade; WCLIB, or WWPA.
 - 2. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.7 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

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- D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.
- E. Wood Screws: ASME B18.6.1.
- F. Lag Bolts: ASME B18.2.1.
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.8 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. KC Metals Products, Inc.
 - 2. Simpson Strong-Tie Co., Inc.
 - 3. USP Structural Connectors.
 - 4. Or Equal.
- B. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.
- E. Stainless-Steel Sheet: ASTM A 666, Type 304.
 - 1. Use for exterior locations and where indicated.
- F. Joist Hangers: U-shaped joist hangers with 2-inch-long seat and 1-1/4-inch-wide nailing flanges at least 85 percent of joist depth.

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1. Thickness: As indicated.
- G. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
1. Strap Width and Thickness: As indicated.
- H. Bridging: Rigid, V-section, nailless type, 0.050 inch thick, length to suit joist size and spacing.
- I. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch-minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.
- J. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
1. Width: 1-1/4 inches.
 2. Thickness: 0.050 inch unless noted otherwise.
 3. Length: As indicated.
- K. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick
- L. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.
- M. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.
- N. Wall Bracing: T-shaped bracing made for letting into studs in saw kerf, 1-1/8 inches wide by 9/16 inch deep by 0.034 inch thick with hemmed edges.
- O. Wall Bracing: Angle bracing made for letting into studs in saw kerf, 15/16 by 15/16 by 0.040 inch thick with hemmed edges.
- 2.9 MISCELLANEOUS MATERIALS
- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

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- C. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.
- D. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
- E. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.

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2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- J. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
1. Use inorganic boron for items that are continuously protected from liquid water.
 2. Use copper naphthenate for items not continuously protected from liquid water.
- K. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- L. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. Table 2304.9.1, "Fastening Schedule," in the California Building Code (CBC).
 2. ICC-ES evaluation report for fastener.
- M. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- 3.2 WOOD BLOCKING, AND NAILER INSTALLATION
- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of

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ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-size furring horizontally and vertically at 24 inches o.c.
- C. Furring to Receive Gypsum Board Plaster Lath: Install 1-by-2-inch nominal-size furring vertically at 16 inches o.c.

3.4 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction unless otherwise indicated.
 - 1. For interior partitions and walls: As indicated on Structural Drawings.
 - 2. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.
 - 2. For load-bearing walls, provide double-jamb studs for openings 60 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.

3.5 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Ceiling Joists: Install with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.

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1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate, and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal-size or 2-by-4-inch nominal-size stringers spaced 48 inches o.c. crosswise over main ceiling joists.
- B. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
 1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
 2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal-size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.6 TIMBER FRAMING INSTALLATION

- A. Install timber beams with crown edge up and provide not less than 4 inches of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports as indicated if not continuous.
- B. Where beams or girders are framed into pockets of exterior concrete or masonry walls, provide 1/2-inch airspace at sides and ends of wood members.
- C. Install wood posts using metal anchors indicated.
- D. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

3.7 STAIR FRAMING INSTALLATION

- A. Provide stair framing members of size, space, and configuration indicated.

END OF SECTION 06 10 00

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SECTION 07 2100

BUILDING INSULATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Thermal blanket/batt insulation in exterior wall construction.
 - 2. Sound attenuation blanket/batt insulation in interior partitions.
- B. Related Sections:
 - 1. Section 06 10 00: Rough Carpentry
 - 2. Section 09 29 00: Gypsum Board; acoustical sealant.
- C. Related Requirements:
 - 1. Refer to Division 21 through 23 Sections for piping and HVAC insulation requirements.

1.02 REFERENCES

- A. California Code of Regulations (CCR), Title 24, current edition:
 - 1. Part 2, California Building Code (CBC), Volumes 1 and 2.
 - 2. Part 6, California Energy Code, current edition.
- B. ASTM International (ASTM):
 - 1. ASTM C 423 – Test Method for Sound Absorption Coefficient by the Reverberation Room Method.
 - 2. ASTM C 518 – Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter.
 - 3. ASTM C 665 – Specification for Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 4. ASTM E 84 – Test Method for Surface Burning Characteristics of Building Materials.
 - 5. ASTM E 136 – Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's product literature and installation instructions for each type of insulation required.
- B. Certified Test Reports:
 - 1. Include with product data, copies of certified test reports showing compliance with specified performance values, including R-values, characteristics, and perm ratings.

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C. Quality Certification:

1. Manufacturer's certification stating insulating materials comply with Standards for Insulating Material.

1.04 QUALITY ASSURANCE

A. Standard:

1. Provide products complying CBC Chapter 7, Section 707 and Part 12, Chapter 12-13, Standards for Insulating Materials.

- ### **B. Recycled Content:** Provide glass-fiber insulation with recycled content so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 10 percent.

1.05 DELIVERY, STORAGE AND HANDLING

- ### **A. Deliver materials to Project Site and store in safe, dry place, with labels intact and legible at time of installation.**

B. Protect insulation from physical damage and from becoming wet or soiled.

1. Comply with manufacturer's recommendations for handling, storage and protection during installation.
2. Do not install insulation that has become wet or soiled.
 - a. Immediately remove wet or soiled materials from Project Site.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- ### **A. Inorganic mineral or glass fibers formed into flexible resilient blankets/batts of definite dimension and controlled density as manufactured by one of following:**

1. CertainTeed Corp., Insulation Group, Malvern, PA
2. Knauf Insulation, Shelbyville, IN
3. Johns Manville, Denver, CO
4. Owens Corning Insulating Systems, LLC, Toledo, OH
5. Rockwool, Byhalia, MS

2.02 THERMAL INSULATION

- ### **A. Blankets/batts, with reflective (foil-faced) vapor retardant membrane facing complying with ASTM C 665, Type III, Class B, Category 1:**

1. Surface Burning Characteristics, ASTM E 84:
 - a. Flame spread index of 75 or less
 - b. Smoke developed index of 150 or less.
2. Permeability, ASTM E 96: Foil - 0.05 Perms
3. Provide Type III in exterior walls where indicated.
4. Foil-Faced Batts by Johns Manville, or approved equal

- ### **B. Provide thermal insulation with material only "R" value as follows:**

1. Exterior wall cavities: R-19
 - a. Nominal Thickness: 6 inches.

SPECIFICATIONS

- 2. Underneath Second Floor roof deck: R-30
 - a. Nominal Thickness: 10 inches.
- C. Sag Wires: 18 gage steel wires.

2.03 SOUND ATTENUATION INSULATION

- A. Wall Cavity:
 - 1. Unfaced glass fiber insulation blankets/batts, complying with ASTM C 665, Type I.
 - 2. Blankets/batts without membrane facing in manufacturer's standard lengths and widths as required, conforming to following:
 - a. Surface Burning Characteristics, ASTM E 84:
 - 1) Flame spread index of 10 or less
 - 2) Smoke developed index of 10 or less.
- B. Provide sound attenuation insulation in interior partitions conforming to following:
 - 1. Nominal 6 inches thick, minimum, friction fit.
 - 2. NRC Rating of 1.0 on E-405 mounting.
 - 3. Provide sound attenuation insulation to produce STC Ratings indicated on Drawings.

2.04 ACCESSORIES

- A. Provide accessory materials, not specifically described but required for complete and proper installation, as selected by Contractor, subject to approval of Architect.
 - 1. Provide metal clips, impaling pins and washers, hardware, zinc-coated wires, furring channels, and other items for anchoring insulation to substrates as required and recommended by insulation manufacturer.

PART 3 EXECUTION

3.01 INSPECTION AND PREPARATION

- A. Inspect substrate and conditions under which insulation work is to be performed.
- B. Clean substrates of substances harmful to insulations, including removal of projections which might interfere with installation.
- C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Comply with manufacturer's instructions for particular conditions of installation in each case.
 - 1. Where printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with Work.
- B. Extend insulation full thickness as shown over entire surface to be insulated.
 - 1. Cut and fit insulation tightly around pipes, conduits and penetrations.

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2. Remove projections which interfere with placement.
3. Friction-fit sound attenuation insulation in metal deck flutes as indicated on Drawings.
 - a. Acoustic sealant is specified in Section 09 2900.
- C. Apply single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.
 1. Maintain total insulation integrity over entire area to be insulated, including areas between closely spaced members.
- D. Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations.
 1. Where specific method is not indicated, use mechanical anchorage to provide permanent placement and support of units.
 2. Prevent insulation from sagging during and after installation by installing adequate sag wires.
- E. Make insulation continuous at corners and overlaps.
 1. Fit tightly against adjoining insulation and frames.
 2. Extend insulation from floor to ceiling or above as indicated.
 3. Avoid gaps, bulges or extreme compression.
 - a. Do not compress insulation in excess of 10 percent.
- F. Set vapor barrier faced units with vapor barrier to warm side of construction
 1. Do not obstruct ventilation spaces
 2. Tape joints and ruptures in vapor barriers, and seal each continuous area of
 - a. insulation to surrounding construction to ensure vapor-tight installation.
 3. Set reflective foil-faced units accurately with air space in front of foil as shown.
 - a. Provide 0.75 inch air space where possible.

3.03 CLEANING

- A. Remove and legally dispose of rubbish, debris, and waste materials off Project Site.
 1. Comply with requirements of Section 01 7419.

3.04 PROTECTION

- A. Protect installed insulation from harmful weather exposures and from possible physical abuse, by temporary covering or enclosure, where installation of concealing work is delayed.
 1. Installer to advise Contractor of exposure hazards, including possible sources of deterioration and fire hazards.

END OF SECTION 07 21 00

SPECIFICATIONS

SECTION 07 54 19 POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Adhered polyvinyl chloride (PVC) roofing system.
 - 2. Substrate board.
 - 3. Roof insulation.
 - 4. Walkways.
 - 5. PVC coated metal.
- B. Related Requirements:
 - 1. Section 07 21 00 "Building Insulation" for insulation beneath the roof deck.
 - 2. Section 07 62 00 "Sheet Metal Flashing and Trim" for non-PVC coated metal roof flashing and counterflashing.
 - 3. Section 07 92 00 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
 - 4. Section 22 14 23 "Storm Drainage Piping Specialties" for roof drains.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Roofing Conference: Conduct conference at Project Site.
 - 1. Meet with District Construction Manager, Project Inspector, Architect, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

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3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base tie-ins, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include roof plans, elevations, sections, details, and attachments to other work, including:
 1. Base flashings and membrane terminations.
 2. Tapered insulation, thicknesses, and slopes.
 3. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
 5. Walkways
- C. Samples for Verification: For the following products:
 1. Roofing membrane, of color required.
 2. Walkway pads or rolls, of color required.
 3. Roof insulation.
 4. PVC coated metal of color required.
 5. Metal termination bars.
 6. Three fasteners of each type and finish.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Manufacturer Certificates:
 1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.

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2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
- C. Product Test Reports: For roof membrane and insulation, tests performed by independent qualified testing agency indicating compliance with specified requirements.
- D. Field quality-control reports.
- E. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.
- B. Information Card: Furnish a typewritten card, laminated in plastic. Card shall be 8-1/2-by-11 inches and shall contain the information listed on Form 1 located at end of this section.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

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- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period, without monetary limitation.
 - 1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, substrate board, walkways, and other components of roofing system.
 - 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain components including roof insulation, fasteners, and other products required for roofing system from same manufacturer as roof membrane or manufacturer approved by roof membrane manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.
 - 1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:
 - 1. Zone 1 (Roof Area Field): per structural drawings SO.01

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2. Zone 2 (Roof Area Perimeter): per structural drawings SO.01.
 3. Zone 3 (Roof Area Corners): per structural drawings SO.01.
- D. Energy Performance: Roofing system shall have a minimum aged solar reflectance of 0.63 and a minimum thermal emittance of 0.75 or a minimum solar reflectance index (SRI) of 75 when tested according to CRRC-1.
- E. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A, for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- F. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 PVC ROOFING

- A. PVC Sheet: ASTM D 4434/D 4434M, Type III, fabric reinforced.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville; a Berkshire Hathaway company.
 - b. Sika Sarnafil.
 - c. GAF Materials Corporation.
 - d. Or Equal.
 2. Thickness: 80 mils nominal on horizontal surfaces; 60 mils nominal on vertical surfaces.
 3. Exposed Face Color: White.

2.4 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
1. Adhesives and Sealants: Comply with VOC limits of San Diego Air Pollution Control District.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, and color as PVC sheet.
- C. Bonding Adhesive: Manufacturer's standard, water based for horizontal applications; solvent based for vertical applications.
- D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1-by-1/8-inch-thick; with anchors.

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- E. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.
- F. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 PVC COATED SHEET METAL

- A. Roof membrane manufacturer's standard 0.028-inch thick minimum galvanized sheet metal laminated to minimum 20-mil-thick non-reinforced PVC membrane. Color to match roofing membrane.

2.6 SUBSTRATE BOARDS

- A. Substrate Board: Substrate board must be the product that was used in testing the roof assembly to gain a Class A rating.
 - 1. Glass-mat faced water-resistant gypsum substrate.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

2.7 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by PVC roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses to achieve slopes and R-values indicated. Tested in accordance with ASTM E84 and achieves a flame spread index ≤ 75 . (CBC 2603.3)
 - 1. Roof insulation for intended use to comply with UL Construction No. 123.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
- C. Perlite Board Insulation: ASTM C 728, Type I, rigid, mineral-aggregate thermal insulation board composed of expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal coated.
- D. Tapered Insulation: Provide factory-tapered insulation boards.
 - 1. Material: Match roof insulation.
 - 2. Minimum Thickness: 1/4-inch (6.35 mm).
 - 3. Slope:

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- a. Roof Field: 1/4-inch per foot (1:48) unless otherwise indicated on Drawings.
 - b. Saddles and Crickets: 1/2-inch per foot (1:24) unless otherwise indicated on Drawings.
- E. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.8 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and substrate boards to substrate, and acceptable to roofing system manufacturer.
- C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
 - 1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
 - 2. Full-spread spray-applied, low-rise, two-component urethane adhesive.

2.9 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, color grey, and acceptable to roofing system manufacturer.

2.10 BUILDING NUMBERS

- A. Cut from factory-formed, nonporous, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16-inch thick, color and size to achieve high-contrast aerial visibility, and acceptable to membrane roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.

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2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 05 31 00 "Steel Decking."

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Install roof membrane and auxiliary materials to tie-in to existing roofing to maintain weathertightness of transition and not void warranty for existing roofing system.

3.4 SUBSTRATE BOARD INSTALLATION

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.
 1. Tightly butt substrate boards together.
 2. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
- B. Mechanically Fastened Substrate Board: Secure to deck using mechanical fasteners specifically designed and sized for fastening specified board to deck type.
 1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
- C. Adhered Substrate Board Installation: Install substrate board and adhere to insulation as follows:
 1. Set substrate board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining board in place.

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2. Set substrate board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining board in place.

3.5 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is greater than 3/4-inch, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4-inch with insulation.
 1. Cut and fit insulation within 1/4-inch of nailers, projections, and penetrations.
- G. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 1. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 2. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
- H. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
- I. Mechanically Fastened and Adhered Insulation: Install each layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 2. Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

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3. Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
- J. Install slip sheet over existing substrate.

3.6 ADHERED ROOFING INSTALLATION

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roof membrane and allow to relax before installing.
- B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- C. Accurately align roof membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- E. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- F. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.
 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.7 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.

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- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.8 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products according to manufacturer's written instructions in locations indicated on Drawings. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.9 BUILDING NUMBER INSTALLATION

- A. Install building numbers in locations indicated. Heat weld to substrate or adhere to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.10 FIELD QUALITY CONTROL

- A. Roofing Inspector: District will engage a qualified roofing inspector to inspect substrate conditions, surface preparation, roof membrane application, flashings, protection, and drainage components.
- B. For testing and inspections not provided by District and as specified herein, provide qualified personnel and furnish reports to Project Inspector.
- C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of District Construction Manager, and to prepare inspection report.
- D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.11 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing

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system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and District Construction Manager.

- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 54 19

SPECIFICATIONS

FORM 1 – ROOFING SYSTEM DESCRIPTION

1. Location: _____ 2. Bldg. Name: _____
3. Bldg. No.: _____ 4. Roof Area (SF): _____ 5. Contract No.: _____
6. Deck Slope: _____
7. Type of Deck:
- | | |
|---|--|
| <input type="checkbox"/> Metal | <input type="checkbox"/> Wood Plank or Plywood |
| <input type="checkbox"/> Cast-In-Place Concrete | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Precast/Prestressed Concrete | |
8. Type of Insulation Board:
- | | |
|---|---|
| <input type="checkbox"/> Polyisocyanurate/Composite | <input type="checkbox"/> Polyisocyanurate |
| <input type="checkbox"/> Polystyrene/Composite | <input type="checkbox"/> Polystyrene |
| <input type="checkbox"/> Perlite | <input type="checkbox"/> Mineral Fiber |
| <input type="checkbox"/> Other: _____ | |
9. Insulation Manufacturer: _____
10. Insulation Thickness: _____
11. Roofing Type:
- | | |
|---|---|
| <input type="checkbox"/> Built-Up (Asphalt) | <input type="checkbox"/> PVC |
| <input type="checkbox"/> Metal | <input type="checkbox"/> SBS Mod. Bitumen |
| <input type="checkbox"/> Shingles | <input type="checkbox"/> Other: _____ |
12. Roofing Manufacturer: _____
13. Roofing Installer/Warrantor: _____
14. Roofing Application Method:
- | | |
|--|--|
| <input type="checkbox"/> Bitumen | <input type="checkbox"/> Fully Adhered |
| <input type="checkbox"/> Mechanically Fastened | <input type="checkbox"/> Mechanically Fastened/Fully Adhered |
| <input type="checkbox"/> Other: _____ | |
15. Warranty Period: From: _____ To: _____
16. Warranty Serial Number: _____
17. Date Roofing Completed: _____ 18. Inspector: _____
19. Prime Contractor Name/Address: _____
- Signature: _____ Date: _____

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INSTRUCTIONS FOR FORM 1 (Do Not Post)

1. Location: Name of facility as shown on contract.
2. Bldg. Name: As shown on contract or as provided by District Construction Manager.
3. Bldg. Number: As provided by District Construction Manager.
4. Roof Area: Area in square feet of roof for which deck insulation, membrane, etc. are the same. A separate form is required if any part of roof system is different over other areas of the roof.
5. Contract Number: As shown on the contract.
6. Show deck slope.
7. Deck: Check appropriate block.
8. Type of Insulation Board: Check appropriate block.
9. Show manufacturer of insulation.
10. Show minimum thickness of installed insulation.
11. Roofing Type: Check appropriate block.
12. Show roofing manufacturer's name.
13. Roofing Installer's or Contractor's name.
14. Roofing Application Method: Check appropriate block.
15. Warranty Period: Insert start and end dates.
16. Warranty Serial Number: Insert serial number.
17. Show date of Substantial Completion. Warranty period begins on this date.
18. Show Project Inspector's name.
19. Prime Contractor Name/Address/Signature: Must be signed and dated by an official of Contracting firm.

SPECIFICATIONS

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Sheet metal flashing and trim, including, but not necessarily limited to:
 - a. Roofing sheet metal flashing work.
 - b. Reglet and counter flashing assemblies.
 - c. Miscellaneous metal flashing and counter flashing as required
 - d. Drip flashings.
 - e. Other sheet metal items, not necessarily specified, but required to prevent penetration of water into building.
- B. Related Sections:
 - 1. Section 06 10 00: Rough Carpentry; wood blocking and nailers.
 - 2. Section 07 92 00: Joint Sealants.
 - 3. Section 09 91 00: Painting; items specified to be field painted

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - 2. ASTM B 69 – Standard Specification for Zinc Sheet.
 - 3. ASTM C 920 – Standard Specification for Elastomeric Joint Sealants
 - 4. ASTM D 4586 – Standard Specification for Asphalt Roof Cement, Asbestos-Free.
- B. Sheet Metal & Air Conditioning Contractors' National Association (SMACNA):
 - 1. Architectural Sheet Metal Manual
- C. Specialty Steel Industry of North America (SSINA):
 - 1. SSINA Designer Handbook – Standard Practices for Stainless Steel
- D. American National Standards Institute and Single Ply Roofing Institute (ANSI/SPRI):
 - 1. ANSI/SPRI ES-1 – Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
 - a. Testing and Certification Listing of Shop Fabricated Edge Metal and Coping.
 - b. Only required for fabricated item procedures.
- E. South Coast Air Quality Management District (SCAQMD):
 - 1. Rule 1113 – Architectural Coatings
 - 2. Rule 1168 – Adhesive and Sealant Applications

SPECIFICATIONS

3.

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. Showing fabrication, jointing and securing of metal to form flashings and trim.
 - a. Include expansion joint details and waterproof connections to adjoining work and at obstructions and penetrations.
 - 2. Identify material, thickness, weight and finish for each item and location in Project.
 - 3. Show Details for:
 - a. Forming sheet metal flashing and trim.
 - 1) Including profiles, shapes, seams and dimensions.
 - b. Fastening, joining, supporting and anchoring sheet metal flashing and trim.
 - 1) Including fasteners, clips, cleats and attachments to adjoining work.
- B. Samples:
 - 1. Each type of sheet metal flashing and trim indicated with factory-applied color finishes.
 - a. Minimum of four 6 inch square samples on same metal used for flashings.

1.04 QUALITY ASSURANCE

- A. Standards:
 - 1. Comply with material and installation requirements of SMACNA Architectural Sheet Metal Manual, unless otherwise indicated or specified.
- B. General:
 - 1. Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, or fastener disengagement.

1.05 SEQUENCING

- A. Coordinate metal flashing and trim work with adjacent work, including, but not necessarily limited to:
 - 1. Installation of roofing, waterproofing, drains, piping, blocking, nailers, reglets, framing at openings, curbs and parapets.
- B. Coordinate installation with interfacing and adjoining construction to provide leakproof, secure, and non-corrosive installation.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged.
 - 1. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in manner to prevent bending, warping, twisting, and surface damage.

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- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering.
 - 1. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

PART 2 PRODUCTS

2.01 SHEET METAL MATERIALS

- A. Galvanized Steel Sheet:
 - 1. Conforming to ASTM A 653 with G90 coating.
 - 2. Structural quality, minimum 0.0299 inch thickness (22 U.S. standard gage) unless otherwise indicated.
 - 3. Conform to requirements for field painting per Section 09 9100, when not indicated to be prefinished.
- B. Prefinished Metal:
 - 1. Galvanized steel sheet conforming to paragraph A.
 - 2. Coil-Coated Colored Finish:
 - a. Fluoropolymer (Kynar resin-based) coating.
 - b. Comply with requirements in Section 05 0513 for Metal Finish Type B:
 - 1) 1 mil dry film thickness, one side.
 - 2) 0.3 to 0.4 mil on other side.
 - 3. Use in visually exposed locations.
 - 4. Color: As selected by Architect

2.02 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Fasteners:
 - 1. Same metal as flashing/sheet metal or other corrosion resistant metal as recommended by sheet manufacturer.
 - 2. Match finish of exposed heads with material being fastened.
- B. Reglets:
 - 1. Metal units of type and profile indicated, compatible with flashing indicated, corrosion resistant.
 - 2. Fry Reglet Co. "Spring Lok" 2-piece style as indicated; 24 gage galvanized steel.
 - 3. Provide manufacturer's standard prefabricated corner units.
 - 4. Use stainless steel washers with neoprene facing.
 - 5. Equivalent products by MM Systems or Lane-Aire may be used subject to acceptance by Architect.
- C. Metal Accessories:
 - 1. Provide sheet metal clips, straps, anchoring devices and similar accessory unit as required for installation of Work, matching or compatible with material being installed, corrosion resistant, size and gage required for performance.
- D. Zinc Drain Pans and Pipe Flashing:
 - 1. Conforming to ASTM B 69, 99.995 percent pure zinc
 - a. ZincJak by Commercial Innovations or approved equal.
 - 2. Thickness: 0.02 inch

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3. Pipe Flashing:
 - a. Interior coated, exterior preprimed
 4. Drain Pans:
 - a. Pretreated both sides with factory primer topside coating
 5. Lead Free Solder for Zinc: SN 100C, Aim Solder
 6. Flux for Zinc: No. 17 or No. 70, Superior Flux Mfg. Co.
- E. Epoxy Seam Sealer:
1. 2-part noncorrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior nonmoving joints including riveted joints.
- F. Mastic Sealant:
1. Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- G. Isolation Between Dissimilar Materials:
1. Provide single-component, inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities
 - a. VOC compliant.
 2. Elasto-Deck BT as manufactured by Pacific Polymers, Division of Holcim Solutions and Products US, or equivalent product acceptable to Architect.
- H. Roofing Cement:
1. Conforming to ASTM D 4586, asphaltic, compatible with roofing materials.
- I. Elastomeric Sealant:
1. Generic type recommended by manufacturer of metal and fabricator of components being sealed
 2. Comply with ASTM C 920 and requirements of Section 07 9200.
- J. Flashing Compound:
1. Federal Specification SS-C-153, fibrated asphalt plastic cement, compatible with roofing materials.

2.03 FABRICATION

- A. Sheet metal work is not necessarily individually described.
1. Descriptions included are major items or those requiring detail.
 2. Provide other work, as indicated or necessary.
- B. Shop fabricate Work to greatest extent possible.
1. Comply with details shown, applicable requirements of SMACNA Manual, and other recognized industry practices.
 2. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of Work.
 3. Form work to fit substrates.
 4. Comply with material manufacturer instructions and recommendations for forming material.
 5. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

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- C. Seams:
 - 1. Fabricate non-moving seams in sheet metal with flat-lock seams.
 - 2. For metal other than aluminum, tin edges to be seamed, form seams, and solder.
- D. Expansion Provisions:
 - 1. Where lapped or bayonet-type expansion provisions in Work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- E. Separations:
 - 1. Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with specified isolation coating or other permanent separation as recommended by manufacturer/fabricator.
- F. Counterflashing, Reglets, Copings, and Edgings:
 - 1. In-stock patterns, conforming substantially to details and design as shown, are acceptable.
 - 2. Manufacturers: Fry Reglet Corp., Lane-Aire Corp., or approved equal.

PART 3 EXECUTION

3.01 GENERAL

- A. Inspect substrates and conditions under which metal flashing and trim will be installed.
 - 1. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations, and with SMACNA Manual.
 - 1. Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units.
 - a. Conceal fasteners where possible, and set units true to line and level as indicated.
 - 2. Install Work with laps, joints and seams which will be permanently watertight and weatherproof.
 - 3. Use fasteners, solder, welding rods, protective coatings, separators, sealants and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 4. Anchor sheet metal flashings in accordance with Factory Mutual Loss Prevention Data Sheet 1-49.
 - 5. Drive exposed fasteners through steel/neoprene washers.
- C. Bed flanges of Work in thick coat of specified isolation coating where required for waterproof performance.
- D. Install reglets to receive counter flashing in manner and by methods indicated.
 - 1. Where shown in concrete, furnish reglets to trades of concrete and masonry work for installation as Work of Sections 03 3000 and 04 2000.

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2. Install counterflashing in reglets, either by snap-in seal arrangement, or by wedging in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.
- E. Metal Protections:
 1. Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with isolation coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
- F. Install exposed sheet metal flashing and trim without excessive oil canning, buckling and tool marks.
- G. Expansion Provisions:
 1. Provide for thermal expansion of exposed flashing and trim.
 2. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection.
 3. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.
- H. Seal joints with elastomeric or butyl sealant as required for watertight construction.
- I. Touch-up abraded areas, where coating has been damaged, with 2 mil coating of paint, specifically recommended by manufacturer for repair of prepainted coatings.

3.02 ROOFING WORK

- A. General:
 1. Install sheet metal work and accessories under direct supervision, and to complete satisfaction of roofing installer.
 2. Install Work watertight and weathertight throughout.
 3. Provide for expansion and contraction, free from undue stress in any part of completed Work using lap-type expansion joints bedded in flashing compound.
- B. For embedment of metal flashing flanges in roofing or composition flashing or stripping, extend flanges for minimum of 4 inch embedment.
- C. Pipe and Conduit Penetrations of Roofing:
 1. Flash with zinc flashing.
 2. Flanges stripped in by roofer.
 3. At short vent pipes, flash per SMACNA, Figure 4-158, with top of flashing turned down 2 inches inside vent pipe.
 4. At pipes extending above roof too far to completely cover with zinc, extend zinc flashing up pipe minimum 8 inches and counterflash with storm collar with draw band per SMACNA, Figure 4-15C.
 - a. Seal top of storm collar against pipe with elastomeric sealant.

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3.03 CLEANING

- A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.

END OF SECTION 07 62 00

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**SHEET METAL FLASHING AND TRIM
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SECTION 07 72 00 ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Roof access hatches.
- B. Related Sections:
 - 1. Section 07 62 00 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, and miscellaneous sheet metal trim and accessories.

1.3 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories.
 - 1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

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1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Standards: Comply with the following:
 - 1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

2.2 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90coating designation and mill phosphatized for field painting where indicated.
 - 1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
 - 2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
- B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50coated.
 - 1. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
- C. Aluminum Sheet: ASTM B 209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
 - 1. Mill Finish: As manufactured.
 - 2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
- D. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and

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temper for type of use, finished to match assembly where used; otherwise mill finished.

- E. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.
- F. Steel Tube: ASTM A 500/A 500M, round tube.
- G. Galvanized-Steel Tube: ASTM A 500/A 500M, round tube, hot-dip galvanized according to ASTM A 123/A 123M.
- H. Steel Pipe: ASTM A 53/A 53M, galvanized.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Glass-Fiber Board Insulation: ASTM C 726, nominal density of 3 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F, thickness as indicated.
- C. Polyisocyanurate Board Insulation: ASTM C 1289, thickness and thermal resistivity as indicated.
- D. Bituminous Coating: SSPC-12, cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M. Free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coating.
- E. Underlayment:
 - 1. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 - 2. Polyethylene Sheet: 6-mil-thick polyethylene sheet complying with ASTM D 4397.
 - 3. Slip Sheet: Building paper, 3 lb/100 sq. ft minimum, rosin sized.
 - 4. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 5. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
 - 6. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
 - 7. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

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- G. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- H. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- I. Asphalt Roofing Cement: ASTM D 4586/D 4586M, asbestos free, of consistency required for application.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
 - 1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Coordinate installation of roof accessories with installation of roof deck, roof insulation, flashing, roofing membranes, penetrations, equipment, and other construction involving roof accessories to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight.
 - 3. Anchor roof accessories securely in place so they are capable of resisting indicated loads.

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4. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 5. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.
- D. Pipe Support Installation: Comply with MSS SP-58 and MSS SP-89. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.
1. Pipes of Various Sizes: Space supports for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
- E. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.
- F. Cap Flashing: Where required as component of accessory, install cap flashing to provide waterproof overlap with roof flashing (as counterflashing). Seal overlap with thick bead of mastic sealant.
- G. Seal joints with elastomeric sealant as required by roof accessory manufacturer.
- 3.3 REPAIR AND CLEANING
- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780/A 780M.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 09 91 13 "Exterior Painting."
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Clean off excess sealants.

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- E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 72 00

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SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: All sealant types utilized, including but not limited to:
 - 1. Nonstaining silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Mildew-resistant joint sealants.
- B. Related Requirements:
 - 1. Section 32 13 73 "Concrete Paving Joint Sealants" for sealing joints in paved roads, parking lots, walkways, and curbing.

1.3 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. 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.

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4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.
- C. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
- D. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.7 PRECONSTRUCTION TESTING

- A. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, and curing time.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.9 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 2. When joint substrates are wet.
 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 4. Where contaminants capable of interfering with adhesion have not yet been

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removed from joint substrates.

1.10 WARRANTY

- A. Special Installer's Warranty: 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 agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Manufacturer's standard.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
- C. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- D. Sealants shall comply with the testing and product requirements of San Diego Air Pollution Control District Rule 67.0 "Architectural Coatings" and Rule 67.21 "Adhesive Material Application Operations".
- E. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints

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that will come in repeated contact with food; provide products that comply with 21 CFR 177.2600.

2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to 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 this Project.
- C. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. Pecora Corporation.
 - c. Tremco Incorporated.
 - d. Or Equal.

2.3 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Uses T and NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF / Sonneborn Corporation.
 - b. Sika Corporation.
 - c. Tremco Incorporated.
 - d. Or Equal.

2.4 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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

- a. Dow Corning Corporation.
- b. Pecora Corp.
- c. Tremco Incorporated.
- d. Or Equal.

2.5 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

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, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.
- D. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

2.7 SPECIAL FINISHES

- A. Special finishes and fluoropolymer coatings such as PVDF Hylar, Kynar, Duranar, etc. shall be given special consideration by the contractor for sealant adhesion and compatibility to adjacent surfaces. Only products recommended and tested by manufacturer per ASTM C 794, and tested per Article 1.7 for such surfaces, shall be used.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. 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.

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3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- 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. (Default requirement).
 - 4. Provide flush joint profile at locations indicated on Drawings and where requested by Architect, according to Figure 8B in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 CLEANING

- A. Clean off excess sealant, sealant smears and tape residue 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.

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3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application Type A: Exterior joints in vertical surfaces and horizontal non-traffic surfaces.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between different materials listed above.
 - c. Perimeter joints between materials listed above and frames of doors, and louvers.
 - d. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, nonstaining, Type S, Grade NS, Class 50, Use NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application Type B: Interior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Urethane, Type S, Grade NS, Class 25, Use T, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application Type C: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, mildew resistant, acid curing, Type S, Grade NS, Class 25, Use NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of

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colors.

- D. Joint-Sealant Application Type D: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Joints in gypsum board walls to adjoining surfaces.
 - b. Vertical joints on exposed surfaces of unit masonry and concrete walls and partitions.
 - c. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Urethane, Type S, Grade NS, Class 25, Use NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application Type E: One-Part Butyl Rubber Base Sealant complying with Federal Specification TT-S-001657, Type I and ASTM C 1085. Use: All exterior sheet metal flashing laps and intermediate joints with less than 10% movement.
- F. Pipes and conduits penetrating underground or waterproofed walls: Sealant compatible with waterproofing system installed, approved by waterproofing manufacturer.

END OF SECTION 07 92 00

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SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Hollow metal doors and frames as indicated and scheduled.
- B. Related Sections:
 - 1. Section 07 92 00: Joint Sealants
 - 2. Section 08 14 00: Wood Doors
 - 3. Section 08 71 00: Door Hardware
 - 4. Section 09 91 00: Painting; field painting of hollow metal doors and frames

1.02 REFERENCES

- A. California Code of Regulations (CCR), Title 24, Part 2, California Building Code (CBC), Volumes 1 and 2, current edition
 - 1. Chapter 11B – Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing.
- B. American National Standards Institute (ANSI)/ Steel Door Institute (SDI):
 - 1. ANSI/SDI A250.4 – Test Procedure and Acceptance Criteria for – Physical Endurance for Steel Doors, Frames, and Frame Anchors
 - 2. ANSI/SDI A250.6 – Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames
 - 3. ANSI/SDI A250.8 – Specifications for Standard Steel Doors and Frames (SDI-100)
 - 4. ANSI A250.10 – Test Procedure and Acceptance Criteria for Prime Painted Steel Doors and Frames.
 - 5. ANSI/SDI A250.11 – Recommended Erection Instructions for Steel Frames.
 - 6. SDI 117 – Manufacturing Tolerances for Standard Steel Doors and Frames.
- C. ASTM International (ASTM):
 - 1. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - 2. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - 3. ASTM A1008 – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
 - 4. ASTM A1011 – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 80 – Standard for Fire Doors and Other Opening Protectives
 - 2. NFPA 252 – Standard Methods of Fire Tests of Door Assemblies
 - 3. NFPA 257 – Standard on Fire Test for Window and Glass Block Assemblies

HOLLOW METAL DOORS AND FRAMES

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SPECIFICATIONS

1.03 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Door and frame assemblies, including reinforcing and provisions for hardware as shown and specified.
 - 2. Drawings indicate profile and general details of steel frame fabrication and installation.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's data for each type of door and frame indicated.
 - a. Including, but not necessarily limited to following:
 - 1) Door designation
 - 2) Type, level, and model
 - 3) Material description
 - 4) Core description
 - 5) Construction details
 - 6) Label compliance
 - 7) Fire resistance ratings
 - 8) Finishes.
- B. Shop Drawings:
 - 1. Showing fabrication and installation of steel doors and frames.
 - a. Including, but not limited to following:
 - 1) Details of each frame type
 - 2) Elevations of door design types
 - 3) Conditions at openings
 - 4) Details of construction
 - 5) Location and installation requirements of finish hardware and reinforcements.
 - 6) Details of joints and connections.
 - 2. Show anchorage and accessory items.
- C. Samples:
 - 1. Hollow Metal Frame:
 - a. Corner section of typical exterior and interior frame, of sufficient composite size to illustrate following:
 - 1) Corner joint construction.
 - 2) Hinge reinforcement.
 - 3) Closer reinforcement.
 - 4) Floor anchor, dust cover, and jamb anchors showing galvanizing and prime coat finishes.
 - 2. Hollow Metal Door:
 - a. Section of typical interior door of sufficient composite size to illustrate:
 - 1) Edge, top, and bottom.
 - 2) Core construction
 - 3) Hinge reinforcement and face stiffening
 - 4) Closer and kick plate reinforcement
 - 5) Corner of vision opening construction with glazing beads.
- D. Certification:

SPECIFICATIONS

1. Certification of compliance with referenced standards and specified criteria, including but not necessarily limited to:
 - a. Physical Endurance in accordance with ANSI A250.4
 - b. Prime Paint performance in accordance with ANSI A250.10, and as specified.
- E. Door Schedule:
 1. Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 1. Minimum documented experience of more than five years providing hollow metal doors and frames for similar size projects.
- B. Coordinate with hardware supplier for fabrication of doors and frames to receive hardware items.
- C. Quality Standards:
 1. Provide steel doors and frames complying with referenced standards as follows:
 - a. ANSI/SDI A250.4
 - b. ANSI/SDI A250.8
 - c. ANSI A250.10

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cartoned or crated to provide protection during transit and Project storage.
- B. Inspect doors and frames upon delivery for damage and notify shipper and supplier should damage be found.
 1. Minor damages may be repaired provided refinished items are equal with respect to new work and acceptable to Architect.
 2. Remove and replace damaged items that cannot be repaired as directed.
- C. Store doors and frames at Project Site under cover.
 1. Place units on minimum 4 inch high wood blocking.
 2. Avoid using non-vented plastic or canvas shelters that could create humidity chamber.
 3. Should door packaging become wet, remove cartons immediately.
 4. Provide minimum 1/4 inch spaces between stacked doors to permit air circulation.

1.07 REGULATORY REQUIREMENTS

- A. Fire-Rated Door Assemblies:
 1. Assemblies complying with NFPA 80, labeled and listed by UL, Intertek Group, or another testing and inspection agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.

SPECIFICATIONS

- B. Fire-Rated Window Assemblies:
 - 1. Assemblies complying with NFPA 80, listed and labeled by testing and inspection agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- C. Accessibility:
 - 1. Conform to requirements of CBC Chapter 11B, Section 11B-404

1.08 WARRANTY

- A. Furnish manufacturer's 1 year material and workmanship warranty.
- B. Furnish installer's 2 year labor warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, provide products by one of following, or approved equal:
 - 1. ASSA ABLOY Door Security Solutions.
 - 2. Door Components, Inc.
 - 3. Steelcraft; division of Allegion
- B. Materials, Fabrication, and Installation:
 - 1. Comply with requirements of standards referenced in "Quality Assurance" Article.

2.02 MATERIALS

- A. General:
 - 1. Steel thicknesses meeting minimum requirements of ASTM standards and as described in ANSI/SDI A250.8.
- B. Hot Rolled Steel Sheets:
 - 1. ASTM A 1011, Commercial Steel (CS), Type B.
 - a. Free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic Coated Steel Sheets:
 - 1. ASTM A 653, Commercial Steel (CS), Type B.
 - a. A40 zinc-iron-alloy (galvannealed) coating
 - b. Stretcher-leveled standard of flatness.
- D. Cold Rolled Steel Sheets:
 - 1. ASTM A 1008, Commercial Steel (CS)
 - a. Suitable for exposed applications, Type B.
 - b. Stretcher-leveled standard of flatness.
- E. Supports and Anchors:
 - 1. Fabricate from minimum 16 gage sheet steel unless noted otherwise.
 - 2. After fabricating, galvanize units to be built into exterior walls according to ASTM A 153, Class B.
- F. Inserts, Bolts, and Fasteners:

SPECIFICATIONS

1. Provide as shown on Drawings and to suit conditions of secure installations.
 2. Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153.
 3. Furnish Type 304 stainless steel fasteners at exterior doors.
- G. Sound Deadener:
1. Spray-on type, non-combustible and non-bleeding
 - a. INC DC-10 Noise Dampening Compound by Industrial Noise Control, Inc., or approved equal

2.03 DOORS

- A. General:
1. Provide type and size of doors shown with louvers and openings for glazing where indicated.
 2. Minimum Door Thickness: 1-3/4 inches.
- B. Interior Doors:
1. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI A250A for physical endurance level:
 - a. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).
 - 1) 0.053 inch (16 gage) thick faces.
- C. Exterior Doors:
1. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI A250A for physical endurance level:
 - a. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).
 - 1) 0.053 inch (16 gage) thick faces.
- D. Door Louvers:
1. Interior Doors:
 - a. Provide louvers for interior doors, where indicated on Door Schedule.
 - b. Sightproof Louvers:
 - 1) Stationary louvers constructed with inverted Y-shaped blades.
 - a) Form blades of 16 gage, cold-rolled steel sheet.
 - b) Frameless louver with blades flush with face of door.
 - 2) Framed louver kits are not permitted.
 2. Exterior Doors:
 - a. Provide storm proof louvers for exterior doors, where indicated on Door Schedule.
 - 1) Form blades of 0.063 inch thick, extruded aluminum.
 - b. Storm Proof Louvers:
 - 1) Stationary louvers constructed with 45 degree blades.
 - c. Louver Screens for Exterior Louvers:
 - 1) Provide insect screen in removable frames for exterior door louvers.
 - 2) Comply with requirements for removable louver screens as specified in Section 08 9100.
 - d. Product and Manufacturer:

[Use following where security grilles are not required]

SPECIFICATIONS

- 1) Anemostat SRDL Storm Proof Extruded Aluminum Louver, or approved equal.

[Use following where security grilles are required]

E. Vision Lights:

1. Provide flush mounted steel vision light for nominal 1/4 inch (6 mm) glass, unless noted otherwise.
 - a. Consisting of glass light moldings flush with face of door, to accommodate specified glass thickness.
 - 1) Vision light kits with face frames are not acceptable.
 - b. Comply with glazing requirements specified in Section 08 8000 for both fire-rated and non-rated glass.

2.04 FRAMES

A. General:

1. Provide fully welded steel frames for doors that comply with ANSI/SDI A250.8 and with details indicated for type and profile.
2. Conceal fastenings, unless otherwise indicated.

B. Frames of 0.067 inch (14 gage) thick steel sheet for:

1. Level 3 steel doors.
2. Wood doors

C. Door Silencers:

1. Except on frames scheduled to receive door seals, fabricate stops to receive silencers as follows:
 - a. Interior Hollow Metal Frames:
 - 1) Provide for three silencers on strike jambs on single door frames.
 - 2) Provide two silencers in head frame, for pairs of doors.
 - 3) Do not leave pre-punched silencer holes unfilled or uncovered.
2. Silencers are specified in Section 08 7100.

D. Plaster Guards:

3. Provide 0.016 inch thick, steel sheet plaster guards or mortar boxes to close off interior of openings
4. Place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.

B. Supports and Anchors:

1. Fabricated from not less than 0.042 inch thick, electrolytic zinc-coated or metallic-coated steel sheet.

2.05 SOURCE QUALITY CONTROL

- A. Provide hollow metal doors and frames as products of single manufacturer.

2.02 FABRICATION

A. General:

1. Fabricate steel door and frame units to comply with ANSI/SDI A250.8 to be rigid, neat in appearance, and free from defects including warp and buckle.
2. Where practical, fit and assemble units in manufacturer's plant.

HOLLOW METAL DOORS AND FRAMES

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SPECIFICATIONS

3. Clearly identify work that cannot be permanently factory assembled before shipment, to ensure proper assembly at Project Site.
- B. Exterior Door Construction:
 1. Fabricate doors and frames from metallic coated steel sheet for exterior locations and elsewhere as indicated,.
 2. Close top and bottom edges of doors flush as integral part of door construction by addition of 0.053 inch thick, metallic coated steel channels with channel webs placed even with top and bottom edges.
- C. Dutch Door Construction:
 1. Fabricate doors of same materials as specified for exterior door construction.
 2. Fabricate shelf as detailed from same 16 gage material.
 3. Fabricate two 16 gage sheet steel brackets for mounting of shelf.
 - a. Locate mounting brackets to provide adequate clearance at lever handle locket to comply with accessibility requirements and to clear shelf bevel..
 - b. Shop weld bracket to shelf.
 4. Provide 1/8 inch steel astragal.
 - a. Shop weld astragal to exterior face of top door leaf.
- D. Interior Door Faces:
 1. Fabricate exposed faces of doors, including stiles and rails of nonflush units, from following material:
 - a. Cold -rolled steel sheet.
- E. Core Construction:

[Standard core, unless noted otherwise]

 1. Standard Laminated Honeycomb Core:
 - a. One inch cell, 99 pound, Kraft honeycomb core.
 - b. Reinforced, stiffened, sound deadened, and insulated.
 - c. Impregnated with phenol formaldehyde free phenolic resin.
 - 1) Completely fill inside of doors and laminate to inside faces of both panels using contact adhesive applied to both panels and honeycomb core.
 - 2) Sand honeycomb surfaces for maximum adhesion.
 - d. Provide STC ratings where indicated on Drawings, scheduled, or for partition ratings indicated on Drawings.
 - 1) Provide doors having minimum sound transmission classification (STC) of 28 as tested under ASTM E 90 and ASTM E 413, unless noted otherwise.
 - e. Provide exterior doors meeting or exceeding required thermal rating indicated, scheduled, or for wall rating.

[Optional core]

 2. Vertical Steel Stiffeners:
 - a. Stiffen door face sheets with continuous vertical-formed steel (rib) sections.
 - 1) Minimum 20 gage.
 - 2) Full thickness of interior space between door faces.
 - 3) Space 6 inches on center maximum.
 - 4) Spot weld to both faces at 4 inches on center maximum.
 - b. Core Insulation:
 - 1) Provide sound deadening and insulating material through entire core of door.

SPECIFICATIONS

- a) Full height, width, and thickness of door.
 - 2) Provide STC ratings where indicated on Drawings, scheduled, or for partition ratings indicated on Drawings.
 - 3) Provide doors having minimum sound transmission classification of 28 as tested under ASTM E 90 and ASTM E 413, unless noted otherwise.
 - 4) Provide exterior doors meeting or exceeding required thermal rating indicated, scheduled, or for wall rating.
- F. Clearances for Non-Fire Rated Doors:
- 1. Not more than 1/8 inch at jambs and heads, and not more than 1/8 inch between pairs of doors.
 - 2. Not more than 3/4 inch from bottom of door to top of concrete slab.
- G. Clearances for Fire-Rated Doors:
- 1. As required by NFPA 80.
- H. Single-Acting, Door Edge Profile:
- 1. Beveled edge.
- I. Tolerances:
- 1. Comply with SDI 117 – Manufacturing Tolerances for Standard Steel Doors and Frames.
- J. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold or hot rolled steel sheet.
- K. Hardware Preparation:
- 1. Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier.
 - 2. Comply with applicable requirements in ANSI A250.6 and ANSI A 115 specifications for door and frame preparation for hardware.
- L. Frame Construction:
- 1. Fabricate frames to profiles shown with mitered or coped, continuously welded corners and seamless face joints
 - 2. For Exterior Applications:
 - a. Fabricate frames from metallic coated steel sheet, with mitered or coped, continuously welded corners and seamless face joints.
 - b. Provide continuously welded 12 gage closure plate of bottom of exterior frames.
 - 3. Provide welded frames with temporary spreader bars.
 - a. Do not remove until frames are installed, unless otherwise directed.
 - 4. Sound Deadener:
 - a. Apply sound deadener to concealed surfaces of frames in accordance with manufacturer's instructions.
 - b. Produce effective sound deadening for each application.
- M. Supports and Anchors:
- 1. Fabricate from minimum 16 gage, galvanized steel sheet.
 - 2. Refer to details indicated on Drawings.
 - a. Floor Anchors:

SPECIFICATIONS

- 1) Minimum Thickness:
 - a) 12 gage galvanized steel sheet or bent steel plate:
- 2) Fastened to each jamb with No. 10 x 3/8 inch adjustment screw.
- 3) Provide two holes in anchor at each jamb for 3/8 inch floor anchorage fasteners.
- 4) Provide adjustable floor anchors, allowing for minimum 2-1/8 inch height adjustment.
 - a) Where required at sloping and uneven floor conditions, or to coordinate adjustments for trim alignments,
3. Jamb Anchors – General:
 - a. Locate anchors near top and bottom and at intermediate points not to exceed 24 inches on center.
4. Anchors in Metal Stud Partitions:
 - a. Provide steel anchors, 16-gage minimum sheet steel, of design to suit partition construction, securely welded inside each jamb.
5. Through-Frame Anchors:
 - a. At frames indicated to be anchored with bolts through frame, provide countersunk holes for bolts with 16 gage minimum sheet steel stiffeners full thickness of frame, and securely welded inside each frame at each hole.
- N. Inserts, Bolts, and Fasteners:
 1. Manufacturer's standard units,
 - a. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153, Class C or D as applicable.
- O. Head Reinforcing:
 1. Reinforce internally with full length, 10 gage angles on each side of frame and bar at bottom of stop for closer reinforcement in frames.
 2. Do not allow reinforcing to act as lintel or load-carrying member.
 3. Provide at frames regardless of whether or not closer is specified.
- P. Hardware Reinforcement and Accessories:
 1. Reinforce doors and frames to receive surface applied hardware.
 - a. Drilling and tapping for surface applied hardware may be done at Project Site.
 - b. Butt Hinge:
 - 1) Minimum 7 gage, 4 inches longer than height of hinge.
 - c. Continuous Hinge:
 - 1) Minimum 14 gage continuous strip reinforcing.
 - d. Door Closers:
 - 1) Minimum 14 gage channel, 6 inches high on each side of door.
 - 2) Extend reinforcement full width of door.
 - e. Accomplish Reinforcing for other items of finish hardware according to ANSI A250.6
 2. Locate hardware as indicated on Shop Drawings
 - a. Where not indicated, locate according to ANSI/SDI A250.8, except where modified by requirements of CBC, Section 1008.1.9.2.
- Q. Glazing Stops:
 1. Manufacturer's standard applied stops with mitered corners, formed from 0.032 inch thick steel sheet.

SPECIFICATIONS

2. Provide non removable stops in one-piece lengths on outside of exterior doors and on secure side of interior doors for glass and louvers in doors.
3. Provide screw-applied, removable, glazing stops on inside of glass panels in doors.
 - a. Secure within 3 inches of each end and at 12 inches on center with oval head countersunk tamper resistant screws

2.03 FINISHES

- A. Shop Prime Finish:
 1. Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.
 2. Coordinate with Paint Systems in Section 09 9100 to ensure compatibility with field applied finish coats.

PART 3 EXECUTION

3.01 INSTALLATION – GENERAL

- A. Install standard steel doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as specified.

3.02 FRAME INSTALLATION

- A. Comply with provisions of SDI-105 – Recommended Erection Instructions for hollow metal frames, unless otherwise indicated.
 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set.
 2. Anchor frames in wood frame partitions with manufacturer recommended anchors.
 3. Upon completion of wall construction, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - a. Except for frames located at in-place concrete installations, place frames prior to construction of enclosing walls and ceilings.
 4. In existing concrete construction, anchor frames with galvanized anchor bolts 3/8 inch diameter, counter-sunk at 24 inches on center.
 - a. Provide at least three completed opening anchors per jamb.
 - b. Install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb.
 - c. Set frames and secure to adjacent construction with bolts
 5. Install fire-rated frames in accordance with UL Listings and according to NFPA 80.

3.03 DOOR INSTALLATION

- A. Install hollow metal doors complying with ANSI/SDI A2S0.B and in accordance with manufacturer's installation instructions.
 1. Coordinate with Work of other trades.
- B. Fit hollow metal doors accurately in frames, within clearances specified in ANSI/SDI A2S0.8.
 1. Fire Rated Doors:

SPECIFICATIONS

- a. Install to ensure that door and jamb clearances comply with UL Listings, with clearances specified in NFPA 80.
- 2. Shim as necessary to comply with SDI-122 and ANSI/DHI A 115.1G.
- C. Adjust operable parts for correct function.
- D. Remove hardware, except prime coated items, tag, box, and install after finish painting has been completed.
- E. Dutch Door Installation:
 - 1. Comply with general door installation requirements and following:
 - a. Install shelf on bottom door leaf.
 - 1) Fasten shelf brackets to door as detailed on Drawings with No. 10 x 3/4 inch pan head self-tapping screws.
 - a) Pre-drill door for self-tapping screws.

3.04 PRIME COAT TOUCH-UP

- A. Prime Coat Touch-Up:
 - 1. Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air drying primer.

3.05 REPAIR, ADJUST, AND CLEAN

- A. Repairs:
 - 1. Fill surface depressions, including countersunk fasteners, with metallic paste filler
 - 2. Allow to thoroughly cure, sand flush, and smooth for invisible appearance with adjacent metal surfaces.
- B. Protection Removal:
 - 1. Immediately before final inspection, remove protective wrappings from doors and frames.
- C. Final Adjustment:
 - 1. Check and readjust operating finish hardware items, leaving hollow metal doors and frames undamaged and in complete and proper operating condition.
- D. Remove and legally dispose of rubbish, debris and waste materials off Project Site.

3.06 PROTECTION

- A. Protect Work until Substantial Completion.

END OF SECTION 08 11 13

SPECIFICATIONS

SECTION 08 12 13

HOLLOW METAL FRAMES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Hollow metal frames where indicated and scheduled.
 - a. For use with wood doors.
- B. Related Sections:
 - 1. Section 07 92 00: Joint Sealants
 - 2. Section 08 14 00: Wood Doors
 - 3. Section 08 71 00: Door Hardware
 - 4. Section 09 91 00: Painting; field painting of hollow metal door frames.

1.02 REFERENCES

- A. California Code of Regulations (CCR), Title 24, Part 2, California Building Code (CBC), Volumes 1 and 2, current edition
- B. American National Standards Institute (ANSI)/ Steel Door Institute (SDI):
 - 1. ANSI/SDI A250.4 – Test Procedure and Acceptance Criteria for – Physical Endurance for Steel Doors, Frames, and Frame Anchors
 - 2. ANSI/SDI A250.6 – Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames
 - 3. ANSI/SDI A250.8 – Specifications for Standard Steel Doors and Frames (SDI-100)
 - 4. ANSI A250.10 – Test Procedure and Acceptance Criteria for Prime Painted Steel Doors and Frames.
 - 5. ANSI/SDI A250.11 – Recommended Erection Instructions for Steel Frames.
 - 6. SDI 117 – Manufacturing Tolerances for Standard Steel Doors and Frames.
- C. ASTM International (ASTM):
 - 1. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - 2. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - 3. ASTM A1008 – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
 - 4. ASTM A1011 – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

SPECIFICATIONS

1.03 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Door and frame assemblies, including reinforcing and provisions for hardware as shown and specified.
 - 2. Drawings indicate profile and general details of steel frame fabrication and installation.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's data for each type of door frame indicated.
 - a. Including, but not necessarily limited to following:
 - 1) Door opening designation
 - 2) Material description
 - 3) Construction details
 - 4) Finishes.
- B. Shop Drawings:
 - 1. Showing fabrication and installation of steel doors and frames.
 - a. Including, but not limited to following:
 - 1) Details of each frame type
 - 2) Conditions at openings
 - 3) Details of construction
 - 4) Location and installation requirements of finish hardware and reinforcements.
 - 5) Details of joints and connections.
 - 2. Show anchorage and accessory items.
- C. Samples:
 - 1. Hollow Metal Frame:
 - a. Corner section of typical exterior and interior frame, of sufficient composite size to illustrate following:
 - 1) Corner joint construction.
 - 2) Hinge reinforcement.
 - 3) Closer reinforcement.
 - 4) Floor anchor, dust cover, and jamb anchors showing galvanizing and prime coat finishes.
- D. Certification:
 - 1. Certification of compliance with referenced standards and specified criteria, including but not necessarily limited to:
 - a. Physical Endurance in accordance with ANSI A250.4
 - b. Prime Paint performance in accordance with ANSI A250.10, and as specified.
- E. Door Schedule:
 - 1. Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

SPECIFICATIONS

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Minimum documented experience of more than five years providing hollow metal frames for similar size projects..
- B. Coordinate with hardware supplier for fabrication of doors and frames to receive hardware items.
- C. Quality Standards:
 - 1. Provide steel doors and frames complying with referenced standards as follows:
 - a. ANSI/SDI A250.4
 - b. ANSI/SDI A250.8
 - c. ANSI A250.10

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver frames cartoned or crated to provide protection during transit and Project storage.
- B. Inspect frames upon delivery for damage and notify shipper and supplier should damage be found.
 - 1. Minor damages may be repaired provided refinished items are equal with respect to new work and acceptable to Architect.
 - 2. Remove and replace damaged items that cannot be repaired as directed.
- C. Store frames at Project Site under cover.
 - 1. Place units on minimum 4 inch high wood blocking.
 - 2. Avoid using non-vented plastic or canvas shelters that could create humidity chamber.
 - 3. Should packaging become wet, remove cartons immediately.

1.07 WARRANTY

- A. Furnish manufacturer's 1 year material and workmanship warranty.
- B. Furnish installer's 2 year labor warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, provide products by one of following, or approved equal:
 - 1. ASSA ABLOY Door Security Solutions.
 - 2. Door Components, Inc.
 - 3. Steelcraft; division of Allegion
- B. Materials, Fabrication, and Installation:
 - 1. Comply with requirements of standards referenced in "Quality Assurance" Article.

SPECIFICATIONS

2.02 MATERIALS

- A. General:
 - 1. Steel thicknesses meeting minimum requirements of ASTM standards and as described in ANSI/SDI A250.8.
- B. Hot Rolled Steel Sheets:
 - 1. ASTM A 1011, Commercial Steel (CS), Type B.
 - a. Free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic Coated Steel Sheets:
 - 1. ASTM A 653, Commercial Steel (CS), Type B.
 - a. A40 zinc-iron-alloy (galvannealed) coating
 - b. Stretcher-leveled standard of flatness.
- D. Cold Rolled Steel Sheets:
 - 1. ASTM A 1008, Commercial Steel (CS)
 - a. Suitable for exposed applications, Type B.
 - b. Stretcher-leveled standard of flatness.
- E. Supports and Anchors:
 - 1. Fabricate from minimum 16 gage sheet steel unless noted otherwise.
 - 2. After fabricating, galvanize units to be built into exterior walls according to ASTM A 153, Class B.
- F. Inserts, Bolts, and Fasteners:
 - 1. Provide as shown on Drawings and to suit conditions of secure installations.
 - 2. Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153.
 - 3. Furnish Type 304 stainless steel fasteners at exterior doors.
- G. Sound Deadener:
 - 1. Spray-on type, non-combustible and non-bleeding INC DC-10 Noise Dampening Compound by Industrial Noise Control, Inc., or approved equal

2.03 FRAMES

- A. General:
 - 1. Provide fully welded steel frames for doors that comply with ANSI/SDI A250.8 and with details indicated for type and profile.
 - 2. Conceal fastenings, unless otherwise indicated.
- B. Frames of 0.067 inch (14 gage) thick steel sheet for:
 - 1. Wood doors
- C. Door Silencers:
 - 1. Fabricate stops to receive three silencers on strike jambs on single door frames and two silencers on heads of double door frames.
- D. Plaster Guards:
 - 1. Provide 0.016 inch thick, steel sheet plaster guards or mortar boxes to close off interior of openings

SPECIFICATIONS

2. Place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.
- E. Supports and Anchors:
1. Fabricated from not less than 0.042 inch thick, electrolytic zinc-coated or metallic-coated steel sheet.

2.04 FABRICATION

- A. General:
1. Fabricate steel frame units to comply with ANSI/SDI A250.8 to be rigid, neat in appearance, and free from defects including warp and buckle.
 2. Where practical, fit and assemble units in manufacturer's plant.
 3. Clearly identify work that cannot be permanently factory assembled before shipment, to ensure proper assembly at Project Site.
- B. Tolerances:
1. Comply with SDI 117 – Manufacturing Tolerances for Standard Steel Doors and Frames.
- C. Hardware Preparation:
1. Prepare frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier.
 2. Comply with applicable requirements in ANSI A250.6 and ANSI A 115 specifications for frame preparation for hardware.
 3. Coordinate hardware locations with wood door manufacturer.
- D. Frame Construction:
1. Fabricate frames to profiles shown with mitered or coped, continuously welded corners and seamless face joints
 2. For exterior applications, fabricate frames from metallic coated steel sheet, with mitered or coped, continuously welded corners and seamless face joints.
 - a. Provide continuously welded 12 gage closure plate of bottom of exterior frames.
 3. Provide welded frames with temporary spreader bars.
 - a. Do not remove until frames are installed, unless otherwise directed.
 4. Sound Deadener:
 - a. Apply sound deadener to concealed surfaces of frames in accordance with manufacturer's instructions.
 - b. Produce effective sound deadening for each application.
- E. Supports and Anchors:
1. Fabricate from minimum 16 gage, galvanized steel sheet.
 2. Refer to details indicated on Drawings.
 - a. Floor Anchors: Minimum thickness:
 - 1) 12 gage galvanized steel sheet or bent steel plate, securely fastened inside each jamb, with two holes in anchor at each jamb for 3/8 inch floor anchorage fasteners.
 - b. For preframed wood stud walls provide an additional wood stud anchor located as close to bottom of jamb as practical.

SPECIFICATIONS

- c. Where required at sloping and uneven floor conditions, or to coordinate adjustments for trim alignments, provide adjustable floor anchors, providing at least 2 inch height adjustment.
 - 3. Jamb Anchors – General:
 - a. Locate anchors near top and bottom and at intermediate points not to exceed 24 inches on center.
 - b. Provide 2 anchors per head for openings up to 48 inches wide.
 - c. Openings over 48 inches wide provide anchors at 24 inches on center maximum.
 - 4. Anchors in Wood Stud Partitions:
 - a. Provide steel anchors, 16 gage minimum sheet steel, of design to suit partition construction, securely welded inside each jamb.
- F. Inserts, Bolts, and Fasteners:
- 1. Manufacturer's standard units,
 - a. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153, Class C or D as applicable.
- G. Head Reinforcing:
- 1. Reinforce internally with full length, 10 gage angles on each side of frame and bar at bottom of stop for closer reinforcement in frames.
 - 2. Do not allow reinforcing to act as lintel or load-carrying member.
- H. Provide at frames regardless of whether or not closer is specified.
- H. Hardware Reinforcement and Accessories:
- 1. Reinforce doors and frames to receive surface applied hardware.
 - a. Drilling and tapping for surface applied hardware may be done at Project Site.
 - b. Butt Hinge:
 - 1) Minimum 7 gage, 4 inches longer than height of hinge.
 - c. Continuous Hinge:
 - 1) Minimum 14 gage continuous strip reinforcing.
 - d. Door Closers:
 - 1) Minimum 14 gage channel, 6 inches high on each side of door.
 - 2) Extend reinforcement full width of door.
 - e. Accomplish Reinforcing for other items of finish hardware according to ANSI A250.6
 - 2. Locate hardware as indicated on Shop Drawings
 - 3. Where not indicated, locate according to ANSI/SDI A250.8, except where modified by requirements of CBC, Section 1008.1.9.2.

2.05 FINISHES

- A. Shop Prime Finish:
- 1. Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.
 - 2. Coordinate with Paint Systems in Section 09 91 00 to ensure compatibility with field applied finish coats.

SPECIFICATIONS

PART 3 EXECUTION

3.01 INSTALLATION – GENERAL

- A. Install standard steel frames, and accessories in accordance with final shop drawings, manufacturer's data, and as specified.

3.02 FRAME INSTALLATION

- A. Comply with provisions of SDI-105 – Recommended Erection Instructions for hollow metal frames, unless otherwise indicated.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set.
 - 2. Anchor frames in wood frame partitions with manufacturer recommended anchors.
 - 3. Upon completion of wall construction, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - a. Except for frames located at in-place concrete installations, place frames prior to construction of enclosing walls and ceilings.
 - 4. In existing concrete construction, anchor frames with galvanized anchor bolts 3/8 inch diameter, counter-sunk at 24 inches on center.
 - a. Provide at least three completed opening anchors per jamb.
 - b. Install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb.
 - c. Set frames and secure to adjacent construction with bolt

3.03 PRIME COAT TOUCH-UP

- A. Prime Coat Touch-Up:
 - 1. Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air drying primer.

3.04 REPAIR, ADJUST, AND CLEAN

- A. Repairs:
 - 1. Fill surface depressions, including countersunk fasteners, with metallic paste filler
 - 2. Allow to thoroughly cure, sand flush, and smooth for invisible appearance with adjacent metal surfaces.
- B. Protection Removal:
 - 1. Immediately before final inspection, remove protective wrappings from doors and frames.
- C. Final Adjustment:
 - 1. Check and readjust operating finish hardware items, leaving hollow metal doors and frames undamaged and in complete and proper operating condition.
- D. Remove and legally dispose of rubbish, debris and waste materials off Project Site.
 - 1. Comply with requirements of Section 01 74 19

SPECIFICATIONS

3.05 PROTECTION

- A. Protect Work until Substantial Completion.

END OF SECTION 08 12 13

SPECIFICATIONS

SECTION 08 14 00

WOOD DOORS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Solid Core Flush Wood Doors.
 - a. Including following:
 - 1) Vision lights with tempered glass and flush wood stops.
 - 2) Door Louvers:
 - a) Wood sightproof inverted chevron (V-Slat) with flush wood moulding.
 - b) Fusible-Link louvers in fire-rated doors.
 - 2. Where indicated and as scheduled.
- B. Related Sections:
 - 1. Section 08 11 13: Hollow Metal Doors and Frames; hollow metal frames for wood doors.
 - 2. Section 08 71 00: Door Hardware
 - 3. Section 09 91 00: Painting; field finishing of wood doors.

1.02 REFERENCES

- A. California Code of Regulations (CCR), Title 24, Part 2, California Building Code (CBC), Volumes 1 and 2, current edition.
 - 1. Chapter 11B – Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing.
- B. American National Standards Institute (ANSI)/Window and Door Manufacturers Association (WDMA):
 - 1. ANSI/WDMA I.S. 1A – Architectural Wood Flush Doors
- C. ASTM International (ASTM):
 - 1. ASTM D 5456 – Standard Specification for Evaluation of Structural Composite Lumber Products
- D. Woodwork Institute (WI):
 - 1. North American Architectural Woodwork Standards (NAAWS) 4.0
 - a. Section 9 – Doors
- E. South Coast Air Quality Management District (SCAQMD):
 - 1. Rule 1113 – Architectural Coatings
 - 2. Rule 1168 – Adhesive and Sealant Applications
- F. Door and Hardware Institute (DHI):
 - 1. DHI-WDHS Recommended Standards for Flush Wood Doors

1.03 SYSTEM DESCRIPTION

WOOD DOORS

08 14 00 - 1

CITY OF LA PUENTE ACTIVITY CENTER

SPECIFICATIONS

- A. Design Requirements:
 - 1. Drawings indicate sizes, locations and general details of wood door construction and installation.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's product data, specifications and installation instructions for each type of wood door required, including details of core and edge construction, trim for louvers and similar components.
- B. Shop Drawings:
 - 1. Schedules and plans, indicating location and size of each door.
 - 2. Elevations and details of each kind of door, indicating door construction details,
 - a. Include opening identification symbols, sizes, door type and grade fire ratings, swing, louver cutout size and locations, undercuts, and other pertinent data.
 - 3. Show location and extent of hardware blocking.
 - a. Provide blocking as required to eliminate need for through-bolting of surface applied hardware.
 - 4. Use same door numbering system as Drawing door schedules.
 - 5. Indicate name of door manufacturer on shop drawing.
- C. Samples:
 - 1. Construction Samples:
 - a. Minimum of 4 samples of not less than 6 inches by 6 inches for each type of door to be furnished, showing face, edge and core construction.
 - 2. Wood Louvers:
 - a. Minimum of four 12 inch x 12 inch louvers in wood frame, unfinished.
 - 3. Metal Louvers:
 - a. Minimum of four 6 inch long sections of louver blade and frame for each material and finish required.
- D. Certificates:
 - 1. Certificate that solid core wood doors comply with requirements of WDMA I.S. 1A and NAAWS Section 9.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect wood doors during transit, storage, and handling to prevent damage, soiling and deterioration.
 - 1. Package doors at factory prior to shipping using manufacturer's standard method.
- B. Deliver materials in manufacturers original, unopened, undamaged containers with identification labels intact.
 - 1. Include name of manufacturer stamped or marked on packaging.
- C. Deliver doors to Project Site only after building has been provided with design temperature and humidity.
- D. Store and handle in accordance with ANSI/WDMA I.S.1A.

SPECIFICATIONS

1. Store doors protected from exposure to harmful conditions and at temperature and humidity conditions recommended by manufacturer.

1.06 PROJECT CONDITIONS

- A. Do not install doors until building is enclosed and ambient conditions are within temperature and humidity range recommended by door manufacturer.

1.07 WARRANTY

- A. Door Manufacturer's Warranty:
 1. Written agreement on door manufacturer's standard form signed by manufacturer, installer and Contractor, agreeing to repair or replace defective doors which have warped (bow, cup or twist) or which show telegraphing of core construction in face veneers, or do not conform to tolerance limitations of NAAWS.
 2. Furnish Warranty in effect for following period of time after date of Substantial Completion:
 - a. Solid Core Flush Interior Doors:
 - 1) Life of original installation
- B. Installer Warranty:
 1. Furnish labor warranty for wood doors.
 - a. Warranty Period: 2 years from date of Substantial Completion.
- C. Responsibility for replacement or refinishing of doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty rests with Contractor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, provide products of one of following, or approved equal:
 1. Eggers Industries – Two Rivers, WI
 2. Forte Opening Solutions, Marshfield, WI
 3. Haley Bros., Inc. – Buena Park, CA
 4. Lynden Door – Lynden, WA
 5. Oregon Door – Winston, OR
 6. V.T. Industries, Inc. – Holstein, IA

2.02 VENEER-FACED DOORS FOR TRANSPARANT FINISH

- A. Interior Solid-Core Doors::
 1. Grade: Premium, with Grade A faces.
 2. Species: Red Oak.
 3. Cut: Rift cut.
 4. Match between Veneer Leaves: Book match
 5. Assembly of Veneer Leaves on Door Faces: Running match
 6. Pair and Set Match: Provide for doors hung in the same opening.

SPECIFICATIONS

7. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
8. Transom Match: Continuous match.
9. Exposed Vertical and Top Edges: Same species as faces or a compatible species – edge Type A
10. Core: Structural composite lumber.
11. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.
12. Adhesives: Type II per WDMA T.M.-6

2.03 SOURCE QUALITY CONTROL

- A. Obtain doors from single manufacturer to ensure uniformity in quality of appearance and construction, fabricated to dimensions specified.

2.04 FABRICATION – GENERAL

- A. Factory machine doors for hardware that is not surface applied.
 1. Locate hardware to comply with DHI-WDHS-3.
 - a. Comply with requirements of CBC Chapter 11B for locations of hardware required to be accessible.
 2. Comply with following:
 - a. Final hardware schedules.
 - b. Door frame shop drawings,
 - c. DHI Standards.
 - d. Hardware templates.
 3. Coordinate locations of hardware preparation in hollow metal frames to verify dimensions and alignment prior factory machining of wood doors.
- B. Openings:
 1. Cut and trim openings through doors to comply with applicable requirements of referenced standards for kinds of doors required.
 2. Vision Light Openings:
 - a. Trim openings with moldings of material and profile indicated.
 3. Louvers:
 - a. Factory install louvers in prepared openings.
- C. Raceways:
 1. Install UL Listed conduit in door construction to provide raceway for electric locks.
 2. Coordinate with Door Hardware for doors required to have raceway.
 3. Run raceway from electric hinge or EPT location to electric lock.
 4. Conform to UL requirements where installed in fire rated doors to maintain label.

2.05 FINISHING

- A. Transparent Finish:
 1. Manufacturer's standard factory-applied finish with performance requirements comparable to NAAWS System 12-Polyurethane, Water-Based per Section 05.
 - a. Conforming to following for open grain wood:

SPECIFICATIONS

- b. Premium Grade,
 - 1) Stain Coat:
 - a) Waterborne Wiping Stain (Color as scheduled)
 - 2) Apply 3 coat finish system producing following appearance characteristics:
 - a) Effect: Closed-grain finish.
 - b) Sheen: Satin.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install Work as specified in Woodwork Institute NAAWS.
 - 1. Provide Woodwork Institute Certified Compliance Certificate for Installation at Substantial Completion.
- B. Provide each door accurately cut, trimmed, and fitted to its frame and hardware.
 - 1. Clearance at Stiles and Top: 1/8 inch.
 - 2. Undercut:
 - a. Top of Slab to Bottom of Door: 3/4 inch, except where otherwise indicated.
 - 3. Arises:
 - a. Rounded to 1/16 inch radius
 - 4. Lock Rail Edges:
 - a. Slightly beveled.
 - 5. Screws for Hardware:
 - a. Screws are to be screwed, not driven, into pre-drilled holes.
- C. Ensure that doors operate freely, but not loosely, without sticking or binding, without hinge-bind conditions and with hardware properly adjusted and functioning.

3.02 CLEANING

- A. Remove and legally dispose of rubbish, waste and debris off Project Site.
 - 1. Comply with requirements of Section 01 7419.

3.03 PROTECTION

- A. Protect Work until Substantial Completion.

END OF SECTION 08 14 00

SPECIFICATIONS

SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Access doors and frames for walls and ceilings.
 - 2. Fire-rated access doors and frames for walls and ceilings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Detail fabrication and installation of access doors and frames for each type of substrate.
- C. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.
- D. Submit Keys at Contract Closeout per Section 01 77 00 "Closeout Procedures."

1.4 COORDINATION

- A. Verification: Confirm specific locations and sizes for access doors needed to gain access to concealed equipment.

SPECIFICATIONS

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
 - 2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Elmdor / Stoneman Manufacturing Company.
 - 2. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - 3. Nystrom, Inc.
 - 4. Or Equal.
- B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- C. Interior Flush Access Doors with Exposed Flanges:
 - 1. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
 - 2. Locations: Wall and ceiling.
 - 3. Door Size: If not indicated on Drawings, then as selected by Architect in submittals.
 - 4. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage.
 - a. Finish: Factory prime.
 - 5. Frame Material: Same material, thickness, and finish as door.
 - 6. Hinges: Continuous Type.
 - 7. Hardware: Lock.
- D. Exterior Flush Access Doors:
 - 1. Assembly Description: Fabricate door to be weatherproof and fit flush to frame. Provide manufacturer's standard 2-inch-thick fiberglass insulation and extruded door gaskets. Provide manufacturer's standard-width frame for surface mounting, proportional to door size.
 - 2. Locations: Wall or soffit.
 - 3. Door Size: If not indicated on Drawings, then as selected by Architect in

SPECIFICATIONS

- submittals.
- 4. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage.
 - a. Finish: Factory prime.
- 5. Frame Material: Same material, thickness, and finish as door.
- 6. Hinges: Continuous Type.
- 7. Hardware: Lock.
- E. Fire-Rated, Flush Access Doors with Exposed Flanges
 - 1. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
 - 2. Locations: Fire-rated walls.
 - 3. Fire-Resistance Rating: Not less than that of adjacent construction (wall or ceiling being pierced).
 - 4. Temperature-Rise Rating: 450 deg F at the end of 30 minutes.
 - 5. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch, 20 gage.
 - a. Finish: Factory prime.
 - 6. Frame Material: Same material, thickness, and finish as door.
 - 7. Hinges: Continuous Type.
 - 8. Hardware: Lock.
- F. Hardware:
 - 1. Latch: Cam latch operated by pinned-hex-head wrench.
 - 2. Lock: Cylinder lock conforming to District Standards. Furnish two keys per lock and key all locks alike. All access doors to have locks.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating. All exterior doors & frames to be metallic-coated steel.
- D. Frame Anchors: Same type as door face.
- E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

SPECIFICATIONS

2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
 - 2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
 - 3. Provide mounting holes in frames for attachment of units to metal framing.
 - 4. Provide mounting holes in frame for attachment of masonry anchors.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
 - 1. For recessed doors with plaster infill, provide self-furring expanded metal lath attached to door panel.
- E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - 1. For cylinder locks, furnish two keys per lock and key all locks alike.
 - 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

2.5 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Steel and Metallic-Coated-Steel Finishes:
 - 1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-

SPECIFICATIONS

- free, universal primer immediately after surface preparation and pretreatment.
- 2. Apply compatible finish coats per Division 09 Painting Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 31 13

SPECIFICATIONS

SECTION 08 71 00 DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Mechanical door hardware for:
 - a. Swinging doors.
- B. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:
 - 1. Windows
 - 2. Cabinets (casework), including locks in cabinets.
 - 3. Signage
 - 4. Toilet accessories
 - 5. Overhead doors
 - 6. Installation.
 - 7. Rough hardware.
 - 8. Conduit, junction boxes & wiring.
 - 9. Folding partitions, except cylinders where detailed.
 - 10. Sliding aluminum doors, except cylinders where detailed.
 - 11. Access doors and panels, except cylinders where detailed.
- C. Related Sections:
 - 1. Division 01 Section "Alternates" for alternates affecting this section.
 - 2. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
 - 3. Division 09 sections for touchup finishing or refinishing of existing openings modified by this section.
 - 4. Division 13 Section "Radiation Protection" for requirements for lead-lining for door hardware at openings indicated to receive radiation protection. Division 26 sections for connections to electrical power system and for low-voltage wiring.
 - 5. Division 28 sections for coordination with other components of electronic access control system.

1.3 REFERENCES

- A. UL - Underwriters Laboratories
 - 1. UL 10B - Fire Test of Door Assemblies
 - 2. UL 10C - Positive Pressure Test of Fire Door Assemblies
 - 3. UL 1784 - Air Leakage Tests of Door Assemblies
 - 4. UL 305 - Panic Hardware

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- B. ANSI - American National Standards Institute
 - 1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
- C. California Code of Regulations
 - 1. Title 24: California Building Standards Code

1.4 SUBMITTALS

- A. General:
 - 1. Submit in accordance with Conditions of Contract and Division 01 requirements.
- B. Action Submittals:
 - 1. Product Data: Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 - 2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
 - 3. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier in like-new condition. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
 - 4. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:
 - a. Door Index; include door number, heading number, and Architects hardware set number.
 - b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
 - c. Type, style, function, size, and finish of each hardware item.
 - d. Name and manufacturer of each item.
 - e. Fastenings and other pertinent information.
 - f. Location of each hardware set cross-referenced to indications on Drawings.
 - g. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - h. Mounting locations for hardware.
 - i. Door and frame sizes and materials.
 - j. Name and phone number for local manufacturer's representative for each product.
 - k. Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components). Operational description should include how door will operate on egress, ingress, and fire and smoke alarm connection.

SPECIFICATIONS

- 1) Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work that is critical in Project construction schedule.
5. Key Schedule:
 - a. Initiate and conduct meeting(s) with Owner representatives and hardware supplier to determine system keyway(s), keybow styles, structure, stamping, degree of physical security and degree of geographic exclusivity. Furnish Owner's written approval of the system; do not order keys or cylinders without written confirmation of actual requirements from the Owner.
 - b. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used, and door numbers controlled.
 - c. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - d. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - e. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - f. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
 - 1) Forward bitting list, key cuts, and key system schematic directly to Owner, by means as directed by Owner.
6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory prepared for door hardware installation.
- C. Informational Submittals:
 1. Qualification Data: For Supplier and Installer.
 2. Product Certificates for electrified door hardware, signed by manufacturer:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 3. Certificates of Compliance:
 - a. Electrified Hardware Coordination Conference Certification: Letter of compliance, signed by Contractor, attesting to completion of electrified hardware coordination conference, specified in "QUALITY ASSURANCE" article, herein.
 4. Warranty: Special warranty specified in this Section.
- D. Closeout Submittals:
 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Name, address, and phone number of local representative for each manufacturer.
 - d. Final approved hardware schedule, edited to reflect conditions as installed.
 - e. Final keying schedule
 - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

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- g. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.5 QUALITY ASSURANCE

- A. Product Substitutions: Comply with product requirements stated in Division 01 and as specified herein.
 - 1. Where specific manufacturer's product is named and accompanied by "Owner Standard," including make or model number or other designation, provide product specified. (Note: Certain products have been selected for their unique characteristics and particular project suitability.)
 - a. Where no additional products or manufacturers are listed in product category, requirements for "Owner Standard" govern product selection.
 - 2. Where products indicate "acceptable manufacturers" or "acceptable manufacturers and products", provide product from specified manufacturers, subject to compliance with specified requirements and "Single Source Responsibility" requirements stated herein.
- B. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project.
 - 1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 - 2. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- C. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.
- D. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
 - 1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.
- E. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
- F. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
- G. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
- H. Means of Egress Doors: Latches do not require more than 5 lbs. (67 N) to release latch. Locks do not require use of key, tool, or special knowledge for operation.
- I. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in "REFERENCES" article, herein.
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of wrist and that operate with force of not more than 5 lbs. (22.2 N).
 - 2. Maximum opening-force requirements:

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- a. Interior, Non-Fire-Rated Hinged Doors: 5 lbs. (22.2 N) applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbs. (22.2 N) applied parallel to door at latch.
 - c. Fire Doors: The minimum opening force allowable by the appropriate administrative authority, not to exceed 15 lbs. (66.7N).
3. Bevel raised thresholds with slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
4. Adjust closer so that the time required to move the door from the 90-degree position to 12 degrees from the latch is 5 seconds minimum.
- J. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01.
 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 2. Inspect and discuss preparatory work performed by other trades.
 3. Inspect and discuss electrical roughing-in for electrified door hardware.
 4. Review sequence of operation for each type of electrified door hardware.
 5. Review required testing, inspecting, and certifying procedures.
- K. Coordination Conferences:
 1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
 - a. Attendees: Door hardware supplier, door hardware installer, Contractor.
 - b. After meeting, provide letter of compliance to Architect, indicating when meeting was held and who was in attendance.
 2. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.
 - a. Attendees: electrified door hardware supplier, doors and frames supplier, electrified door hardware installer, electrical subcontractor, Owner, Owner's security consultant, Architect and Contractor.
 - b. After meeting, provide letter of compliance to Architect, indicating when coordination conference was held and who was in attendance.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
 1. Deliver each article of hardware in manufacturer's original packaging.
- C. Project Conditions:
 1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
 2. Provide secure lock-up for door hardware delivered to Project, but not yet installed. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- D. Protection and Damage:
 1. Promptly replace products damaged during shipping.

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2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace, or repair products damaged during Work.
3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- E. Owner to verify how and where permanent cores and keys are to be delivered.

1.7 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- E. Existing Openings:
 1. Prior to submittal, carefully inspect existing conditions to verify finish hardware required to complete Work, including sizes, quantities, existing hardware scheduled for re-use, and sill condition material. If conflict between the specified/scheduled hardware and existing conditions, submit request for direction from Architect. Include date of jobsite visit in the submittal.
 2. Submittals prepared without thorough jobsite visit by qualified hardware expert will be rejected as non-compliant.
- F. Direct shipments not permitted, unless approved by Contractor.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Years from date of Substantial Completion, for durations indicated.
 - a. Closers:
 - 1) Mechanical: 10 years.
 - b. Automatic Operator: 2 Years.
 - c. Exit Devices:
 - 1) Mechanical: 3 years.
 - 2) Electrified: 1 year.
 - d. Locksets:
 - 1) Mechanical: 10 years.
 - 2) Electrified: 1 year.
 - e. Continuous Hinges: Lifetime warranty
 - f. Key Blanks: Lifetime
 2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

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1.9 MAINTENANCE

A. Maintenance Tools:

1. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Where "Owner Standard" is noted, submittals and substitution requests for other products will not be considered.
- B. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturer" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- D. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
- E. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2 MATERIALS

A. Fasteners

1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
 2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
 4. Install hardware with fasteners provided by hardware manufacturer.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.3 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Ives 5BB series
2. Acceptable Manufacturers and Products: Hager BB series, Stanley FBB series.

B. Requirements:

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1. Provide five-knuckle ball bearing hinges conforming to ANSI/BHMA A156.1.
2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
3. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
4. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
6. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
8. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
9. Doors 36 inches (914 mm) wide or less furnish hinges 4-1/2 inches (114 mm) high; doors greater than 36 inches (914 mm) wide furnish hinges 5 inches (127 mm) high, heavy weight or standard weight as specified.
10. Provide hinges with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component.
11. Provide mortar guard for each electrified hinge specified.
12. Provide spring hinges where specified. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Provide one additional bearing hinge for each 30 inches (762 mm) of additional door height.

2.4 PIVOT SETS

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives
 2. Acceptable Manufacturers: Dorma, Rixson
- B. Requirements:
 1. Provide pivot sets complete with oil-impregnated top pivot, unless indicated otherwise.
 2. Where offset pivots are specified, Provide one intermediate pivot for doors less than 91 inches (2311 mm) high and one additional intermediate pivot per leaf for each additional 30 inches (762 mm) in height or fraction thereof. Intermediate pivots spaced equally not less than 25 inches (635 mm) or not more than 35 inches (889 mm) on center, for doors over 121 inches (3073 mm) high.
 3. Provide appropriate model where pivot sets are scheduled at fire rated openings.
 4. Provide lead-lined model where pivot sets are specified at lead-lined doors.

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5. Provide pivots with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electrified pivot nearest to electrified locking component. If manufacturer of electrified locking component requires another device for power transfer, then provide recommended power transfer device and appropriate quantity of pivots.
6. Provide mortar guard for each electric pivot specified, unless specified in hollow metal frame specification.

2.5 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage L9000 series
2. Acceptable Manufacturers and Products: Best 45H series, Sargent 8200 series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1 Operational, Grade 1 Security, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
2. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
3. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
4. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide a request to exit (RX) switch that is actuated with rotation of inside lever.
 - a. UL Listed – 3-hour fire door.
5. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
 - a. Lever Design: As scheduled.

2.6 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Von Duprin 35 series
2. Acceptable Manufacturers and Products: Sargent 8000 Series, Precision Apex series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1, and UL listed for Panic Exit or Fire Exit Hardware. Cylinders: Refer to "KEYING" article, herein.
2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
3. Touchpad: Extend minimum of one half of door width. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other finishes, provide compatible finish to exit device. No plastic inserts are allowed in touchpads.
4. Provide exit devices with dead-latching feature for security and for future addition of alarm kits and/or other electrified requirements.
5. Provide flush end caps for exit devices.
6. Provide exit devices with manufacturer's approved strikes.

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7. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
8. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
9. Provide cylinder dogging at non-fire-rated exit devices.
10. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
11. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
 - a. Lever Style: Match lever style of locksets.
12. Accessibility: Maximum 5lbs force to retract latch bolt per CBC Chapter 11B.
"AX" feature: touchpad directly retracts the latchbolt with 5 lbs. or less of force. Provide testing lab certification confirming that the mechanical device is independent third-party tested to meet this 5 lbs. requirement.
13. Provide UL labeled fire exit hardware for fire rated openings.
14. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and were noted in hardware sets.
15. Provide electrified options as scheduled.

2.7 FLUSH BOLTS

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives
 2. Acceptable Manufacturers: DonJo, Trimco
- B. Requirements:
 1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.8 COORDINATORS

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives
 2. Acceptable Manufacturers: Rockwood, Trimco
- B. Requirements:
 1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
 2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.

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2.9 CYLINDERS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Schlage and as per Owner.
 - 2. Acceptable Manufacturers: TBD by Owner, to match existing.
- B. Requirements:
 - 1. cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision, Section 12, Grade 1; permanent cylinders; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
 - 2. Replaceable Construction Cores:
 - a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - 1) 3 construction control keys
 - 2) 12 construction change (day) keys.
 - b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2.10 KEYING

- A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- B. Provide cylinders/cores keyed into Owner's existing factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- C. Requirements:
 - 1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - a. Master Keying system as directed by the Owner.
 - 2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 - 3. Provide keys with the following features:
 - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - b. Identification stamping provisions must be approved by the Architect and Owner.
 - 4. Identification:
 - a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Blind code marks shall not include actual key cuts.
 - b. Identification stamping provisions must be approved by the Architect and Owner.
 - c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - d. Failure to comply with stamping requirements shall be cause for replacement of keys involved at no additional cost to Owner.
 - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
 - 5. Quantity: Furnish in the following quantities.
 - a. Change (Day) Keys: 3 per cylinder/core.
 - b. Permanent Control Keys: 3.
 - c. Master Keys: 6.

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2.11 KEY CONTROL SYSTEM

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Telkee
 - 2. Acceptable Manufacturers: HPC, Lund
- B. Requirements:
 - 1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.12 DOOR CLOSERS

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product: LCN 4040XP series.
 - 2. Acceptable Manufacturers and Products: Sargent 281 series.
- B. Requirements:
 - 1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certifies closers. Stamp units with date of manufacture code.
 - 2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
 - 3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
 - 4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
 - 5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
 - 6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
 - 7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
 - 8. Pressure Relief Valve (PRV) Technology: Not permitted.
 - 9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117 or has special rust inhibitor (SRI).
 - 10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

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2.13 DOOR TRIM

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives
 - 2. Acceptable Manufacturers: Hager, Trimco.
- B. Requirements:
 - 1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
 - 2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back-to-back with pull.
 - 3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
 - 4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
 - 5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
 - 6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
 - 7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
 - 8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.14 PROTECTION PLATES

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives
 - 2. Acceptable Manufacturers: Hager, Trimco
- B. Requirements:
 - 1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
 - 2. Sizes of plates:
 - a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs.
 - b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs.
 - c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.15 DOOR STOPS AND HOLDERS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives
 - 2. Acceptable Manufacturers: Hager, Trimco
- B. Provide door stops at each door leaf:
 - 1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
 - 2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.

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3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.16 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

- A. Manufacturers:
 1. Scheduled Manufacturer: Zero International
 2. Acceptable Manufacturers: National Guard, Trimco.
- B. Requirements:
 1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
 2. Size of thresholds:
 - a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width.
 - b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width
 3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.17 FINISHES

- A. Finish: BHMA 626/652 (US26D); except:
 1. Hinges at Exterior Doors: BHMA 630 (US32D)
 2. Continuous Hinges: BHMA 628 (US28)
 3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
 4. Protection Plates: BHMA 630 (US32D)
 5. Overhead Stops and Holders: BHMA 630 (US32D)
 6. Door Closers: Powder Coat to Match, 689.
 7. Wall Stops: BHMA 630 (US32D)
 8. Latch Protectors: BHMA 630 (US32D)
 9. Weatherstripping: Clear Anodized Aluminum
 10. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

- A. Where on-site modification of doors and frames is required:
 - 1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
 - 2. Field modifies and prepare existing door and frame for new hardware being installed.
 - 3. When modifications are exposed to view, use concealed fasteners, when possible.
 - 4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
 - a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
 - b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
 - c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- H. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).
- I. Lock Cylinders: Install construction cores to secure building and areas during construction period.

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1. Replace construction cores with permanent cores as indicated in keying section.
- J. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- K. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.
- L. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- M. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
 1. Coordination: Coordinate provision with the security systems provider to mitigate excessive or redundant purchase.
 2. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware.
- N. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- O. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard. Locate no more than 4 inches from walls.
- P. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- Q. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- R. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.

SPECIFICATIONS

- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

- A. Provide training for Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

- A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type, and function. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- B. Do not order material until submittal has been reviewed, stamped, and signed by hardware consultant.
- C. Hardware Sets: See Hardware sets below.

Abbreviation	Name
B/O	By Others
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
LCN	LCN Commercial Division
SCH	Schlage Lock Company
TBD	Manufacturer To Be Determined
VON	Von Duprin
ZER	Zero International Inc

SPECIFICATIONS

OPT0453989 Version 1

Legend:

 Link to catalog cut sheet

















 Electrified Opening

Hardware Group No. 1

For use on Door #(s):

101A 101B

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	PIVOT SET	7215 SET		626	IVE
2	EA	INTERMEDIATE PIVOT	7215 INT		626	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB		689	VON
1	EA	PANIC HARDWARE	CDSI-AX-35A-EO		626	VON
1	EA	PANIC HARDWARE	CDSI-AX-35A-NL-OP-388		626	VON
1	EA	RIM CYLINDER	20-057		626	SCH
1	EA	MORTISE CYLINDER (MULLION CYLINDER)	20-061 114		626	SCH
2	EA	MORTISE CYLINDER (CYLINDER DOGGING)	20-061 X XQ11-948		626	SCH
4	EA	FSIC CORE	23-030 (TO MATCH BUILDING STD)		626	SCH
2	EA	90 DEG OFFSET PULL	8190EZHD 12"		630- 316	IVE
2	EA	OH STOP	100S		630	GLY
2	EA	SURFACE CLOSER	4040XP EDA WMS		689	LCN
1	EA	RAIN DRIP	142A (OMIT IF SHELTERED)		AA	ZER
1	EA	MULLION SEAL	8780NBK PSA		BK	ZER
1	SET	GASKETING AND SEAL	BY STOREFRONT MFG./SUPPLIER. TO MATCH DOOR HARDWARE		TBD	B/O
2	EA	DOOR SWEEP	8197AA (OR BY DOOR MFG.)		AA	ZER
1	EA	THRESHOLD	103A-223 (OR AS REQ'D)		A	ZER

















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Hardware Group No. 2

For use on Door #(s):

106B

Provide each PR door(s) with the following:








QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		630	IVE
1	EA	CONST LATCHING BOLT	FB51P		630	IVE
1	EA	DUST PROOF STRIKE	DP1 OR DP2 AS REQ'D		626	IVE
1	EA	STOREROOM W/DEADBOLT W/ OUTSIDE INDICATOR	LV9480T 06N L583-363 OS-LOC XL13-439		630	SCH
1	EA	FSIC CORE	23-030 (TO MATCH BUILDING STD)		626	SCH
1	EA	COORDINATOR	COR X FL		628	IVE
2	EA	MOUNTING BRACKET	MB		689	IVE
2	EA	OH STOP	100S		630	GLY
2	EA	SURFACE CLOSER	4040XP EDA WMS		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142A (OMIT IF SHELTERED)		AA	ZER
1	SET	GASKETING (JAMBS)	328AA		AA	ZER
1	EA	GASKETING (HEAD)	429AA-S		AA	ZER
1	EA	ASTRAGAL	43SP		600	ZER
2	EA	DOOR SWEEP	8197AA (OR BY DOOR MFG.)		AA	ZER
1	EA	THRESHOLD	103A-223 (OR AS REQ'D)		A	ZER

Hardware Group No. 3

For use on Door #(s):

104

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		630	IVE
1	EA	STOREROOM W/DEADBOLT W/ OUTSIDE INDICATOR	LV9480T 06N L583-363 OS-LOC XL13-439		630	SCH
1	EA	FSIC CORE	23-030 (TO MATCH BUILDING STD)		626	SCH
1	EA	SURFACE CLOSER	4040XP H WMS PULL SIDE		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER










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Hardware Group No. 4

For use on Door #(s):

103 112

Provide each SGL door(s) with the following:









QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		630	IVE
1	EA	PRIVACY W/COIN TURN W/ OUTSIDE INDICATOR	LV9044 06N L583-363 OS-OCC		630	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PAAS REQ WMS		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS18S/FS18L		BLK	IVE
1	EA	FLOOR STOP/ WALL STOP	FS436/FS438 OR WS406/407CCV (AS REQ'D)		626	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	COAT AND HAT HOOK	571 (ADD 1 @ 42" FOR ADA REQ'D)		626	IVE

Hardware Group No. 5

For use on Door #(s):

106A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 5 X 4.5		630	IVE
1	EA	STOREROOM W/DEADBOLT W/ OUTSIDE INDICATOR	LV9480T 06N L583-363 OS-LOC XL13-439		630	SCH
1	EA	FSIC CORE	23-030 (TO MATCH BUILDING STD)		626	SCH
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP ST-1630 WMS		689	LCN
1	EA	TOP JAMB MTG PLATE	4040XP-18TJ (AS REQ'D)		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER












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Hardware Group No. 6

For use on Door #(s):

105

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		630	IVE
1	EA	STOREROOM W/DEADBOLT W/ OUTSIDE INDICATOR	LV9480T 06N L583-363 OS-LOC XL13-439		630	SCH
1	EA	FSIC CORE	23-030 (TO MATCH BUILDING STD)		626	SCH
1	EA	LOCK GUARD	LG12		630	IVE
1	EA	SURFACE CLOSER	4040XP EDA WMS		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142A (OMIT IF SHELTERED)		AA	ZER
1	SET	GASKETING (JAMBS)	328AA		AA	ZER
1	EA	GASKETING (HEAD)	429AA-S		AA	ZER
1	EA	DOOR SWEEP	8197AA (OR BY DOOR MFG.)		AA	ZER
1	EA	THRESHOLD	103A-223 (OR AS REQ'D)		A	ZER

-ELECTRICAL ROOMS: IF CONTAINED EQUIPMENT LOAD EXCEEDS 600V/ 800 AMPS, DOOR SHALL OUTSWING AND RECIEVE EXIT DEVICE TO MEET NFPA 70 REQUIRMENTS.

Hardware Group No. 7

For use on Door #(s):








107

108

109

110

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		630	IVE
1	EA	CORRIDOR W/DEADBOLT W/ OUTSIDE INDICATOR	LV9456T 06N L583-363 OS-OCC XL13-439		630	SCH
1	EA	FSIC CORE	23-030 (TO MATCH BUILDING STD)		626	SCH
1	EA	SURFACE CLOSER	4040XP H WMS		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP/ WALL STOP	FS436/FS438 OR WS406/407CCV (AS REQ'D)		626	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

SPECIFICATIONS

Hardware Group No. FL-01

For use on Door #(s):

101C 101D

Provide each FLD door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
SET	FOLDING DOOR, FRAME, C/W HARDWARE	BY FOLDING DOOR MFG./ SUPPLIER.	TBD	B/O

-CYLINDER SUPPLIED BY 08 71 00, AS REQ'D.

-4 PANELS FOLDING SUSTEM WITH GLASS LITE, DOOR C/W HARDWARE SUPPLIED BY SPECIALTY DOOR MANUFACTURER, LISTED ITEMS FOR REFERENCE ONLY.

Hardware Group No. R-UP-01

For use on Door #(s):

106C

Provide each RU door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1 EA	Roll up Door Hardware	BY DOOR MANUFACTURER		B/O

-CYLINDER SUPPLIED BY 08 71 00, AS REQ'D.

-DOOR C/W HARDWARE SUPPLIED BY DOOR MANUFACTURER, LISTED ITEMS FOR REFERENCE ONLY.

END OF SECTION 08 71 00

SPECIFICATIONS

SECTION 08 71 00 DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Mechanical door hardware for:
 - a. Swinging doors.
- B. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:
 - 1. Windows
 - 2. Cabinets (casework), including locks in cabinets.
 - 3. Signage
 - 4. Toilet accessories
 - 5. Overhead doors
 - 6. Installation.
 - 7. Rough hardware.
 - 8. Conduit, junction boxes & wiring.
 - 9. Folding partitions, except cylinders where detailed.
 - 10. Sliding aluminum doors, except cylinders where detailed.
 - 11. Access doors and panels, except cylinders where detailed.
- C. Related Sections:
 - 1. Division 01 Section "Alternates" for alternates affecting this section.
 - 2. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
 - 3. Division 09 sections for touchup finishing or refinishing of existing openings modified by this section.
 - 4. Division 13 Section "Radiation Protection" for requirements for lead-lining for door hardware at openings indicated to receive radiation protection. Division 26 sections for connections to electrical power system and for low-voltage wiring.
 - 5. Division 28 sections for coordination with other components of electronic access control system.

1.3 REFERENCES

- A. UL - Underwriters Laboratories
 - 1. UL 10B - Fire Test of Door Assemblies
 - 2. UL 10C - Positive Pressure Test of Fire Door Assemblies
 - 3. UL 1784 - Air Leakage Tests of Door Assemblies
 - 4. UL 305 - Panic Hardware

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- B. ANSI - American National Standards Institute
 - 1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
- C. California Code of Regulations
 - 1. Title 24: California Building Standards Code

1.4 SUBMITTALS

- A. General:
 - 1. Submit in accordance with Conditions of Contract and Division 01 requirements.
- B. Action Submittals:
 - 1. Product Data: Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 - 2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
 - 3. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier in like-new condition. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
 - 4. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:
 - a. Door Index; include door number, heading number, and Architects hardware set number.
 - b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
 - c. Type, style, function, size, and finish of each hardware item.
 - d. Name and manufacturer of each item.
 - e. Fastenings and other pertinent information.
 - f. Location of each hardware set cross-referenced to indications on Drawings.
 - g. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - h. Mounting locations for hardware.
 - i. Door and frame sizes and materials.
 - j. Name and phone number for local manufacturer's representative for each product.
 - k. Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components). Operational description should include how door will operate on egress, ingress, and fire and smoke alarm connection.

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- 1) Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work that is critical in Project construction schedule.
5. Key Schedule:
 - a. Initiate and conduct meeting(s) with Owner representatives and hardware supplier to determine system keyway(s), keybow styles, structure, stamping, degree of physical security and degree of geographic exclusivity. Furnish Owner's written approval of the system; do not order keys or cylinders without written confirmation of actual requirements from the Owner.
 - b. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used, and door numbers controlled.
 - c. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - d. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - e. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - f. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
 - 1) Forward bitting list, key cuts, and key system schematic directly to Owner, by means as directed by Owner.
6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory prepared for door hardware installation.
- C. Informational Submittals:
 1. Qualification Data: For Supplier and Installer.
 2. Product Certificates for electrified door hardware, signed by manufacturer:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 3. Certificates of Compliance:
 - a. Electrified Hardware Coordination Conference Certification: Letter of compliance, signed by Contractor, attesting to completion of electrified hardware coordination conference, specified in "QUALITY ASSURANCE" article, herein.
 4. Warranty: Special warranty specified in this Section.
- D. Closeout Submittals:
 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Name, address, and phone number of local representative for each manufacturer.
 - d. Final approved hardware schedule, edited to reflect conditions as installed.
 - e. Final keying schedule
 - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

SPECIFICATIONS

- g. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.5 QUALITY ASSURANCE

- A. Product Substitutions: Comply with product requirements stated in Division 01 and as specified herein.
 1. Where specific manufacturer's product is named and accompanied by "Owner Standard," including make or model number or other designation, provide product specified. (Note: Certain products have been selected for their unique characteristics and particular project suitability.)
 - a. Where no additional products or manufacturers are listed in product category, requirements for "Owner Standard" govern product selection.
 2. Where products indicate "acceptable manufacturers" or "acceptable manufacturers and products", provide product from specified manufacturers, subject to compliance with specified requirements and "Single Source Responsibility" requirements stated herein.
- B. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project.
 1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 2. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- C. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.
- D. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
 1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.
- E. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
- F. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
- G. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
- H. Means of Egress Doors: Latches do not require more than 5 lbs. (67 N) to release latch. Locks do not require use of key, tool, or special knowledge for operation.
- I. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in "REFERENCES" article, herein.
 1. Provide operating devices that do not require tight grasping, pinching, or twisting of wrist and that operate with force of not more than 5 lbs. (22.2 N).
 2. Maximum opening-force requirements:

DOOR HARDWARE

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CITY OF LA PUENTE ACTIVITY CENTER

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- a. Interior, Non-Fire-Rated Hinged Doors: 5 lbs. (22.2 N) applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbs. (22.2 N) applied parallel to door at latch.
 - c. Fire Doors: The minimum opening force allowable by the appropriate administrative authority, not to exceed 15 lbs. (66.7N).
3. Bevel raised thresholds with slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
4. Adjust closer so that the time required to move the door from the 90-degree position to 12 degrees from the latch is 5 seconds minimum.
- J. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01.
 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 2. Inspect and discuss preparatory work performed by other trades.
 3. Inspect and discuss electrical roughing-in for electrified door hardware.
 4. Review sequence of operation for each type of electrified door hardware.
 5. Review required testing, inspecting, and certifying procedures.
- K. Coordination Conferences:
 1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
 - a. Attendees: Door hardware supplier, door hardware installer, Contractor.
 - b. After meeting, provide letter of compliance to Architect, indicating when meeting was held and who was in attendance.
 2. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.
 - a. Attendees: electrified door hardware supplier, doors and frames supplier, electrified door hardware installer, electrical subcontractor, Owner, Owner's security consultant, Architect and Contractor.
 - b. After meeting, provide letter of compliance to Architect, indicating when coordination conference was held and who was in attendance.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
 1. Deliver each article of hardware in manufacturer's original packaging.
- C. Project Conditions:
 1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
 2. Provide secure lock-up for door hardware delivered to Project, but not yet installed. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- D. Protection and Damage:
 1. Promptly replace products damaged during shipping.

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2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace, or repair products damaged during Work.
3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- E. Owner to verify how and where permanent cores and keys are to be delivered.

1.7 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- E. Existing Openings:
 1. Prior to submittal, carefully inspect existing conditions to verify finish hardware required to complete Work, including sizes, quantities, existing hardware scheduled for re-use, and sill condition material. If conflict between the specified/scheduled hardware and existing conditions, submit request for direction from Architect. Include date of jobsite visit in the submittal.
 2. Submittals prepared without thorough jobsite visit by qualified hardware expert will be rejected as non-compliant.
- F. Direct shipments not permitted, unless approved by Contractor.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Years from date of Substantial Completion, for durations indicated.
 - a. Closers:
 - 1) Mechanical: 10 years.
 - b. Automatic Operator: 2 Years.
 - c. Exit Devices:
 - 1) Mechanical: 3 years.
 - 2) Electrified: 1 year.
 - d. Locksets:
 - 1) Mechanical: 10 years.
 - 2) Electrified: 1 year.
 - e. Continuous Hinges: Lifetime warranty
 - f. Key Blanks: Lifetime
 2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

SPECIFICATIONS

1.9 MAINTENANCE

A. Maintenance Tools:

1. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Where "Owner Standard" is noted, submittals and substitution requests for other products will not be considered.
- B. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturer" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- D. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
- E. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2 MATERIALS

A. Fasteners

1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
 2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
 4. Install hardware with fasteners provided by hardware manufacturer.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.3 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Ives 5BB series
2. Acceptable Manufacturers and Products: Hager BB series, Stanley FBB series.

B. Requirements:

SPECIFICATIONS

1. Provide five-knuckle ball bearing hinges conforming to ANSI/BHMA A156.1.
2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
3. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
4. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
6. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
8. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
9. Doors 36 inches (914 mm) wide or less furnish hinges 4-1/2 inches (114 mm) high; doors greater than 36 inches (914 mm) wide furnish hinges 5 inches (127 mm) high, heavy weight or standard weight as specified.
10. Provide hinges with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component.
11. Provide mortar guard for each electrified hinge specified.
12. Provide spring hinges where specified. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Provide one additional bearing hinge for each 30 inches (762 mm) of additional door height.

2.4 PIVOT SETS

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives
 2. Acceptable Manufacturers: Dorma, Rixson
- B. Requirements:
 1. Provide pivot sets complete with oil-impregnated top pivot, unless indicated otherwise.
 2. Where offset pivots are specified, Provide one intermediate pivot for doors less than 91 inches (2311 mm) high and one additional intermediate pivot per leaf for each additional 30 inches (762 mm) in height or fraction thereof. Intermediate pivots spaced equally not less than 25 inches (635 mm) or not more than 35 inches (889 mm) on center, for doors over 121 inches (3073 mm) high.
 3. Provide appropriate model where pivot sets are scheduled at fire rated openings.
 4. Provide lead-lined model where pivot sets are specified at lead-lined doors.

DOOR HARDWARE

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SPECIFICATIONS

5. Provide pivots with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electrified pivot nearest to electrified locking component. If manufacturer of electrified locking component requires another device for power transfer, then provide recommended power transfer device and appropriate quantity of pivots.
6. Provide mortar guard for each electric pivot specified, unless specified in hollow metal frame specification.

2.5 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage L9000 series
2. Acceptable Manufacturers and Products: Best 45H series, Sargent 8200 series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1 Operational, Grade 1 Security, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
2. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
3. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
4. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide a request to exit (RX) switch that is actuated with rotation of inside lever.
 - a. UL Listed – 3-hour fire door.
5. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
 - a. Lever Design: As scheduled.

2.6 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Von Duprin 35 series
2. Acceptable Manufacturers and Products: Sargent 8000 Series, Precision Apex series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1, and UL listed for Panic Exit or Fire Exit Hardware. Cylinders: Refer to "KEYING" article, herein.
2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
3. Touchpad: Extend minimum of one half of door width. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other finishes, provide compatible finish to exit device. No plastic inserts are allowed in touchpads.
4. Provide exit devices with dead-latching feature for security and for future addition of alarm kits and/or other electrified requirements.
5. Provide flush end caps for exit devices.
6. Provide exit devices with manufacturer's approved strikes.

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SPECIFICATIONS

7. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
8. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
9. Provide cylinder dogging at non-fire-rated exit devices.
10. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
11. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
 - a. Lever Style: Match lever style of locksets.
12. Accessibility: Maximum 5lbs force to retract latch bolt per CBC Chapter 11B.
"AX" feature: touchpad directly retracts the latchbolt with 5 lbs. or less of force. Provide testing lab certification confirming that the mechanical device is independent third-party tested to meet this 5 lbs. requirement.
13. Provide UL labeled fire exit hardware for fire rated openings.
14. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and were noted in hardware sets.
15. Provide electrified options as scheduled.

2.7 FLUSH BOLTS

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives
 2. Acceptable Manufacturers: DonJo, Trimco
- B. Requirements:
 1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.8 COORDINATORS

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives
 2. Acceptable Manufacturers: Rockwood, Trimco
- B. Requirements:
 1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
 2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.

SPECIFICATIONS

2.9 CYLINDERS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Schlage and as per Owner.
 - 2. Acceptable Manufacturers: TBD by Owner, to match existing.
- B. Requirements:
 - 1. cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision, Section 12, Grade 1; permanent cylinders; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
 - 2. Replaceable Construction Cores:
 - a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - 1) 3 construction control keys
 - 2) 12 construction change (day) keys.
 - b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2.10 KEYING

- A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- B. Provide cylinders/cores keyed into Owner's existing factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- C. Requirements:
 - 1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - a. Master Keying system as directed by the Owner.
 - 2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 - 3. Provide keys with the following features:
 - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - b. Identification stamping provisions must be approved by the Architect and Owner.
 - 4. Identification:
 - a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Blind code marks shall not include actual key cuts.
 - b. Identification stamping provisions must be approved by the Architect and Owner.
 - c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - d. Failure to comply with stamping requirements shall be cause for replacement of keys involved at no additional cost to Owner.
 - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
 - 5. Quantity: Furnish in the following quantities.
 - a. Change (Day) Keys: 3 per cylinder/core.
 - b. Permanent Control Keys: 3.
 - c. Master Keys: 6.

SPECIFICATIONS

2.11 KEY CONTROL SYSTEM

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Telkee
 - 2. Acceptable Manufacturers: HPC, Lund
- B. Requirements:
 - 1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.12 DOOR CLOSERS

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product: LCN 4040XP series.
 - 2. Acceptable Manufacturers and Products: Sargent 281 series.
- B. Requirements:
 - 1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certifies closers. Stamp units with date of manufacture code.
 - 2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
 - 3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
 - 4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
 - 5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
 - 6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
 - 7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
 - 8. Pressure Relief Valve (PRV) Technology: Not permitted.
 - 9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117 or has special rust inhibitor (SRI).
 - 10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

SPECIFICATIONS

2.13 DOOR TRIM

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives
 - 2. Acceptable Manufacturers: Hager, Trimco.
- B. Requirements:
 - 1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
 - 2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back-to-back with pull.
 - 3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
 - 4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
 - 5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
 - 6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
 - 7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
 - 8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.14 PROTECTION PLATES

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives
 - 2. Acceptable Manufacturers: Hager, Trimco
- B. Requirements:
 - 1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
 - 2. Sizes of plates:
 - a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs.
 - b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs.
 - c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.15 DOOR STOPS AND HOLDERS

- A. Manufacturers:
 - 1. Scheduled Manufacturer: Ives
 - 2. Acceptable Manufacturers: Hager, Trimco
- B. Provide door stops at each door leaf:
 - 1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
 - 2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.

SPECIFICATIONS

3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.16 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

- A. Manufacturers:
 1. Scheduled Manufacturer: Zero International
 2. Acceptable Manufacturers: National Guard, Trimco.
- B. Requirements:
 1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
 2. Size of thresholds:
 - a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width.
 - b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width
 3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.17 FINISHES

- A. Finish: BHMA 626/652 (US26D); except:
 1. Hinges at Exterior Doors: BHMA 630 (US32D)
 2. Continuous Hinges: BHMA 628 (US28)
 3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
 4. Protection Plates: BHMA 630 (US32D)
 5. Overhead Stops and Holders: BHMA 630 (US32D)
 6. Door Closers: Powder Coat to Match, 689.
 7. Wall Stops: BHMA 630 (US32D)
 8. Latch Protectors: BHMA 630 (US32D)
 9. Weatherstripping: Clear Anodized Aluminum
 10. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

SPECIFICATIONS

3.2 PREPARATION

- A. Where on-site modification of doors and frames is required:
 - 1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
 - 2. Field modifies and prepare existing door and frame for new hardware being installed.
 - 3. When modifications are exposed to view, use concealed fasteners, when possible.
 - 4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
 - a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
 - b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
 - c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- H. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).
- I. Lock Cylinders: Install construction cores to secure building and areas during construction period.

SPECIFICATIONS

1. Replace construction cores with permanent cores as indicated in keying section.
- J. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- K. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.
- L. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- M. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
 1. Coordination: Coordinate provision with the security systems provider to mitigate excessive or redundant purchase.
 2. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware.
- N. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- O. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard. Locate no more than 4 inches from walls.
- P. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- Q. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- R. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.

SPECIFICATIONS

- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

- A. Provide training for Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

- A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type, and function. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- B. Do not order material until submittal has been reviewed, stamped, and signed by hardware consultant.
- C. Hardware Sets: See Hardware sets below.

Abbreviation	Name
B/O	By Others
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
LCN	LCN Commercial Division
SCH	Schlage Lock Company
TBD	Manufacturer To Be Determined
VON	Von Duprin
ZER	Zero International Inc

SPECIFICATIONS

OPT0453989 Version 1

Legend:

 Link to catalog cut sheet

















 Electrified Opening

Hardware Group No. 1

For use on Door #(s):

101A 101B

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	PIVOT SET	7215 SET		626	IVE
2	EA	INTERMEDIATE PIVOT	7215 INT		626	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB		689	VON
1	EA	PANIC HARDWARE	CDSI-AX-35A-EO		626	VON
1	EA	PANIC HARDWARE	CDSI-AX-35A-NL-OP-388		626	VON
1	EA	RIM CYLINDER	20-057		626	SCH
1	EA	MORTISE CYLINDER (MULLION CYLINDER)	20-061 114		626	SCH
2	EA	MORTISE CYLINDER (CYLINDER DOGGING)	20-061 X XQ11-948		626	SCH
4	EA	FSIC CORE	23-030 (TO MATCH BUILDING STD)		626	SCH
2	EA	90 DEG OFFSET PULL	8190EZHD 12"		630- 316	IVE
2	EA	OH STOP	100S		630	GLY
2	EA	SURFACE CLOSER	4040XP EDA WMS		689	LCN
1	EA	RAIN DRIP	142A (OMIT IF SHELTERED)		AA	ZER
1	EA	MULLION SEAL	8780NBK PSA		BK	ZER
1	SET	GASKETING AND SEAL	BY STOREFRONT MFG./SUPPLIER. TO MATCH DOOR HARDWARE		TBD	B/O
2	EA	DOOR SWEEP	8197AA (OR BY DOOR MFG.)		AA	ZER
1	EA	THRESHOLD	103A-223 (OR AS REQ'D)		A	ZER

















SPECIFICATIONS

Hardware Group No. 2

For use on Door #(s):

106B

Provide each PR door(s) with the following:








QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		630	IVE
1	EA	CONST LATCHING BOLT	FB51P		630	IVE
1	EA	DUST PROOF STRIKE	DP1 OR DP2 AS REQ'D		626	IVE
1	EA	STOREROOM W/DEADBOLT W/ OUTSIDE INDICATOR	LV9480T 06N L583-363 OS-LOC XL13-439		630	SCH
1	EA	FSIC CORE	23-030 (TO MATCH BUILDING STD)		626	SCH
1	EA	COORDINATOR	COR X FL		628	IVE
2	EA	MOUNTING BRACKET	MB		689	IVE
2	EA	OH STOP	100S		630	GLY
2	EA	SURFACE CLOSER	4040XP EDA WMS		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142A (OMIT IF SHELTERED)		AA	ZER
1	SET	GASKETING (JAMBS)	328AA		AA	ZER
1	EA	GASKETING (HEAD)	429AA-S		AA	ZER
1	EA	ASTRAGAL	43SP		600	ZER
2	EA	DOOR SWEEP	8197AA (OR BY DOOR MFG.)		AA	ZER
1	EA	THRESHOLD	103A-223 (OR AS REQ'D)		A	ZER

Hardware Group No. 3

For use on Door #(s):

104

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		630	IVE
1	EA	STOREROOM W/DEADBOLT W/ OUTSIDE INDICATOR	LV9480T 06N L583-363 OS-LOC XL13-439		630	SCH
1	EA	FSIC CORE	23-030 (TO MATCH BUILDING STD)		626	SCH
1	EA	SURFACE CLOSER	4040XP H WMS PULL SIDE		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER










SPECIFICATIONS

Hardware Group No. 4

For use on Door #(s):

103 112

Provide each SGL door(s) with the following:









QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		630	IVE
1	EA	PRIVACY W/COIN TURN W/ OUTSIDE INDICATOR	LV9044 06N L583-363 OS-OCC		630	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PAAS REQ WMS		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS18S/FS18L		BLK	IVE
1	EA	FLOOR STOP/ WALL STOP	FS436/FS438 OR WS406/407CCV (AS REQ'D)		626	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	COAT AND HAT HOOK	571 (ADD 1 @ 42" FOR ADA REQ'D)		626	IVE

Hardware Group No. 5

For use on Door #(s):

106A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 5 X 4.5		630	IVE
1	EA	STOREROOM W/DEADBOLT W/ OUTSIDE INDICATOR	LV9480T 06N L583-363 OS-LOC XL13-439		630	SCH
1	EA	FSIC CORE	23-030 (TO MATCH BUILDING STD)		626	SCH
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP ST-1630 WMS		689	LCN
1	EA	TOP JAMB MTG PLATE	4040XP-18TJ (AS REQ'D)		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER












SPECIFICATIONS

Hardware Group No. 6

For use on Door #(s):

105

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		630	IVE
1	EA	STOREROOM W/DEADBOLT W/ OUTSIDE INDICATOR	LV9480T 06N L583-363 OS-LOC XL13-439		630	SCH
1	EA	FSIC CORE	23-030 (TO MATCH BUILDING STD)		626	SCH
1	EA	LOCK GUARD	LG12		630	IVE
1	EA	SURFACE CLOSER	4040XP EDA WMS		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142A (OMIT IF SHELTERED)		AA	ZER
1	SET	GASKETING (JAMBS)	328AA		AA	ZER
1	EA	GASKETING (HEAD)	429AA-S		AA	ZER
1	EA	DOOR SWEEP	8197AA (OR BY DOOR MFG.)		AA	ZER
1	EA	THRESHOLD	103A-223 (OR AS REQ'D)		A	ZER

-ELECTRICAL ROOMS: IF CONTAINED EQUIPMENT LOAD EXCEEDS 600V/ 800 AMPS, DOOR SHALL OUTSWING AND RECIEVE EXIT DEVICE TO MEET NFPA 70 REQUIRMENTS.

Hardware Group No. 7

For use on Door #(s):








107

108

109

110

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		630	IVE
1	EA	CORRIDOR W/DEADBOLT W/ OUTSIDE INDICATOR	LV9456T 06N L583-363 OS-OCC XL13-439		630	SCH
1	EA	FSIC CORE	23-030 (TO MATCH BUILDING STD)		626	SCH
1	EA	SURFACE CLOSER	4040XP H WMS		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP/ WALL STOP	FS436/FS438 OR WS406/407CCV (AS REQ'D)		626	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

SPECIFICATIONS

Hardware Group No. FL-01

For use on Door #(s):

101C 101D

Provide each FLD door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
SET	FOLDING DOOR, FRAME, C/W HARDWARE	BY FOLDING DOOR MFG./ SUPPLIER.	TBD	B/O

-CYLINDER SUPPLIED BY 08 71 00, AS REQ'D.

-4 PANELS FOLDING SUSTEM WITH GLASS LITE, DOOR C/W HARDWARE SUPPLIED BY
SPECIALTY DOOR MANUFACTURER, LISTED ITEMS FOR REFERENCE ONLY.

Hardware Group No. R-UP-01

For use on Door #(s):

106C

Provide each RU door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1 EA	Roll up Door Hardware	BY DOOR MANUFACTURER		B/O

-CYLINDER SUPPLIED BY 08 71 00, AS REQ'D.

-DOOR C/W HARDWARE SUPPLIED BY DOOR MANUFACTURER, LISTED ITEMS FOR
REFERENCE ONLY.

END OF SECTION 08 71 00

SPECIFICATONS

SECTION 09 29 00 GYPSUM BOARD

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Gypsum board systems and accessory components for gypsum board partitions, ceilings, soffits, and shaft wall assemblies ..
 - a. Gypsum Board attached to metal framing.
 - b. Gypsum board finishing.

B. Related Sections:

1. Section 06 10 00: Rough Carpentry; wood framing, blocking, and nailers.
2. Section 09 91 00: Painting; priming and finish painting of gypsum board.

1.02 REFERENCES

A. California Code of Regulations (CCR), Title 24, Part 2, California Building Code (CBC), Volumes 1 and 2, current edition.

1. CBC, Chapter 25 – Gypsum Board, Gypsum Panel Products, and Plaster.

B. ASTM International (ASTM):

1. ASTM C 473 – Standard Test Methods for Physical Testing of Gypsum Panel Products.
2. ASTM C 518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
3. ASTM C 834 – Standard Specification for Latex Sealants
4. ASTM C 840 – Standard Specification for Application and Finishing of Gypsum Board.
5. ASTM C 1002 – Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
6. ASTM C 1047 – Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
7. ASTM C 1396 – Standard Specification for Gypsum Board.
8. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Envirommental Chamber.
9. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
10. ASTM E 90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

SPECIFICATONS

11. ASTM E 119 – Standard Test Methods for Fire Tests of Building Construction and Materials
12. ASTM E 413 - Classification for Rating Sound Insulation

C. National Fire protection Association (NFPA):

1. NFPA or UL requirements for fire-rated assemblies per ASTM E119.

D. UL, LLC (UL):

1. UL 2818 – GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes and Furnishings.
2. UL 2821 – GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions From Building Materials, Finishes and Furnishings
3. Requirements and listings for fire-rated materials and products classification.

E. Gypsum Association (GA):

1. GA 214 – Recommended Levels of Gypsum Board Finish.
2. GA-216 – Application and Finishing of Gypsum Panel Products.
3. GA-253 – Application of Gypsum Sheathing
4. GA-600 – Fire Resistance Design Manual

1.03 SYSTEM DESCRIPTION

A. Design Requirements:

1. Provide systems capable of deflection as required by current CBC and authorities having jurisdiction.

1.04 SUBMITTALS

A. Product Data:

1. Manufacturer's catalog data for each product proposed for use.
2. Manufacturer's certification of compliance with fire and sound requirements indicated or specified.

B. Shop Drawings:

1. Details of proprietary or non-proprietary components when included.

C. Environmental Certifications:

1. Certificates for GREENGUARD Gold Certification per UL 2818 and UL 2821.
2. Certificates for EQ Low-Emitting Materials:
 - a. Interior Adhesives and Sealants applied on Site.

SPECIFICATONS

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Installer: Minimum 5 years experience in installing and finishing gypsum board.

B. Finishes:

1. Conform to requirements of GA 214, and as specified.
2. Levels used on the project are described as follows:

LEVELS OF GYPSUM BOARD FINISH					
Level	Joints	Interior Angles	Accessories	Fasteners	Surface
1	Tape set in compound	Tape set in joint compound			Tool marks and ridges acceptable
2	Tape set in joint compound and one separate coat of joint compound	Tape embedded in joint compound and wiped to leave a thin coat of compound over tape, and one separate coat	Covered by one separate coat of joint compound	Covered by one separate coat of joint compound	Free from excess joint compound. Tool marks and ridges acceptable.

LEVELS OF GYPSUM BOARD FINISH					
Level	Joints	Interior Angles	Accessories	Fasteners	Surface
3	After taping, cover with two separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Smooth and free of tool marks and ridges *
4	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Smooth and free of tool marks and ridges *

SPECIFICATONS

5	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Skim coat of joint compound applied to entire surface. Surface free from tool marks and ridges. **
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* At completion of specified taping and finishing, apply one coat of high solids primer as specified in Section 09 9100.

**Or use Sheetrock Brand Primer Surfer "Tuff-Hide" in lieu of skim coat and primer.

C. Fire Resistance Rated Assemblies:

1. Provide UL Design Number for basic systems.

D. Sound Rated Assemblies (STC):

1. Provide sound-rated system whose materials and construction comply with requirements of ASTM E 90 and are classified according to ASTM E 413 by qualified testing agency.

E. Preinstallation Conference: Conduct conference at Project Site.

1. Review methods and procedures for Work related to:
 - a. Gypsum Board partition assemblies.
 - b. Shaft Wall System assemblies.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, factory sealed packages, containers or bundles bearing brand name and name of manufacturer.
- B. Keep materials dry.
 1. Neatly stack gypsum board flat.
 2. Avoid sagging and damage to edges, ends. and surface
- C. Use means necessary to protect gypsum board systems before, during and after installation.

1.07 PROJECT CONDITIONS

- A. Install gypsum panels following environmental conditions, room temperatures and ventilation specified.

SPECIFICATONS

1.08 REGULATORY REQUIREMENTS

- A. Comply with current CBC requirements for design and installation.
 - 1. CBC, Chapter 25.
- B. Fire-Resistance Ratings:
 - 1. Comply with fire-resistance ratings as shown and as required by governing authorities and codes.
 - 2. Provide materials, accessories and application procedures which have been listed by UL or tested according to ASTM E 119 for type of construction shown.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Products of following manufacturers form basis for design and quality intended.
 - 1. Georgia-Pacific Gypsum LLC, Atlanta, GA
 - 2. National Gypsum Company, Charlotte, NC.
 - 3. United States Gypsum Company (USG), Chicago, IL

2.02 MATERIALS

- A. Gypsum Board Panels – Type 1
 - 1. Conforming to ASTM C 1396.
 - 2. Width: 48 inches.
 - 3. Thickness: 5/8 inch.
 - 4. Edges: Tapered.
 - 5. Type X as minimum.
 - a. Comply with UL Type, SCX.
 - 6. Location:
 - a. Provide at walls not indicated to receive abuse-resistant or moisture and mold resistant panels, or tile backer board.
 - 7. Product and Manufacturer:
 - a. Sheetrock Brand Firecode X Panels by USG, or approved equal.
- B. Moisture and Mold Resistant Gypsum Panels – Type 2:
 - 1. Conforming to ASTM C 1396.
 - 2. Width: 48 inches.
 - 3. Thickness: 5/8 inch.

SPECIFICATONS

4. Edges: Tapered.
5. UL Type: SCX.
6. Fire Resistance:
 - a. Class A as defined in CBC Section 803.1
 - b. When tested in accordance with ASTM E 84:
 - 1) Flame Spread Index: 15
 - 2) Smoke Developed Index: 0
7. Average Water Absorption, ASTM C 473:
 - a. Not greater than 5 percent by weight after two hour immersion.
8. Location:
 - a. Provide at walls and ceilings in toilet rooms and janitor storage, not indicated to receive tile.
9. Product and Manufacturer:
 - a. Sheetrock Brand Mold Tough Firecode X Panels by USG, or approved equal.

C. Fastenings:

1. Steel Drill Screws:
 - a. Self-drilling, self-tapping bugle-head drywall screws:
 - 1) Conforming to ASTM C 1002:
 - a) For fastening gypsum board to steel members less than 0.03 inch thick.
 - 2) For fastening gypsum board to wood members.
 - 3) Type S, 1-5/8 inches long bugle head for steel framing
 - a) For single-layer panels.
 - b) Use longer screws for double-layer panels as recommended by manufacturer.
 - b. Conforming to ASTM C 954:
 - 1) For fastening gypsum board to steel members from 0.033 to 0.112 inch thick.
 - c. Furnish screws with corrosion-resistant treatment.

D. Metal Trim:

1. Conforming to ASTM C 1047:

SPECIFICATONS

- a. Metal trim and cornerbead fabricated from minimum 26 gage steel sheet zinc coated by hot-dip process or rolled zinc.
 - 1) Paper-faced where required.
- 2. Trim Units:
 - a. Shapes indicated below by reference to Figure 1 designations in ASTM C 1047 of size and type to fit gypsum board construction:
 - 1) Cornerbead on outside corners, unless otherwise indicated.
 - 2) LC-bead with both face and back flanges:
 - a) Face flange formed to receive joint compound.
 - b) Use LC-beads for edge trim, unless otherwise indicated.
 - 3) L-bead with face flange only:
 - a) Face flange formed to receive joint compound.
 - b) Use L-bead where indicated.
 - 4) U-bead with face and back flanges:
 - a) Face flange formed to be left without application of joint compound.
 - b) Use U-bead where indicated.
 - b. Control Joint:
 - 1) One-piece control joint formed with V-shaped slot and removable strip covering slot opening.
 - c. Crimp-on type trim is not allowed.
- 3. Acceptable Manufacturers:
 - a. USG, Beadex, National Gypsum Company, or approved equal.
- E. Resilient Furring:
 - 1. Conforming to ASTM C 645.
 - a. Minimum 25 gage.
 - 2. Provide manufacturer's special type designed to reduce sound transmission.
- F. Finishing Materials:
 - 1. Gypsum Board Primer and Paint:
 - a. As specified in Section 09 9100.

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2. Contractor's Option:
 - a. Use Sheetrock Brand Primer Surfer, Tuff-Hide in lieu, of skim coat and high solids primer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Metal Framing:
 1. Refer to Sections 05 12 00 or 09 29 16.
- B. Metal Trim:
 1. Provide following:
 - a. Corner beads at outside corners and angles
 - b. Metal casing where gypsum board terminates at uncased openings
 - c. Metal edge trim where board edges abut horizontal and vertical surfaces of other construction.
 2. Install trim in accordance with manufacturer's directions and secure to framing with joint compound.
 - a. Apply trim in longest practical pieces.
- C. Gypsum Board:
 1. Install gypsum board in conformance with ASTM C 840 and the manufacturer's recommendations.
 2. Cut gypsum board by scoring and breaking or by sawing, working from face side.
 - a. Where board meets projecting surfaces, scribe and neatly cut.
 - b. Unless conditions require otherwise, apply board first to ceilings, then to walls.
 - c. End joints to occur over support.
 - d. Use panels of maximum practical length so that minimum number of end joints occur.
 3. Stagger end joints and arrange joints on opposite sides of partition to occur on different studs.
 - a. Make joint layout at openings so that no end joints will align with edges of openings.
 4. Except where specified otherwise, space fasteners not less than 3/8 inch from edges and ends of gypsum board.
 - a. Do not stagger fasteners at adjoining edges and ends.

SPECIFICATONS

5. Install gypsum board vertically or horizontally.
 - a. Attach board with drywall screws spaced not to exceed 8 inches on center around perimeter of boards and 12 inches on center on intermediate studs.
 - b. Space screws at 8 inches on centers along top and bottom runners.
 - c. Drive screws to provide screwhead penetration just below gypsum board surface without breaking surface layer.
 - d. Where electrical outlet and switch boxes are indicated, provide adjustable attachment brackets between studs.
 - e. Nails are not permitted.
6. Install gypsum board to heights indicated, with long dimension at right angles to steel framing members.
 - a. Attach with specified drywall screws spaced 6 inch to 7 inch on centers across board.
 - b. Do not install screws less than 1/2 inch from side joints and 3/8 inch from butt end joints.
 - c. Install so that abutting end joints occur over framing and that end joints of boards are staggered.
7. Install access doors, furnished under separate section, in correct location, plumb or level, flush with adjacent construction, and securely attached to framing.

3.02 TOLERANCES

- A. Install gypsum board flat within 1/8 inch in 10 feet.

3.03 JOINT TREATMENT AND FINISHING

- A. Conform to GA 214 and following.
 1. Apply tape bedding compound, tape, and finishing cement on joints in gypsum board, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fasteners heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for for specified levels of finish.
 2. Apply joint tape over gypsum board joints, except those with trim accessories having flanges not requiring tape.
 3. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.
- B. Level 1:
 1. Embed tape in joint compound.
- C. Levels 2 through 5:
 1. Apply joint cement and finishing cement over screw heads.

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- a. Treat inside corners with joint cement, tape, and finishing cement.
 - b. Treat outside corners with corner beads and finishing cement.
 2. Provide metal casing beads at edges of gypsum board which abut ceiling, wall, or column finish, and elsewhere as required.
 - a. Make exposed joints, trims and attachments non-apparent following application of paint or other finishes.
 - b. Where joints and fasteners are apparent, correct defects as directed.
 3. Seal raw edges of plumbing openings and boards that have been cut to fit with brushed on sealing compound.
- D. Additional Finish Requirements:
1. When entire installation is completed and prior to installation of finish materials by other trades, correct and repair broken, dented, scratched or damaged gypsum board
 2. Levels 3 and 4:
 - a. Apply one coat of high solids primer over entire surface.
 3. Level 5:
 - a. Apply one coat of skim coat of topping compound over entire surface, followed by one coat of high solids primer over entire surface.

3.04 REQUIRED LEVELS OF FINISH

- A. Levels of finish required are as follows, unless otherwise indicated or specified:
1. Level 1:
 - a. Ceiling plenum areas above ceilings, fire-taped areas, insides of shafts, and other concealed areas, unless higher level of finish is required for fire-resistance-rated assemblies.
 2. Level 2:
 - a. Substrate for tile
 3. Level 3:
 - a. Backing for adhered acoustic tile and where textured finish is indicated.
 4. Level 4:
 - a. Exposed, painted gypsum board in utility rooms, corridors and areas receiving vinyl wall covering.
 5. Level 5:

SPECIFICATONS

- a. Exposed, painted gypsum board in restrooms and corridors where semi gloss enamel is used.

3.05 TEXTURE COAT

- A. Spray apply texture coat to interior gypsum board surfaces which are scheduled to receive painted finish, except in food preparation areas.
- B. Apply texture coat creating uniform splatter pattern finish with 80 percent minimum coverage of surface.
- C. Protect interior surfaces of electrical boxes and wiring therein from spray.

3.06 REPAIR OF DAMAGED GYPSUM BOARD

- A. Upon completion of gypsum board installation, examine areas of Work and make necessary repairs as follows:
 - 1. Reset protruding or loose fasteners.
 - 2. For each screw in fractured area or protruding screws, replace with specified screw placed in undamaged area near loose screw.
 - 3. Remove loose gypsum, paper, and joint compound.
 - 4. Refinish to match existing texture.
 - a. Paint entire wall plane.
 - 1) Color to match existing.

3.07 CLEANING

- A. Upon completion, repair damage caused by Work and remove debris, surplus materials and tools of Work from Project Site.
- B. Leave installation clean and ready for finishing.

END OF SECTION 09 29 00

SPECIFICATIONS

SECTION 09 30 00 TILE

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 1 apply to this section.
- B. Section Includes:
 - 1. Ceramic tile.
 - 2. Waterproof membrane for tile.
 - 3. Stone thresholds related to tile.
 - 4. Mortar setting beds for floor tile.
 - 5. Thin set beds for floor and wall tile.
- C. Related Sections:
 - 1. Section 03 30 00: Cast-In-Place Concrete.
 - 2. Section 09 29 00: Gypsum Board
 - 3. Section 07 92 00: Joint Sealants

1.02 SUBMITTALS

- A. Product Data: Manufacturer's data, standard specifications, Material Safety Data Sheets, and other technical information for each product specified.
- B. Material Samples: Manufacturer's standard palette, indicating full range of tile colors, textures, and grout colors.
- C. Mock-Ups: For each type, color, and texture, minimum 1' x 1' or three full tile courses, on Plexiglas to demonstrate proper bond mortar and coverage; grout color, hardness and depth.
- D. Installation Instructions: Manufacturer's preparation and installation instructions.
- E. Product Certificates: Signed by manufacturer certifying that the products furnished comply with requirements of this Specification.
- F. Reference Methods: Copies of TCA and ANSI Methods.

1.03 QUALITY ASSURANCE

- A. Comply with applicable parts of the following codes or standards as a minimum requirement:

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1. ANSI A108, American National Standard Specifications for the Installation of Ceramic Tile.
 2. ANSI A118, American National Standard Specifications for Ceramic Tile Installation Materials.
 3. ANSI A137.1, Standard Specifications for Ceramic Tile.
 4. ASTM A 185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 5. ASTM C 144 - Aggregate for Masonry Mortar.
 6. ASTM C 150 - Portland Cement.
 7. ASTM C-144 – Sand.
 8. ASTM C 206 - Finishing Hydrated Lime.
 9. ASTM C-206 or C 207 - Hydrated Lime for Masonry Purposes.
 10. ASTM C 645 - Nonstructural Steel Framing Members.
 11. ASTM C 1028 - Determining the Static Coefficient of Friction of Ceramic Tile and other like surfaces by the Horizontal Dynamometer Pull-Meter Method.
 12. ASTM D 4551 - Poly Vinyl Chloride (PVC) Plastic Flexible Concealed Water-Containment Membrane.
 13. Tile Council of America (TCA) – Handbook for Ceramic Tile installation.
- B. Grade Certificate and Labeling: With each delivery of tile, furnish manufacturer's "Master Grade Certificate" to the Project Inspector.
- C. Laboratory Testing: Tile shall be tested for compliance with ASTM C 1028.
- D. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.
- E. Comply with all requirements of 2007 California Building Code and ADA.
- F. Qualifications of Tile Manufacturer: Company specializing in ceramic tile, mosaics, pavers, trim units, and thresholds with five years minimum experience. Obtain tile from a single source with resources to provide products of consistent quality in appearance and physical properties.
- G. Qualification of Installation System Manufacturer: Company specializing in installation systems/ mortars, grouts/ adhesives with ten years minimum experience. Obtain products from single source manufacturer to insure consistent quality and compatibility.
- H. Qualifications of Installer: Company specializing in installation of ceramic tile, mosaics, pavers, trim units and thresholds with five years experience with installations of similar scope, materials, and design.
- I. Pre-Construction Meetings:
1. Prior to start of the Work of this section and after approval of submittals, schedule an on-site meeting with the Contractor, Owner, Architect, and representatives of the material manufacturer and tile installer to review construction conditions and Drawings for conformance with the requirements of this specification for each substrate.
 2. Prior to laying tile and after surfaces to receive tile are installed (mortar beds, backing boards, joint separators) and after testing of waterproof membrane, schedule an on-site meeting with the Contractor, Owner, Architect, Project

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Inspector and representatives of the material manufacturer and tile installer to review tile, tile installation materials, and finishing equipment for conformance with the requirements of this specification.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver tile in sealed containers, with manufacturer's labels intact.
- B. Deliver other products in manufacturer's unopened containers.
- C. Keep all materials clean and dry.

1.05 MAINTENANCE

- A. Extra Materials: Provide a minimum of 5 percent of each type and color of tile and accessory shapes, from the same run or lot as the installed tile, in manufacturers' cartons and labeled.

1.06 WARRANTY

- A. Manufacturer shall provide a 5-year material warranty.
- B. Installer shall provide a 5-year labor warranty.
- C. For waterproofing, manufacturer shall provide a 10-year material warranty for waterproofing installation, tile setting, and grouting materials.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Tile: To establish quality, the Specification is based on ANSI A.137.1 Standard Grade by Dal-Tile Corporation. Equivalent tile products from the following manufacturers may be provided:
 - 1. Dal-Tile Corporation
 - 2. American Olean Company.
 - 3. Owner approved equal.
- B. Installation Materials: To establish quality, the specification is based on setting and waterproofing materials and methods by Laticrete International, Inc. Equivalent products and methods of the following manufacturers may be provided:
 - 1. Laticrete International, Inc.
 - 2. Custom Building Products
 - 3. Mapei
- C. Colors, Textures, and Patterns: Tile from manufacturer's standard product line, 90% from price group 2, 10% from price group 3, except as indicated otherwise. Tile trim

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and accessories shall match adjoining tile. Grout color shall match tile unless otherwise indicated.

- D. Tile sizes: Tile sizes specified are modular dimensions unless otherwise indicated.

2.02 TILE

A. Unglazed Ceramic Floor Tile:

1. Size:
 - a. Field Tile: 20 inch by 20 inch
 - b. Accent Tile: 4 inch by 4 inch.
2. Colors and patterns as selected by Architect from price groups specified.
3. Slip Resistance: Resistant to slipping appropriate to the installed conditions of use, as required by the 2010 California Building Code and ADA.
 - a. Ceramic tile flooring demonstrating a coefficient of friction of at least 0.6 per ASTM C1028 will be accepted as meeting the intent of slip resistance. CBC 1124B.1/ADA Standards 4.5.1.
 - b. For tile in shower and locker areas, incorporate grit into tile to increase slip resistance.

B. Ceramic Wall Tile:

1. Size: as indicated by Architect.
2. Colors and patterns as selected by Architect.

C. Trim:

1. Integral bullnose at external corners.
2. Provide bullnose where tile projects from jamb.

2.03 INSTALLATION MATERIALS

- A. Mortar Sand: ASTM C 144.
- B. Portland Cement: ASTM C 150, Type I or II.
- C. Hydrated Lime: ASTM C 207, Type S; or ASTM C 206.
- D. Portland Cement Mortar: ANSI 108.1B
- E. Latex Portland Cement Mortar: Sand-cement mortar mix gauged with Laticrete 38 Acrylic Admix or Custom Building Products Acrylic Mortar Admix.
- F. Latex Portland Cement Mortar for Shower Areas: Laticrete 226 Thick Bed Mortar Mix Gauged with Laticrete 3701 Mortar and Grout Admix.
- G. Latex Portland Cement Bond Mortar: Laticrete 317 Floor & Wall Thinset gauged with Laticrete 3701 Admix, or Custom Building Products Master Blend mixed with Acrylic Mortar Admix.

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- H. Latex Portland Cement Bond Mortar over Waterproof Membrane: Laticrete 317 Floor & Wall Thinset gauged with Laticrete 3701 Admix.
- I. Waterproof Membrane: Thin, cold-applied, single component liquid with embedded reinforcing fabric equal in performance characteristics to Laticrete 9235 Waterproof Membrane.
- J. Latex Portland Cement Grout: Laticrete Sanded Grout (1500 Series) or Unsanded Grout (1600 Series, for joints smaller than 1/8").
- K. Epoxy Grout for Floors: Laticrete SP-100 Stainless Epoxy Grout for Floors and Walls (Series 700).
- L. Cleavage Membrane and Wall Backing Paper: ASTM D 226, Type I (No. 15) 15-pound asphalt-saturated felt.
- M. Separation Material (for all caulked joints including perimeters and quarry-tile fields of floor mortar beds): Quality Foam, QF 200 white, 3/8" wide x 5" high.
- N. Backer Rod for sealants (for ceramic mosaic fields): Polyethylene foam, closed-cell, flexible and compressible, 3/16" diameter.
- O. Cleaner and Sealer:
 - 1. Cleaner and sealer shall be from one manufacturer, acceptable to tile and grout manufacturers. To establish quality, the Specification is based on Aqua Mix Inc. Equivalent products from Miracle Sealants Co. or Watco Tile and Brick may be provided.
 - 2. Cleaner: Aqua Mix Concentrated Tile Cleaner, neutral phosphate-free cleaner, or Custom Building Products Tile Lab Concentrated Tile/ Stone Cleaner.
 - 3. Sealer: Aqua Mix Penetrating Sealer, fungus- and bacteria-resistant, stain-resistant, and slip-resistant as specified for tile, or Custom Building Products Tile Lab Surface Gard.
- P. Sealant:
 - 1. Sealant and primer shall be from one manufacturer, acceptable to tile and grout manufacturers. To establish quality, the Specification is based on the following products. Equivalent products from other approved manufacturers may be provided (see Section 07920, Joint Sealants).
 - 2. Sealant for Ceramic Mosaic Tile: Pecora 898 Silicone Sanitary Sealant or Laticrete Latasil NS.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Examine substrates, areas, and conditions where tile will be installed for compliance with requirements for installation tolerances and other conditions affecting performance

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of installed tile. Verify that all vents, drains, piping, and other projections through substrate have been installed. Proceed with Work only after all conditions are in compliance.

- B. Verify that substrates for setting tile are firm; dry, clean and within flatness tolerances required by relevant ANSI A108 tile installation standards. Prepare surfaces as follows:
 - 1. Concrete Floors: Allow concrete floors to cure for 28 days minimum before beginning tile and grout installation. Remove laitance, sand, dust, and loose particles with air blast. If coatings remain, including curing compounds and other substances that contain soap, wax, oil, or silicone and are incompatible with tile-setting materials, remove them by using a terrazzo or concrete grinder, a drum sander, a polishing machine equipped with a heavy-duty wire brush, or a shot-blast system.
 - 2. Plywood Subfloors: Before installing mortar setting bed over plywood sub-floors, install cleavage membrane over the sub-floor. Anchor firmly in place and lap joints 6 inches minimum. Turn up 6 inches at walls, beneath building felt on walls.
 - a. Cleavage Membrane:
 - 1) No. 15 (16.9 kg) asphalt saturated felt, ASTM D226, Type 1.
 - 2) Polyethylene film, ASTM D4397, 4.0 mil thickness.
- C. Substrates to receive wall tile and base shall be:
 - 1. Scratch coat of cement plaster, required in student restrooms, showers and locker rooms, and quarry tile bases.
 - 2. Cementitious backing panels, as specified in Section 09250: Gypsum Board.
- D. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical items of Work, and similar items located in or behind tile have been completed before installing tile.
- E. Verify that joints and cracks in tile substrates are coordinated with tile caulked- joint locations; if not coordinated, adjust as required by the Architect.
- F. Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.
- G. Protect adjacent surfaces during progress of the Work of this section.

3.02 TILE INSTALLATION, GENERAL

- A. Install tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are the same size. Lay out Work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
- B. For tile mounted in sheets, install joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished Work.

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- C. Extend Work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate Work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Locate expansion, control, contraction or isolation joints and other sealant-filled joints, directly above joints in concrete substrates, at horizontal and vertical changes in plane, or where indicated during installation of mortar beds. In quarry tile floors, provide at 12 feet on center maximum. Use foam to provide 3/8-inch width. Do not saw-cut joints after installing tiles.
- F. Prepare and clean joints to be caulked, and apply sealants to comply with requirements of Section 07920, Joint Sealants.
- G. Conform to manufacturers printed instructions, and applicable requirements of ANSI and TCA Standards.

3.03 TILE INSTALLATION, FLOOR

- A. Install reinforcing and latex Portland-cement mortar setting bed over cured concrete slab or cleavage membrane on plywood floor. Lap reinforcing at least one full mesh, and support or lift so that it is approximately in the middle of mortar bed. Do not abut against vertical surfaces. Install foam separation material at perimeters and expansion joint locations for caulked joints.
- B. Mix setting mortar in accordance with ANSI A.108.1a.2.2.
- C. Once begun, mortar installation must continue until room is completely filled. Discard any batch not floated and finished within ½ hour of mixing. Firmly compact before screeding. Screed to true plane and pitch as indicated. Slope mortar bed sufficiently that water flows to
drain and no puddling will occur. Slope mortar down to floor drains for proper installation of waterproof membrane. After screeding, firmly rub down with steel or wood float.
- D. Cure mortar bed with a light fog spray of water and cover with 6-mil Visqueen for 72 hours.
- E. Waterproof Membrane:
 - 1. Install waterproof membrane where indicated and in all kitchen, toilet, shower, and locker areas per TCA Standard F122-02. Extend membrane up wall mortar or backing board as follows:
 - a. 6 inches minimum, or 3 inches above top of curb wall.
 - b. In shower rooms, to ceilings.
 - 2. Insure that all layers of membrane are fully inserted into clamping ring of floor drain.

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After membrane installation and before tile setting, install pea gravel around sub drain to prevent blockage of weep holes and place mortar to proper level for setting tile.

3. Before setting tile and after seven (7) days curing, water test the membrane by damming drains and doors, filling floor with water to 4-inch minimum depth, and leaving for 24 hours. Correct any leaks and re-test before proceeding. After testing, protect membrane from traffic until tile Work begins.

F. Install tile over properly cured setting bed or waterproof membrane utilizing "thin-set" method with latex Portland cement bond mortar, in accordance with manufacturer's printed instructions and ANSI A108.5. Confirm substrate is completely clean and free of dust. Cut foam at floor perimeters flush with top of mortar bed. Insure that bond coats do not intrude into joints to be caulked.

G. Minimum coverage of bond mortar shall be 80% except 95% in shower areas, for quarry tile, and exterior installations. Place tile into fresh mortar and move and press or beat in tile to insure full contact. Before setting proceeds, set and remove three tiles or sheets of tiles to confirm specified coverage of bond mortar. If coverage is insufficient, utilize a larger toothed trowel or back butter tiles until proper coverage is provided.

H. Install tile on floors with the following joint widths:

1. Ceramic Tile: 1/16 to 1/8 inch.

3.04 TILE INSTALLATION, WALLS

A. Install wall mortar beds before floor mortar beds.

B. On plaster walls, clean scratch coat surface of loose or foreign materials, fog spray with water, and install brown coat mortar bed over scratch coat to a thickness not less than 3/8" and not greater than 3/4 inch. Once started, wall mortar installation must continue until wall is completely floated. Discard any batch not floated and finished within ½ hour of mixing. As soon as wall mortar is dried to sufficient hardness but still in a plastic condition, firmly rub down with wood float and scribe all plane interfaces the full depth.

C. Cover cure with 40 wt. Kraft paper for 72 hours minimum.

D. Install tile over properly cured setting bed, waterproof membrane, or cementitious backing panels utilizing "thin-set" method with latex Portland cement bond mortar, in accordance with manufacturer's printed instructions and ANSI A108.5. Confirm substrate is completely clean and free of dust. Insure that bond coats do not intrude into joints to be caulked.

E. Minimum coverage of bond mortar shall be 80% except 95% in shower areas or exterior installations. Set and test as specified for floors.

F. Lay out the Work so tiles will be centered on each wall or section of wall in order to minimize tile cuts. Lay out tile wainscots to next full tile beyond dimensions indicated. Spot setting bed with mortared tile, set plumb and true, to accurately indicate plane of finished tile surfaces.

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- G. Install tile on walls with following joint widths:
 - 1. Glazed Wall Tile: 1/16 inch.
- H. Horizontal joints shall be level, vertical joints plumb with surfaces true and plumb, edges of tiles flushed.
- I. Rub exposed cuts smooth with a fine stone; no cut edge shall be set against a fixture or adjoining surface without a 1/16 inch joint to be caulked.
- J. Install access doors where required, furnished under another section, in correct location, plumb or level, flush with adjacent construction, and securely fastened to framing.

3.06 GROUTING

- A. Prior to starting, ensure that all wall and floor tile surfaces are clean and any excessive bond mortar is scraped and vacuumed from joints (approximately 2/3 depth of tile should be open for grouting). Follow manufacturer's instructions for mixing grout. Once grout Work commences, proceed until complete wall or floor area is finished utilizing one batch of grout.
- B. Latex Portland cement grouting: Dampen tile surface and joints with water using sponge, but leaving no puddles in joints. Force grout into joints using sufficient pressure on rubber float so as to fill joints completely, and scrape excess grout off tile surface with rubber float. Smooth or tool grout to uniform joint finish. Do not over water.
- C. Curing latex Portland cement grout: Remove final grout haze with clean soft cloth, and cover with 40-weight Kraft paper to cure. Leave paper in place for protection. Cover wall surfaces with 40-weight Kraft paper for 72 hours.

3.07 CLEANING AND SEALING

- A. If grout scum is not visible on tile surface after curing, clean tile surface with clear water. Remove and replace cracked, broken or defective Work with proper material.
- B. If, when curing membrane is removed, grout scum is visible on tile surface, follow this cleaning method:
 - 1. Immediately recover floor with paper or felt and allow to continue curing for a minimum of 14 days. Uncover floor and maintain entire tile surface saturated with clean cool water for not less than 2 hours.
 - 2. Utilize a neutral cleaner acceptable to manufacturers of tile and grout, and follow manufacturer's instruction. Do not provide generic acid cleaners.
 - 3. Wet tile floors and apply cleaning solution to floor surface, then scrub with a brush. Rinse area several times with clean water to flush solution off floor surface.
- C. Apply penetrating sealer in accordance with manufacturer's instructions utilizing a dense sponge applicator, paint pad, sprayer or brush. Avoid overlapping, puddling, and rundown.

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Completely wipe surface dry within 3 to 5 minutes using cotton or paper towels. Do not allow sealer to dry on tile. After 2 hours, test surface by applying water droplets to surface. If water is absorbed, apply a second coat. Avoid surface traffic for 24 hours.

3.08 CAULKING

- A. Insure joints to be caulked are free and clear of all setting and grouting materials and construction debris. Do not permit any foot traffic on installed caulking for a minimum of 48 hours or protect with hardboard strips.
- B. Install in accordance with Section 07920: Joint Sealants.

3.09 PROTECTION

- A. Admit no traffic where tile is installed until mortar and grout has set for a minimum of 72 hours.
- B. Protect the Work of this section until Substantial Completion.

3.10 CLEAN UP

- A. Remove and legally dispose of rubbish, debris, and waste material off the Project site.

END OF SECTION 09 30 00

SPECIFICATIONS

SECTION 09 91 00 PAINTING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Surface preparation, priming, and field painting of following:
 - a. Exposed exterior and interior items and surfaces as indicated.

B. Related Sections:

1. Section 09 29 00: Gypsum Board

C. Related Requirements:

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

1.02 REFERENCES

A. California Air Resources Board (CARB):

1. South Coast Air Quality Management Owner (SCAQMD):
 - a. Rule 1113 – Architectural Coatings
 - b. Rule 1168 – Adhesive and Sealant Applications

B. California Department of Public Health (CDPH):

1. Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.2 – 2017

C. United States Environmental Protection Agency (EPA):

1. 40 CFR Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings
 - a. Method 24 – Surface Coatings

D. The Society of Protective Coatings (SSPC):

1. SSPC-SP 1 – Solvent Cleaning.

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2. SSPC-SP 2 – Hand Tool Cleaning.
3. SSPC-SP 3 – Power Tool Cleaning.
4. SSPC-SP 6 – Commercial Blast Cleaning (NACE No. 3)
5. SSPC-SP 7– Brush-off Blast Cleaning.(NACE No. 4)

1.03 DEFINITIONS

A. Paint – As used in this Section:

1. Means coating systems materials, including primers, emulsions, enamels, stains, sealers, and other applied materials whether used as prime, intermediate, or finish coats.

1.04 SYSTEM DESCRIPTION

A. Paint exposed surfaces except where material is obviously intended and specifically noted as surface not to be painted:

1. Where items or surfaces are not specifically mentioned, paint item or surface same as adjacent similar materials or surfaces whether or not schedules indicate colors.
 - a. When system, color, or finish is not designated, Architect will select from standard colors and finishes available.
2. Refer to Finish Schedules and notations on Drawings.
3. Painting Includes:
 - a. Field painting of exposed bare and covered pipes, ducts (including color coding), and hangers.
 - b. Exposed steel and iron work.
 - c. Conduit, and metal surfaces of mechanical and electrical equipment as indicated.
 - d. Exposed piping, ductwork, equipment, and other such items as designated or required.

B. Work Not to be Painted:

1. Do not include painting when factory finishing or installer finishing is specified for such items as, but not limited to, following:
 - a. Acoustic materials
 - b. Decorative laminate casework
 - c. Natural finished wood casework.
 - d. Aluminum with shop-applied finish.
 - 1) Includes high performance coatings and anodizing.
 - e. Stainless steel, chromium plate, brass, bronze and similar finish materials.

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- f. Factory-finished mechanical and electrical equipment including light fixtures, switchgear and distribution cabinets.
- 2. In general, following items will not require finishing unless specifically specified, scheduled, or indicated:
 - a. Exterior aluminum and galvanized components of modular buildings.
 - b. Flexible conduit connections to equipment, miscellaneous nameplates, stamping, and instruction labels and manufacturer's data.
 - c. Do not paint moving parts of operating units, including, but not limited to:
 - 1) Mechanical and electrical parts, such as valves and damper operators, linkages, sensing devices, motor and fan shafts.
 - d. Do not paint over code required labels, such as Underwriters' Laboratories and Factory Mutual, or equipment identification, performance rating, name, or nomenclature plates.
 - e. Finish Hardware, except prime coated items.
 - f. Concealed Surfaces:
 - 1) Painting is not required on wall or ceiling surfaces in concealed areas and inaccessible areas, such as furred areas, pipe spaces, duct shafts, and elevator shafts, as applicable to Project.
 - g. Exterior concrete and masonry
 - h. Exterior aluminum and galvanized components of modular buildings.
- 3. Portland Cement Plaster:
 - a. Unless direct otherwise by Architect at request of Owner, do not paint following:
 - 1) Integrally colored polymer-modified (acrylic) finish.
 - 2) Integrally colored Portland cement plaster (stucco) finish,
 - b. In lieu of painting, apply fog coat to integrally colored Portland cement plaster in accordance with plaster specification section.
 - c. When directed to paint Portland cement plaster, refer to Schedule of Exterior Paint Systems in this Section for appropriate paint system.

C. Shop Priming:

- 1. Unless otherwise specified, shop priming of ferrous metal items is included under various sections for metal fabrications, hollow metal work and similar items.

1.05 SUBMITTALS

A. Product Data:

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1. Provide for each paint system specified; include primers.
2. Material List:
 - a. Provide inclusive list of required coating materials:
 - 1) Indicate each material and cross-reference specific coating, finish system, and application.
 - 2) Identify each material by catalog number and general classification.
 - 3) In addition to manufacturer's name, product name and number, include following:
 - a) Primers, thinners, and coloring agents.
 - b) Manufacturers' catalog data fully describing each material as to content, recommended installation, and preparation methods.
 - b. Identify surfaces to receive various paint materials.
3. Manufacturer's Information:
 - a. Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
4. Certification by manufacturer that products supplied comply with local regulations controlling use of Volatile Organic Compounds (VOC).

B. Samples:

1. After receipt of Architect's Color Schedule, submit following for Architect's review for color and texture only:
 - a. Draw-Downs:
 - 1) Manufacturer-produced draw-downs for each color sample required
 - b. Stepped Samples:
 - 1) Defining each separate coat, including primers.
 - 2) Use representative colors when preparing samples for review.
 - 3) Resubmit until required sheen, color, and texture are achieved.
2. Furnish list of materials and applications for each coat of each sample.
 - 1) Label each sample for location and application.
3. Furnish minimum of four 8-1/2 by 11 inch painted samples of each color and material, with texture to simulate actual conditions.
 - a. On Metal – Provide minimum of four 4 by 8 inch samples for each type of finish and color, defining prime and finish coat.
 - b. Do not proceed with painting work until color samples have been accepted.

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C. Field Samples:

1. When and as directed by Architect, apply one complete coating system for each color, gloss and texture required.
2. When approved, sample panel areas will be deemed incorporated into Work and will serve as standards by which subsequent Work of this Section will be judged.

D. Environmental Certifications:

1. Certificates for EQ Low-Emitting Materials:
 - a. Interior Paints and Coatings applied on Site.
 - b. Interior Adhesives and Sealants applied on Site

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project Site in original, new, and unopened packages and containers bearing manufacturer's name and label, and following information:

1. Name or title of material.
2. Product Description (Generic Classification or Binder Type).
3. Federal Specification number, if applicable.
4. Manufacturer's stock number and date of manufacture.
5. Manufacturer's name
6. Contents by volume, for major pigment and vehicle constituents.
7. Thinning instructions.
8. Application instructions.
9. Color name and number.
10. VOC Content
11. Concurrently provide local representative of approved paint products with copies of invoices of purchased materials.

B. Storage and Mixing of Materials:

1. Store and mix paint materials in single suitable place in compliance with health and fire regulations.
2. Open and mix ingredients on premises in presence of Project Inspector.
3. Maintain such storage spaces clean and neat.
4. Remove oily rags, waste, and like materials from building each night and take every precaution to avoid danger of fire.

1.07 PROJECT CONDITIONS

- A. Apply primers and paints only when temperature of surfaces to be painted and surrounding air temperatures are within range permitted by paint manufacturer's printed instructions.
- B. Do not apply paint in rain, fog, mist or to damp or wet surfaces; or when relative humidity exceeds 85 percent, unless otherwise specified by paint manufacturer.

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- C. Do not apply paint, interior, or exterior, when temperature is below 50 degrees F or above 90 degrees F, or when dust conditions are unfavorable for application.
- D. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature ranges specified by paint manufacturer during application and drying periods.
- E. Painting Work by Other Trades:
 - 1. Examine Drawings and Specifications, including requirements specified in other sections for painting work by other trades.
 - 2. Notify Architect in writing of conflicts between Work of this Section and that of other trades and sections, and errors, omissions, or impractical requirements.
 - 3. Paint or finish surfaces that are left unfinished by requirements of their specification as Work of this Section.

1.08 REGULATORY REQUIREMENTS

- A. Codes and Standards:
 - 1. Conform work and materials to regulations of State Fire Marshal, Safety Color Coding in conformance with OSHA, Cal/OSHA, and local or State Ordinances having jurisdiction.
 - a. Conform to most stringent requirements and authorities having jurisdiction.
- B. Comply with applicable codes and regulations of governmental agencies having jurisdiction including those having jurisdiction over airborne emissions and industrial waste disposal.
 - 1. Where those requirements conflict with this Specification, comply with more stringent provisions.
 - 2. Regulatory changes may affect formulation, availability, or use of specified coatings.
 - a. Confirm availability of coatings to be used prior to Project bid and before start of painting on Project.
 - 3. Comply with current applicable regulations of following:
 - a. California Air Resources Board (CARB)
 - b. South Coast Air Quality Management Owner (SCAQMD)
 - c. California Department of Public Health (CDPH)
 - d. U.S. Environmental Protection Agency (EPA), as applicable.

1.09 MAINTENANCE STOCK

- A. Upon completion of Work of this Section, deliver to Owner, extra stock consisting of one gallon of each color, type, and gloss of finish (topcoat) paint used in Work.

SPECIFICATIONS

1. Tightly seal each container and clearly label contents and location where used.

PART 2 PRODUCTS

2.01 MATERIAL QUALITY

- A. Provide best quality commercial grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers.
 1. Materials not displaying manufacturer's identification as standard, best grade product will not be acceptable.
- B. Single-Source Responsibility:
 1. Obtain products of only one paint manufacturer unless otherwise specified or approved.
 - a. Obtain primers, thinners, coloring agents, and catalysts for each painting system from same manufacturer as finish coats, or as approved for use by manufacturer of paint, except for materials furnished with shop prime coat by other trades.
 - b. Use approved thinners only within recommended limits.
 - c. Factory mix paint materials to correct color, gloss, and consistency for installation to maximum extent feasible.
- C. Factory mix paint materials to correct color, gloss, and consistency for installation to maximum extent feasible.
- D. Do not use paints in Work which have been packaged longer than six months, except when such products are known to have long package stability when unopened and only when guaranteed by manufacturer.

2.02 MANUFACTURERS

- A. Manufacturer's catalog names and numbers as listed are used to aid in establishing kind and quality of material required and are not used as indication of color desired.
- B. Opaque Paint Finish Materials:
 1. Basis-of-Design:
 - a. Paint Systems specified are products of Dunn-Edwards Corporation, Los Angeles, CA, unless indicated otherwise.

2.03 SOURCE QUALITY CONTROL

SPECIFICATIONS

- A. Obtain paint materials of each paint manufacturer for specified systems, as accepted by Architect.
 - 1. Furnish materials as supplied from paint manufacturer's branded paint store or manufacturer-approved dealer.
 - 2. Furnish copies of invoices from paint supplier to manufacturer's representative and Architect.
 - a. Furnish to Owner when requested.

2.04 COLORS AND FINISHES

- A. Surface treatments and finishes are shown on Drawings and indicated in Schedules on Drawings.
 - 1. Paint colors are shown on Architect's Color Schedule.
- B. Colors required or listed by Architect are not necessarily stock colors available in one particular manufacturer's range.
 - 1. Non-availability of colors selected by Architect will be sufficient reason to disqualify manufacturer not capable of providing such colors.
- C. Paint Coordination:
 - 1. Provide finish coats which are compatible with prime paints used.
 - 2. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates.
 - 3. Upon request from other subcontractors, furnish information on characteristic of specified finish materials, to ensure that compatible prime coats are used.
 - 4. Provide barrier coats over incompatible primers or remove and reprime as required.
 - 5. Notify Architect in writing of anticipated problems using specified coating systems with substrates primed by others.

2.05 PAINTABLE CAULK

- A. Acrylic latex, one-part, non-sag, mildew resistant, non-bleeding and non-staining, acrylic emulsion component compound conforming to ASTM C 834, Type OP, Grade NS, formulated to be paintable.
 - 1. For use as interior caulk in nonworking joints only.
 - 2. Must be able to accommodate joint movement of not more than 5 percent in both extension and compression for total of 10 percent.
 - 3. Backup and Bond Breaker: Products recommended by caulking manufacturer.
 - 4. Provide one of following products:
 - a. AC-20: Pecora Corporation.

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- b. Bostik Home Painter's Caulk: Bostik Construction Products.
 - c. GE RCS20: Momentive Performance Materials.
- 5. VOC compliant per SCAQMD Rule 1168.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint.
 - 1. Do not begin paint application until unsatisfactory conditions have been corrected and surfaces scheduled to receive paint are thoroughly dry.
- B. Starting of painting will be construed as applicator's acceptance of surfaces and conditions within particular area.

3.02 SURFACE PREPARATION

- A. Clean and prepare surfaces to be painted following paint manufacturer's written instructions and as specified, for each particular substrate condition.
- B. Clean surfaces to be painted before applying paint or surface treatments.
 - 1. Remove oil and grease prior to mechanical cleaning.
 - 2. Program cleaning and painting so contaminants from cleaning process will not fall onto wet, newly painted surfaces.
 - 3. Cover surfaces and equipment as necessary to prevent contaminants from cleaning process from falling onto equipment.
- C. Clean floors and surfaces in room being painted of loose dirt and dust before painting is started.
- D. Moisture Content:
 - 1. Measure moisture content of surfaces using electronic moisture meter.
 - 2. Do not apply finishes unless moisture content of surfaces are below maximum levels specified, or as otherwise recommended by manufacturer.
- E. Remove hardware, hardware accessories, switch and receptacle plates, surface-mounted lighting fixtures, escutcheons and plates, surface-mounted equipment, free-standing equipment blocking access to painted surfaces, and other items as required prior to surface preparation and painting operations.
 - 1. Following completion of painting of each space or area, reinstall removed items.
- F. Provide barrier coats over incompatible primers or remove and reprime.

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G. Gypsum Board:

1. Remove dust, loose particles or other matter that would prevent proper paint adhesion.
2. Check to see that joints and screw heads have been properly covered with joint compound and sanded smooth and flush with adjacent surfaces.
3. Before finishing untextured smooth gypsum board, use damp sponge along edge of joints where nap of paper has been raised by sanding.

H. Wood:

1. Ensure that surfaces are clean and dry.
2. Sandpaper wood (except saw-textured wood, when specified) smooth to provide even surface and then dust off and wipe clean.
3. Touch up knots and pitch pockets with shellac on interior wood.
4. After priming coat has been applied, thoroughly fill nail holes, irregularities and cracks using plastic wood filler for stained or natural finish, and putty for painted work.

I. Ferrous Metals:

1. Clean ungalvanized ferrous metal surfaces that have not been shop coated or are not otherwise specified to receive high performance coatings.
2. Remove oil, grease, dirt, loose mill scale, and other foreign substances.
3. Use solvent (SSPC SP-1) or mechanical cleaning methods (SSPC SP-2 and SP-3) that comply with The Society for Protective Coatings (SSPC) recommendations.
4. Where rust or scale is present, wire brush and sandpaper clean.
5. Clean field welds and abraded portions of field welded and erected ferrous metal components.

J. Galvanized Surfaces:

1. When indicated to be painted, clean galvanized surfaces with non-petroleum-based solvents complying with SSPC SP-1, so surface is free of oil and surface contaminants.
 - a. When necessary, brush blast surfaces complying with SSPC SP-7 to remove burrs and rough spots.
2. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
3. Spot prime field connections, welds, soldered joints, and burned and abraded portions.
4. Sand or etch factory finished surfaces indicated to be repainted to increase adherence of finish coats.

K. Paintable Caulk Installation:

1. Comply with general sealant installation requirements in Section 09 9200.
2. Use only for caulking of followings joints in dry areas:

SPECIFICATIONS

- a. Perimeter caulking of:
 - 1) Interior door frames.
 - 2) Casework not subject to moisture.
- 3. Joint Design:
 - a. Width of joint should be approximately 12 times anticipated movement and fall within range of 1/4 inch to 3/4 inch

3.03 MATERIAL PREPARATION

- A. Mix and prepare painting materials in field following manufacturer's directions.
- B. Store materials not in actual use in tightly covered containers.
 - 1. Maintain containers used in storage, mixing and application of paint in clean condition, free of foreign materials and residue.
- C. Stir materials before application to produce mixture of uniform density:
 - 1. Stir as required during application.
 - 2. Do not stir surface film into material.
 - 3. Remove film and, if necessary, strain material before using.

3.04 APPLICATION

- A. Apply paint following manufacturer's directions.
 - 1. Use applicators and techniques best suited for substrate and type of material being applied.
 - 2. Mix to proper consistency.
 - 3. On brush-applied work, brush out smooth leaving minimum of brush marks, with paint uniformly flowed on.
- B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, and conditions otherwise detrimental to formation of durable paint film.
- C. Apply paint to clean, dry, prepared surfaces only.
 - 1. Apply paint material evenly, smoothly flowed on without runs, sags, or holidays.
- D. Provide finish coats compatible with primers used.
- E. Minimum Coating Thickness:
 - 1. Apply each material at not less than manufacturer's recommended spreading rate, to provide a total dry film thickness of not less than 5.0 mils for entire coating system of prime and finish coats for 3 coat work.

SPECIFICATIONS

2. Provide total dry film thickness of not less than 3.5 mils for entire coating system of prime and finish coat for 2 coat work.
- F. Number of coats and film thickness required is same regardless of application method.
1. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
 2. Sand between applications where sanding is required to produce even smooth surface following manufacturer's directions.
- G. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance.
1. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive dry film thickness equivalent to that of flat surfaces.
 2. Number of coats specified herein are minimum to be applied.
 - a. Apply additional coats in event full coverage is not obtained or required total thickness of paint does not comply with mil thickness recommended by paint manufacturer.
- H. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
- I. Included Work:
1. Finish tops, bottoms, and edges of doors same as balance of door.
 2. Where walls are specified to be painted, include columns, arrises, reveals, soffits, returns, and like surfaces.
- J. Priming:
1. Where shop coats and touch-up painting are specified under other sections of Work, omit prime coat.
- K. Completed Work:
1. Match approved samples for color, texture, and coverage.
 2. Remove, refinish, or repaint work not in compliance with specified requirements.
- 3.05 CLEANING AND PROTECTION
- A. Cleaning:
1. At end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from Project Site.
 2. Remove paint, varnish and brush marks from glazing material
 3. Upon completion of painting work, wash and polish glazing material both sides.

SPECIFICATIONS

- a. Remove and replace glazing material, which has been damaged by painting operations, with new material.
4. Comply with additional cleaning requirements specified in Section 01 74 23.
- B. Protection:
 1. Protect work of other trades, whether to be painted or not, against damage by painting.
 2. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
- C. Protect floors and adjacent surfaces from paint smears, spatters, and droppings:
 1. Use dropcloths to protect floors.
 2. Cover fixtures and mask off areas where required.
- D. Provide "Wet Paint" signs and barricades to protect newly painted finishes.
 1. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
- E. At completion of work of other trades, touch-up and restore damaged and defaced painted surfaces.

3.06 PAINT SYSTEM SCHEDULES – GENERAL

- A. Provide following paint systems for substrate indicated.
 1. Products must meet or exceed current applicable regulations of agencies listed in Regulatory Requirements Article.

3.07 SCHEDULE OF EXTERIOR PAINT SYSTEMS

- A. Paint System Type 1:
 1. Type and Gloss: 100 percent Acrylic, Flat
 2. Use: Portland Cement Plaster
 - a. Primer (1st Coat):
 - 1) SLPR00-2-WH SUPER-LOC Premium
 - b. 2nd and 3rd Coats:
 - 1) EVSH10-2 EVERSIELD Exterior Flat
- B. Paint System Type 2:
 1. Type and Gloss: 100 percent Acrylic, Eggshell

SPECIFICATIONS

2. Use: Portland Cement Plaster

a. Primer (1st Coat):

1) SLPR00-2-WH SUPER-LOC Premium

b. 2nd and 3rd Coats:

1) EVSH30-3 EVERSIELD Exterior Eggshell

C. Paint System Type 4:

1. Type and Gloss: 100 percent Acrylic, Flat

2. Use: Concrete Masonry Units (CMU)

a. Primer (1st Coat):

1) SBPR00 Smooth BLOCFIL Premium

b. 2nd Coat:

1) SSSL 10 SPARTASHIELD Flat

D. Paint System Type 5:

1. Type and Gloss: 100 percent Acrylic, Semi-Gloss

2. Use: Concrete Masonry Units (CMU)

a. Primer (1st Coat):

1) SBPR00 Smooth BLOCFIL Premium

b. 2nd and 3rd Coats:

1) SSSL50 SPARTASHIELD Semi-Gloss Exterior Semi-Gloss

E. Paint System Type 6:

1. Type and Gloss: 100 percent Acrylic, Flat

2. Use: Brick Masonry, Concrete

a. Primer (1st Coat):

1) ESPR00 EFF-STOP Premium

b. 2nd Coat:

1) EVSH10 EVERSIELD Exterior Flat Ultra Premium

F. Paint System Type 7:

1. Type and Gloss: Enamel, Semi-Gloss.

SPECIFICATIONS

2. Use: Wood, Wood Doors, Medium Density Overlay (MDO) Doors
3. Application Method on Doors: Shortnap roller
 - a. Primer (1st Coat):
 - 1) EZPR00 E-Z PRIME Premium
 - b. 2nd and 3rd Coats:
 - 1) ASHL50 ARISTOSHIELD Interior/Exterior Ultra Premium

G. Paint System Type 9:

1. Type and Gloss: 100 percent Acrylic, Flat
2. Use: Galvanized Metal, Aluminum
 - a. Pretreatment:
 - 1) SC-ME-01 Krud Kutter Metal Clean & Etch
 - b. Primer (1st Coat):
 - 1) UGPR00 ULTRA-GRIP Premium, *or*
 - 2) ULGM00-WH ULTRASHIELD Interior/Exterior Galvanized Metal Primer
 - c. 2nd and 3rd Coats:
 - 1) EVSH10 EVERSCHILD Exterior Flat Ultra Premium

H. Paint System Type 10:

1. Type and Gloss: Enamel, Semi-Gloss, as indicated
2. Use: Galvanized Metal, Aluminum
 - a. Pretreatment:
 - 1) SC-ME-01 Krud Kutter Metal Clean & Etch
 - b. Primer (1st Coat):
 - 1) UGPR00 ULTRA-GRIP Premium, *or*
 - 2) ULGM00-WH ULTRASHIELD Interior/Exterior Galvanized Metal Primer
 - c. 2nd and 3rd Coats:
 - 1) ASHL50 ARISTOSHIELD Semi-Gloss Interior/Exterior, *or*
 - 2) ENCT50 ENDURA-COAT Semi-Gloss

3.08 SCHEDULE OF INTERIOR PAINT SYSTEMS

SPECIFICATIONS

A. Paint System Type 16:

1. Type and Gloss: Flat
2. Use: Gypsum Plaster, Concrete, Brick
 - a. Primer (1st Coat):
 - 1) UGPR00 Ultra-Grip Premium
 - b. 2nd and 3rd Coats:
 - 1) SZRO10 SPARTAZERO Low Odor, Zero VOC, Interior Flat

B. Paint System Type 17:

1. Type and Gloss: Eggshell
2. Use: Gypsum Plaster, Concrete, Brick
 - a. Primer (1st Coat):
 - 1) UGPR00 ULTRA-GRIP Premium
 - b. 2nd and 3rd Coats:
 - 1) SWLL30 SPARTAWALL Low Odor, Zero VOC, Interior Eggshell

C. Paint System Type 18:

1. Type and Gloss: Semi-Gloss
2. Use: Gypsum Plaster, Concrete, Brick
 - a. Primer (1st Coat):
 - 1) UGPR00 Ultra-Grip Premium
 - b. 2nd Coat:
 - 1) SWLL50 SPARTAWALL Low Odor, Zero VOC Interior Semi-Gloss

D. Paint System Type 19:

1. Type and Gloss: Flat
2. Use: Concrete Masonry Units (CMU)
 - a. Primer (1st Coat):
 - 1) SBPR00 Smooth Block Filler
 - b. 2nd and 3rd Coats:
 - 1) SZRO10 SPARTAZERO Low Odor, Zero VOC, Interior Flat

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E. Paint System Type 20:

1. Type and Gloss: Eggshell
2. Use: Concrete Masonry Units (CMU)
 - a. Primer (1st Coat):
 - 1) SBPR00 Smooth Block Filler
 - b. 2nd and 3rd Coats:
 - 1) SWLL30 SPARTAWALL Low Odor, Zero VOC, Interior Eggshell

F. Paint System Type 21:

1. Type and Gloss: Semi-Gloss
2. Use: Concrete Masonry Units (CMU)
 - a. Primer (1st Coat):
 - 1) W6329 Concrete Block Filler
 - b. 2nd and 3rd Coats:
 - 1) SWLL50 SPARTAWALL Low Odor, Zero VOC Interior Semi-Gloss

G. Paint System Type 22:

1. Type and Gloss: Flat
2. Use: Exposed, interior ferrous metal surfaces indicated, including hollow metal doors, frames, access doors, panels, and other metal surfaces indicated.
 - a. Primer (1st Coat):
 - 1) UGPR00-1 ULTRA-GRIP Premium, Multi Purpose Primer, or
 - 2) BRPR00 Bloc-Rust Rust Preventive Primer
 - b. 2nd and 3rd Coats:
 - 1) SZRO10 SPARTAZERO, Interior Zero VOC, Flat

H. Paint System Type 23:

1. Type and Gloss: Eggshell
2. Use: Exposed, interior ferrous metal surfaces indicated, including hollow metal doors, frames, access doors, panels, and other metal surfaces indicated.
 - a. Primer (1st Coat):
 - 1) UGPR00-1 ULTRA-GRIP Premium, Multi Purpose Primer, or
 - 2) BRPR00 Bloc-Rust Rust Preventive Primer

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b. 2nd and 3rd Coats:

- 1) SWLL30 SPARTAWALL Low Odor, Zero VOC, Interior Eggshell, or
- 2) ASHL30 ARISTOSHIELD Interior/Exterior Ultra Low VOC, Eggshell

I. Paint System Type 24:

1. Type and Gloss: Semi-Gloss
2. Use: Exposed, interior ferrous metal surfaces indicated, including hollow metal doors, frames, access doors, panels, and other metal surfaces indicated.

a. Primer (1st Coat):

- 1) UGPR00-1 ULTRA-GRIP Premium, Multi Purpose Primer, *or*
- 2) ASHL50 ARISTOSHIELD Semi-Gloss Interior/Exterior

b. 2nd and 3rd Coats:

- 1) SWLL50 SPARTAWALL Low Odor, Zero VOC, Interior Semi-Gloss,
or
- 2) ASHL50 ARISTOSHIELD Semi-Gloss Interior/Exterior Ultra-Low VOC

J. Paint System Type 25:

1. Type and Gloss: Flat
2. Use: Galvanized Metal, Aluminum

a. Pretreatment: SC-ME-01 Krud Kutter Metal Clean & Etch

b. Primer (1st Coat):

- 1) ULGM00-WH ULTRASHIELD Interior/Exterior Galvanized Metal Primer

c. 2nd and 3rd Coats:

- 1) SZRO10 SPARTAZERO=Low Odor, Zero VOC, Interior Flat

K. Paint System Type 26:

1. Type and Gloss: Eggshell
2. Use: Galvanized Metal, Aluminum

a. Pretreatment:

- 1) SC-ME-01 Krud Kutter Metal Clean & Etch

b. Primer (1st Coat):

- 1) ULGM00-WH ULTRASHIELD Interior/Exterior Galvanized Metal Primer

SPECIFICATIONS

- c. 2nd and 3rd Coats:
 - 1) SWLL30 SPARTAWALL Low Odor, Zero VOC, Interior Eggshell, *or*
 - 2) ASHL30 ARISTOSHIELD Eggshell Interior/Exterior Ultra-Low VOC
- L. Paint System Type 27:
 - 1. Type and Gloss: Semi-Gloss
 - 2. Use: Galvanized Metal, Aluminum
 - a. Pretreatment:
 - 1) SC-ME-01 Krud Kutter Metal Clean & Etch
 - b. Primer (1st Coat):
 - 1) ULGM00-WH Ultrashield Interior/Exterior Galvanized Metal Primer
 - c. 2nd and 3rd Coats:
 - 1) SWLL50 Spartawall Low Odor, Zero VOC, Interior Semi-Gloss, *or*
 - 2) ASHL50 Aristoshield Semi-Gloss Interior/Exterior Ultra-Low VOC
- M. Paint System Type 28:
 - 1. Type and Gloss: Flat
 - 2. Use: Gypsum Board
 - a. Primer (1st Coat):
 - 1) VNPR00-1 VINYLASTIC Premium Interior Wall Sealer
 - b. 2nd and 3rd Coats:
 - 1) SWLL10 SPARTAWALL Low Odor, Zero VOC, Interior Flat
- N. Paint System Type 29:
 - 1. Type and Gloss: Eggshell
 - 2. Use: Gypsum Board
 - a. Primer (1st Coat):
 - 1) VNPR00-1 VINYLASTIC Premium Interior Wall Sealer
 - b. 2nd and 3rd Coats:
 - 1) SWLL30 SPARTAWALL Low Odor, Zero VOC, Interior Eggshell
- O. Paint System Type 30:
 - 1. Type and Gloss: Semi-Gloss

SPECIFICATIONS

2. Use: Gypsum Board
 - a. Primer (1st Coat):
 - 1) VNPR00-1 VINYLASTIC Premium Interior Wall Sealer
 - b. 2nd and 3rd Coats:
 - 1) SWLL50 SPARTAWALL Low Odor, Zero VOC, Interior Semi-Gloss

P. Paint System Type 31:

1. Type and Gloss: Semi-Gloss
2. Use: Wood and Hardboard; Wood Doors, Opaque (Medium Density Overlay (MDO), or as specified
3. Roller application by shortnap roller.
 - a. Primer (1st Coat):
 - 1) UGPR00 ULTRA-GRIP Premium Primer
 - b. 2nd and 3rd Coats:
 - 1) SWLL50 SPARTAWALL Low Odor, Zero VOC, Interior Semi-Gloss

3.09 SPECIAL TREATMENT OF SPECIFIC SURFACES

A. Paint System Type 38:

1. Type and Gloss: Flat Black
2. Use:
 - a. Ducts visible through grilles and registers
 - b. Reveals at ceiling edges
 - c. Structure visible through glass above ceiling line, unless indicated otherwise
 - d. Primer (1st Coat): UGPR00 ULTRA-GRIP Premium
 - e. 2nd Coat:
 - 1) SZRO10 SPARTAZERO Low Odor, Zero VOC, Interior Flat

B. Paint System Type 42:

1. Miscellaneous Mechanical and Electrical Work:
 - a. Paint exposed surfaces of mechanical and electrical Work not otherwise specified, including but not limited to following:
 - 1) Interior plumbing, HVAC, and electrical, factory-primed equipment, apparatus, pipes and fittings.

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- 2) Vents, ducts, miscellaneous supports and hangers.
 - 3) Electrical conduit, fittings, pull boxes, outlet boxes, and other unfinished surfaces of mechanical and electrical Work.
 - 4) Miscellaneous factory-primed metal cabinets, and panels.
2. Provide paint systems for each type of material in accordance with paint manufacturer's recommendations, unless otherwise indicated.
 - a. Make submittals of each system for Architect's review, in accordance with requirements of this Section and Section 01 33 00.
3. Colors: As selected by owner or architect.

END OF SECTION 09 91 00

SPECIFICATIONS

SECTION 09 98 00

CONCRETE FLOOR SEALER

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes:
 - 1. Concrete floor sealer on concrete surfaces as indicated on Drawings.
 - 2. Bead blasting of existing concrete floor surfaces to receive sealer.
- C. Related Sections:
 - 1. Section 03300: Cast-In-Place Concrete.

1.02 SUBMITTALS

- A. Samples: Submit one pint Sample of floor sealer.
- B. Product Data: Submit floor sealer manufacturer's technical data and installation instructions covering installation conditions of the Work of this section, with copies of code approvals.

1.03 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Concrete floor sealer shall be product of a manufacturer who has been regularly engaged in manufacture of material for at least 10 years and can provide references of at least 5 installations in which this material has been in satisfactory service for at least 3 years.
- B. Compliance with Regulations: Materials shall comply with the current rules and regulations of the local air quality management owner, with the rules regarding volatile organic compounds, and with FDA rules and regulations for dangerous materials in sealers.

1.04 PRODUCT HANDLING

- A. Materials shall be delivered to Project site in manufacturer's unopened containers bearing manufacturer's labels with batch number and date of manufacture.

SPECIFICATIONS

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Thoro System Products, Miami FL.
- B. ProSoCo, Inc., Kansas City, KS.
- C. Or approved equal.

2.02 MATERIALS

- A. General: Sealer shall be water based, SCAQMD approved, clear urethane coating, designed for installation on interior and exterior traffic surfaces. Sealer shall be designed to penetrate the pore surface of the concrete and inhibit moisture migration.
- B. Sheen: Completed sealer shall have semi-gloss sheen, unless otherwise required.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which Work of this section will be applied. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Bead blasting: Work includes bead blasting of surfaces as required for proper preparation of surfaces. Completely remove existing curing compounds, finishes, stains, oil, grease, bitumen, penetrated mastics and adhesives including primers, and substances deleterious to bond or connection of new materials, and expose clean sound surfaces. Employ wet bead blasting for interior surfaces and for exterior surfaces where required.
- B. Sealer application: Prepare surfaces in accordance with the coating manufacturers printed instructions. Remove contaminants including loose mortar, rust and other products of corrosion, disintegrated concrete, and other substances that could interfere with adhesion of the coating system to the substrate.

3.03 APPLICATION

- A. Install by experienced mechanics with methods and spray or roller equipment recommended by coating manufacturer, after surfaces to be treated are dry.
- B. Mix the 2 components and install floor sealer in accordance with manufacturer's recommendations. Install evenly over the surface in 2 coats at approximately 200 square feet per gallon per coat.

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- C. Keep traffic from treated surfaces until the material is thoroughly dry.

3.04 CLEANING

- A. Remove and legally dispose of rubbish, debris and waste material off the Project site.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION 09 98 00

SPECIFICATIONS

SECTION 10 14 23

SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Panel signs.
 - 2. Fabricated Exterior Metal Letter Signage
 - 3. Room-identification signs.
 - 4. Code-Required Signage
 - a. Parking lot warning signs and Accessible stall signs
 - b. Symbols of international accessibility
 - c. Fire Department information signs
 - d. Stair signs
 - e. Restroom Identification signs
 - f. Assistive Listening Device signs

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 COORDINATION

- A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For panel signs and fabricated metal letters.
 - 1. Include fabrication and installation details and attachments to other work.

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2. Include plans, elevations, and large-scale sections of typical members and other components.
 3. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 4. Show typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed color, pattern and surface finish.
1. Include representative Samples of available typestyles and graphic symbols.
 2. Stand-offs or pins holding exterior metal letters, and as otherwise indicated.
- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
1. Panel Signs: Full-size Sample of 3 different signs, to be selected by Architect.
 2. Room-Identification Signs: Full-size Sample.
 3. Cast Acrylic Sheet: Manufacturer's color charts of actual sections of material including the full range of colors available for each material required.
 4. A Single Cut-out Dimensional Exterior Metal Letter of each material indicated. Provide aluminum letter sample with specified powder-coat finish.
 5. Full-size Samples, if approved, will be returned to Contractor for use in Project.
- E. Sign Schedule: Use same designations specified or indicated on Drawings. Indicate sign type, text, size, material, finish/color, characters, location, and mounting for each.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer of products, or an entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Single Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

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1.9 FIELD CONDITIONS

- A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings

1.10 WARRANTY

- A. Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - d. Failure or deterioration of sign attachment to building.
 - 2. Warranty Period: Two years from Substantial Completion date.

PART 2 - PRODUCTS

2.1 PANEL SIGNS, GENERAL

- A. Panel Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
 - 1. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16-inch measured diagonally.
- B. Unframed Panel Signs: Fabricate signs with edges mechanically and smoothly finished to conform with the following requirements:
 - 1. Edge Condition: Beveled.
 - 2. Corner Condition: Corners rounded to a 3/8-inch radius.
- C. Framed Panel Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
 - 1. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally
- D. Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, finishes, and colors of

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letters, numbers, and other graphic devices.

- E. Raised Copy and Braille: Machine-cut copy characters from matte-finished opaque acrylic sheet and chemically weld onto the acrylic sheet forming sign panel face. Produce precisely formed characters with square cut edges free from burrs and cut marks.
- F. Code Requirements for Signage and Graphics:
 - 1. Panel Material: Matte-finished opaque acrylic sheet.
 - 2. Raised Copy Thickness: Not less than 1/32-inch.
 - 3. Character Type: Characters on signs shall be raised and shall be sans serif uppercase characters accompanied by California Contracted Grade 2 Braille.
 - 4. Character Height (per CBC 11B-703.2.5): Raised characters shall be a minimum of 5/8-inch and a maximum of 2-inches high, based on the height of the uppercase letter 'I'.
 - 5. Finish and Contrast (per CBC 11B-703.5.1): Contrast between character, symbols and their background must be non-glare, either light characters on dark background or dark characters on light background.
 - 6. Proportions (per CBC 11B-703.4 and CBC 11B-703.6): Characters on signs shall have an uppercase letter 'O' that is 60 percent minimum and 110 percent maximum of the height of the uppercase letter 'I'. Stroke thickness of the uppercase letter 'I' shall be 15 percent maximum of the height of the character.
 - 7. Character Spacing (per CBC 11B-703.2.7): Character spacing shall be measured between the two closest points of adjacent raised characters within a message, excluding word spaces. Where characters have rectangular cross sections, spacing between individual raised characters shall be 1/8-inch minimum and 4 times the raised character stroke width maximum. Where characters have other cross section, spacing between individual raised characters shall be 1/16-inch minimum and 4 times the raised character stroke width maximum at the base of the cross sections, and 1/8-inch minimum and 4 times the raised character stroke width maximum at the top of the cross sections. Characters shall be separated from raised borders and decorative elements 3/8-inch minimum.
 - 8. Line Spacing (per CBC 11B-703.2.8): Spacing between the baselines of separate lines of raised characters within a message shall be 135 percent minimum and 170 percent maximum of the raised character height.
 - 9. Braille Symbols (per CBC 11B-703.3 and CBC 11B-703.4): California Contracted Grade 2 Braille shall be used wherever Braille symbols are required. Dots shall have a domed or rounded shape and shall comply with CBC Table 11B-703.3.1. The indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials, and acronyms.
 - 10. Mounting Height: A tactile sign shall be located 48" minimum to the baseline of the lowest Braille cells and 60" maximum to the baseline of the highest line of raised characters above the finish floor or ground surface.
 - 11. Mounting location: A tactile sign shall be located on the approach side, as one enters or exits rooms or space, and be reached within 0" of the required clear floor space per CBC Section and Figure 11B -703.4.2 as follows:
 - a. A clear floor space of 18 inches x 18 inches minimum, centered on the

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tactile characters, shall be provided beyond the arc of any door swings between the closed position and 45 degree open position.

- b. On the wall at the latch side of a single door.
 - c. On the inactive leaf of a double door with one active leaf.
 - d. On the wall at the right side of a double door with two active leafs.
 - e. On the nearest adjacent wall where there is no wall space at the latch side of a single door or no space at the right side of a double door with two active leafs.
- 12. Visual characters shall comply with CBC Section 11B-703.5 and shall be 40" minimum above finish floor or ground.
 - 13. Pictograms shall comply with CBC Section 11B-703.6.
 - 14. Symbol of accessibility shall comply with CBC Section 11B-703.7.

2.2 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities, and with CBC for signs.

2.3 PANEL SIGNS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ASI Sign Systems, Inc.
 - 2. Best Sign Systems, Inc.
 - 3. Vomar Products, Inc.
 - 4. Or equal.
- B. Interior Panel Signs and Room Identification Signs: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles. Match approved submitted sample. Provide all signs to be only one of the following types:
 - 1. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated to acrylic backing sheet to produce composite sheet.
 - a. Composite-Sheet Thickness: 0.25 inch.
 - b. Surface-Applied Graphics: Applied vinyl film or photo image.
 - 2. Laminated Polycarbonate-Sheet Sign: Polycarbonate face sheet laminated to each side of base sheet to produce composite sheet.

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- a. Composite-Sheet Thickness: Manufacturer's standard for size of sign.
 - b. Surface-Applied Graphics: Applied vinyl film or photo image.
3. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition: Squared off.
 - b. Corner Condition in Elevation: Rounded to radius indicated.
4. Mounting: Countersunk flathead through fasteners or adhesive.
5. Surface Finish and Applied Graphics:
 - a. Integral Acrylic or PVC Sheet Color: As selected by Architect from full range of industry colors.
 - b. Photo-Image Graphics: Manufacturer's standard black-and-white, 600-dpi halftone or dot-screen image.
6. Text and Typeface: Accessible raised characters and Braille. Typeface as selected by Architect from manufacturer's full range. Finish raised characters to contrast with background color, and finish Braille to match background color.
7. Flatness Tolerance: Sign panel shall remain flat or uniformly curved under installed conditions as indicated and within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.

2.4 SIGN MATERIALS

- A. Aluminum Extrusions (Exterior Letters): ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Aluminum Castings: ASTM B 26/B 26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.
- C. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- D. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet per ASTM D 4802 Type UVF (UV filtering), in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested according to ASTM D 790, with a minimum allowable continuous service temperature of 176 deg. F (80 deg. C), and of the following general types:
 1. Opaque Sheet: Provide colored opaque acrylic sheet in colors and finishes as selected from the manufacturer's standards.
- E. Colored Coatings for Acrylic Plastic Sheet: Use colored coatings, including inks and paints for copy and background colors that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for the application intended.

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- F. Polycarbonate Sheet: ASTM C 1349, Appendix X1, Type II (coated, mar-resistant, UV-stabilized polycarbonate), with coating on both sides.
- G. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- H. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- I. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.5 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
 - 1. For exterior exposure, furnish nonferrous-metal, or hot-dip galvanized devices unless otherwise indicated.
 - 2. Exposed Metal-Fastener Components, General:
 - a. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish insets, as required, to be set into concrete or masonry work.
 - b. Fastener Heads: For nonstructural connections, use flathead screws and bolts with tamper-resistant or Allen-head spanner-head slots unless otherwise indicated.
 - 3. Sign Mounting Fasteners:
 - a. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.
 - b. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
 - c. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
- B. Adhesive: Use liquid silicone adhesive as recommended by sign manufacturer.
- C. Two-Face Tape: Manufacturer's very high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.

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2.6 FABRICATION OF PANEL SIGNS

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 - 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 - 3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 - 4. Internally brace signs for stability and for securing fasteners.
 - 5. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
- B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
 - 1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish to match sign-background color unless otherwise indicated.

2.7 EXTERIOR DIMENSIONAL CHARACTERS

- A. Cutout Metal Characters: Characters with uniform faces; square-cut, smooth edges; precisely formed lines and profiles; and as follows:
 - 1. Character Material: Sheet or plate stainless steel.
 - 2. Integral Stainless-Steel Finish: Directional Satin Finish: No. 4.
 - 3. Character Height and Thickness: As indicated on drawings.
 - 4. Mounting: Welding and Concealed, stainless-steel back bar or bracket assembly.
 - 5. Match Architect's approved sample.
- B. Typeface: Per submittals approved by Architect.
- C. Cast Characters: Characters with uniform faces, sharp corners, and precisely formed lines and profiles. Cast aluminum.
- D. Fabrication of Exterior Metal Letters:
 - 1. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 - 2. Conceal connections if possible; otherwise, locate connections where they are

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- inconspicuous.
- 3. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners.
- E. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
 - 1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish to match sign-background color, unless otherwise indicated.

2.8 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.
- E. Baked-Enamel or Powder-Coat Finish on Aluminum: Conform to AAMA 2604 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish. Match approved sample in color designated by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 - 4. Corrosion Protection: Coat concealed surfaces of unfinished exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Room-Identification Signs and Other Accessible Signage: Install in locations on walls as indicated on Drawings and according to accessibility standard.
- C. Mounting Methods for Plastic Panel Signs:
 - 1. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten. Architect to locate mounting holes on Shop Drawings.
 - 2. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
- D. Mounting of Exterior Metal Letters
 - 1. Concealed Studs: Using a template for entire word(s), drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - 2. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
 - 3. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - 4. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
 - 5. Back Bar and Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position, so that signage is correctly located and aligned.

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6. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
7. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by District.

END OF SECTION 10 14 23

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SECTION 10 28 00 TOILET ROOM ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Under-lavatory guards.
 - 3. Electric warm-air hand dryers.
- B. Related Requirements:
 - 1. Section 09 30 13 "Ceramic Tiling".

1.3 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Include electrical characteristics.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations, arranged by Building number and room number of each accessory required.

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1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Regulatory and Code Requirements: Install toilet and bath accessories per ADA-ABA and CBC Title 24 access requirements.
 1. Accessible toilet accessories shall be mounted at heights and at horizontal locations according to CBC Title 24.
 2. Toilet paper dispensers and feminine napkin disposal units located on the grab bar side of an accessible toilet room or stall shall not project more than 3-inches from the finished wall surface nor be located closer than 1-1/2-inch clear of the tangent point of the grab bar.

1.8 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, visible silver spoilage defects.
 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WASHROOM ACCESSORIES

- A. Source Limitations: Obtain public-use washroom accessories from a single source and from a single manufacturer.
- B. Toilet Room Accessories: Basis-of-Design Products: Model numbers indicated in Accessory Lists on Drawings are generally for products manufactured by Bobrick Washroom Equipment Co. Subject to compliance with specified requirements, provide the named products or comparable products by one of the following:
 1. A & J Washroom Accessories, Inc.
 2. American Specialties, Inc.
 3. Bradley Corporation

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4. General Accessories Manufacturing Co. (GAMCO)
5. Or approved equal

2.2 UNDER-LAVATORY GUARDS

A. Under-lavatory Guard

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Plumberex Specialty Products, Inc.
 - b. Truebro by IPS Corporation.
 - c. Or equal.
2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
3. Material and Finish: Antimicrobial, molded plastic, white.

2.3 WARM-AIR DRYERS

A. Source Limitations: Obtain warm-air dryers from single source from single manufacturer.

B. Warm-Air Dryer:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc. (Basis-of-Design)
 - c. Bradley Corporation.
 - d. Or equal.
2. Description: Standard-speed, warm-air hand dryer.
3. Mounting: Surface mounted, with low-profile design.
4. Operation: Electronic-sensor activated with timed power cut-off switch.
 - a. Operation Time: 30 to 40 seconds.
5. Cover Material and Finish: Stainless steel, No. 4 finish (satin).
6. Electrical Requirements: 115 V AC, 15 Amps, 1725 Watts.

2.4 CUSTODIAL ACCESSORIES

A. Source Limitations: Obtain custodial accessories from single source from single manufacturer.

B. Mop and Broom Holder: Basis-of-Design Product is Bobrick B-224 x 36.

1. Manufacturers: Subject to compliance with requirements, provide products by

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one of the following:

- a. American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.
 - c. Bradley Corporation.
 - d. Or equal.
2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
 3. Length: 36 inches.
 4. Hooks: Three.
 5. Mop/Broom Holders: Four spring-loaded, rubber hat, cam type.
 6. Material and Finish: Stainless steel, No. 4 finish (satin).
- a. Shelf: Not less than nominal 0.05-inch-thick stainless steel.
 - b. Rod: Approximately 1/4-inch-diameter stainless steel.

2.5 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.6 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Construction Manager.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install toilet accessory units following manufacturer's instructions, using fasteners appropriate to substrate and recommended by unit manufacturer. Install units plumb, level, and firmly anchored in locations and at heights indicated.
 - 1. Use concealed fastenings wherever possible.
 - 2. Provide anchors, bolts and other necessary anchorages.
 - 3. Install concealed mounting devices and fasteners fabricated of same material as accessories, or of galvanized steel, as recommended by manufacturer.
 - 4. Install exposed mounting devices and fasteners finished to match accessories.
 - 5. Provide theft-resistant fasteners for all accessory mountings.
 - 6. Fit flanges of accessories snug to wall surfaces. Provide sealant in gaps between 90 degree return flanges and finish wall surface after accessories are installed.
 - 7. Elements of Sanitary facilities shall be mounted at locations in compliance with CBC Sections 11B-602 through 11B-612.
- B. Provide solid wood blocking in wall framing as required to receive wall-attached items. Do not attach into hollow wall areas
- C. Provide backing where basic substrate is not sufficient to support accessory without additional material.
- D. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.
 - 1. Grab bars in toilet facilities and bathing facilities shall comply with CBC Section 11B-609.
 - 2. Grab bars and any wall or other surfaces adjacent to grab bars shall be free of sharp or abrasive elements and shall have rounded edges. The space around the grab bars shall be as follows:
 - a. 1 ½" between the grab bar and the wall.
 - b. 1 ½" minimum between the grab bar and projecting objects below and at the ends.
 - c. 12" minimum between the grab bar and projecting objects above.
- E. Protruding Objects (Towel dispensers, napkin disposals, etc.) shall protrude no more than 4 inches per CBC.
- F. Coordinate wiring of electric warm-air dryers with electrical work and specifications.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or

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defective items.

- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 10 28 00

SPECIFICATIONS

SECTION 10 80 00

TOILET ROOM ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work includes installation only of accessories provided by the owner and listed below:
 - 1. Toilet room accessories in toilets.
 - 2. Electric Hand Dryer.

1.02 QUALITY ASSURANCE

- A. Acceptable manufacturers: The product model numbers indicated below and on the Drawings are Bobrick Washroom Equipment, Inc., unless noted otherwise.
 - 1. Bradley Washroom Equipment, Inc.
 - 2. American Specialties, Inc.
 - 3. General Accessory Manufacturing Co.
 - 4. Fort James Co. – Plastic Roll Paper Towel Dispensers only.
- B. Locked (tumbler lock) accessories shall be keyed alike except for lock on coin receiving boxes in vending equipment.

1.03 SUBMITTALS

- A. Comply with requirements of Division-1 Section "Submittals" regarding submittals.
- B. Product Data: Manufacturer's catalog and data sheets, parts list, and installation requirements for each accessory item specified.
- C. Matrix: Provide a matrix indicating the name of each room to receive accessories and the type and quantity of each accessory to be provided in each room.
- D. Operation and Maintenance Data: Maintenance data, operating instructions and keys required for each type of equipment and lock.

PART 2 - PRODUCTS

2.01 PUBLIC TOILETS

- A. Unless noted otherwise below, provide toilet room accessories equal to the Bobrick model numbers listed below, or approved equal.
 - 1. B347 Classic Series Partition Mounted Seat Cover Dispenser and Toilet Tissue Dispenser at each non-accessible stall in toilet rooms.

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2. B3471 Classic Series Partition Mounted Seat Cover Dispenser and Toilet Tissue Dispenser at each accessible stall in toilet rooms.
3. Dyson, polished stainless steel Airblade 120V. Die-cast aluminum casing with anti-microbial scuff resistant lacquer coating on exterior surfaces. Metallic silver color.
4. B2112 Contura Series Waste Receptacle
5. B4111 Series Soap Dispenser, stainless steel, surface mounted.
6. B43500 Contura Series Sanitary Napkin/Tampon Vendor.
7. B5806 Series, 1 ¼" diameter, stainless steel Grab Bar with concealed mounting.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Check wall opening for correct dimensions, plumbness of blocking or frames, and other preparation that would affect installation of accessories.
- B. Check areas to receive surface mounted units for conditions that would affect quality and execution of work.
- C. Verify spacing of plumbing fixtures and toilet partitions that affect installation of accessories.
- D. Do not begin installation of washroom accessories until openings and surfaces are acceptable to contractor or architect.

3.02 INSTALLATION

- A. Install accessories at locations and height indicated level and plumb. Installation methods shall be in accordance with manufacturer's recommendations. All exposed fasteners to be tamper-proof. Finish of exposed fasteners to match items secured.
- B. Toilet accessories required to be accessible shall be mounted at heights according to CBC Section 1118B. Toilet paper and feminine napkin dispensers located on the grab side of an accessible toilet room or stall shall not project more than 3" from the finished wall surface nor be located closer than 1½" clear of the tangent point of the grab bar.
- C. Install manufacturer's recommended anchor system for all grab bars.
- D. Conceal evidence of drilling, cutting and fitting on adjacent finishes.
- E. Fit flanges of accessories snug to wall surfaces. Caulk gaps between flanges and finish wall surfaces after accessories are installed.
- F. Where Plywood Backing is used, finish and paint the edges grey or silver.

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3.03 ADJUST AND CLEAN

- A. Adjust accessories for proper operation.
- B. Clean exposed surfaces prior to final inspection.
- C. Deliver accessories schedule, keys and parts manual as part of project closeout documents. For owner's permanent records, provide two sets of the following items of manufacturer's literature:
 - 1. Technical data sheets of each item used for the project.
 - 2. Service and parts manuals.
 - 3. Name and local representative to be contacted in the event of need of field service or consultation.

END OF SECTION 10 80 00

SPECIFICATIONS

SECTION 21 13 13

WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work includes, but is not necessarily limited to, the following work areas:
1. Installation of a complete wet-pipe automatic fire sprinkler systems in all areas shown on plans including all interior compartments, exterior soffits (where required) and combustible concealed spaces if any.
 2. Compilation of record drawings by installing contractor, including all field changes and installing contractor's C-16 license number.
 3. Connection of interior fire sprinkler systems to site fire service laterals, at points of connection shown on fire protection and civil site plans.
 4. Test valves, drain lines, and all other inspection components.
 5. All coring, drilling, sleeving and chasing required for piping installation, as approved by Architect and Structural.
 6. Local audible alarm and connection points for central station monitoring, as shown on plans and as specified.
 7. Fees, permits, inspections and tests.
 8. Meetings and correspondence with project team members to confirm specific requirements for this project, including:
 - a. Location and methods of discharging water from test and drain connections.
 - b. Zoning and signaling requirements for alarm, detection and monitoring systems.

1.2 RELATED WORK IN OTHER SECTIONS

- A. General Requirements Division 01
- B. Section 09 91 00 "Painting"

1.3 QUALITY ASSURANCE

- A. Qualifications of Fabricators and Installers
1. For actual fabrication and installation of sprinkler systems, use only personnel who are thoroughly trained and experienced with the products involved, and in the recommended methods of their installation.
 2. Installing contractor shall have a California C-16 license and be experienced in design and installation of systems in projects of similar size and scope.

1.4 REFERENCES

- A. In addition to complying with all pertinent standards, codes and regulations, comply with all requirements of:
1. California Building Code, 2022 edition.

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2. California Fire Code, 2022 edition.
3. State of California, Division of the State Architect.
4. Serving Local Fire Department requirements.
5. Serving Local Water Utilities Department requirements.
6. NFPA 13, 24, 25 and 72 (as adopted by the State of California).
7. Underwriters Laboratories (UL) and FM Global (FM) listed products.
8. ICC Evaluation Service listed products.

1.5 SUBMITTALS

A. Shop Drawings

1. Within 30 days after award of Contract, submit shop drawings to the Architect for review. A complete submittal shall include the following:
 - a. Shop drawings shall be in compliance with approved plans.
 - b. Location of all switches, bells and electrical connections for alarm system, as described in this specification.
 - c. Location of connections to drain receptors for test and drain discharge.
 - d. Where revisions are proposed due to coordination with work of other trades, they shall be clearly illustrated and called out for review.
 - e. Where value-engineered revisions are proposed, they shall be clearly illustrated and called out for review.
 - f. Notations and identifying marks for fabrication may be included.
2. Submit materials data sheets for all proposed product substitutions from the approved plans and data sheets. A statement of equivalency shall accompany items that are not exactly comparable to the approved product. Proposed substitutions of hanger and bracing materials shall only be allowed if submitted to and approved by DSA Fire Life Safety and Structural review with all required calculations and written acceptance by project structural engineer. Such substitutions shall be at the contractor's risk and at no additional expense to the owner.

B. Maintenance Manual

1. At close-out, submit maintenance manual describing maintenance schedules, replacement parts, and operational requirements.

C. Guarantee

1. Contractor shall guarantee fixed fire protection system, for a period of two years after date of final inspection, from leaks and other failures from materials and workmanship. Guarantee shall include repair of damage to Owner.

1.6 COORDINATION

- A. Coordinate work with that specified in other sections before start of installation. Any installation found to be in conflict with other trades due to neglected coordination, shall be removed and reinstalled as directed by the Architect at no additional expense to the Owner.

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- B. Contractor shall contact the Architect and obtain necessary information to design fire sprinkler system to fit into allotted spaces without interfering with work by other trades.
- C. Coordinate with Plumbing section for size and location of drain receptors, where required or shown for draining and testing fire sprinkler risers and systems. All drain piping shall discharge into the receptors and not through walls or curbs, unless noted otherwise.

PART 2 - PRODUCTS

GENERAL DESIGN CRITERIA

PRODUCT DATA SHEET 0 - Coverage and Scope

- 2.1 Kitchen, food preparation, storage, custodial and utility areas shall be protected for Ordinary Hazard. Sprinklers shall be spaced at a maximum coverage of 130 sq. ft. for standard spray sprinklers.
- 2.2 All other areas shall be protected for Light Hazard. Sprinklers shall be spaced at a maximum coverage of 225 sq. ft. for standard spray sprinklers or as shown on plans for sidewall or extended coverage sprinklers.

PRODUCT DATA SHEET 1 - System shall be designed using point of connection as shown on drawings, and as described in this specification.

MATERIALS AND PRODUCTS - GENERAL

- A. All material installed shall be approved and/or listed for fire protection use by the referenced authorities, codes and standards. All material shall be new and without field modifications.

SPRINKLERS

- A. General
 - 2.1 All sprinklers shall be of similar make and appearance and shall have the same bulb or link and finish except where otherwise required by exposure to heat sources, freezing temperatures, corrosive environment, etc.
- B. Interior Finished Ceilings and Exterior Soffits
 - 2.2 Provide recessed standard spray pendent, with white polyester finish and matching escutcheon.
 - 2.3 Listed corrosion-resistant sprinklers shall be installed at exterior areas, with white polyester or Teflon finish and matching escutcheon.

PRODUCT DATA SHEET 2 - Concealed Areas, Unfinished Ceilings, and Service Areas

- 2.1 Provide standard spray upright or pendent, with white finish.
- 2.2 Where required, escutcheons shall be two-piece, style #401 with white painted finish at areas with ceilings.

PRODUCT DATA SHEET 3 - Temperature Ratings and Response Type

SPECIFICATIONS

- 2.1 Sprinklers below finished ceilings, and in all other occupied areas shall have a temperature rating of Ordinary (155-165° F), except as noted below.
 - A. Sprinklers in unventilated spaces and under exterior canopies shall have a temperature rating of Intermediate (200-212° F).
 - B. Sprinklers in zone of influence of space heaters or other heat-producing equipment shall have a temperature rating of High (250-300° F), unless otherwise required by code.
 - C. All sprinklers shall be listed, quick-response type.

HANGERS AND SUPPORTS

PRODUCT DATA SHEET 4 - General

- 2.1 Provide hangers approved by UL/FM and NFPA 13 for fire sprinkler systems. Shop fabricated supports shall be designed to meet requirements of NFPA 13, and must be certified by a registered professional engineer.
- 2.2 Provide earthquake bracing in accordance with UL/FM, NFPA 13 and ASCE 7. Locations of all bracing shall be shown on shop drawings in conformance with approved plans. All bracing shall be assembled and installed per NFPA 13 and manufacturer's installation instructions.
- 2.3 Size all anchors and fasteners per NFPA 13. All lag screws, bolts and drive screws shall be installed as required by codes and accepted good practices.
- 2.4 All fasteners and/or anchors proposed for use in concrete construction shall be specifically listed and approved for use on fire sprinkler systems in seismic zones. Powder-driven studs shall not be used unless all system components including installation tool and pins are listed.

INTERIOR SPRINKLER PIPE AND FITTINGS

PRODUCT DATA SHEET 5 - General

- 2.1 All pipe and fittings shall be new, acceptable to authorities having jurisdiction, per all applicable standards and codes, and free from damage and distortion.

PRODUCT DATA SHEET 6 - Product Characteristics

- 2.1 Black steel, Schedule 40, ASTM A-53/135/795, for all piping, with threaded joints and fittings.
- 2.2 Black steel, Schedule 10, ASTM A-53/135/795, for all piping, with non-threaded joints and fittings.
- 2.3 Threaded fittings shall be of cast or malleable iron, class 125 or 150, conforming to ANSI B16.3 and ANSI B16.4.
- 2.4 Flanged fittings shall be provided where required. Flanges shall be of cast iron, class 125, conforming to ANSI B16.1.
- 2.5 Welded fittings shall be of wrought steel, conforming to ANSI B16.9.
- 2.6 One-piece reducing fittings shall be used wherever a change is made in pipe size. Bushings shall not be used, except where fittings of the required size are not available.
- 2.7 Grooved thinwall steel pipe connections shall be made using a UL/FM approved ductile iron coupling, with rubber gasket. Installation shall be per manufacturer's instructions.

SPECIFICATIONS

- 2.8 All piping shall be joined with welded, threaded or grooved fittings. Fittings for hole-cut connections are not acceptable.

ACCESSORY CABINET

PRODUCT DATA SHEET 7 - Furnish metal sprinkler cabinet in riser room, with reserve supply of sprinklers as required by NFPA 13. Include one suitable head wrench for each type of sprinkler installed. Stock shall include all types and temperature ratings.

SIGNS

PRODUCT DATA SHEET 8 - Provide metal signage permanently marked to show function, for all valves, controls and related assemblies. Locate as required by NFPA 13 and authorities having jurisdiction. Where signs are required to identify valves or assemblies in hidden or void spaces, locate as directed by Architect.

PROTECTION OF SPRINKLERS

PRODUCT DATA SHEET 9 - Provide UL/FM listed guards for sprinkler heads located in areas susceptible to mechanical damage.

ESCUTCHEON PLATES

PRODUCT DATA SHEET 10 - Provide chrome-plated escutcheons where exposed piping penetrations are made through finished walls and ceilings. Plates shall be painted to resist corrosion when exterior installation is required.

LOCAL ALARM COMPONENTS

PRODUCT DATA SHEET 11 - Exterior Alarm Bell

- 2.1 Furnish 10" diameter, UL/FM approved bell with identification sign, rated 120VAC, with standard mounting hardware.
- 2.2 Locate as shown on approved plans.

PRODUCT DATA SHEET 12 - Water Flow Switch

- 2.1 Provide UL/FM approved, 120VAC with two sets of Form C, single pole, double throw contacts, and adjustable retard feature.
- 2.2 Retard shall be set by Contractor so as to prevent false alarms, and still allow audible alarm within 30 seconds.

CENTRAL STATION SUPERVISION

PRODUCT DATA SHEET 13 - General

- 2.1 Furnish supervision at all valves controlling fire protection water supplies, and any required underground conduit thereto.
- 2.2 Provide UL/FM approved tamper switch, Model PCVS-1, or OSYSU-1, or UL/FM listed equivalent, 120VAC with one set of Form C, single-pole, double-throw contacts.

SPECIFICATIONS

FIRE DEPARTMENT CONNECTION

PRODUCT DATA SHEET 14 - Provide 4 " x 2 ½", single or double clapper 2-way fire department connection. Finish and model shall be as required by serving fire department. Provide check valve per Section 2.14B.

VALVE COMPONENTS

PRODUCT DATA SHEET 15 - Control Valve

- 2.1 Provide iron, double disc, bronze-mounted gate valve, with adjustable indicator post.
- 2.2 Post shall be compatible with valve, and be field painted as required by serving fire department.

PRODUCT DATA SHEET 16 - Backflow Prevention and Check Valves

- 2.1 Check valves shall be iron body, bronze mounted, horizontal swing check. As acceptable to authorities having jurisdiction, iron body, bronze, disk wafer check may be used.
- 2.2 Check valve shall be U.L/FM approved for fire protection use, and recommended by the manufacturer for direct bury where such installation is to be required.
- 2.3 Iron body, bronze disk threaded or grooved swing check may be installed at Fire Department Connection, and located as acceptable to serving fire department.

PRODUCT DATA SHEET 17 - Interior Drain/Test Valves

- 2.1 Furnish listed combination test and drain valve at riser, as shown on the approved plans. Provide pressure relief type, with bypass.
- 2.2 Where auxiliary drainage is required, provide brass, rubber disc, angle or globe pattern, with screwed ends, rated 200psi WOG.

VALVE CHART

PRODUCT DATA SHEET 18 - Provide chart in enclosed frame, indicating all valve locations functions.

UNDERGROUND PIPE AND FITTINGS

PRODUCT DATA SHEET 19 - General

- 2.1 All pipe and fittings shall be new, acceptable to authorities having jurisdiction, comply with all applicable standards and codes, and free from damage and distortion.

PRODUCT DATA SHEET 20 - Product Characteristics

- 2.1 Pipe shall be cast or ductile iron, or C-900 PVC, as shown on plans or required by water department. Pipe under structural footings shall be cast or ductile iron only, to at least 5'-0" beyond outside face of building.
- 2.2 Fittings shall be ductile iron, class 250, flanged or mechanical joints as required. Proper thrust restraint shall be provided per NFPA 24.
- 2.3 All hardware installed below-grade, including studs, bolts, nuts, washers, thrust-restraint rods, etc. shall be stainless steel conforming to UNS 31600 (formerly AISI Type 316). Hex-head bolts shall conform to ASTM F593,

SECTION TITLE

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CITY OF LA PUENTE ACTIVITY CENTER

SPECIFICATIONS

Alloy Group 2, Condition CW1/CW2 (depending on size). Hex nuts shall conform to ASTM F594, Alloy Group 2, Condition CW1/CW2 (depending on size). T-bolts shall be stamped to show conformance with UNS 31600.

PART 3 - EXECUTION

JOB SITE CONDITIONS

PRODUCT DATA SHEET 0 - Inspection

- 3.1 Prior to all work of this section carefully inspect the installed work of other sections, and verify that all such work is complete to the point where this portion of the work may properly commence in accordance with all submittals, designs, and applicable codes.

PRODUCT DATA SHEET 1 - Discrepancies

- 3.1 In the event of a discrepancy, immediately notify the Architect. Do not proceed with installation in areas of discrepancy until all such discrepancies and/or omissions have been fully reviewed and clarified.

FABRICATION

PRODUCT DATA SHEET 2 - General

- 3.1 All pipe, fittings, and materials shall be prepared by qualified personnel, trained and experienced with the products involved, and the recommended methods of preparation.
- 3.2 All pipe cuts, threads, and grooves shall be made according to applicable codes, standards and accepted good practices.
- 3.3 Pipe shall be free of damage, flaws and burrs. Threads and grooves shall not be excessively shallow or deep.
- 3.4 Fittings shall be made onto the pipe no tighter than necessary. Cracked or broken fittings shall be replaced, without exception.
- 3.5 Excess dope and oils shall be removed before shipment to job site.

PRODUCT DATA SHEET 3 - Welding

- 3.1 Welding methods shall comply with NFPA 13 and AWS B2.1. Contractor shall be responsible for all welded joints and any qualifying procedures for welders and related personnel.
- 3.2 Holes in pipe for outlets shall be cut to full inside diameter of fitting, prior to welding in place. Holes shall be free of slag and welding residue and of smooth bore. Fittings shall not penetrate internal diameter of run piping. Holes shall be cut by hole-saw or other rotary bit. Torch-cutting of holes is prohibited.

INSTALLATION

PRODUCT DATA SHEET 4 - General

SPECIFICATIONS

- 3.1 All installations shall be per referenced standards. Follow manufacturer's directions and recommendations in all cases as required for all approvals and warranty enforcement.
- 3.2 All cutting of structure shall be subject to approval by the Architect. Beams, decks and other structural components shall not be cut or altered in any way unless previously approved.
- 3.3 Provide flexible couplings where required to provide expansion capability, and for earthquake protection per NFPA 13. Provide sway bracing as required by coupling locations.
- 3.4 Entire sprinkler system shall be installed in such a manner so that it can be drained in accordance with NFPA 13. Drains shall be located at suitable points as approved by Architect. No primary or auxiliary drain shall be located in any public area or electrical room. All drains shall discharge into dedicated receptors.
- 3.5 No work shall be covered or enclosed until inspected, tested, and approved by Architect and/or authority having jurisdiction. Should any work be concealed before inspection, the Contractor shall, at Contractor's expense, uncover such work and after it has been inspected, tested and approved, provide for all repairs as may be necessary to restore work to original and proper condition.
- 3.6 Sprinklers at finished ceilings and in exposed locations shall form a symmetrical pattern and shall be located at the exact centerline of 2' square ceiling tiles and "Second Look" tile modules. Where 2' x 4' ceilings occur, sprinklers shall be centered in the 2' direction with escutcheons at least 6" clear of ceiling T-bars.
- 3.7 Sprinkler layout shall accommodate lighting and HVAC register locations. Coordination with the work of these sections is the responsibility of Contractor.
- 3.8 Without exception, no piping shall be run under or through any skylight or skylight well. Any additional upright or pendent sprinklers, which may be required by skylight locations, shall be the responsibility of this contractor.
- 3.9 All penetrations of wall and floor assemblies shall be suitably sleeved, patched and/or sealed in order to preserve fire rating, where applicable.
- 3.10 Location of control valves, fire department connection, and inspector's test shall be as required by authorities having jurisdiction, and as approved by Architect.
- 3.11 Local alarm bells shall be located so as to be easily heard and seen by passersby and fire department personnel. Locate on exterior wall, 10'-0" – 12'-0" above finished grade.
- 3.12 Provide wood or metal floor pans under and around pipe cutting/threading machines to protect floor surfaces from damage and discoloration.
- 3.13 Paint all fire sprinkler piping risers, drops and other components exposed to view in final construction as directed by Architect and per Section 09 91 23.
- 3.14 Underground pipe and fittings shall be installed per NFPA 24, and applicable local codes and standards. Trenching, back-filling, depth of bury and size, shape and location of all thrust blocks shall be acceptable to all jurisdictional agencies.

FIELD QUALITY CONTROL

PRODUCT DATA SHEET 5 - Testing

SPECIFICATIONS

- 3.1 Perform all tests as required by NFPA 13, and all authorities having jurisdiction. Maintain an accurate record of all tests and inspections on the job site, including date of test and inspecting agency.
- 3.2 Before connection of interior system to underground main, underground piping shall be hydrostatically tested, flushed and accepted by authorities having jurisdiction. Provide documentation of acceptance by jurisdictional authority. All required health and bacterial tests shall be the responsibility of Contractor.

COMPLETION

PRODUCT DATA SHEET 6 - Closeout

- 3.1 Upon completion and approval of system, and prior to occupancy, provide instruction to the Owner, or Owner's representative, in all details of system operation and maintenance. Prepare and submit maintenance and operation manual per other sections of specifications as applicable.
- 3.2 Provide three copies of final inspection and certification as prescribed by Owner's Insurance Underwriter, and other authorities having jurisdiction.
- 3.3 Furnish fully executed NFPA Materials and Test Certificate to Owner or Owner's representative, local fire authority, architect and to DSA.
- 3.4 Submit two copies of guarantee per Section 01 78 39.
- 3.5 Provide three (3) copies of system "As-Built" drawings to the Owner or Owner's representative. Drawings shall show actual installation details including all piping and equipment locations, room or facilities modifications, etc. One (1) copy of drawings shall be on reproducible type media.

PRODUCT DATA SHEET 7 - Clean Up

- 3.1 Equipment, appurtenances, fixtures and exposed piping shall be clean, and all excess dope and oil shall be removed. Sprinkler heads shall be cleaned without the use of any solvents.
- 3.2 Upon completion of work, remove all surplus material, debris, and equipment associated with or used in the execution of this work. Sweep work and storage areas, as required, to remove metal shavings and oily residue.

END OF SECTION 21 13 13

SPECIFICATIONS

SECTION 22 11 13 FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Reference Standards:
 - 1. Standard Specifications for Public Works Construction, current edition, including Regional and City of San Diego Supplemental Amendments.

1.2 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for water service and fire service mains.
- B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.
- C. Related Requirements:
 - 1. See other Division 22 Sections for additional piping installation requirements.
 - 2. Section 21 13 13 "Wet-Pipe Sprinkler Systems" for fire-suppression-water piping inside the building.
 - 3. Section 22 11 16 "Domestic Water Piping" for potable-water piping inside the building.
 - 4. Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables" for wiring connection requirements.
 - 5. Section 26 05 26 "Grounding and Bonding for Electrical Systems" for equipment grounding requirements.
 - 6. Section 31 20 00 "Earth Moving" for excavating, trenching, and backfilling, and underground warning tapes.
 - 7. Section 33 05 00 "Common Work Results for Utilities" for piping-system common requirements, commonly used joining materials, basic piping joint construction, joining piping of dissimilar metals, and piping connections to valves and equipment.

1.3 DEFINITIONS

- A. EPDM: Ethylene propylene diene terpolymer rubber.
- B. LLDPE: Linear, low-density polyethylene plastic.

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- C. PA: Polyamide (nylon) plastic.
- D. PP: Polypropylene plastic.
- E. PVC: Polyvinyl chloride plastic.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Include rated capacities and shipping, installed and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components and piping and wiring connections for the following:
 - 1. Backflow preventors and water regulators.
 - 2. Drain valves, hose bibs, hydrants, and hose stations.
- C. Shop Drawings: Detail precast concrete vault assemblies. Indicate dimensions, method of field assembly, and components.

1.5 INFORMATIONAL SUBMITTALS

- A. 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.
- B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
 - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
 - 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

SPECIFICATIONS

- C. 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.
- D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
- E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
- G. NSF Compliance:
 - 1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
 - 2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
 - 1. Ensure that valves are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends and flange faces.
 - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
 - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.

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- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.9 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by City of La Puente or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
 - 1. Notify City of La Puente Construction Manager no fewer than five days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of water-distribution service without City of La Puente Construction Manager's written permission.

1.10 COORDINATION

- A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Soft Copper Tube: ASTM B 88, Type L, water tube, annealed temper.
 - 1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
- B. Hard Copper Tube: ASTM B 88, Type L, water tube, drawn temper.
 - 1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
- C. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
- D. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.2 PVC PIPE AND FITTINGS

- A. PVC, AWWA Pipe: AWWA C900 Class 200, with bell end with gasket, and with spigot end.
 - 1. Comply with UL 1285 for fire-service mains if indicated.

SPECIFICATIONS

2. PVC Fabricated Fittings: AWWA C900, Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Gaskets: AWWA C111, rubber.
5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.3 SPECIAL PIPE FITTINGS

A. Ductile-Iron Rigid Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. EBAA Iron, Inc.
 - b. Hays Fluid Products; a Division of ROMAC Industries Inc.
 - c. Star Pipe Products.
 - d. Or Equal.
2. Description: Three-piece, ductile-iron assembly consisting of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
 - a. Pressure Rating: 250 psig minimum.
 - b. Offset as indicated or required.
 - c. Expansion as indicated or required.

B. Ductile-Iron Flexible Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. EBAA Iron, Inc.
 - b. Hays Fluid Controls.
 - c. Star Pipe Products.
 - d. Or Equal.
2. Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections.

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Assemble components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

- a. Pressure Rating: 250 psig minimum.

2.4 JOINING MATERIALS

- A. Brazing Filler Metals: AWS A5.8, BCuP Series.
- B. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.5 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:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ford Meter Box Company, Inc. (The).
 - b. JCM Industries, Inc.
 - c. Smith-Blair, Inc.
 - d. Or Equal.
 - 2. Description: 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.
 - a. Standard: AWWA C219.
 - b. Center-Sleeve Material: Carbon steel.
 - c. Gasket Material: Natural or synthetic rubber.
 - d. Pressure Rating: 200 psig minimum.
 - e. Metal Component Finish: Corrosion-resistant coating or material.
- C. Split-Sleeve Pipe Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Victaulic Company.
 - b. Or Equal.
 - 2. Description: Metal, bolted, split-sleeve-type, reducing or transition coupling with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.
 - a. Standard: AWWA C219.
 - b. Sleeve Material: Carbon steel.

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- c. Sleeve Dimensions: Of thickness and width required to provide pressure rating.
- d. Gasket Material: O-rings made of EPDM rubber, unless otherwise indicated.
- e. Pressure Rating: 200 psig minimum.
- f. 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:

- 1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- 2. Dielectric Unions:
 - a. Description:
 - 1) Standard: ASSE 1079.
 - 2) Pressure Rating: 250 psig.
 - 3) End Connections: Solder-joint copper alloy and threaded ferrous.
- 3. Dielectric Flanges:
 - a. Description:
 - 1) Standard: ASSE 1079.
 - 2) Factory-fabricated, bolted, companion-flange assembly.
 - 3) Pressure Rating: 150 psig or 300 psig.
 - 4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- 4. Dielectric-Flange Insulating Kits:
 - a. Description:
 - 1) Field-assembled companion-flange assembly, full face or ring type.
 - 2) Non-conducting materials for field assembly of companion flanges.
 - 3) Pressure Rating: 150 psig or 300 psig.
 - 4) Gasket: Neoprene or phenolic.
 - 5) Bolt Sleeves: Phenolic or polyethylene.
 - 6) Washers: Phenolic with steel backing washers.
- 5. Dielectric Couplings:

SPECIFICATIONS

a. Description:

- 1) Galvanized steel couplings with inert and noncorrosive thermoplastic lining, with threaded ends.
- 2) Pressure Rating: 300 psig.

6. Dielectric Nipples:

a. Description:

- 1) Standard: IAPMO PS 66.
- 2) Electroplated steel nipple complying with ASTM F 1545.
- 3) Pressure Rating: 300 psig at 225 deg F minimum.
- 4) End Connections: Male threaded or grooved.
- 5) Lining: Inert and noncorrosive, propylene.

2.6 CORROSION-PROTECTION PIPING ENCASEMENT

A. Encasement for Underground Metal Piping:

1. Standards: ASTM A 674 or AWWA C105.
2. Form: Sheet or tube.
3. Material: LLDPE film of 0.008-inch minimum thickness.
4. Material: LLDPE film of 0.008-inch minimum thickness, or high-density, cross-laminated PE film of 0.004-inch minimum thickness.
5. Material: High-density, cross-laminated PE film of 0.004-inch minimum thickness.
6. Color: Black.

2.7 GATE VALVES

A. Ball Valves

1. All ball valves ¾" to 2 1/2 " shall be full-port valves.

B. AWWA, Cast-Iron Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. McWane, Inc.
 - b. Mueller Co.
 - c. NIBCO INC.
 - d. Or Equal.
2. Nonrising-Stem, Metal-Seated Gate Valves:
 - a. Description: Gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.
 - 1) Standard: AWWA C500.

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- 2) Minimum Pressure Rating: 200 psig.
 - 3) End Connections: Mechanical joint.
 - 4) Interior Coating: Complying with AWWA C550.
 3. Nonrising-Stem, Resilient-Seated Gate Valves:
 - a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 200 psig.
 - 3) End Connections: Mechanical joint.
 - 4) Interior Coating: Complying with AWWA C550.
 4. Nonrising-Stem, High-Pressure, Resilient-Seated Gate Valves:
 - a. Description: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 250 psig.
 - 3) End Connections: Push on or mechanical joint.
 - 4) Interior Coating: Complying with AWWA C550.
 5. OS&Y, Rising-Stem, Metal-Seated Gate Valves:
 - a. Description: Cast- or ductile-iron body and bonnet, with cast-iron double disc, bronze disc and seat rings, and bronze stem.
 - 1) Standard: AWWA C500.
 - 2) Minimum Pressure Rating: 200 psig.
 - 3) End Connections: Flanged.
 6. OS&Y, Rising-Stem, Resilient-Seated Gate Valves:
 - a. Description: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 200 psig.
 - 3) End Connections: Flanged.

C. Bronze Gate Valves:

 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crane; Crane Energy Flow Solutions.
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.
 - d. Or Equal.

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2. OS&Y, Rising-Stem Gate Valves:
 - a. Description: Bronze body and bonnet and bronze stem.
 - 1) Standards: UL 262 and FMG approved.
 - 2) Minimum Pressure Rating: 175 psig.
 - 3) End Connections: Threaded.
3. Nonrising-Stem Gate Valves:
 - a. Description: Class 125, Type 1, bronze with solid wedge, threaded ends, and malleable-iron handwheel.
 - 1) Standard: MSS SP-80.

2.8 GATE VALVE ACCESSORIES AND SPECIALTIES

- A. Tapping-Sleeve Assemblies:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Cast Iron Pipe Company.
 - b. East Jordan Iron Works, Inc.
 - c. Flowserve Corporation.
 - d. Or Equal.
 2. Description: Sleeve and valve compatible with drilling machine.
 - a. Standard: MSS SP-60.
 - b. 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.
 - c. 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, FMG-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.

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2.9 CHECK VALVES

A. AWWA Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Cast Iron Pipe Company.
 - b. APCO Willamette Valve and Primer Corporation.
 - c. Crane; Crane Energy Flow Solutions.
 - d. Or Equal.
2. Description: Swing-check type with resilient seat. Include interior coating according to AWWA C550 and ends to match piping.
 - a. Standard: AWWA C508.
 - b. Pressure Rating: 175 psig.

2.10 PRESSURE-REDUCING VALVES

A. Water Regulators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cash Acme.
 - b. Conbraco Industries, Inc.
 - c. Honeywell Water Controls.
 - d. Or Equal.
2. Standard: ASSE 1003.
3. Pressure Rating: Initial pressure of 150 psig.
4. Size: As indicated in the drawings.
5. Design Flow Rate: As indicated in the drawings.
6. Design Inlet Pressure: To be determined by the utility company.
7. Design Outlet Pressure Setting: To be determined by the utility company.
8. Body: Bronze with chrome-plated finish for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.
9. Valves for Booster Heater Water Supply: Include integral bypass.
10. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

2.11 RELIEF VALVES

A. Air-Release Valves:

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

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- a. Crispin-Multiplex Manufacturing Co.
 - b. GA Industries, Inc.
 - c. Val-Matic Valve & Manufacturing Corp.
 - d. Or Equal.
2. Description: Hydromechanical device to automatically release accumulated air.
 - a. Standard: AWWA C512.
 - b. Pressure Rating: As indicated in the drawings.

2.12 VACUUM BREAKERS

A. Pressure Vacuum Breaker Assembly:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Flowmatic Corporation.
 - b. Toro Company (The).
 - c. Zurn Industries, LLC.
 - d. Or Equal.
2. Standard: ASSE 1020.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
5. Size: As indicated in the drawings.
6. Accessories: Ball valves on inlet and outlet.

2.13 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Zurn Industries, LLC.
 - b. Flowmatic Corporation
 - c. Or Equal.
2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
5. Size: As indicated in the drawings.
6. Body: Bronze for NPS 2 and smaller; stainless steel for NPS 2-1/2 and larger.
7. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
8. Configuration: Designed for flanged horizontal, straight through flow.
9. Accessories:

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- a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller; OS&Y gate type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.
- b. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground water-service piping NPS 3/4 to NPS 3 shall be the following:
 1. PVC Schedule 80 piping
- F. Underground water-service piping NPS 4 to NPS 8 shall be the following:
 1. AWWA C900 PVC, class as indicated on drawings, but not less than 200, with bell and spigot ends, using mechanical joint fittings.
- G. Aboveground water-service piping NPS 4 to NPS 8 shall be the following:
 1. AWWA C151 Ductile Iron Pipe.

3.2 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, high-pressure, resilient-seated gate valves with valve box.
 2. Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FMG, cast-iron, nonrising-stem gate valves with indicator post.

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3. Pressure-Reducing Valves: Use for water-service piping in vaults and aboveground to control water pressure.
4. Relief Valves: Use for water-service piping in vaults and aboveground.
 - a. Air-Release Valves: To release accumulated air.
 - b. Air/Vacuum Valves: To release or admit large volume of air during filling of piping.
 - c. Combination Air Valves: To release or admit air.

3.3 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- C. Make connections larger than NPS 2 with tapping machine according to the following:
 1. Install tapping sleeve and tapping valve according to MSS SP-60.
 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 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.
- D. Make connections NPS 2 and smaller with drilling machine according to the following:
 1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
 2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
 3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
 4. Install corporation valves into service-saddle assemblies.
 5. Install manifold for multiple taps in water main.
 6. Install curb valve in water-service piping with head pointing up and with service box.
- E. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
- F. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
- G. Bury piping with depth of cover over top at least 30 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:
 1. Under Driveways: With at least 36 inches cover over top.
 2. Under Railroad Tracks: With at least 48 inches cover over top.
 3. In Loose Gravelly Soil and Rock: With at least 12 inches additional cover.

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4. Fire water lines shall have min 48 inches of cover.
 5. Domestic water lines shall have min 36 inches of cover.
- H. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- I. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- J. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.4 JOINT CONSTRUCTION

- A. Make pipe joints according to the following:
1. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
 2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
 3. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
 4. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

3.5 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
1. Concrete thrust blocks.
 2. Locking mechanical joints.
 3. Set-screw mechanical retainer glands.
 4. Bolted flanged joints.
 5. Heat-fused joints.
 6. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.

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2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.6 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
- C. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.
- D. Pressure-Reducing Valves: Install in vault or aboveground between shutoff valves.
- E. Relief Valves: Comply with AWWA C512. Install aboveground with shutoff valve on inlet.

3.7 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
- C. Do not install bypass piping around backflow preventers.

3.8 ALARM DEVICE INSTALLATION

- A. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with valve box do not require supervision.
- B. Supervisory Switches: Supervise valves in open position.
 1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
 2. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.
- C. Locking and Sealing: Secure unsupervised valves as follows:
 1. Valves: Install chain and padlock on open OS&Y gate valve.
 2. Post Indicators: Install padlock on wrench on indicator post.

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- D. Pressure Switches: Drill and thread hole in exposed barrel of fire hydrant. Install switch.
- E. Water-Flow Indicators: Install in water-service piping in vault. Select indicator with saddle and vane matching pipe size. Drill hole in pipe, insert vane, and bolt saddle to pipe.
- F. Connect alarm devices to building fire alarm system.

3.9 CONNECTIONS

- A. Drawings indicate general arrangement of piping, equipment, fittings, and specialties.
- B. Connect water-distribution piping to interior domestic water and fire-suppression piping.
- C. Provide grounding for equipment.
- D. Connect low voltage wiring.

3.10 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-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 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.

3.11 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping.
- B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel.

3.12 CLEANING

- A. Clean and disinfect water-distribution piping as follows:

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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.
 3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
 - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
 - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
 - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

END OF SECTION 22 11 13

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SECTION 22 13 13 FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Reference Standards:
 - 1. City of San Diego Standard Drawings for Public Works Construction, current edition.
 - 2. City of San Diego Standard Specifications for Public Works Construction (Whitebook), current edition.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings.
 - 2. Nonpressure and pressure couplings.
 - 3. Expansion joints and deflection fittings.
 - 4. Backwater valves.
 - 5. Cleanouts.
 - 6. Encasement for piping.
 - 7. Manholes.
 - 8. Concrete for ballast and pipe supports.
- B. Related Requirements:
 - 1. Section 22 13 16 " Sanitary Waste and Vent Piping " for connecting nonpressure, gravity-flow drainage piping to building's sanitary building drains.
 - 2. Section 31 20 00 "Earth Moving" for excavating, trenching, and backfilling, underground warning tapes, and underground utility identification devices.

1.3 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:

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1. Expansion joints and deflection fittings.
 2. Backwater valves.
 3. Transition couplings.
 4. Cleanouts.
- B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewer system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
- B. Profile Drawings: Show system piping in elevation. Draw profiles to horizontal scale of not less than 1-inch equals 50 feet and to vertical scale of not less than 1-inch equals 5-feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- C. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.
- D. Field quality-control reports.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by City of La Puente or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
1. Notify City of La Puente Construction Manager no fewer than seven days in advance of proposed interruption of service.
 2. Do not proceed with interruption of service without City of La Puente Construction Manager's written permission.

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PART 2 - PRODUCTS

2.1 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class.
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.2 PVC PIPE AND FITTINGS

- A. PVC Type PSM Sewer Piping:
 - 1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
 - 2. Fittings: ASTM D 3034, PVC with bell ends.
 - 3. Gaskets: ASTM F 477, elastomeric seals.
- B. PVC Pressure Piping:
 - 1. Pipe: AWWA C900, Class 150 and Class 200 PVC pipe with bell-and-spigot ends for gasketed joints.
 - 2. Fittings: AWWA C900, Class 150 and Class 200 PVC pipe with bell ends.
 - 3. Gaskets: ASTM F 477, elastomeric seals.

2.3 NONPRESSURE-TYPE TRANSITION COUPLINGS

- A. Shielded, Flexible Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cascade Waterworks Mfg. Co.
 - b. Dallas Specialty & Mfg. Co.
 - c. Mission Rubber Company, LLC; a division of MCP Industries.
 - d. Or Equal.
 - 2. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Ring-Type, Flexible Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fernco Inc.

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- b. Logan Clay Pipe.
 - c. Mission Rubber Company, LLC; a division of MCP Industries.
 - d. Or Equal.
2. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.4 EXPANSION JOINTS AND DEFLECTION FITTINGS

A. Ductile-Iron Deflection Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. EBAA Iron, Inc.
 - b. Or Equal.
2. Description: Compound coupling fitting with ball joint, flexing section, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include rating for 250-psig minimum working pressure and for up to 15 degrees of deflection.

2.5 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Smith, Jay R. Mfg. Co.
 - b. Tyler Pipe; a subsidiary of McWane Inc.
 - c. Zurn Industries, LLC.
 - d. Or Equal.
2. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
3. Top-Loading Classification(s): Heavy Duty.

B. PVC Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. NDS Inc.
 - b. Sioux Chief Manufacturing Company, Inc.
 - c. Zurn Industries, LLC.

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d. Or Equal.

2. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.6 ENCASEMENT FOR PIPING

- A. Standard: ASTM A 674 or AWWA C105.
- B. Material: High-density, cross-laminated polyethylene film of 0.004-inch minimum thickness.
- C. Form: Tube.
- D. Color: Natural.

2.7 MANHOLES

- A. Standard Precast Concrete Manholes:
 1. Manholes shall be according to City of San Diego standards.
- B. Manhole Frames and Covers:
 1. Manhole frames and covers shall be according to City of San Diego standards.
- C. Manhole-Cover Inserts:
 1. Manhole inserts shall be according to City of San Diego standards.

2.8 CONCRETE

- A. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as

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indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - 3. Install piping with 36-inch minimum cover, unless otherwise indicated.
 - 4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 - 5. Install hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 - 6. Install PVC cellular-core sewer piping according to ASTM D 2321 and ASTM F 1668.
 - 7. Install PVC profile sewer piping according to ASTM D 2321 and ASTM F 1668.
 - 8. Install PVC gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
- G. Install force-main, pressure piping according to the following:
 - 1. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - 2. Install piping with 36-inch minimum cover.
 - 3. Install ductile-iron pressure piping according to AWWA C600 or AWWA M41.
 - 4. Install ductile-iron special fittings according to AWWA C600.
 - 5. Install PVC pressure piping according to AWWA M23 or to ASTM D 2774 and ASTM F 1668.
 - 6. Install PVC water-service piping according to ASTM D 2774 and ASTM F 1668.
- H. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:

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1. Hub-and-spigot, cast-iron soil pipe.
 2. Hubless cast-iron soil pipe and fittings.
 3. Ductile-iron pipe and fittings.
 4. Expansion joints and deflection fittings.
- I. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.2 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, drainage piping according to the following:
1. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
 2. Join PVC cellular-core sewer piping according to ASTM D 2321 and ASTM F 891 for solvent-cemented joints.
 3. Join PVC profile sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
 4. Join dissimilar pipe materials with nonpressure-type, flexible couplings.
- B. Join force-main, pressure piping according to the following:
1. Join ductile-iron pressure piping according to AWWA C600 or AWWA M41 for push-on joints.
 2. Join ductile-iron special fittings according to AWWA C600 or AWWA M41 for push-on joints.
 3. Join PVC pressure piping according to AWWA M23 for gasketed joints.
 4. Join PVC water-service piping according to ASTM D 2855.
 5. Join dissimilar pipe materials with pressure-type couplings.
- C. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. Shielded flexible couplings for pipes of same or slightly different OD.
 - b. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
 2. Use pressure pipe couplings for force-main joints.

3.3 MANHOLE INSTALLATION

- A. General: Install manholes complete with appurtenances and accessories indicated.

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- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Install FRP manholes according to manufacturer's written instructions.
- D. Form continuous concrete channels and benches between inlets and outlet.
- E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.
- F. Install manhole-cover inserts in frame and immediately below cover.

3.4 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.5 BACKWATER VALVE INSTALLATION

- A. Install horizontal-type backwater valves in piping manholes or pits.
- B. Install combination horizontal and manual gate valves in piping and in manholes.
- C. Install terminal-type backwater valves on end of piping and in manholes. Secure units to sidewalls.

3.6 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Medium-Duty, top-loading classification cleanouts in unpaved and paved foot-traffic areas.
 - 2. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
 - 3. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 18-by-18-by-12 inches deep. Set with tops 1-inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.7 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains.

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- B. Connect force-main piping to building's sanitary force mains. Terminate piping where indicated.
- C. Make connections to existing piping and underground manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
 - 4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 CLOSING ABANDONED SANITARY SEWER SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 - 1. Close open ends of piping with at least 8-inch-thick, brick masonry bulkheads.
 - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes: Excavate around manhole as required and use either procedure below:
 - 1. Remove manhole and close open ends of remaining piping.

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2. Remove top of manhole down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.

C. Backfill to grade.

3.9 IDENTIFICATION

A. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

1. Use detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.10 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate report for each system inspection.
2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:

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- a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
 - b. Close openings in system and fill with water.
 - c. Purge air and refill with water.
 - d. Disconnect water supply.
 - e. Test and inspect joints for leaks.
 6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
 - b. Option: Test concrete gravity sewer piping according to ASTM C 924.
 7. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than 150 psig.
 - a. Ductile-Iron Piping: Test according to AWWA C600, "Hydraulic Testing."
 - b. PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.
 8. Manholes: Perform hydraulic test according to ASTM C 969.
 - C. Leaks and loss in test pressure constitute defects that must be repaired.
 - D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.
- 3.11 CLEANING
- A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION 22 1313

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SECTION 22 14 23 STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Roof drains.
 - 2. Miscellaneous storm drainage piping specialties.
 - 3. Cleanouts.
- B. Related Requirements:
 - 1. Section 07 62 00 "Sheet Metal Flashing and Trim" for roof drain elastomeric flashing system.

1.3 ACTION SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 METAL ROOF DRAINS

- A. Cast-Iron, General-Purpose Roof Drains CRD-1 and CRD-2:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Zurn Industries, LLC.

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- b. Josam Company.
 - c. Smith, Jay R. Mfg. Co.
 - d. Or Equal.
 - 2. Standard: ASME A112.6.4, for general-purpose roof drains.
 - 3. Body Material: Cast iron.
 - 4. Dimension of Body: Nominal 8-12-inch diameter.
 - 5. Combination Flashing Ring and Gravel Stop: Not required.
 - 6. Flow-Control Weirs: Not required.
 - 7. Outlet: Bottom.
 - 8. Outlet Type: No hub.
 - 9. Extension Collars: Not required.
 - 10. Underdeck Clamp: Required.
 - 11. Expansion Joint: Required.
 - 12. Sump Receiver Plate: Not required.
 - 13. Dome Material: Cast iron.
 - 14. Perforated Gravel Guard: [Not required.
 - 15. Vandal-Proof Dome: Required.
 - 16. Water Dam: 2 inches high.
- B. Metal, Small-Sump, Deck Drains DD-1
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Zurn Industries, LLC.
 - b. Josam Company.
 - c. Smith, Jay R. Mfg. Co.
 - d. Or Equal.
 - 2. Standard: ASME A112.6.4, for general-purpose deck drains.
 - 3. Body Material: Cast iron.
 - 4. Flow-Control Weirs: Not required.
 - 5. Outlet: Bottom.
 - 6. Outlet Type: No hub.
 - 7. Sump Receiver Plate: Not required.
 - 8. Vandal-Proof Cover: Required.

2.2 MISCELLANEOUS STORM DRAINAGE PIPING SPECIALTIES

- A. Downspout Adaptors:
- 1. Description: Manufactured, gray-iron casting, for attaching to horizontal-outlet, parapet roof drain and to exterior, sheet metal downspout.
 - 2. Size: Inlet size to match parapet drain outlet.
- B. Downspout Boots:

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1. Description: Manufactured, ASTM A 48/A 48M, gray-iron casting, with strap or ears for attaching to building; NPS 4 outlet; and shop-applied bituminous coating.
2. Size: Inlet size to match downspout and NPS 4 outlet.

C. Conductor Nozzles:

1. Description: Bronze body with threaded inlet and bronze wall flange with mounting holes.
2. Size: Same as connected conductor.

D. Downspout Covers:

1. Description: Stainless steel body with securing wall flange with mounting holes and vandal proof secured perforated stainless steel hinged strainer.
2. Size: Same as connected conductor.

2.3 CLEANOUTS

A. Cast-Iron Wall Cleanouts

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Zurn Industries, LLC
 - b. Josam Company.
 - c. Smith, Jay R. Mfg. Co.
 - d. Or Equal.
2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: As required to match connected piping.
5. Closure Plug:
 - a. Drilled and threaded for cover attachment screw.
 - b. Size: Same as, or not more than, one size smaller than cleanout size.
6. Wall Access: Round wall-installation frame and cover.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.
 1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
 2. Install expansion joints, if indicated, in roof drain outlets.

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3. Position roof drains for easy access and maintenance.
- B. Install downspout adapters on outlet of back-outlet parapet roof drains and connect to sheet metal downspouts.
- C. Install conductor nozzles at exposed bottom of conductors where they spill onto grade.
- D. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:
 1. Use cleanouts the same size as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
 3. Locate cleanouts at base of each vertical storm stack.
- E. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

3.2 CONNECTIONS

- A. Comply with requirements for piping specified in Section 22 14 13 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 14 23

SPECIFICATIONS

SECTION 26 01 00

ELECTRICAL GENERAL PROVISIONS

PART 1 – GENERAL

SUMMARY

- 1.1 This Division of the specification outlines the provisions of the contract work to be performed under this Division.
- 1.2 This Section applies to and forms a part of each section of specifications in Division 26 and all work performed under Division 26, 27 and 28.
- 1.3 In addition, work in this Division is governed by the provisions of the bidding requirements, contract forms, general conditions and all sections under general requirements.
- 1.4 These specifications contain statements which may be more definitive or more restrictive than those contained in the General Conditions. Where these statements occur, they shall take precedence over the General Conditions.
- 1.5 Where the words 'provide' or 'provision' are used, it shall be definitely interpreted as 'furnishing and installing complete in operating condition'. Where the words 'as indicated' or 'as shown' are used, it shall mean as shown on contract drawings.
- 1.6 Where items are specified in the singular, this Division shall provide the quantity as shown on drawings plus any spares or extras mentioned on drawings or specifications. All specified and supplied equipment shall be new.

CONTRACTOR QUALIFICATIONS

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

CODES, PERMITS AND FEES

- 1.8 Comply with all applicable laws, ordinances, rules, regulations, codes, or rulings of governmental units having jurisdiction as well as standards of CEC and serving utility requirements.
- 1.9 Obtain permits, fees, inspections, meter and the like, associated with work in each section of this Division.
- 1.10 Installation procedures, methods and conditions shall comply with the latest requirements of the Federal Occupational Safety and Health Act (OSHA).

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EXAMINATION OF PREMISES

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

STANDARDS

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

- 1.12.1 2022 California Electrical Code (CEC), Part 3 Title 24 CCR.
- 1.12.2 National Fire Protection Association.
- 1.12.3 Underwriters' Laboratories, Inc. (UL).
- 1.12.4 Certified Ballast Manufacturers' Association (CBM).
- 1.12.5 National Electrical Manufacturers' Association (NEMA).
- 1.12.6 Institution of Electrical & Electronics Engineers (IEEE).
- 1.12.7 American Society for Testing & Materials (ASTM).
- 1.12.8 National Board of Fire Underwriters (NBFU).
- 1.12.9 National Board of Standards (NBS).
- 1.12.10 American National Standards Institute (ANSI).
- 1.12.11 Insulated Power Cable Engineers Association (IPECS).
- 1.12.12 Electrical Testing Laboratories (ETL).
- 1.12.13 National Electrical Safety Code (NESC).
- 1.12.14 2022 California Building Code (CBC), Part 2, Title 24 CCR.
- 1.12.15 2022 California Fire Code (CFC), Part 9, Title 24, CCR.
- 1.12.16 2022 NFPA 72 with California State Amendments
- 1.12.17 National Electrical Testing Association (NETA), 2010 or most current

DEFINITIONS

- 1.13 Concealed: Hidden from sight, as in trenches, chases, hollow construction, or above furred spaces, hung ceilings - acoustical or plastic type, or exposed to view only in tunnels, attics, shafts, crawl spaces, unfinished spaces, or other areas solely for maintenance and repair.
- 1.14 Exposed, Non-Concealed, Unfinished Space: A room or space that is ordinarily accessible only to building maintenance personnel, a room noted on the 'finish schedule' with exposed and unpainted construction for walls, floors, or ceilings or specifically mentioned as 'unfinished'.
- 1.15 Finish Space: Any space ordinarily visible, including exterior areas.

WORK AND MATERIALS

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

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

SHOP DRAWINGS AND SUBMITTALS

- 1.18 Submit shop drawings and all data in accordance with Division 1 of these specifications and as noted below for all equipment provided under this Division.
- 1.19 Shop drawings submittal demonstrate to the Architect that the Contractor understands the design concept. The Contractor demonstrates their understanding by indicating which equipment and material they intend to furnish and install and by detailing the fabrication and installation methods of material and equipment he intends to use. If deviations, discrepancies, or conflicts between submittals and specifications are discovered either prior to or after submittals are processed, notify the Architect immediately.
- 1.20 Manufacturer's data and dimension sheets shall be submitted giving all pertinent physical and engineering data including weights, cross sections and maintenance instructions. Standard items of equipment such as receptacles, switches, plates, etc., which are cataloged items, shall be listed by manufacturer.
- 1.21 Index all submittals and reference them to these specifications. All submittal items shall be assembled and submitted, one for each specification section. (Multiple specification sections may be grouped together in one common submittal binder, as long as each individual section is clearly identified.) Partial or incomplete submittal sections will not be reviewed.

EQUIPMENT PURCHASES

- 1.22 Arrange for purchase and delivery of all materials and equipment within 20 days after approval of submittals. All materials and equipment must be ordered in ample quantities for delivery at the proper time. If items are not on the project in time to expedite completion, the Owner may purchase said equipment and materials and deduct the cost from the contract sum.
- 1.23 Provide all materials of similar class or service by one manufacturer.

COOPERATIVE WORK

- 1.24 Correct without charge any work requiring alteration due to lack of proper supervision or failure to make proper provision in time. Correct without charge any damage to adjacent work caused by the alteration.
- 1.25 Cooperative work includes: General supervision and responsibility for proper location and size of work related to this Division, but provided under the other

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sections of these specifications, and installation of sleeves, inserts, and anchor bolts for work under each section in this Division.

VERIFICATION OF DIMENSIONS

- 1.26 Scaled and figured dimensions are approximate only. Before proceeding with work, carefully check and verify dimensions, etc., and be responsible for properly fitting equipment and materials together and to the structure in spaces provided.
- 1.27 Drawings are essentially diagrammatic, and many offsets, bends, pull boxes, special fittings, and exact locations are not indicated. Carefully study drawings and premises in order to determine best methods, exact location, routes, building obstructions, etc. and install apparatus and equipment in manner and locations to avoid obstructions, preserve headroom, keep openings and passageways clear, and maintain proper clearances.

CLOSING-IN OF UNINSPECTED WORK

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

EXCAVATION AND BACKFILL

- 1.29 All excavation and backfill shall be in accordance with Division 1 of these specifications and as noted below.
- 1.30 Perform all necessary excavation, shoring, and backfilling required for the proper laying of all conduits inside the building and premises, and outside as may be necessary.
- 1.31 Excavate all trenches open cut, keep trench banks as nearly vertical as practicable, and sheet and brace trenches where required for stability and safety. Excavate trenches true to line and make bottoms no wider than necessary to provide ample work room. Grade trench bottoms accurately. Machine grade only to the top line of the conduits, doing the remainder by hand. Do not cut any trench near or under footings without first consulting the Architect. All trenches shall be done in accordance with OSHA standards and regulations.
- 1.32 Backfilling shall be done with each layer compacted before another layer is added. No stones or coarse lumps shall be laid directly on a conduit or conduits.
- 1.33 Trenches shall be filled with the specified material. Sod, if any, shall be removed in cut sections and replaced in same manners.
- 1.34 Provide pumps and drainage of all open trenches for purposes of installing electrical duct and wiring.

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

CONCRETE

- 1.37 Where used for structures to be provided under the contract such as bases, etc., concrete work, and associated reinforcing shall be as specified under Division 3 of these specifications.
- 1.38 See other sections for additional requirements for underground vaults, cable ducts, etc.

ACCESSIBILITY

- 1.39 Install all control devices or other specialties requiring reading, adjustment, inspection, repairs, removal, or replacement conveniently and accessibly throughout the finished building.
- 1.40 All required access doors or panels in walls and ceilings are to be furnished and installed as part of the work under this Section. Refer to Division 1 of these specifications and as noted below.
- 1.41 Where located in fire rated assemblies, provide doors which match the rating of the assembly and are approved by the jurisdictional authority.
- 1.42 Refer to 'finish schedule' for types of walls and ceilings in each area and the architectural drawings for rated wall construction.
- 1.43 Coordinate work of the various sections to locate specialties requiring accessibility with others to avoid unnecessary duplication of access doors.

FLASHING

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

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IDENTIFICATION OF EQUIPMENT

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

1.45.1 General:

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

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

1.45.2 Lighting and Local Panelboards:

- 1.45.2.1 Panel identification shall be with white and black micarta nameplates. Letters shall be no less than 3/8" high.

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

1.45.3 Distribution Switchboards and Feeders Sections:

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

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

1.45.4 Disconnect Switches, Motor Starters and Transformers:

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

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

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CONSTRUCTION FACILITIES

- 1.46 Furnish and maintain from the beginning to the completion all lawful and necessary guards, railings, fences, canopies, lights, warning signs, etc. Take all necessary precautions required by City, State Laws, and OSHA to avoid injury or damage to any persons and property.
- 1.47 Temporary power and lighting for construction purposes shall be provided under this Section. All work shall be in accordance with Division 1 of these specifications.

GUARANTEE

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

PATENTS

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

PLUMBING (DIVISION 22) / HEATING, VENTILATING, AND AIR CONDITIONING (DIVISION 23) / ELECTRICAL – COORDINATION REQUIREMENTS

- 1.50 All electrical work performed for this project shall conform to the California Electrical Code, to Local Building Codes and in conformance with Division 22, 23, and 26 of these specifications, whether the work is provided under the "Plumbing", "Heating, Ventilating, and Air Conditioning", or the "Electrical" Division of these specifications. Where the Division 22 and/or Division 23 Contractor is required to provide electrical work, he shall arrange for the work to be done by a licensed Division 26 Contractor, using qualified electricians. The Division 22 and/or Division 23 Contractor shall be solely and completely responsible for the correct functioning of all equipment regardless of who provided the electrical work.
- 1.51 The work under Division 22 and/or Division 23 shall include the following:
 - 1.51.1 All motors required by mechanical equipment.
 - 1.51.2 All starters for mechanical equipment which are not provided under the electrical division as part of a motor control center or otherwise indicated on the electrical drawings.
 - 1.51.3 All wiring interior to packaged equipment furnished as an integral part of the equipment.
 - 1.51.4 All control **wiring and conduit** for mechanical control systems.

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- 1.51.5 All control systems required by mechanical equipment.
- 1.52 The work under Division 26 shall include the following:
 - 1.52.1 All power wiring and conduit; and conduit only for EMS control conductors between each building and the main control panel.
 - 1.52.2 Electrical disconnects as shown on the electrical drawings.
 - 1.52.3 Starters forming part of a motor control center.
- 1.53 All power wiring and conduit to equipment furnished under Division 22 and/or Division 23 shall be provided under Division 26. Control wiring and conduit, whether line voltage or low voltage, shall be provided under the division which furnishes the equipment.
- 1.54 Power wiring shall be defined as all wiring between the panelboard switchboard overcurrent device, motor control center starter or switch, and the safety disconnect switch or control panel serving the equipment. Also, the power wiring between safety disconnect switch and the equipment line terminals.
- 1.55 Control wiring shall be defined as all wiring, either line voltage or low voltage, required for the control and interlocking of equipment, including but not limited to wiring to motor control stations, solenoid valves, pressure switches, limit switches, flow switches, thermostats, humidistats, safety devices, smoke detectors, and other components required for the proper operation of the equipment.
- 1.56 All motor starters which are not part of motor control centers and which are required for equipment furnished under this Division shall be furnished and installed by the Division furnishing the equipment and power wiring connected under Division 26. Motor starters and control devices in motor control centers shall be furnished and installed under Division 26.
- 1.57 Division 26 Contractor shall make all final connections of power wiring to equipment furnished under this Division.
- 1.58 Wiring diagrams complete with all connection details shall be furnished under each respective Section.
- 1.59 Motor starters supplied by Plumbing and/or Heating, Ventilating and Air Conditioning shall be fused combination type minimum NEMA Size 1, and conform to appropriate NEMA standards for the service required. Provide NEMA type 3R/12 gasketed enclosures in wet locations. Provide all starters with appropriately sized overload protection and heater strips provided in each phase, hand/off auto switches, a minimum of 2 NO and NC auxiliary contacts as required, and an integral disconnecting means. For ½ horsepower motors and below, when control requirements do not dictate the use of a starter, a manual motor starter switch with

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overload protection in each phase may be provided. Acceptable manufacturers are Allen Bradley, General Electric, Square D, Furnas and Cutler Hammer.

EQUIPMENT ROUGH-IN

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

OWNER FURNISHED AND OTHER EQUIPMENT

- 1.61 Rough-in and make final connections to all Owner furnished equipment shown on the drawings and specified, and all equipment furnished under other sections of the specifications.

EQUIPMENT FINAL CONNECTIONS

- 1.62 Provide all final connections for the following:
- 1.62.1 All equipment furnished under this Division.
 - 1.62.2 Electrical equipment furnished under other sections of the specification.
 - 1.62.3 Owner furnished equipment as specified under this Division.

INSERTS, ANCHORS, AND MOUNTING SLEEVES

- 1.63 Inserts and anchors must be:
- 1.63.1 Furnished and installed for support of work under this Division.
 - 1.63.2 Mounting of equipment that is of such size as to be free standing and that equipment which cannot conveniently be located on walls, such as motor starters, etc., shall be rigidly supported on a framework of galvanized steel angle of Unistrut or B-line systems with all unfinished edges painted.
 - 1.63.3 Furnish and install all sleeves as required for the installation of all work under all Sections of this Division and for all communication systems including any communication systems described in this Section which are bid to the General Contractor. Sleeves through floors, roof, and walls shall be as described in "Conduit and Fittings" Section 26 05 33.

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SEISMIC ANCHORING

- 1.64 All switchgear and other free-standing electrical equipment or enclosures shall be anchored to the floor and braced at the top of the equipment to the structure. The Contractor shall submit drawings signed by the Contractors registered structural Engineer indicating method of compliance prior installation.
- 1.65 All sound systems, communication, signal or data networking equipment or enclosures shall be anchored to the structure. The Contractor shall submit drawings signed by the Contractors registered Structural Engineer indicating method of compliance prior to installation.

RUST PROOFING

- 1.66 Rust proofing must be applied to all ferrous metals and shall be in accordance with Section 05500 of these specifications and as noted below.
 - 1.66.1 Hot-dipped galvanized shall be applied and after forming of angle-iron, bolts, anchors, etc.
 - 1.66.2 Hot-dipped galvanized coating shall be applied after fabrication for junction boxes and pull boxes cast in concrete.

GENERAL WIRING

- 1.67 Where located adjacent in walls, outlet boxes shall not be placed back to back, nor shall extension rings be used in place of double boxes, all to limit sound transmission between rooms. Provide short horizontal nipple between adjacent outlet boxes, which shall have depth sufficient to maintain wall coverage in rear by masonry wall.
- 1.68 In those instances where outlet boxes, recessed terminal boxes, or recessed equipment enclosures are installed in a fire rated assembly, provide "Flamesafe FSD 1077" fire stopping pads or approved equal, over the outlet or box.
- 1.69 Complete rough-in requirements of all equipment to be wired under the contract are not indicated. Coordinate with respective trades furnishing equipment or with the Architect as the case may be for complete and accurate requirements to result in a neat, workmanlike installation.

SEPARATE CONDUIT SYSTEMS

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

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

CLEANUP

- 1.72 In addition to cleanup specified under other sections, thoroughly clean all parts of the equipment. Where exposed parts are to be painted, thoroughly clean off any spattered construction materials and remove all oil and grease spots. Wipe the surface carefully and scrape out all cracks and corners.
- 1.73 Use steel brushes on exposed metal work to carefully remove rust, etc., and leave smooth and clean.
- 1.74 During the progress of the work, keep the premises clean and free of debris.

PAINTING

- 1.75 Paint all unfinished metal as required in accordance with Division 1 of these specifications. (Galvanized and factory painted equipment shall be considered as having a sub-base finish.)
- 1.76 Paint all exposed conduit locations in finished spaces to match the finish on the surfaces they are attached to. Verify all color selections with the Architect prior to painting.

GENERAL DEMOLITION REQUIREMENTS

- 1.77 Remove existing work and items which are required to be removed in such manner that minimum damage and disturbance is caused to adjacent and connection work scheduled to remain. Repair or replace existing work schedule.
- 1.78 Include preparation of existing areas to receive new materials and removal of materials and equipment to alter or repair the existing building as indicated and as specified.
- 1.79 Perform demolition exercising proper care to prevent injury to the public, workmen and adjoining property.
- 1.80 Perform the removal, cutting, drilling of existing work with extreme care and use small tools in order not to jeopardize the structural integrity of the building.
- 1.81 Rebuild to existing condition or better, existing work which has to be removed to allow the installation of new work as required.
- 1.82 Remove, protect and reinstall existing items as indicated. Replace materials scheduled for reuse which are damaged by the Contractor to the extent that they cannot be reused, with equal quality material, and installation.

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- 1.83 Do not reuse in this project materials and items removed from existing site or building, except with specific written approval by the Architect in each case, unless such removed material or item is specifically indicated or specified to be reused.
- 1.84 Remove materials and equipment indicated to be salvaged for reinstallation and store to prevent damage and reinstall as the work progresses. Do not reuse in this project, other materials and equipment removed from existing site or building, except with specific written approval by the Architect in each case.
- 1.85 Patch areas requiring patching, including damage caused by removing, relocating or adding fixtures and equipment, damages caused by demolition at adjacent materials.
- 1.86 Do not stockpile debris in the existing building, without the approval of the Architect. Remove debris as it accumulates from removal operations to a legal disposal area.
- 1.87 Contractor to assume existing oil filled and dry transformers, oil switches, ballasts, lamps, wooden poles, cross arms, computers, computer monitors, and conductor insulation containing materials considered hazardous. Comply with local, state and federal regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution. Contractor shall be responsible for removal of the above hazardous materials where encountered. Include all costs for such removal as part of this contract.
- 1.88 All fluorescent, compact fluorescent, high intensity discharge, metal halide, mercury vapor, high and low-pressure sodium, and neon lamps are to be disposed of as required by the California Waste Rule Regulations as described in the California Code of Regulations, Title 22, Division 4.5 and Chapter 23.
- 1.89 **Communication System:** Where new communication systems, (including telephone, intercom, clock, security, fire alarm, data, multimedia, CATV or lighting controls) are installed to replace existing systems, unless where otherwise directed the existing systems shall remain fully operational until the new system has been installed and tested. Demolition of the existing systems shall include removal of all equipment and associated wiring and exposed conduits and providing new blank covers for all abandoned device locations.
- 1.90 **Salvage Power Equipment:** The Contractor shall carefully remove all existing switchboards, panelboards, transformers, and confirm in writing which items the Owner wishes to keep. These items shall be transported to the Owner's maintenance facilities by the Contractor. All remaining items shall be disposed of by the Contractor.
- 1.91 **Salvage Lighting Equipment:** The Contractor shall confirm in writing which items the Owner wishes to keep. These items shall be transported to the Owner's maintenance facilities by the Contractor. All remaining items shall be disposed of by the Contractor.

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- 1.92 **Salvage Communication Equipment:** The Contractor shall carefully remove all communication devices (telephone, intercom, clock, security, fire alarm, data, multimedia, CATV or lighting controls) and box each type of devices separately. The Contractor shall deliver all items to the Owner's maintenance facility.

PROJECT CLOSEOUT

- 1.93 Prior to completion of project, compile a complete equipment maintenance manual for all equipment supplied under sections of this Division, in accordance with Division 1 of these specifications and as described below.
- 1.94 Equipment Lists and Maintenance Manuals:
- 1.94.1 Prior to completion of job, Contractor shall compile a complete equipment list and maintenance manuals. The equipment list shall include the following items for every piece of material equipment supplied under this Section of the specifications:
- 1.94.1.1 Name, model, and manufacturer.
- 1.94.1.2 Complete parts drawings and lists.
- 1.94.1.3 Local supply for parts and replacement and telephone number.
- 1.94.1.4 All tags, inspection slips, instruction packages, etc., removed from equipment as shipped from the factory, properly identified as to the piece of equipment it was taken from.
- 1.95 Maintenance manuals shall be furnished for each applicable section of the specifications and shall be suitably bound with hard covers and shall include all available manufacturers' operating and maintenance instructions, together with "as-built" drawings to properly operate and maintain the equipment. The equipment lists and maintenance manuals shall be submitted in duplicate to the Architect for approval not less than 10 days prior to the completion of the job. The maintenance manuals shall also include the name, address, and phone numbers of all subcontractors involved in any of the work specified herein. Four copies of the maintenance manuals bound in single volumes shall be provided.

RECORD DRAWINGS

- 1.96 The Division 26 Contractor shall maintain record drawings as specified in accordance with Division 1 of these specifications, and as noted below.
- 1.97 Drawings shall show locations of all concealed underground conduit runs, giving the number and size of conduit and wires. Underground ducts shall be shown with cross section elevations and shall be dimensioned in relation to permanent structures to indicate their exact location. Drawing changes shall not be identified only with referencing CORs and RFIs, the drawings shall reflect all of the actual additions or changes made. All as-built drawing information shall be prepared by

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the contractor in AutoCAD, updating the contract computer files as needed to reflect actual installed conditions for all site plans, lighting, power, communication, networking, audio visual, security or fire alarms systems included in the scope of work for this project.

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

CHANGES AND EXTRA WORK

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

1.99.1 The material Costs shall **not exceed** the invoice pricing from an Electrical Distributor indicating the pricing provided at the time of bid. The Contractor shall submit a print out copy of the pricing with the change order to substantiate these values.

1.99.2 The labor Costs shall **not exceed** the latest edition of the "NECA Manual of Labor Units" **normal column**.

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

1.100.1 The Material Costs shall **not be less than 80% of** the invoice pricing from an Electrical Distributor indicating the pricing provided at the time of bid. Restocking fees may also be included in this amount where applicable.

1.100.2 The Labor Costs shall **not be less than 80% of** the latest edition of the "NECA Manual of Labor Units" **normal column**.

- 1.101 Conduit pricing for conduits of all types sized 3" or smaller.

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

1.101.1 Couplings.

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

1.101.3 Conduit straps and associated screws or nails.

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

1.102 Wire pricing for all types and sizes.

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

1.102.1 Locknuts, Bushings, tape, wire markers.

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

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

1.103.2 Locknuts, washers, tape.

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

1.104.1 Change orders with 1 to 30 total labor hours

General Laborer	10%	of total labor hours
Journeyman	10%	of total labor hours
Foreman	80%	of total labor hours

1.104.2 Change orders with 31 to 100 total labor hours

General Laborer	20%	of total labor hours
Journeyman	40%	of total labor hours
Foreman	40%	of total labor hours

1.104.3 Change orders with over 100 total labor hours

General Laborer	30%	of total labor hours
Journeyman	50%	of total labor hours
Foreman	20%	of total labor hours

1.105 When change orders are issued which allow the work to be completed in the normal sequence of construction, the labor rates shall be based on the most current "Prevailing Wage" – straight time total hourly rate. When change orders require the Contractor to work out of sequence the "Prevailing Wage" – daily overtime hourly

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rate shall apply. Special condition situations shall be reviewed on an individual basis for alternate hourly rate schedules.

- 1.106 Costs **will not** be permitted for additional supervision on site or office time for processing any change order other than the 10% overhead allowance as described in Division 1. Cost for special equipment required to install items for an individual change order are permitted and must be individually identified. Lump Sum cost for small tools or any other cost not specifically required for the change order are **not** permitted.
- 1.107 Contractor estimates shall be formatted to clearly identify each of the following:
 - 1.107.1 Line item description of each type of material or labor item.
 - 1.107.2 Description of quantity for each item.
 - 1.107.3 Description of (material cost per / quantity).
 - 1.107.4 Description of (labor cost per / quantity).
 - 1.107.5 Description of total labor hour breakdown per Foreman, Journeyman or General Laborer as described above.

ELECTRONIC FILES

- 1.108 The Contractor shall make a **written** request directly to Johnson Consulting Engineers for electronic drawing files. As a part of the written request, please include the following information:
 - 1.108.1 Clearly indicate each drawing sheet needed (i.e., E1.1, E2.1, etc.).
 - 1.108.2 Identify the name, phone number, mailing address and e-mail address of the person to receive the files.
 - 1.108.3 Provide written confirmation and agreement with the requirements described for payment of computer files, as described below.
- 1.109 Detail or riser diagram sheets, or any other drawings other than floor plans or site plans, **will not be made available to the Contractor.**
- 1.110 Files will only be provided in the AutoCAD format in which they were created.
- 1.111 Requests for files will be processed as soon as possible; a minimum of 7 working days should be the normal processing time. The Contractor shall be completely responsible for requesting the files in time for their use.

END OF SECTION

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SECTION 26 05 19

POWER CONDUCTORS

PART 1 – GENERAL

- 1.1 Furnish and install wire and cable for branch circuits and feeders specified herein and as shown on the electrical drawings.
- 1.2 Submittals: Submit manufacturers' data for the following items:
 - 1.2.1 All cables and terminations
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
 - 1.3.1 Not including all items listed in the above itemized description.
 - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining, or clouding the items to be reviewed, or crossing out the items which are not applicable.
 - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
 - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed

PART 2 – PRODUCTS

- 2.1 Wire and cable Rated 120 volt to 600 volt.
 - 2.1.1 All wire and cable shall be new, 600 volt insulated copper, of types specified below for each application. All wire and cable shall bear the UL label and shall be brought to the job in unbroken packages. Wire insulation shall be the color as specified herein and shall be type THWN-2. Insulated conductors shall be installed in all exterior exposed raceways. Conductors for branch circuit lighting, receptacle, power and miscellaneous systems shall be a minimum of No. 12 AWG. Increase conductor size to No. 10 AWG for 120 volt circuits greater than 100 feet from the panel to the load and for 277 volt circuits greater than 200 feet from the panel to the load. Circuit home-runs indicated to be larger than No. 12 must be increased the entire length of the circuit, including equipment grounding conductor. Wire sizes No. 14 through No. 10 shall be solid. No. 8 and larger shall be stranded.
 - 2.1.2 Aluminum conductors will be permitted (only where specifically identified on the drawings. See "600 Volt Feeder Schedule") in sizes 2/0 or larger.

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Conductors shall be listed by Underwriters Laboratories (UL) and suitable for operation at 600 volts or less, at a maximum operating temperature of 90N C maximum in wet or dry locations. Conductors shall be marked "SUN-RES". Aluminum alloy conductors shall be compact stranded conductors of STABILOY® (AA-8030) as manufactured by Alcan Cable or Listed equal. AA-8000 Series aluminum alloy conductor material shall be recognized by The Aluminum Association.

2.1.3 MC type armored cable reference Section 26 05 33.

2.2 Wire and cable for systems below 120 volts.

2.2.1 All low voltage and communications systems cables routed underground shall be provided with a moisture resistant outer jacket, West Penn "Aquaseal" or equal, unless otherwise specified.

PART 3 - EXECUTION

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

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

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

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

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

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

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

3.3.3 No. 8 wire and larger above grade: Quantities only where indicated, 'Raychem' long barrel compression terminals with crimping tool and quantity

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of crimps as recommended by manufacturer, provide 'Raychem' WCSM-S series in-line heat shrink, sealant coated splice kit. Alternate products must be UL listed for direct burial/submersible and rated to (1000V).

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

- 3.4 All wiring throughout shall be color coded as follows:

	<u>480 volt system</u>	<u>208 or 240 volt system</u>
A Phase	Brown	Black
B Phase	Orange	Red
C Phase	Yellow	Blue
Neutral	Grey	White
Ground	Green	Green

- 3.5 Wiring must be color coded throughout its entire length, except feeders may have color coded plastic tape at both ends and any other accessible point.
- 3.6 All control wiring in a circuit shall be color coded, each phase leg having a separate color, and with all segments of the control circuit, whether in apparatus or conduit, utilizing the same color coding.
- 3.7 At all terminations of control wiring, the wiring shall have a numbered T&B or Brady plastic wire marker.
- 3.8 Cables when installed are to be properly trained in junction boxes, etc., and in such a manner as to prevent any forces on the cable which might damage the cable.
- 3.9 All conductors to be installed into a common raceway, shall be pulled into the raceway at the same time.
- 3.10 All conductors shall be installed in such a manner as to not exceed the manufacturers' recommended pulling tension and bending radius. The equipment used for pulling must be specifically designed for the purpose. Motorized vehicles such as pickup trucks, are not acceptable.

END OF SECTION

POWER CONDUCTORS

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SECTION 26 05 26

GROUNDING

PART 1 – GENERAL

- 1.1 Furnish and install grounding and grounding conductors and electrodes as specified herein and as shown on the drawings.
- 1.2 Submit catalog data for all components.
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
 - 1.3.1 Not including all items listed in the above itemized description.
 - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
 - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
 - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – EXECUTION

- 2.1 Grounding
 - 2.1.1 All panelboard cabinets, equipment, enclosures, and complete conduit system shall be grounded securely in accordance with pertinent sections of CEC Article 250. Conductors shall be copper. All electrically operated equipment shall be bonded to the grounded conduit system. All non-current carrying conductive surfaces that are likely to become energized and subject to personal contact shall be grounded by one or more of the methods detailed in CEC Article 250. All ground connections shall have clean contact surfaces. Install all grounding conductors in conduit and make connections readily accessible for inspection.
 - 2.1.2 Provide an insulated equipment grounding conductor in all branch circuit and feeder raceway systems, sized in accordance with CEC 250-122.
 - 2.1.3 Provide an additional individual insulated grounding conductor for each circuit which contains an isolated ground receptacle or surge suppression receptacle.

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- 2.1.4 Grounding of metal raceways shall be assured by means of provisions of grounding bushings on feeder conduit terminations at the panelboard, and by means of insulated continuous stranded copper grounding wire extended from the ground bus in the panelboard to the conduit grounding bushings.
- 2.1.5 Except for connections which access for periodic testing is required, make grounding connections which are buried or otherwise inaccessible by exothermite type process.
- 2.1.6 The following ohmic values shall be test certified for each item listed. A written report signed and witnessed by the project IOR shall be provided to the engineer. If the ohmic value listed cannot be obtained additional grounding shall be installed to reach the value listed.
 - 2.1.6.1 Service.10 ohms.
 - 2.1.6.2 Step down transformers and non-current carrying metal parts
. 25 ohms.
 - 2.1.6.3 Manholes, handholes, etc.
. 10 ohms.

END OF SECTION

SPECIFICATIONS

SECTION 26 05 33 CONDUIT AND FITTINGS

PART 1 – GENERAL

- 1.1 Furnish and install conduit and fittings as shown on the drawings and as specified herein.
- 1.2 Submit Manufacturer's data on the following:
 - 1.2.1 Conduit.
 - 1.2.2 Fittings
 - 1.2.3 Fire stopping Material.
 - 1.2.4 Surface Raceways.
 - 1.2.5 Type MC or MC-PCS cable, provide construction details and UL "E" number.
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
 - 1.3.1 Not including all items listed in the above itemized description.
 - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
 - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
 - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

- 2.1 Rigid steel conduit, intermediate metal conduit (IMC), electrical metallic tubing (EMT) and flexible metallic conduit shall be steel, hot dipped galvanized after fabrication.
- 2.2 PVC conduit shall be Carlon or approved equal.
- 2.3 Liquid tight flexible metal conduit shall be Anaconda Sealtite type UA or approved equal. Fittings shall be Appleton, Crouse-Hinds, Steel City, T&B, or equivalent.

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- 2.4 MC type armored cable, when utilized, shall be provided with the following:
- 2.4.1 Comply with UL 1479 and CEC 330
 - 2.4.2 90°C, copper, THHN conductors.
 - 2.4.3 Minimum #12 insulated grounding conductor.
 - 2.4.4 Conductors sized No. 10 and smaller shall be solid, No. 8 and larger shall be stranded.
 - 2.4.5 Oversized (150%) neutrals or separate neutrals shall be provided.
 - 2.4.6 Increase phase conductors to No. 10 AWG for 120 volt circuits greater than 100 feet from panel to load and for 277 volt circuits greater than 200 feet from panel to load. Where required increase conductor sizes for entire length of circuit.
 - 2.4.7 Interlocked armored aluminum sheath.
 - 2.4.8 AC or BX type armored cable shall **not** be substituted in lieu of MC type cable.
 - 2.4.9 Color code cable according to cable type and configuration.
 - 2.4.10 Acceptable manufacturers are AFC and Alfex.
- 2.5 Conduits shall be provided with factory painted color coding, provide colored conduit for the following systems as follows:
- 2.5.1 Lighting and Power Not Required
 - 2.5.2 Emergency Power Purple – White Lettering
 - 2.5.3 High Voltage (over 600v) Orange – Black Lettering
 - 2.5.4 Security/Access Control Green – Black Lettering
 - 2.5.5 Fire Alarm Red - White Lettering
 - 2.5.6 Data Blue – White Lettering
 - 2.5.7 Fiber Pink – Black Lettering
 - 2.5.8 Audio Visual Light Blue – Black Lettering
 - 2.5.9 Intercom Gray – Black Lettering
 - 2.5.10 An alternate approved method would be to provide self-adhesive vinyl labels minimum ½" high lettering for conduits ¾" - 1" size, ¾" high for 1½" – 2½",

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1¼" high for 3" – 4". Minimum 8" length on all conduits exposed within the building or above accessible ceilings at maximum 20'0" intervals and all penetrations through walls or floors and all junction boxes. Color shall match the above with lettering identifying each system.

- 2.6 MC-PCS luminary armored cable , when utilized, shall be provided with the following:
 - 2.6.1 Comply with UL 1479 and CEC 330
 - 2.6.2 90°C, copper, THHN conductors.
 - 2.6.3 Minimum #12 insulated grounding conductor.
 - 2.6.4 Lighting phase conductors sized No. 10 and smaller shall be solid, lighting control conductors shall be sized no. 16 solid.
 - 2.6.5 Interlocked armored aluminum sheath.
 - 2.6.6 AC or BX type armored cable shall not be substituted in lieu of MC type cable.
 - 2.6.7 Color code phase cable according to cable type and configuration. color code control conductors purple/gray.
 - 2.6.8 Acceptable manufacturers are AFC and Alfex.
- 2.7 Fire stopping material shall provide an effective seal against fire, heat, smoke and fire gases. Fire stopping material shall be tested to comply with ASTM E 814 and UL 1479. The submittal for this product shall include the UL listed system number and installation requirements for each type of penetration seal required for this project.
- 2.8 Each length of conduit shall be stamped with the name or trademark of the manufacturer and shall bear the UL label.
- 2.9 All plastic conduit shall be rigid, schedule 40, heavy wall PVC. All PVC conduit shall be UL listed. Underground utility company conduits shall comply with local utility co. requirements.
- 2.10 Plastic conduit shall be stored on a flat surface, and protected from the direct rays of the sun.
- 2.11 Where branch circuit or communication raceways cannot be concealed in ceilings or walls and are required to be exposed in interior spaces, provide nonmetallic surface raceway system sized per the manufacturer capacity requirements. A full complement of nonmetallic fittings must be available and matching device boxes and cover plates must be provided. The color of the raceway system, components and boxes shall be (white). Where data networking cabling is to be installed, all

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raceway fittings shall meet Category 5 radius requirements. Where specific raceway types have been noted on the drawings they shall be as follows:

2.11.1 System 'SR'	Hubbell Wiremold Panduit Hellerman-Tyton	WALLTRAK 1 series ECLIPSE PN05series LD5 series TSR2 series
2.11.2 System 'SR2'	Hubbell Wiremold Panduit Hellerman-Tyton	WALTRAK 22 2300D Series D2P10 TSR3 series
2.11.3 System 'SR3'	Hubbell Wiremold Panduit Hellerman-Tyton	BASETRAK series 5400 - series 70 series MCR Infostream" series

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

PART 3 – FITTINGS

- 3.1 All metallic fittings, including those for EMT, flexible conduit, or malleable iron. Die cast fittings of any other material are not permitted.
- 3.2 Locknuts shall be steel or malleable iron with sharp clean cut threads.
- 3.3 Entrance seals shall be 0.Z. type FSK or equivalent.
- 3.4 Bushings and locknuts: Where conduits enter boxes, panels, cabinets, etc., they shall be rigidly clamped to the box by locknuts on the outside, and a lock nut and plastic bushing on the inside of the box. All conduits shall enter the box squarely.
- 3.5 Furnish and install insulated bushings as per CEC article No. 300 - 4 (F) on all conduits. The use of insulated bushings does not exclude the use of double locknuts to fasten conduit to the box.
- 3.6 Transition from plastic to steel conduits shall be with PVC female threaded adaptors.
- 3.7 Couplings and connectors for rigid steel or IMC conduit must be threaded, or compression type (set screw fittings are not permitted).
- 3.8 Couplings and connectors for EMT shall be compression, watertight. Set screw connectors are not acceptable, except for systems below 120 volts.

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- 3.9 MC or MC-PCS type armored cable shall be provided with listed clamp type die cast zinc set screw connectors. Anti-short bushings shall be provided at all cable ends.
- 3.10 Connectors for flexible metal conduit shall be steel or malleable iron with screw provided to clinch the conduit into the adapter body. For sizes up to $\frac{3}{4}$ " a screw-in, "Jake type," fitting may be used.
- 3.11 Install approved expansion fittings, or liquid tight flex conduit with a minimum 6" slack for conduits passing through all expansion and seismic joints.

PART 4 - EXECUTION

- 4.1 All branch circuits shall be installed concealed in walls or above ceilings or in concrete floor slabs. PVC conduits installed in concrete floor slabs shall transition to PVC coated rigid steel where conduits penetrate above finished grade or finished floor.
- 4.2 Conduit sizes for various numbers and sizes of wire shall be as required by the CEC, but not smaller than $\frac{1}{2}$ " for power wiring and $\frac{3}{4}$ " for communications and fire alarm systems unless otherwise noted. Conduit in slab or below grade shall be $\frac{3}{4}$ " minimum trade size, unless otherwise identified.
- 4.3 Conduit size shall be such that the required number and sizes of wires can be easily pulled in and the Contractor shall be responsible for the selection of the conduit sizes to facilitate the ease of pulling. Conduit sizes shown on the drawings are minimum sizes in accordance with appropriate tables in the CEC. If because of bends or elbows a larger conduit size is required, the Contractor shall so furnish without further cost to the Owner.
- 4.4 The Contractor shall be entirely responsible for the proper protection of this work from the other trades on the job. When conduit becomes bent or holes are punched through same, or outlets moved after being roughed-in, the Contractor shall replace same, without additional cost to the Owner.
- 4.5 Rigid steel conduit or IMC shall be used as follows:
 - 4.5.1 Exposed exterior locations.
 - 4.5.2 Exposed interior locations below eight feet above floor, except in electrical rooms and closets.
 - 4.5.3 In hazardous or classified areas as required by CEC.
- 4.6 EMT conduit shall be used for areas as follows:
 - 4.6.1 All interior communications, signal, and data networking systems.

SPECIFICATIONS

- 4.6.2 All interior power wiring systems where not required to be in rigid steel, IMC or flexible conduit.
- 4.7 Flexible metal conduit shall be used for areas as follows:
 - 4.7.1 To connect motors, transformers, and other equipment subjected to vibration or where specifically detailed on the drawings.
 - 4.7.2 Flexible metal conduit shall not be used to replace EMT in other locations where the conduit will be exposed.
 - 4.7.3 Flexible metal conduit shall be ferrous. Installation shall be such that considerable slack is realized. The conduit shall contain separate code sized grounding conductor.
 - 4.7.4 Liquid tight flexible metal conduit shall be used in conformance with CEC in lengths not to exceed 4'. For equipment connections, route the conduit at 90 degrees to the adjacent path for point of connection. The conduit shall contain separate code sized grounding conductor. Use liquid tight flexible metal conduit for all equipment connections exposed in possible wet, corrosive or oil contaminated areas, e.g., shops and outside areas.
- 4.8 MC armored cable may be used as follows:
 - 4.8.1 All branch circuit wiring for lighting and power circuits where permitted and installed in compliance with UL 1569 and CEC 330.
- 4.9 MC-PCS luminary armored cable may be used as follows:
 - 4.9.1 All Lighting branch circuit wiring for lighting circuits where permitted and installed in compliance with UL 1569 and CEC 300-22(c), 330. This cable permits conductors of control circuits to be placed in a cable with lighting power circuits or class 1 circuits.
 - 4.9.2 It shall not be considered an acceptable option to install lighting control class 1 circuits as an open wire installation.
- 4.10 MC and MC-PCS armored cable shall **not** be used for the following areas:
 - 4.10.1 Any exterior, underground or buried in concrete circuits.
 - 4.10.2 Any circuits feeding HVAC equipment or pumps or any circuit with 30 AMPs or greater overcurrent protection.
 - 4.10.3 Any exposed interior locations except in electrical, communication or mechanical equipment rooms.

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- 4.10.4 Any exposed interior damp/wet locations, kitchens, science classrooms, shop areas, or concealed in science classroom casework, unless provided with approved PVC jacket.
- 4.10.5 Any hazardous rated area.
- 4.11 Plastic conduit shall be used for all exterior underground, in slab, and below slab on grade conduit installations. Install bell ends at all conduit terminations in manholes and pull boxes. Where plastic conduit transitions from below grade to above grade, no plastic conduit shall extend above finished exterior grade, or above interior finished floor level.
- 4.12 Plastic conduit joints shall be made up in accordance with the manufacturer's recommendations for the particular conduit and coupling selected. Conduit joint couplings shall be made watertight. Plastic conduit joints shall be made up by brushing a plastic solvent cement on the inside of a plastic fitting and on the outside of the conduit ends. The conduit and fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly.
- 4.13 All underground conduit depths shall be as detailed on the drawings or a minimum of 30" below finished grade (when not specifically detailed otherwise), for all exterior underground conduits. Where concrete slurry or concrete encasement is provided, include "Red" color dye in mixture.
- 4.14 All underground conduits for power systems (600v and higher), shall be concrete encased and a minimum of 48" below grade or as detailed on the drawings. Where concrete slurry or concrete encasement is provided, include "Red" color dye in mixture.
- 4.15 Conduit shall be continuous from outlet to outlet, cabinet or junction box, and shall be so arranged that wire may be pulled in with the minimum practical number of junction boxes.
- 4.16 All conduits shall be concealed wherever possible. All conduit runs may be exposed in mechanical equipment rooms, electrical equipment rooms, electrical closets, and in existing or unfinished spaces. No conduit shall be run exposed in finished areas without the specific approval of the Architect.
- 4.17 All raceways which are not buried or embedded in concrete shall be supported by straps, clamps, or hangers to provide a rigid installation. Exposed conduit shall be run in straight lines at right angles to or parallel with walls, beams, or columns. In no case shall conduit be supported or fastened to other pipes or installed to prevent the ready removal of other trades piping. Wire shall not be used to support conduit.
- 4.18 It shall be the responsibility of the Contractor to consult the other trades before installing conduit and boxes. Any conflict between the location of conduit and boxes, piping, duct work, or structural steel supports, shall be adjusted before installation. In general, large pipe mains, waste, drain, and steam lines shall be given priority.

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- 4.19 Conduits above lay-in grid type ceilings shall be installed in such a manner that they do not interfere with the "lift-out" feature of the ceiling system. Conduit runs shall be installed to maintain the following minimum spacing wherever practical.
- 4.19.1 Water and waste piping not less than 3".
- 4.19.2 Steam and steam condensate lines not less than 12".
- 4.19.3 Radiation and reheat lines not less than 6".
- 4.20 Provide all necessary sleeves and chases required where conduits pass through floors or walls as part of the work of this section. Core drilling will only be permitted where approved by the Architect.
- 4.21 All empty conduits and surface mounted raceways shall be provided with a ¼" polypropylene plastic pull cord and threaded plastic or metal plugs over the ends. Fasten plastic "Dymo" tape label to exposed spare conduit to identify "power" or "communication" system, and to where it goes.
- 4.22 The ends of all conduits shall be securely plugged, and all boxes temporarily covered to prevent foreign material from entering the conduits during construction. All conduit shall be thoroughly swabbed out with a dry swab to remove moisture and debris before conductors are drawn into place.
- 4.23 Bending: Changes in direction shall be made by bends in the conduit. These shall be made smooth and even without flattening the pipe or flaking the finish. Bends shall be of as long a radius as possible, and in no case smaller than CEC requirements.
- 4.23.1 For power conduits for conductors (600v and below), provide minimum 36" radius (vertical) and 72" radius (horizontal) bends.
- 4.23.2 For power conduits for conductors (greater than 600v), provide minimum 72" radius (vertical) and 72" radius (horizontal) bends.
- 4.24 Supports: Conduit shall be supported at intervals as required by the California Electrical Code. Where conduits are run individually, they shall be supported by approved conduit straps or beam clamps. Straps shall be secured by means of toggle bolts on hollow masonry, machine screws or bolts on metal surfaces, and wood screws on wood construction. **[No perforated straps or wire hangers of any kind will be permitted. Where individual conduits are routed, or above ceilings, they shall be supported by hanger rods and hangers.]** Conduits installed exposed in damp locations shall be provided with clamp backs under each conduit clamp, to prevent accumulation of moisture around the conduits.
- 4.25 Where a number of conduits are to be run exposed and parallel, one with another, they shall be grouped and supported by trapeze hangers. Hanger rods shall be fastened to structural steel members with suitable beam clamps or to concrete

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inserts set flush with surface. A reinforced rod shall be installed through the opening provided in the concrete inserts. Beam clamps shall be suitable for structural members and conditions. Rods shall be galvanized steel 3/8" diameter minimum. Each conduit shall be clamped to the trapeze hanger with conduit clamps.

- 4.26 All concrete inserts and pipe clamps shall be galvanized. All steel bolts, nuts, washers, and screws shall be galvanized or cadmium plated. Individual hangers, trapeze hangers and rods shall be prime-coated.
- 4.27 Openings through fire rated floors/walls and/or smoke walls through which conduits pass shall be sealed by Fire stopping material to comply with Division 1 to seal off flame, heat, smoke and fire gases. Sleeves shall be provided for power or communication system cables which are not installed in conduits, and shall be sealed inside and out to comply with manufacturers UL system design details. Where multiple conduits and/or cable tray systems pass thru fire-rated walls at one location, the Contractor shall submit copies of the manufacturers UL system design details proposed for use on this project. All Fire stopping material shall have an hourly fire-rating equal to or higher than the fire rating of the floor or wall through which the conduit, cables, or cable trays pass.
- 4.28 Provide cap or other sealing type fitting on all spare conduits. Conduits stubbed into buildings from underground where cable only extends to equipment, the conduit/cable end shall be sealed to prevent moisture from entering the room or space.
- 4.29 All conduits which are part of a paralleled feeder or branch circuit shall be installed underground.
- 4.30 All conduits which are required as a part of systems specified in Divisions 27 or 28, or any other low voltage communication systems, shall be furnished and installed by the Division 26 Contractor.
 - 4.30.1 The Contractor shall coordinate all conduit requirements with each system supplier prior to bid to determine special conduit system requirements.
 - 4.30.2 The Contractor shall provide a pull rope in all conduits for these systems.
 - 4.30.3 The Contractor shall provide conduit sleeves for all open cable installations thru rated walls or block walls. Provide conduit from each building main termination cabinet or backboard to the nearest accessible ceiling for access into all electrical or communications rooms.
- 4.31 In addition to the above requirements, the following requirements shall apply to all Division 27 or 28 conduits:
 - 4.31.1 Flexible metal conduit may only be used where required at building seismic and/or expansion joints.

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- 4.31.2 All underground conduits shall be provided with minimum 24" radius elbows (vertical) and 60" (horizontal).
- 4.31.3 No length of conduit above grade shall be installed to exceed 150 feet between pull boxes, or points of connection, unless where specifically detailed on the drawings.
- 4.31.4 No length of conduit shall be installed to exceed two 90 degree bends between pull boxes, or points of connection, unless where specifically detailed on the drawings.
- 4.32 Where surface raceways are installed in interior spaces, the Contractor shall take care to route in straight lines at right angles to or parallel with walls, beams, or columns. All raceways and device boxes shall be securely screwed to the finish surface with zinc screw "Auger" anchors Stk #ZSA1K by Gray Bar Electric or equal. Tape adhesive application will not be permitted.
- 4.33 The Contractor who installs surface raceway systems shall provide and install complete with wire retention clips, one for every (8) vertical feet or (5) horizontal feet or portion thereof. This Contractor shall also provide each raceway channel with pull strings.
- 4.34 It shall be the responsibility of the Contractor installing the raceway to coordinate the installation of raceway device plates and inserts with the communications or data contractors.
- 4.35 MC or MC-PCS cable shall be cut using a specific metallic sheath armor stripping tool. The use of hacksaws, dikes or any other tools not specifically designed to remove the armor sheath will not be permitted.
- 4.36 MC or MC-PCS cables installed in attic spaces or above lay-in ceilings shall be installed to be protected from physical damage. The cable shall be mounted along the sides or bottom of joists, rafters or studs.
- 4.37 Support wires used for supporting ceilings, lighting fixtures or other equipment items shall not be used to support MC or MC-PCS cables. Conduits, duct work, piping or any other equipment shall not be used to support or mount MC cables.
- 4.38 MC or MC-PCS cable supports, fasteners and clips shall be designed specifically for use with MC cables. Standard conduit supports, fasteners and clips, nails or other items are not permitted for installing MC cables.

END OF SECTION

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SECTION 26 05 34

OUTLET AND JUNCTION BOXES

PART 1 – GENERAL

- 1.1 Furnish and install electrical wiring boxes as specified and as shown on the electrical drawings.
- 1.2 Submit manufacturer's data for all items.
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
 - 1.3.1 Not including all items listed in the above itemized description.
 - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
 - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
 - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

- 2.1 Boxes shall be as manufactured by Steel City, Appleton, Racor, or approved equal.
- 2.2 All boxes must conform to the provisions of Article 370 of the CEC. All boxes shall be of the proper size to accommodate the quantity of conductors enclosed in the box. Minimum box size shall be 4" square x 1-1/2" deep.
- 2.3 Boxes generally shall be hot dipped galvanized steel with knockouts. Boxes on exterior surfaces or in damp locations shall be corrosion resistant, cast ferrous and shall have threaded hubs for rigid conduit and neoprene gaskets for their covers. Boxes shall be Appleton Type FS, Crouse-Hinds, or the approved equal. Conduit bodies shall be corrosion resistant, cast malleable iron. Conduit bodies shall have threaded hubs for rigid conduit and neoprene gaskets for their covers. Conduit bodies shall be Appleton Unilets, Crouse-Hinds, or the approved equal. Where recessed, boxes shall have square cut corners.
- 2.4 Deep boxes shall be used in wall covered by wainscot or paneling and in walls or glazed tile, brick, or other masonry which will not be covered with plaster. Through the wall type boxes shall not be used unless specifically called for. All boxes shall be nongangable. Boxes in concrete shall be of a type to allow the placing of

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conduit without displacing the reinforcing bars. All lighting fixture outlet boxes shall be equipped with the proper fittings to support and attach a light fixture.

- 2.5 All light, switch, receptacle, fire alarm devices and similar outlets shall be provided with approved boxes, suitable for their function. Back boxes shall be furnished and installed as required for the equipment and/or systems under this contract.
- 2.6 Pull and junction boxes shall be code gauge boxes with screw covers. Boxes shall be rigid under torsional and deflecting forces and shall be provided with angle from framing where required. Boxes shall be 4" square with a blank cover in unfinished areas and with a plaster ring and blank cover in finished areas. Covers for flush mounted oversize boxes shall extend $\frac{3}{4}$ " past boxes all around. Covers for 4" square boxes shall extend $\frac{1}{4}$ " past box all around.
- 2.7 All terminal cabinets and junction boxes or equipment back boxes which are required as a part of systems specified in Divisions 27 or 28, or any other low voltage communication systems, shall be furnished and installed by the Division 26 Contractor.
 - 2.7.1 The Division 26 Contractor shall coordinate all box requirements with each system supplier prior to bid to determine special cabinet or back box requirements. The Contractor shall also provide stainless steel blank cover plates for all low voltage systems installed for future equipment.
 - 2.7.2 The Contractor shall provide all plywood backboards indicated on walls or inside equipment enclosures. All backboards shall be a minimum of $\frac{3}{4}$ " thick fire rated type plywood.
 - 2.7.3 The Contractor shall coordinate exact rough in locations and requirements with each system supplier.
- 2.8 In addition to the above requirements, boxes for data networking wiring and equipment shall comply with the following:
 - 2.8.1 All boxes shall be a minimum of 4-11/16" square x 2-1/8" deep.
 - 2.8.2 Where pull boxes are required on individual conduits 1-1/4" or smaller, provide 4-11/16" square x 2-1/8" deep boxes. Where pull boxes are required on conduits larger than 1-1/4" for straight pull through, provide eight times the conduit trade size for box length. Where pull boxes are required on conduits larger than 1-1/4" for an angle or a U-pull through installation, provide a minimum distance of six times the conduit trade size between the entering and exiting conduit run for each cable.
- 2.9 Recessed boxes installed in fire rated floors/walls and /or smoke walls shall be sealed by Fire stopping material to comply with Division 1 to seal off flame, heat, smoke and fire gases. The Contractor shall submit copies of the manufacturers UL system design details proposed for use on this project. All Fire stopping material

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shall have an hourly fire-rating equal to or higher than the fire rating of the floor or wall through which the conduit, cables, or cable trays pass.

PART 3 – EXECUTION

- 3.1 Boxes shall be installed where required to pull cable or wire, but in finished areas only by approval of the Architect. Boxes shall be rigidly attached to the structure, independent of any conduit support. Boxes shall have their covers accessible. Covers shall be fastened to boxes with machine screws to ensure continuous contact all around. Covers for surface mounted boxes shall line up evenly with the edges of the boxes.
- 3.2 Outlets are only approximately located on the plans and great care must be used in the actual location of the outlets by consulting the various detailed drawings and specifications. Outlets shall be flush with finished wall or ceiling, boxes installed symmetrically on such trim or fixture. Refer to drawings for location and orientation of all outlet boxes.
- 3.3 Furnish and install all plaster rings as may be required. Plaster rings shall be installed on all boxes where the boxes are recessed. Plaster rings shall be of a depth to reach the finished surface. Where required, extension rings shall be installed so that the plaster ring is flush with the finished surface.
- 3.4 All cabinets and boxes shall be secured by means of toggle bolts on hollow masonry; expansion shields and machine screws or standard precast inserts on concrete or solid masonry; machine screws or bolts on metal surfaces and wood screws on wood construction. All wall and ceiling mounted outlet boxes shall be supported by bar supports extending from the studs or channels on either side of the box. Boxes mounted on drywall or plaster shall be secured to wall studs or adequate internal structure.
- 3.5 Boxes with unused punched-out openings shall have the openings filled with factory-made knockout seals.
- 3.6 Where standby power and normal power are to be located in the same outlet box or 480V in a switch box, install partition barriers to separate the various systems.
- 3.7 All device boxes and junction boxes for fire alarm system shall be painted red and shall be 4-11/16" square by 2-1/8" deep. No exceptions.

END OF SECTION

OUTLET AND JUNCTION BOXES

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SECTION 26 05 43

UNDERGROUND PULL BOXES AND MANHOLES

PART 1 – GENERAL

- 1.1 Furnish and install electrical underground pullboxes and manholes as specified and as shown on the electrical drawings.
- 1.2 Submit manufacturer's data for all items.
- 1.3 Common submittal mistakes which will result in the submittals being rejected:
 - 1.3.1 Not including all items listed in the above itemized description.
 - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
 - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
 - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

- 2.1 The concrete for pull boxes and manholes shall be class 5500 psi or as noted on the drawings. All pullboxes and manholes and covers located in parking lots, driveways, roads, or any other driveable areas shall be traffic rated.
- 2.2 Each manhole shall be provided with a fiberglass ladder and ground rod. Ground rods shall be copper or a copper-clad steel 3/4" diameter by 10-feet long. All non-current carrying metallic components shall be grounded to the ground rods with minimum #6 copper wire.
- 2.3 All underground pullboxes shall be provided with steel bolt down type covers. Bolts shall be bronze or brass. All communication or signal system pullboxes shall be sized to comply with CEC Article 370 unless where other sizes are specifically noted on the drawings.
- 2.4 All underground pullbox and manhole covers shall be provided with either "electrical" or "telephone" or "fire alarm" markings. The telephone marking shall be used to identify telephone, T.V., clock or any other types of communication systems.

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- 2.5 All power and communication systems shall be provided with separate pullboxes or manholes. Fire alarm circuits shall also be provided with separate pullboxes from any other type of communication systems.

PART 3 – INSTALLATION

- 3.1 Shoring of the excavation shall be in accordance with all federal, state and local regulations.
- 3.2 Provide sealing material for the joints between sections per manufacturer's instructions.
- 3.3 The contractor shall make the top and access assembly or lid flush with surrounding areas where installed in driveable or normal walking areas.

END OF SECTION

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SECTION 26 08 00

COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 – GENERAL

RELATED DOCUMENTS

- 1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, 27, 28 Specification Sections, apply to this Section.
- 1.2 Acceptance and start-up testing requirements for electrical power distribution equipment and systems. Contractor shall retain and pay for the services of a recognized, independent testing firm for the purpose of performing inspections and tests as herein specified and as required by code.
 - 1.2.1 The testing firm shall provide all material, equipment, labor, and technical supervision to perform such tests and inspections.
 - 1.2.2 It is the purpose of these tests to assure that all tested electrical equipment is operational and within industry and manufacturers tolerances, and is installed in accordance with design specifications.
 - 1.2.3 The tests and inspections shall determine suitability for start-up and energization.
 - 1.2.4 The following equipment shall be tested and calibrated:
 - 1.2.4.1 Medium voltage cables
 - 1.2.4.2 Medium voltage interrupter switches, fuses, and circuit breakers.
 - 1.2.4.3 Low voltage switches, fuses, and circuit breakers, 100A frame and larger.
 - 1.2.4.4 Low voltage cables and feeders.
 - 1.2.4.5 Motor Control Centers and adjustable frequency drives.
 - 1.2.4.6 Protective relays, instruments, and metering systems.

CODES, STANDARDS, AND REFERENCES

- 1.3 All inspections and tests shall be in accordance with the following codes and standards except as provided otherwise herein.
 - 1.3.1 ANSI/IEEE C2: National Electrical Safety Code (NESC).

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- 1.3.2 ANSI/NFPA 70: National Electrical Code, with California Amendments (CEC).
- 1.3.3 ANSI/NFPA 70E: Standard for Electrical Safety in the Workplace.
- 1.3.4 ANSI/NFPA 78: Lightning Protection Code.
- 1.3.5 ANSI/NFPA 101: Life Safety Code.
- 1.3.6 American Society for Testing and Materials – ASTM.
- 1.3.7 Applicable State and Local Codes, Ordinances and Standards.
- 1.3.8 California Code of Regulations (CCR), Title 8, Title 24.
- 1.3.9 Division 1, Section 019113, “General Commissioning Requirements”.
- 1.3.10 Institute of Electrical and Electronic Engineers – IEEE.
- 1.3.11 Insulated Cable Engineers Association – ICEA.
- 1.3.12 International Electrical Testing Association - NETA Accept: The NETA Acceptance Testing Specifications, latest edition.
- 1.3.13 National Electrical Manufacturers Association – NEMA.
- 1.3.14 Occupational Safety and Health Administration (OSHA) – 29 CFR 1910.7: OSHA Occupational Safety and Health Standards.

QUALIFICATION OF TESTING FIRM

- 1.4 All Inspections and tests shall utilize the following references:
 - 1.4.1 Project design specifications.
 - 1.4.2 Project design drawings
 - 1.4.3 Project list of equipment to be inspected and tested
 - 1.4.4 Manufacturer’s instruction manuals applicable to each particular equipment.
- 1.5 The testing firm shall be an independent testing organization with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- 1.6 The testing firm shall be regularly engaged in the testing of electrical equipment devices, installations, and systems, with at least five (5) years of documented experience.

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- 1.7 The lead, on-site, technical person shall be currently certified by the International Electrical Association (NETA), or National Institute for Certification in Engineering Technologies (NICET) in electrical power distribution system testing.
- 1.8 The testing firm shall utilize engineers and technicians who are regularly employed by the firm for testing services.
- 1.9 The testing firm shall submit proof of the above qualifications with bid documents when requested.
- 1.10 The terms used herein, such as Testing Agency, Testing Contractor, Testing Laboratory, or Contractor Test Company, shall be construed to mean the testing firm.

SUBMITTALS

- 1.11 Provide submittals per Division 1, Section 013300, "Submittal Procedures".
- 1.12 Qualifications of testing firm and personnel.
- 1.13 Certified test reports.
- 1.14 Two copies of blank forms for checklists, test reports, and other related forms for Engineer's review and approval.

GENERAL REQUIREMENTS

- 1.15 Routine insulation resistance, continuity, and rotation tests for all distribution and utilization equipment shall be performed prior to and in addition to acceptance tests specified herein.
- 1.16 The Testing Firm shall notify the Engineer no fewer than 3 working days prior to commencement of any testing.
- 1.17 Any system, material, or workmanship, which is found defective on the basis of Acceptance Tests shall be reported to the Engineer with recommendations for corrective action.
- 1.18 The Testing Firm shall maintain a written record of all tests, and upon completion of project, shall assemble and certify a final test report.
- 1.19 The final Test Report shall be submitted on conclusion of all required tests and corrective measures.

SAFETY AND PRECAUTIONS

- 1.20 Safety practices shall include, but will not be limited to, compliance with the following requirements:
 - 1.20.1 Occupational Safety and Health Act.

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- 1.20.2 Accident Prevention Manual for Industrial Operations, National Safety Council.
- 1.20.3 Applicable State and Local safety operating procedures.
- 1.20.4 Owners' Safety Practices.
- 1.20.5 National Fire Protection Association – NFPA 70E.
- 1.20.6 American National Standards for Personnel Protection.
- 1.21 All tests shall be performed with apparatus de-energized. Exceptions must be thoroughly reviewed to identify safety hazards and adequate safeguards must be devised.
- 1.22 The Testing Firm shall have a designated safety representative on the project site to supervise the testing operations with respect to safety.
- 1.23 Test Report:
 - 1.23.1 The test report shall include the following:
 - 1.23.1.1 Summary of Project.
 - 1.23.1.2 List of testing equipment used.
 - 1.23.1.3 Calibration date of testing equipment and due date of next calibration.
 - 1.23.1.4 Ambient temperature and humidity at time of test.
 - 1.23.1.5 Listing of equipment tested.
 - 1.23.1.6 Test results.
 - 1.23.1.7 Recommendations.
 - 1.23.2 Furnish original and four copies of the complete report to the Architect/District in accordance with requirements of Contract Documents.

INSPECTION AND TEST PROCEDURES

- 1.24 Contractor shall provide the Testing Firm, a copy of related contract documents such as drawings, specifications, engineer-reviewed submittals, coordination study report including all relay settings and other necessary information.
- 1.25 Contractor shall supply a suitable source of power to each site and location per testing firm requirements.

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- 1.26 Contractor shall notify the testing firm when equipment becomes available for acceptance tests. Work shall be coordinated to expedite project scheduling.
- 1.27 Testing Firm shall review and evaluate all received documents and notify the Contractor and Engineer of any discrepancies in the documents and/or any other requirements immediately.
- 1.28 Testing Firm shall provide and comply with the following:
 - 1.28.1 Acceptance test procedures for each individual equipment listed in Part 1 of this section for Engineer review and approval prior to any test and after thorough evaluation of the system. Testing shall conform to the International Electrical Testing Association (NETA) specifications and standards for electrical power distribution equipment and systems and manufacturer's instructions.
 - 1.28.2 Refer to each individual specification section for testing requirements and comply.
 - 1.28.3 Inspect installed equipment and report any discrepancy and/or deficiency with respect to the contract documents and governing codes prior to testing.

SYSTEM FUNCTION TEST

- 1.29 Perform system function test upon completion of equipment tests as defined in this section. It is the purpose of system function tests to verify proper interaction of all sensing, processing, and action devices.
- 1.30 Implementation.
- 1.31 Submit manufacturers' data on all items:
 - 1.31.1 Develop test parameters for the purpose of evaluation performance of all integral components and their functioning as a complete unit within design requirements.
 - 1.31.2 Test all interlocking devices.
 - 1.31.3 Record the operation of alarms and indicating devices.
- 1.32 DEFICIENCIES
- 1.33 Submit manufacturers' data on all items.
 - 1.33.1 All deficiencies reported by the Testing Firm shall be corrected by the Contractor and Acceptance and System Function Tests shall be repeated to verify conformance with requirements.

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PART 2 – PRODUCTS

2.1 Not applicable

PART 3 - EXECUTION

END OF SECTION

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DIGITAL LIGHTING CONTROL SYSTEM

PART 1 – GENERAL

- 1.1 Furnish and install automatic lighting controls as shown on the drawings and as specified herein Submit manufacturers' data on all items.
- 1.2 Equipment shall be UL listed, comply with those portions of CEC as applicable to electrical wiring work and comply with those portions of NEMA or UL pertaining to types of electrical equipment and enclosures. The equipment shall also be certified by the California Energy Commission.
- 1.3 The manufacturer of the lighting control equipment shall have been actively engaged in the manufacture of the types and capacities required for the application for at least three years. It is the sole responsibility of the Division 26 contractor to ensure that submittals of material meets the performance specifications contained herein.
- 1.4 All components and assemblies shall be factory pre-tested and burned-in as a system for 48 hours prior to shipping.
- 1.5 Control Intent – Control Intent includes, but is not limited to:
 - 1.5.1 Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, etc.
 - 1.5.2 Initial sensor and switching zones
 - 1.5.3 Initial time switch settings
 - 1.5.4 Task lighting and receptacle controls
 - 1.5.5 Emergency Lighting control (if applicable)
 - 1.5.6 Manufacturer shall submit a point-to-point line diagram of the system configuration including all devices and accessories required to complete the system.
 - 1.5.7 Manufacturer shall submit data sheets on the components and system submitted, with descriptions of hardware and software components.

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SYSTEM DESCRIPTION & OPERATION

- 1.6 The Lighting Control and Automation system as defined under this section covers the following equipment:
 - 1.6.1 Digital Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications
 - 1.6.2 Digital Switches – Self-configuring, digitally addressable pushbutton on/off, dimming, and scene switches with two-way active infrared (IR) communications
 - 1.6.3 Handheld remotes for personal control – One-button dimming, two-button on/off, or five-button scene remotes provide control using infrared communications. Remote may be configured in the field to control selected loads or scenes without special tools
 - 1.6.4 Digital Daylighting Sensors – Single-zone closed loop, multi-zone open loop and single-zone dual-loop daylighting sensors with two-way active infrared (IR) communications can provide switching, bi-level, tri-level or dimming control for daylight harvesting
 - 1.6.5 Digital Room Controllers – Self-configuring, digitally addressable one, two or three relay plenum-rated controllers for on/off control. Selected models include 0-10 volt or line voltage forward phase control dimming outputs and integral current monitoring capabilities
 - 1.6.6 Digital Plug-Load Controllers – Self-configuring, digitally addressable, single relay, plenum-rated application-specific controllers. Selected models include integral current monitoring capabilities
 - 1.6.7 Configuration Tools – Handheld remote for room configuration and relay panel programming provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from up to 30 feet away. Unit to have Organic LED display, simple pushbutton interface, and allow bi-directional communication of room variables and occupancy sensor settings. Computer software also customizes room settings
 - 1.6.8 Digital Lighting Management (DLM) local network – Free topology, plug-in wiring system (Cat 5e) for power and data to room devices
 - 1.6.9 Digital Lighting Management (DLM) segment network – Linear topology, BACnet MS/TP network (1.5 twisted pair, shielded,) to connect multiple DLM local networks for centralized control
 - 1.6.10 Network Bridge – provides BACnet MS/TP-compliant digital networked communication between rooms, panels and the Segment Manager or

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building automation system (BAS) and automatically creates BACnet objects representative of connected devices.

- 1.6.11 Segment Manager – provides web browser-based user interface for system control, scheduling, power monitoring, room device parameter administration and reporting
- 1.6.12 Programming and Configuration software – Optional PC-native application capable of accessing DLM control parameters within a room, for the local network, via a USB adapter, or globally, for many segment networks simultaneously, via BACnet/IP communication
- 1.6.13 LMCP Digital Lighting Management Relay Panel – provides up to 8, 24, or 48 mechanically latching relays. Relays include a manual override and a single push-on connector for easy installation or removal from the panel. Panel accepts program changes from handheld configuration tool for date and time, location, holidays, event scheduling, button binding and group programming. Provides BACnet MS/TP-compliant digital networked communication between other lighting controls and/or building automation system (BAS)
- 1.6.14 Emergency Lighting Control Unit (ELCU) – allows a standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building

LIGHTING CONTROL APPLICATIONS

- 1.7 Unless relevant provisions of the applicable local Energy Codes are more stringent, provide a minimum application of lighting controls as follows:
 - 1.7.1 Space Control Requirements – Provide occupancy/vacancy sensors with Manual- or Partial-ON functionality in all spaces except toilet rooms, storerooms, library stacks, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. Provide Manual-ON occupancy/vacancy sensors for any enclosed office, conference room, meeting room, open plan system and training room. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors and Manual-ON switches.
 - 1.7.2 Bi-Level Lighting – Provide multi-level controls in all spaces except toilet rooms, storerooms, library stacks, or applications where variable dimming is used
 - 1.7.3 Task Lighting / Plug Loads – Provide automatic shut off of non-essential plug loads and task lighting in all spaces except toilet rooms and storerooms. Provide Automatic-ON of plug loads whenever spaces are occupied. For spaces with multiple occupants a single shut off consistent with the overhead lighting may be used for the area

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- 1.7.4 Daylit Areas – Provide daylight-responsive automatic control in all spaces (conditioned or unconditioned) where daylight contribution is available as defined by relevant local building energy code:
 - 1.7.4.1 All luminaires within code-defined daylight zones shall be controlled separately from luminaires outside of daylit zones
 - 1.7.4.2 Daytime setpoints for total ambient illumination (combined daylight and electric light) levels that initiate dimming shall be programmed in compliance with relevant local building energy codes
 - 1.7.4.3 Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings
 - 1.7.4.4 Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.
- 1.7.5 Conference, meeting, training, auditoriums, and multipurpose rooms shall have controls that allow for independent control of each local control zone. Rooms larger than 300 square feet shall instead have at least four (4) pre-set lighting scenes unless otherwise specified. Occupancy / vacancy sensors shall be provided to extinguish all lighting in the space. Spaces with up to four moveable walls shall include controls that can be reconfigured when the room is partitioned.
- 1.8 Submit shop drawings and manufacturers' data for all components including:
 - 1.8.1 Manufacturer shall submit in bill-of-material form an itemized list of all materials supplied to meet the specification.
 - 1.8.2 Manufacturer shall submit dimensional drawings of lighting control panel(s).
 - 1.8.3 Manufacturer shall submit a point-to-point line diagram of the system configuration including all devices and accessories required to complete the system.
 - 1.8.4 Manufacturer shall submit data sheets on the components and system submitted, with descriptions of hardware and software components
 - 1.8.5 Composite wiring and/or schematic diagram of each control circuit as proposed to be installed
 - 1.8.6 Show exact location of all digital devices, including at minimum sensors, room controllers, and switches for each area on reflected ceiling plans. (Contractor must provide AutoCAD format reflected ceiling plans)

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- 1.8.7 Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies
- 1.8.8 Network riser diagram including floor and building level details. Include network cable specification and end-of-line termination details, if required. Illustrate points of connection to integrated systems. Coordinate integration with mechanical and/or other trades

QUALITY ASSURANCE

- 1.9 Manufacturer: Minimum 10 years' experience in manufacture of lighting controls

PROJECT CONDITIONS

- 1.10 Do not install equipment until following conditions can be maintained in spaces to receive equipment:
 - 1.10.1 Ambient temperature: 0° to 40° C (32° to 104° F)
 - 1.10.2 Relative humidity: Maximum 90 percent, non-condensing.

WARRANTY

- 1.11 Provide a five-year limited manufacturer's warranty on all room control devices and panels

MAINTENANCE

- 1.12 Spare Parts:
 - 1.12.1 The contactor shall provide as a part of this contract additional Control modules of each type used, Switches of each type used, Daylight sensors, Ceiling mounted occupancy sensors, Wall mounted occupancy sensors, Room controller, etc, three (3) for each type. Any devices not required to be included during construction shall be delivered to the District at the completion of the project. **The quantities of these devices shall be listed as a part of the Phase 1 submittals.**

PART 2 – PRODUCTS

- 2.1 Acceptable Manufacturers: **WattStopper, Digital Lighting Management (DLM), Acuity nLight, Current Nx.**

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Substitutions:

- 2.2 Bidder's wishing to obtain approval on manufacturers other than those specified in these specifications or on the drawings shall comply with the following procedures:
- 2.2.1 All substitution requests shall be submitted to the Architect / Engineer no less than 10 business days prior to the project bid opening date. Approvals when accepted will be issued in the form of an addendum to the contract. No consideration for substitutions will be provided after the award of the contract.
 - 2.2.2 The substitution request must include a statement indicating how the substituted product may impact the completion of the project.
 - 2.2.3 The substitution request must include a statement indicating the difference in price (both list price and Contractor price) between the specified product and the substitution.
 - 2.2.4 The substitution request must include a detailed analysis indicating any differences between the specified product and the substitution.
 - 2.2.5 Catalog literature for both the specified and the substitution shall be provided along with contact information of the manufacturer for the substituted product.
- 2.3 The contractor shall pay the Engineer (at their current standard hourly rates) for the time spent reviewing substitutions. These costs will be included as an addendum to be issued to all bidders to include in their proposals and must be paid to the Engineer within 60 days of award of the project.

DIGITAL LIGHTING CONTROLS

- 2.4 Furnish the Company's system which accommodates the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories which suit the lighting and electrical system parameters.

DIGITAL WALL SWITCH OCCUPANCY SENSORS

- 2.5 Wallbox mounted passive infrared PIR or dual technology (passive infrared and ultrasonic) digital occupancy sensor with 1 or 2 switch buttons
- 2.6 Digital Occupancy Sensors shall provide scrolling LCD display for digital calibration and electronic documentation. Features include the following:
- 2.6.1 Digital calibration and pushbutton configuration for the following variables:
 - 2.6.1.1 Sensitivity – 0-100% in 10% increments
 - 2.6.1.2 Time delay – 1-30 minutes in 1 minute increments xx

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2.6.1.3 Test mode – Five second time delay

2.6.1.4 Detection technology – PIR, Dual Technology activation and/or re-activation.

2.6.1.5 Walk-through mode

2.6.1.6 Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network

2.6.2 Programmable control functionality including:

2.6.2.1 Each sensor may be programmed to control specific loads within a local network

2.6.2.2 Sensor shall be capable of activating one of 16 user-definable lighting scenes.

2.6.2.3 Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically during the configurable period of time (default 10 seconds) after turning off.

2.6.2.4 On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:

2.6.2.4.1 Ultrasonic and Passive Infrared

2.6.2.4.2 Ultrasonic only

2.6.2.4.3 Passive Infrared only

2.6.3 Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods

2.6.4 Two RJ-45 ports for connection to DLM local network

2.6.5 Two-way infrared (IR) transceiver to allow remote programming through handheld configuration tool and control by remote person controls.

2.6.6 Device Status LEDs including:

2.6.6.1 PIR detection

2.6.6.2 Ultrasonic detection

2.6.6.3 Configuration mode

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2.6.6.4 Loading binding

- 2.6.7 Assignment of occupancy sensor to a specific load within the room without wiring or special tools
 - 2.6.8 Assignment of local buttons to specific loads within the room without wiring or special tools
 - 2.6.9 Manual override of controlled loads
 - 2.6.10 All digital parameter data programmed into an individual wall switch sensor shall be retained in non-volatile FLASH memory within the wall switch sensor itself. Memory shall have an expected life of no less than 10 years.
- 2.7 BACnet object information shall be available for the following objects:
- 2.7.1 Detection state
 - 2.7.2 Occupancy sensor time delay
 - 2.7.3 Occupancy sensor sensitivity, PIR and Ultrasonic
 - 2.7.4 Button state
 - 2.7.5 Switch lock control
 - 2.7.6 Switch lock status
- 2.8 Units shall not have any dip switches or potentiometers for field settings
- 2.9 Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required
- 2.10 Two-button wall switch occupancy sensors, when connected to a single relay dimming room controller, shall operate in the following sequence as a factory default:
- 2.10.1 Left button
 - 2.10.1.1 Press and release – Turn load on
 - 2.10.1.2 Press and hold – Raise dimming load
 - 2.10.2 Right button
 - 2.10.2.1 Press and release – Turn off
 - 2.10.2.2 Press and hold – Lower dimming load

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2.11 Low voltage momentary pushbuttons shall include the following features:

2.11.1 Load/Scene Status LED on each switch button with the following characteristics:

2.11.1.1 Bi-level LED

2.11.1.2 Dim locator level indicates power to switch

2.11.1.3 Bright status level indicates that load or scene is active

2.11.2 The following button attributes may be changed or selected using a wireless configuration tool:

2.11.2.1 Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).

2.11.2.2 Individual button function may be configured to Toggle, On only or Off only.

2.11.2.3 Individual scenes may be locked to prevent unauthorized change.

2.11.2.4 Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.

2.11.2.5 Ramp rate may be adjusted for each dimmer switch.

2.11.2.6 Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple load

2.12 WattStopper part numbers: LMPW, LMDW. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening

DIGITAL WALL OR CELING MOUNTED OCCUPANCY SENSOR

2.13 Wall or ceiling mounted (to suit installation) passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor

2.14 Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:

2.14.1 Digital calibration and pushbutton configuration for the following variables:

2.14.1.1 Sensitivity – 0-100% in 10% increments

2.14.1.2 Time delay – 1-30 minutes in 1 minute increments

2.14.1.3 Test mode – Five second time delay

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- 2.14.1.4 Detection technology – PIR, Ultrasonic or Dual Technology activation and/or re-activation.
- 2.14.1.5 Walk-through mode
- 2.14.1.6 Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.

2.14.2 Programmable control functionality including:

- 2.14.2.1 Each sensor may be programmed to control specific loads within a local network.
- 2.14.2.2 Sensor shall be capable of activating one of 16 user-definable lighting scenes.
- 2.14.2.3 Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically within a configurable period of time (default 10 seconds) after turning off
- 2.14.2.4 On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
 - 2.14.2.4.1 Ultrasonic and Passive Infrared
 - 2.14.2.4.2 Ultrasonic or Passive Infrared
 - 2.14.2.4.3 Ultrasonic only
 - 2.14.2.4.4 Passive Infrared only

2.14.3 Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.

2.14.4 One or two RJ-45 port(s) for connection to DLM local network

2.14.5 Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls

2.14.6 Device Status LEDs, which may be disabled for selected applications, including:

- 2.14.6.1 PIR detection
- 2.14.6.2 Ultrasonic detection

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- 2.14.6.3 Configuration mode
- 2.14.6.4 Load binding
- 2.14.7 Assignment of occupancy sensor to a specific load within the room without wiring or special tools
- 2.14.8 Manual override of controlled loads
- 2.14.9 All digital parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years
- 2.15 BACnet object information shall be available for the following objects:
 - 2.15.1 Detection state
 - 2.15.2 Occupancy sensor time delay
 - 2.15.3 Occupancy sensor sensitivity, PIR and Ultrasonic
- 2.16 Units shall not have any dip switches or potentiometers for field settings
- 2.17 Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.
- 2.18 WattStopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC

DIGITAL WALL SWITCHES

- 2.19 Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configurations. Wall switches shall include the following features:
 - 2.19.1 Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
 - 2.19.2 Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
 - 2.19.3 Configuration LED on each switch that blinks to indicate data transmission.
 - 2.19.4 Load/Scene Status LED on each switch button with the following characteristics:
 - 2.19.4.1 Bi-level LED
 - 2.19.4.2 Dim locator level indicates power to switch
 - 2.19.4.3 Bright status level indicates that load or scene is active

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- 2.19.5 Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps
- 2.19.6 Programmable control functionality including
 - 2.19.6.1 Button priority may be configured to any BACnet priority level, from 1-16, corresponding to networked operation allowing local actions to utilize life safety priority.
 - 2.19.6.2 Scene patterns may be saved to any button other than dimming rockers. Once set, buttons may be digitally locked to prevent overwriting of the preset levels
- 2.19.7 All digital parameter data programmed into an individual wall switch shall be retained in non-volatile FLASH memory within the wall switch itself. Memory shall have an expected life of no less than 10 years
- 2.20 BACnet object information shall be available for the following objects:
 - 2.20.1 Button state
 - 2.20.2 Switch lock control
 - 2.20.3 Switch lock status
- 2.21 Two RJ-45 ports for connection to DLM local network
- 2.22 Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching
- 2.23 The following switch attributes may be changed or selected using a wireless configuration tool:
 - 2.23.1 Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa)
 - 2.23.2 Individual button function may be configured to Toggle, On only or Off only.
 - 2.23.3 Individual scenes may be locked to prevent unauthorized change.
 - 2.23.4 Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours
 - 2.23.5 Ramp rate may be adjusted for each dimmer switch.
 - 2.23.6 Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads

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- 2.24 WattStopper product numbers: LMSW-101, LMSW-102, LMSW-103, LMSW-104, LMSW-105, LMSW-108, LMDM-101. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening

HANDHELD REMOTE CONTROLS

- 2.25 Battery-operated handheld devices in 1, 2 and 5 button configurations for remote switching or dimming control. Remote controls shall include the following features:
- 2.25.1 Two-way infrared (IR) transceiver for line of sight communication with DLM local network within up to 30 feet
 - 2.25.2 LED on each button confirms button press
 - 2.25.3 Load buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads
 - 2.25.4 Inactivity timeout to save battery life
- 2.26 A wall mount holster and mounting hardware shall be included with each remote control
- 2.27 WattStopper part numbers: LMRH-101, LMRH-102, LMRH-105

DIGITAL PARTITION CONTROLS

- 2.28 Partition controls shall enable manual or automatic coordination of lighting controls in flexible spaces with up to four moveable walls by reconfiguring the connected digital switches and occupancy sensors
- 2.29 Four-button low voltage pushbutton switch for manual control.
- 2.29.1 Two-way infrared (IR) transceiver for use with configuration remote control.
 - 2.29.2 Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall
 - 2.29.3 Configuration LED on each switch that blinks to indicate data transmission.
 - 2.29.4 Each button represents one wall; Green button LED indicates status.
 - 2.29.5 Two RJ-45 ports for connection to DLM local network.
- 2.30 WattStopper part number: LMPS-104. Available in white, light almond, ivory, grey and black; compatible with wall plates with decorator opening

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- 2.31 Contact closure interface for automatic control via input from limit switches on movable walls (by others).
 - 2.31.1 Operates on Class 2 power supplied by DLM local network.
 - 2.31.2 Includes 24VDC output and four input terminals for maintained third party contract closure inputs.
 - 2.31.2.1 Input max. sink/source current: 1-5Ma
 - 2.31.2.2 Logic input signal voltage High: >18VDC
 - 2.31.2.3 Logic input signal voltage Low: <2VDC
 - 2.31.3 Four status LEDs under hinged cover indicate if walls are open or closed; supports LMPS-104 as remote status indicator.
 - 2.31.4 Two RJ-45 ports for connection to DLM local network.
- 2.32 WattStopper part number: LMIO-102

DIGITAL DAYLIGHTING SENSORS

- 2.33 Digital daylighting sensors shall work with room controllers to provide automatic switching, bi-level, or tri-level or dimming daylight harvesting capabilities for any load type connected to a room controller. Daylighting sensors shall be interchangeable without the need for rewiring
 - 2.33.1 Closed loop sensors measure the ambient light in the space and control a single lighting zone
 - 2.33.2 Open loop sensors measure incoming daylight in the space, and are capable of controlling up to three lighting zones
 - 2.33.3 Dual loop sensors measure both ambient and incoming daylight in the space to insure that proper light levels are maintained as changes to reflective materials are made in a single zone
- 2.34 Digital daylighting sensors shall include the following features:
 - 2.34.1 The sensor's internal photodiode shall only measure lightwaves within the visible spectrum. The photodiode's spectral response curve shall closely match the entire photopic curve. The photodiode shall not measure energy in either the ultraviolet or infrared spectrums. The photocell shall have a sensitivity of less than 5% for any wavelengths less than 400 nanometers or greater than 700 nanometers
 - 2.34.2 Sensor light level range shall be from 1-6,553 footcandles (fc).

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- 2.34.3 The capability of ON/OFF, bi-level or tri-level switching, or dimming, for each controlled zone, depending on the selection of room controller(s) and load binding to room controller(s).
- 2.34.4 For switching daylight harvesting, the photosensor shall provide a field-selectable deadband, or a separation, between the "ON Setpoint" and the "OFF Setpoint" that will prevent the lights from cycling excessively after they turn off.
- 2.34.5 For dimming daylight harvesting, the photosensor shall provide the option, when the daylight contribution is sufficient, of turning lights off or dimming lights to a field-selectable minimum level
- 2.34.6 Photosensors shall have a digital, independently configurable fade rate for both increasing and decreasing light level in units of percent per second.
- 2.34.7 Photosensors shall provide adjustable cut-off time. Cut-off time is defined by the number of selected minutes the load is at the minimum output before the load turns off. Selectable range between 0-240 minutes including option to never cut-off
- 2.34.8 Optional wall switch override shall allow occupants to reduce lighting level to increase energy savings or, if permitted by system administrator, raise lighting levels for a selectable period of time or cycle of occupancy
- 2.34.9 Integral infrared (IR) transceiver for configuration and/or commissioning with a handheld configuration tool, to transmit detected light level to wireless configuration tool, and for communication with personal remote controls
- 2.34.10 Configuration LED status light on device that blinks to indicate data transmission
- 2.34.11 Status LED indicates test mode, override mode and load binding.
- 2.34.12 Recessed switch on device to turn controlled load(s) ON and OFF.
- 2.34.13 BACnet object information shall be available for the following daylighting sensor objects, based on the specific photocell's settings:
 - 2.34.13.1 Day and night setpoints
 - 2.34.13.2 Off time delay
 - 2.34.13.3 On and off setpoints
 - 2.34.13.4 Up to three setpoints
 - 2.34.13.5 Operating mode – on/off, bi-level, tri-level or dimming
- 2.34.14 One RJ-45 port for connection to DLM local network

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- 2.35 A choice of accessories to accommodate multiple mounting methods and building materials. The photosensors may be mounted on a ceiling tile, skylight light well, suspended lighting fixture or backbox. Standard tube photosensors accommodate mounting materials from 0-0.62" thickness (LMLS-400, LMLS-500). Extended tube photosensors accommodate mounting materials from 0.62"-1.25" thickness (LMLS-400-L, LMLS-500-L). Mounting brackets are compatible with J boxes (LMLS-MB1) and wall mounting (LMLS-MB2). LMLS-600 photosensor to be mounted on included bracket below skylight well
- 2.36 Any load or group of load in the room can be assigned to a daylighting zone
- 2.37 Each load within a daylighting zone can be individually enabled or disabled for discrete control) load independence)
- 2.38 All digital parameter data programmed into a photosensor shall be retained in non-volatile FLASH memory within the photosensor itself. Memory shall have an expected life of no less than 10 years

Closed loop digital photosensors shall include the following additional features:

- 2.39 An internal photodiode that measures light in a 100-degree angle, cutting off the unwanted light from bright sources outside of this cone.
- 2.40 Automatic self-calibration, initiated from the photosensor, a wireless configuration tool or a PC with appropriate software
- 2.41 Automatically establishes application-specific setpoints following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of loads
- 2.42 WattStopper Product Number: LMLS-400, LMLS-400-L

Open loop digital photosensors shall include the following additional features:

- 2.43 An internal photodiode that measures light in a 60-degree angle cutting off the unwanted light from the interior of the room
- 2.44 Automatically establishes application-specific setpoints following manual calibration using a wireless configuration tool or a PC with appropriate software. For switching operation, an adequate deadband between the ON and OFF setpoints for each zone shall prevent the lights from cycling; for dimming operation, a proportional control algorithm shall maintain the design lighting level in each zone
- 2.45 Each of the three discrete daylight zones can include any non-overlapping group of loads in the room
- 2.46 WattStopper Product Number: LMLS-500, LMLS-500-L

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Dual loop photosensors shall include the following additional features:

- 2.47 Close loop portion of dual loop device must have an internal photodiode that measures light in a 100 degree angle, cutting off the unwanted light from sources outside.
- 2.48 Open loop portion of dual loop device must have an internal photodiode that can measure light in a 60 degree angle, cutting off the unwanted light from the interior of the room
- 2.49 Automatically establishes application-specific set-points following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of load
- 2.50 Device must reference closed loop photosensor information as a base line reference. The device must be able to analyze the open loop photosensor information to determine if an adjustment in light levels is require
- 2.51 Device must be able to automatically commission setpoints each night to provide adjustments to electrical lighting based on changes in overall lighting in the space due to changes in reflectance within the space or changes to daylight contribution based on seasonal changes
- 2.52 Device must include extendable mounting arm to properly position sensor within a skylight well
- 2.53 WattStopper product number LMLS-600

DIGITAL ROOM CONTROLLERS AND PLUG – LOAD CONTROLLERS

- 2.54 Digital controllers for lighting and plug loads automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room and plug load controllers shall be provided to match the room lighting and plug load control requirements. The controllers will be simple to install, and will not have dip switches or potentiometers, or require special configuration for standard Plug n' Go applications. The control units will include the following features:
 - 2.54.1 Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room
 - 2.54.2 Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf
 - 2.54.3 Multiple room controllers connected together in a local network must automatically prioritize each room controller, without requiring any configuration or setup, so that loads are sequentially assigned using room controller device ID's from highest to lowest

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2.54.4 Device Status LEDs to indicate:

- 2.54.4.1 Data transmission
- 2.54.4.2 Device has power
- 2.54.4.3 Status for each load
- 2.54.4.4 Configuration status

2.54.5 Quick installation features including:

- 2.54.5.1 Standard junction box mounting
- 2.54.5.2 Quick low voltage connections using standard RJ-45 patch cable

2.54.6 Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power

- 2.54.6.1 Turn on to 100%
- 2.54.6.2 Remain off
- 2.54.6.3 Turn on to last level

2.54.7 Each load shall be configurable to operate in the following sequences based on occupancy:

- 2.54.7.1 Auto-on/Auto-off (Follow on and off)
- 2.54.7.2 Manual-on/Auto-off (Follow off only)

2.54.8 The priority of each load output shall be reversible, via digital configuration, so that on is off and off is on

2.54.9 BACnet object information shall be available for the following objects:

- 2.54.9.1 Load status
- 2.54.9.2 Electrical current
- 2.54.9.3 Total watts per controller
- 2.54.9.4 Schedule state – normal or after-hours
- 2.54.9.5 Demand response control and cap level
- 2.54.9.6 Room occupancy status

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- 2.54.9.7 Total room lighting and plug loads watts
- 2.54.9.8 Total room watts/sq ft
- 2.54.9.9 Force on/off all loads
- 2.54.10 UL 2043 plenum rated
- 2.54.11 Manual override and LED indication for each load
- 2.54.12 Dual voltage (120/277 VAC, 60 Hz), or 347 VAC, 60 Hz (selected models only). 120/277 volt models rated for 20A total load, derating to 16A required for some dimmed loads (forward phase dimming); 347 volt models rated for 15A total load; plug load controllers carry application-specific UL 20 rating for receptacle control.
- 2.54.13 Zero cross circuitry each load
- 2.54.14 All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.
- 2.55 On/Off Controllers shall include:
 - 2.55.1 One or two relay configuration
 - 2.55.2 Efficient 150 mA switching power supply
 - 2.55.3 Three RJ-45 DLM local network ports with integral strain relief and dust cover
 - 2.55.4 WattStopper product numbers: LMRC-101, LMRC-102
- 2.56 On/Off/Dimming enhanced Room Controllers shall include:
 - 2.56.1 Real time current monitoring
 - 2.56.2 Multiple relay configurations
 - 2.56.2.1 One, two or three relays (LMRC-21 x series)
 - 2.56.2.2 One or two relays (LMRC-22x series)
 - 2.56.3 Efficient 250 mA switching power supply
 - 2.56.4 Four RJ-45 DLM local network ports with integral strain relief and dust cover

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2.56.5 Once dimming output per relay

- 2.56.5.1 0-10V Dimming - Where indicated, one 0-10 volt analog output per relay for control of compatible ballasts and LED drivers. The 0-10 volt output shall automatically open upon loss of power to the Room Controller to assure full light output from the controlled lighting. (LMRC-21x series)
- 2.56.5.2 Line Voltage, Forward Phase Dimming - Where indicated, one forward phase control line voltage dimming output per relay for control of compatible two-wire or three-wire ballasts, LED drivers, MLV, forward phase compatible ELV, neon/cold cathode and incandescent loads. (LMRC-22x series)
- 2.56.5.3 Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver
- 2.56.5.4 The LED level indicators on bound dimming switches shall utilize this new maximum and minimum trim
- 2.56.5.5 Each dimming output channel shall have an independently configurable minimum and maximum trim level to set the dynamic range of the output within the new 0-100% dimming range defined by the minimum and maximum calibration trim
- 2.56.5.6 Calibration and trim levels must be set per output channel
- 2.56.5.7 Devices that set calibration or trim levels per controller are not acceptable
- 2.56.5.8 All configuration shall be digital. Devices that set calibration or trim levels per output channel via trim pots or dip-switches are not acceptable

2.56.6 Each load shall have an independently configurable preset on level for Normal Hours and After Hours events to allow different dimmed levels to be established at the start of both Normal Hours and After Hours events

2.56.7 Fade rates for dimming loads shall be specific to bound switch buttons, and the load shall maintain a default value for any bound buttons that do not specify a unique value

2.56.8 The following dimming attributes may be changed or selected using a wireless configuration tool:

- 2.56.8.1 Establish preset level for each load from 0-100%
- 2.56.8.2 Set high and low trim for each load

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- 2.56.8.3 Set lamp burn in time for each load up to 100 hours
 - 2.56.9 Override button for each load provides the following functions:
 - 2.56.9.1 Press and release for on/off control
 - 2.56.9.2 Press and hold for dimming control
 - 2.57 WattStopper product numbers: LMRC-211, LRMC-212, LMRC-221, LMRC-222
 - 2.58 Plug Load Room Controllers shall include the following:
 - 2.58.1 One relay configuration with additional connection for unswitched load
 - 2.58.2 Configurable additive time delay to extend plug load time delay beyond occupancy sensor time delay (e.g. a 10 minute additive delay in a space with a 20 minute occupancy sensor delay ensures that plug loads turn off 30 minutes after the space is vacated)
 - 2.58.3 Factory default operation is Auto-on/Auto-off, based on occupancy
 - 2.58.4 Real time current monitoring of both switched and un-switched load (LMPL-201 only)
 - 2.58.5 Efficient switching power supply
 - 2.58.5.1 150mA (LMPL-101)
 - 2.58.5.2 250mA (LMPL-201)
 - 2.58.6 RJ-45 DLM local network ports
 - 2.58.6.1 Three RJ-45 ports (LMPL-101)
 - 2.58.6.2 Four RJ-45 ports (LMPL-201)
 - 2.59 Wattstopper product numbers: LMPL-101, LMPL-201
- DLM LOCAL NETWORK (Room Network)
- 2.60 The DLM local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building
 - 2.61 Features of the DLM local network include:
 - 2.61.1 Plug n' Go® automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached

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- 2.61.2 Simple replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup
- 2.61.3 Push n' Learn® configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network
- 2.61.4 Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver
- 2.62 Digital room devices connect to the local network using pre-terminated Cat 5e cables with RJ-45 connectors, which provide both data and power to room devices. Systems that utilize RJ-45 patch cords but do not provide serial communication data from individual end devices are not acceptable
- 2.63 If manufacturer's pre-terminated Cat 5e cables are not used for the installation, the contractor is responsible for testing each cable following installation and supplying manufacturer with test results
- 2.64 WattStopper Product Number: LMRJ-Series

DLM SEGMENT NETWORK (Room to Room Network)

- 2.65 The segment network shall be a linear topology, BACnet-based MS/TP subnet to connect DLM local networks (rooms) and LMCP relay panels for centralized control
 - 2.65.1 Each connected DLM local network shall include a single network bridge (LMBC-300), and the network bridge is the only room-based device that is connected to the segment network
 - 2.65.2 Network bridges, relay panels and segment managers shall include terminal blocks, with provisions for separate "in" and "out" terminations, for segment network connections
 - 2.65.3 The segment network shall utilize 1.5 twisted pair, shielded, cable supplied by the lighting control manufacturer. The maximum cable run for each segment is 4,000 feet. Conductor-to-conductor capacitance of the twisted pair shall be less than 30 pf/ft and have a characteristic impedance of 120 Ohms
 - 2.65.4 Network signal integrity requires that each conductor and ground wire be correctly terminated at every connected device
 - 2.65.5 Substitution of manufacturer-supplied cable must be pre-approved: Manufacturer will not certify network reliability, and reserves the right to void warranty, if non-approved cable is installed, and if terminations are not completed according to manufacturer's specific requirements

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2.65.6 Segment networks shall be capable of connecting to BACnet-compliant BAS (provided by others) either directly, via MS/TP, or through NB-ROUTERs, via BACnet/IP or BACnet/Ethernet. Systems whose room-connected network infrastructure require gateway devices to provide BACnet data to a BAS are unacceptable

2.66 WattStopper Product Number: LM-MSTP, LM-MSTP-DB

CONFIGURATION TOOLS

2.67 A wireless configuration tool facilitates optional customization of DLM local networks using two-way infrared communications, while PC software connects to each local network via a USB interface

2.68 Features and functionality of the wireless configuration tool shall include but not be limited to:

2.68.1 Two-way infrared (IR) communication with DLM IR-enabled devices within a range of approximately 30 feet

2.68.2 High visibility organic LED (OLED) display, pushbutton user interface and menu-driven operation

2.68.3 Must be able to read and modify parameters for room controllers, occupancy sensors, wall switches, daylighting sensors, network bridges and relay panels, and identify room devices by type and serial number

2.68.4 Save up to eight occupancy sensor setting profiles, and apply profiles to selected sensors

2.68.5 Temporarily adjust light level of any load(s) on the local network, and incorporate those levels in scene setting. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings

2.68.6 Adjust or fine-tune daylighting settings established during auto-configuration, and input light level data to complete configuration of open loop daylighting controls

2.68.7 Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings

2.68.8 Verify status of building level network devices

2.69 WattStopper Product Numbers: LMCT-100, LMCI-100/LMCS-100

NETWORK BRIDGE

2.70 The network bridge module connects a DLM local network to a BACnet-compliant segment network for communication between rooms, relay panels and a segment manager or BAS. Each local network shall include a network bridge component to

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provide a connection to the local network room devices. The network bridge shall use industry standard BACnet MS/TP network communication and an optically isolated EIA/TIA RS-485 transceiver

2.70.1 The network bridge shall be provided as a separate module connected on the local network through an available RJ-45 port

2.70.2 Provide Plug n' Go operation to automatically discover room devices connected to the local network and make all device parameters visible to the segment manager via the segment network. No commissioning shall be required for set up of the network bridge on the local network

2.70.3 The network bridge shall automatically create standard BACnet objects for selected room device parameters to allow any BACnet-compliant BAS to include lighting control and power monitoring features as provided by the DLM room devices on each local network. BACnet objects will be created for the addition or replacement of any given in-room DLM device for the installed life of the system. Products requiring that an application-specific point database be loaded to create or map BACnet objects are not acceptable. Systems not capable of providing BACnet data for control devices via a dedicated BACnet Device ID and physical MS/TP termination per room are not acceptable. Standard BACnet objects shall be provided as follows:

2.70.3.1 Read/write the normal or after hours schedule state for the room

2.70.3.2 Read the detection state of each occupancy sensor

2.70.3.3 Read the aggregate occupancy state of the room

2.70.3.4 Read/write the On/Off state of loads

2.70.3.5 Read/write the dimmed light level of loads

2.70.3.6 Read the button states of switches

2.70.3.7 Read total current in amps, and total power in watts through the room control

2.70.3.8 Read/write occupancy sensor time delay, PIR sensitivity and ultrasonic sensitivity settings

2.70.3.9 Activate a preset scene for the room

2.70.3.10 Read/write daylight sensor fade time and day and night setpoints

2.70.3.11 Read the current light level, in footcandles, from interior and exterior photosensors and photocells

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- 2.70.3.12 Set daylight sensor operating mode
- 2.70.3.13 Read/write wall switch lock status
- 2.70.3.14 Read watts per square foot for the entire controlled room
- 2.70.3.15 Write maximum light level per load for demand response mode
- 2.70.3.16 Read/write activation of demand response mode for the room
- 2.70.3.17 Activate/restore demand response mode for the room

2.71 Wattstopper product number: LMBC-300

SEGMENT MANAGER

- 2.72 For networked applications, the Digital Lighting Management system shall include at least one segment manager to manage network communication. It shall be capable of serving up a graphical user interface via a standard web browser utilizing either unencrypted TCP/IP traffic via a configurable port (default is 80) or 256 bit AES encrypted SSL TCP/IP traffic via a configurable port (default is 443)
- 2.73 Each segment manager shall have integral support for at least three segment networks. Segment networks may alternately be connected to the segment manger via external routers and switches, using standard Ethernet structured wiring. Each router shall accommodate one segment network. Provide the quantity of routers and switches as shown on the plans
- 2.74 Operational features of the Segment Manager shall include the following:
 - 2.74.1 Connection to PC or LAN via standard Ethernet TCP/IP via standard Ethernet TCP/IP with the option to use SSL encrypted connections for all traffic
 - 2.74.2 Easy to learn and use graphical user interface, compatible with Internet Explorer 8, or equal browser. Shall not require installation of any lighting control software to an end-user PC
 - 2.74.3 Log in security capable of restricting some users to view-only or other limited operations
 - 2.74.4 Automatic discovery of DLM devices and relay panels on the segment network(s). Commissioning beyond activation of the discovery function shall not be required to provide communication, monitoring or control of all local networks and lighting control panels
 - 2.74.5 After discovery, all rooms and panels shall be presented in a standard navigation tree format. Selecting a device from the tree will allow the device settings and operational parameters to be viewed and changed by the use

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- 2.74.6 Ability to view and modify room device operational parameters. It shall be possible to set device parameters independently for normal hours and after hours operation including sensor time delays and sensitivities, and load response to sensor including Manual-On or Auto-On
- 2.74.7 Ability to set up schedules for rooms and panels, view and override current status of panel channels and relays and assign relays to groups. Schedules shall automatically set controlled zones or areas to either a normal hour or after hours mode of operation. Support for a minimum of 100 unique schedules, each with up to four-time events per day. Support for annual schedules, holiday schedules and unique date-bound schedules
- 2.74.8 Ability to group rooms and loads for common control by schedules, switches or network commands
- 2.74.9 Ability to monitor connected load current and display power consumption for areas equipped with room controllers incorporating the integral current monitoring feature
- 2.74.10 Provide capabilities for integration with a BAS via BACnet protocol. At a minimum, the following points shall be available to the BAS via BACnet IP connection to the segment manager: room occupancy state; room schedule mode; room switch lock control; individual occupancy sensor state; room lighting power; room plug-load power; load ON/OFF state; load dimming level; panel channel schedule state; panel relay state; and Segment Manager Group schedule state control
- 2.74.11 The Segment Manager shall allow access and control of the overall system database via Native Niagara AX FOX connectivity. Systems that must utilize a Tridium Niagara controller in addition to the programming, scheduling and configuration server are not acceptable
- 2.75 Segment Manager shall support multiple DLM rooms as follows:
 - 2.75.1 Support up to 120 network bridges and 900 digital in-room devices (LMSM-3E)
 - 2.75.2 Support up to 300 network bridges and 2,200 digital in room devices, connected via network routers and switches (LMSM-6E)
- 2.76 WattStopper Product Numbers: LMSM-3E, LMSM-6E, NB-ROUTER, NB-SWITCH, NB-SWITCH-8, NB-SWITCH-16

PROGRAMMING, CONFIGURATION AND DOCUMENTATION SOFTWARE

- 2.77 PC-native application for optional programming of detailed technician-level parameter information for all DLM products, including all parameters not accessible via BACnet and the handheld IR configuration tool. Software must be capable of

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accessing room-level parameter information locally within the room when connected via the optional LMCI-100 USB programming adapter, or globally for many segment networks simultaneously utilizing standard BACnet/IP communication. Additional parameters exposed through this method include but are not limited to:

- 2.77.1 Occupancy sensor detection LED disable for performance and other aesthetic spaces where blinking LEDs present a distraction.
- 2.77.2 Six occupancy sensor action behaviors for each controlled load, separately configurable for normal hours and after hours modes. Modes include: No Action, Follow Off Only, Follow On Only, Follow On and Off, Follow On Only with Override Time Delay, Follow Off Only with Blink Warn Grace Time, Follow On and Off with Blink Warn Grace Time.
- 2.77.3 Separate fade time adjustments per load for both normal and after hours from 0 - 4 hours.
- 2.77.4 Configurable occupancy sensor re-trigger grace period from 0 - 4 minutes separate for both normal hours and after hours.
- 2.77.5 Separate normal hours and after hours per-load button mode with modes including: Do nothing, on only, off only, on and off.
- 2.77.6 Load control polarity reversal so that on events turn loads off and vice versa.
- 2.77.7 Per-load DR (demand response) shed level in units of percent.
- 2.77.8 Load output pulse mode in increments of 1second.
- 2.77.9 Fade trip point for each load for normal hours and after hours that establishes the dimmer command level at which a switched load closes its relay to allow for staggered On of switched loads in response to a dimmer
- 2.78 Generation of reports at the whole file, partial file, or room level. Reports include but are not limited to:
 - 2.78.1 Device list report: All devices in a project listed by type.
 - 2.78.2 Load binding report: All load controller bindings showing interaction with sensors, switches, and daylighting.
 - 2.78.3 BACnet points report: Per room Device ID report of the valid BACnet points for a given site's BOM.
 - 2.78.4 Room summary report: Device manifest for each room, aggregated by common BOM, showing basic sequence of operations.

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- 2.78.5 Device parameter report: Per-room lists of all configured parameters accessible via hand held IR programmer for use with O&M documentation.
- 2.78.6 Scene report: All project scene pattern values not left at defaults (i.e. 1 = all loads 100%, 2 = all loads 75%, 3 = all loads 50%, 4 = all loads 25%, 5-16 = same as scene 1).
- 2.78.7 Occupancy sensor report: Basic settings including time delay and sensitivity(ies) for all occupancy sensors
- 2.79 Network-wide programming of parameter data in a spreadsheet-like programming environment including but not limited to the following operations
 - 2.79.1 Set, copy/paste an entire project site of sensor time delays.
 - 2.79.2 Set, copy/paste an entire project site of sensor sensitivity settings.
 - 2.79.3 Search based on room name and text labels.
 - 2.79.4 Filter by product type (i.e. LMRC-212) to allow parameter set by product.
 - 2.79.5 Filter by parameter value to search for product with specific configurations
- 2.80 Network-wide firmware upgrading remotely via the BACnet/IP network
 - 2.80.1 Mass firmware update of entire rooms
 - 2.80.2 Mass firmware update of specifically selected rooms or areas
 - 2.80.3 Mass firmware upgrade of specific products
- 2.81 WattStopper Product Number: LMCS-100, LMCI-100

LMCP LIGHTING CONTROL PANELS

- 2.82 Provide lighting control panels in the locations and capacities as indicated on the plans and schedules. Each panel shall be of modular construction and consist of the following components:
 - 2.82.1 Enclosure/Tub shall be NEMA 1, sized to accept an interior with 1 - 8 relays, 1 - 24 relays and 6 four-pole contactors, or 1 - 48 relays and 6 four-pole contactors
 - 2.82.2 Cover shall be configured for surface or flush wall mounting of the panel as indicated on the plans. The panel cover shall have a hinged and lockable door with restricted access to line voltage section of the panel
 - 2.82.3 Interior assembly shall be supplied as a factory assembled component specifically designed and listed for field installation. The interior construction shall provide total isolation of high voltage (Class 1) wiring from low voltage

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(Class 2) wiring within the assembled panel. The interior assembly shall include intelligence boards, power supply, DIN rails for mounting optional Class 2 control devices, and individually replaceable latching type relays. The panel interiors shall include the following features

- 2.82.3.1 Removable, plug-in terminal blocks with connections for all low voltage terminations
- 2.82.3.2 Individual terminal block, override pushbutton, and LED status light for each relay
- 2.82.3.3 Direct wired switch inputs associated with each relay shall support 2-wire momentary switches only
- 2.82.3.4 Digital inputs (four RJ-45 jacks) shall support 1-, 2-, 3-, 4-, and 8-button digital switches; digital IO modules capable of receiving 0-5V or 0-10V analog photocell inputs; digital IO modules capable of receiving momentary or maintained contact closure inputs or analog sensor inputs; digital daylighting sensors; and digital occupancy sensors. Inputs are divided into two separate digital networks, each capable of supplying 250mA to connected devices
- 2.82.3.5 True relay state shall be indicated by the on-board LED and shall be available to external control devices and systems via BACnet
- 2.82.3.6 Automatically sequenced operation of relays to reduce impact on the electrical distribution system when large loads are controlled simultaneously
- 2.82.3.7 Group and pattern control of relays shall be provided through a simple keypad interface from a handheld IR programmer. Any set of relays can be associated with a group for direct on/off control or pattern (scene) control via a simple programming sequence using the relay override pushbuttons and LED displays for groups 1-8 or a handheld IR programmer for groups 1-99
- 2.82.3.8 Relay group status for shall be provided through LED indicators for groups 1-8 and via BACnet for groups 1-99. A solid LED indicates that the last group action called for an ON state and relays in the group are on or in a mixed state
- 2.82.3.9 Single-pole latching relays with modular plug-in design. Relays shall provide the following ratings and features:

Electrical

2.82.3.9.1 30 amp ballast at 277V

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- 2.82.3.9.2 20 amp ballast at 347V
- 2.82.3.9.3 20 amp tungsten at 120V
- 2.82.3.9.4 30 amp resistive at 347V
- 2.82.3.9.5 1.5 HP motor at 120V
- 2.82.3.9.6 14,000 amp short circuit current rating (SCCR) at 347V
- 2.82.3.9.7 Relays shall be specifically UL 20 listed for control of plug-loads

Mechanical

- 2.82.3.9.8 Replaceable, ½" KO mounting with removable Class 2 wire harness
 - 2.82.3.9.9 Actuator on relay housing provides manual override and visual status indication, accessible from Class 2 section of panel
 - 2.82.3.9.10 Dual line and load terminals each support two #14 - #12 solid or stranded conductors
 - 2.82.3.9.11 Tested to 300,000 mechanical on/off cycles
- 2.83 Isolated low voltage contacts provide for true relay status feedback and pilot light indication
- 2.84 Power supply shall be a multi-voltage transformer assembly with rated power to supply all electronics, occupancy sensors, switches, pilot lights, and photocells as necessary to meet the project requirements. Power supply to have internal over-current protection with automatic reset and metal oxide varistor protection
- 2.85 Where indicated, lighting control panels designated for control of emergency lighting shall be provided with factory installed provision for automatic by pass of relays controlling emergency circuits upon loss of normal power. Panels shall be properly listed and labeled for use on emergency lighting circuits and shall meet the requirements of UL924 and NFPA 70 - Article 700
- 2.86 Integral system clock shall provide scheduling capabilities for panel-only projects without DLM segment networks or BAS control
- 2.86.1 Each panel shall include digital clock capability able to issue system wide automation commands to up to (11) eleven other panels for a total of (12) twelve networked lighting control panels. The clock shall provide capability for up to 254 independent schedule events per panel for each of the ninety-nine system wide channel groups

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- 2.86.2 The clock capability of each panel shall support the time-based energy saving requirements of applicable local energy codes
- 2.86.3 The clock module shall provide astronomic capabilities, time delays, blink warning, daylight savings, and holiday functions and will include a battery back up for the clock function and program retention in non-volatile FLASH memory. Clocks that require multiple events to meet local code lighting shut off requirements shall not be allowed
- 2.86.4 The clock capability of each panel shall operate on a basis of ON/OFF or Normal Hours/After Hours messages to automation groups that implement pre-configured control scenarios. Scenarios shall include:
 - 2.86.4.1 Scheduled ON / OFF
 - 2.86.4.2 Manual ON / Scheduled OFF
 - 2.86.4.3 Astro ON / OFF (or Photo ON / OFF)
 - 2.86.4.4 Astro and Schedule ON / OFF (or Photo and Schedule ON / OFF)
- 2.86.5 The user interface shall be a portable IR handheld remote control capable of programming any panel in the system (LMCT-100)
- 2.86.6 The clock capability of each panel shall employ non-volatile memory and shall retain user programming and time for a minimum of 10 years
- 2.86.7 Schedules programmed into the clock of any one panel shall be capable of executing panel local schedule or Dark/Light (photocell or Astro) events for that panel in the event that global network communication is lost. Lighting control panels that are not capable of executing events independently of the global network shall not be acceptable
- 2.87 The lighting control panel can operate as a stand-alone system, or can support schedule, group, and photocell control functions, as configured in a Segment Manager controller, via a segment network connection
- 2.88 The lighting control panel shall support digital communications to facilitate the extension of control to include interoperation with building automation systems and other intelligent field devices. Digital communications shall be RS485 MS/TP-based using the BACnet® protocol
 - 2.88.1 The panel shall have provision for an individual BACnet device ID and shall support the full 2²² range (0 – 4,193,304). The device ID description property shall be writable via the network to allow unique identification of the lighting control panel on the network
 - 2.88.2 The panel shall support MS/TP MAC addresses in the range of 0 – 127 and baud rates of 9600k, 38400k, 76800k, and 115.2k bits per second

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- 2.88.3 Lighting control relays shall be controllable as binary output objects in the instance range of 1 – 64. The state of each relay shall be readable and writable by the BAS via the object present value property
- 2.88.4 Lighting control relays shall report their true on/off state as binary input objects in the instance range of 1 – 64
- 2.88.5 The 99 group Normal Hours/After Hours control objects associated with the panel shall be represented by binary value objects in the instance range of 201 – 299. The occupancy state of each channel group shall be readable and writable by the BAS via the object present value property. Commanding 1 to a channel group will put all relays associated with the channel into the normal hours mode. Commanding 0 or NULL shall put the relays into the after hours mode
- 2.88.6 Setup and commissioning of the panel shall not require manufacturer-specific software or a computer. All configuration of the lighting control panel shall be performed using standard BACnet objects or via the handheld IR programming remote. Provide BACnet objects for panel setup and control as follows:
 - 2.88.6.1 Binary output objects in the instance range of 1 – 64 (one per relay) for on/off control of relays
 - 2.88.6.2 Binary value objects in the instance range of 1 – 99 (one per channel) for normal hours/after hours schedule control
 - 2.88.6.3 Binary input objects in the instance range of 1 – 64 (one per relay) for reading true on/off state of the relays
 - 2.88.6.4 Analog value objects in the instance range of 101 – 199 (one per channel group) shall assign a blink warn time value to each channel. A value of 5 shall activate the blink warn feature for the channel and set a 5-minute grace-time period. A value of 250 shall activate the sweep feature for the channel and enable the use of sweep type automatic wall switches
- 2.88.7 The description property for all objects shall be writable via the network and shall be saved in non-volatile memory within the panel
- 2.88.8 The BO and BV 1 – 99 objects shall support BACnet priority array with a relinquish default of off and after hours respectively. Prioritized writes to the channel BV objects shall propagate prioritized control to each member relay in a way analogous to the BACnet Channel object described in addendum aa. (<http://www.bacnet.org/Addenda/Add-135-2010aa.pdf>)

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2.88.9 Panel-aggregate control of relay Force Off at priority 2 shall be available via a single BV5 object. Force On at priority 1 shall be available via a single BV4 object

2.88.10 Lockout of all digital switch buttons connected to a given panel shall be command-able via a single BV2 object. The lock status of any connected switch station shall be represented as BV101-196

2.89 WattStopper Product Number: LMCP8, LMCP24 or LMCP48

USER INTERFACE

2.90 Each lighting control panel system shall be supplied with at least (1) handheld configuration tool (LMCT-100). As a remote programming interface the configuration tool shall allow setup, configuration, and diagnostics of the panel without the need for software or connection of a computer. The user interface shall have the following panel-specific functions as a minimum:

2.90.1 Set network parameters including panel device ID, MS/TP MAC address, baud rate and max master range.

2.90.2 Relay Group creation of up to 99 groups. Group creation shall result in programming of all seven key relay parameters for member relays. The seven parameters are as follows: After-hours Override Time Delay, Normal Hours Override Time Delay, Action on Transition to Normal Hours, Action on Transition to After Hours, Sensor Action During Normal Hours, Sensor Action During After Hours, Blink-Warn Time for After Hours.

2.90.3 Program up to 254 separate scheduled events. Events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays. Holidays are also defined through the User Interface.

2.90.4 Program up to 32 separate Dark/Light events. Events shall have a selectable source as either calculated Astro with delay, or a digital IO module with an integral 0-5V or 0-10V analog photocell. Dark/Light events shall occur on seven day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays.

2.90.5 Button binding of digital switches to groups shall be accessible via the handheld IR remote and accomplished from the digital switch station.

2.90.6 Programming of panel location information shall be accomplished by the handheld IR remote and include at a minimum LAT, LON, DST zone, and an approximate city/state location.

2.90.7 An additional handheld IR remote may optionally be specified to be permanently mounted to the panel interior via a retractable anti-theft lanyard to allow for convenient programming of the panel while assuring that the

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handheld programmer is always present at that panel. An unlimited number of handheld IR remotes may also be purchased for facilities staff as determined by the end user's representative.

2.91 WattStopper Product Number: LMCT-100

EMERGENCY LIGHTING CONTROL DEVICES

2.92 Emergency Lighting Control Unit – A UL 924 listed device that monitors a switched circuit providing normal lighting to an area. The unit provides normal ON/OFF control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include:

2.92.1 120/277 volts, 50/60 Hz, 20 amp ballast rating

2.92.2 Push to test button

2.92.3 Auxiliary contact for remote test or fire alarm system interface

2.93 WattStopper Product Numbers: ELCU-100, ELCU-200

PART 3 - EXECUTION

PRE-INSTALLATION MEETING

3.1 A factory authorized manufacturer's representative shall provide the electrical contractor a functional overview of the lighting control system prior to installation. The contractor shall schedule the pre-installation site visit after receipt of approved submittals to review the following:

3.1.1 Confirm the location and mounting of all digital devices, with special attention to placement of occupancy and daylighting sensors.

3.1.2 Review the specifications for low voltage control wiring and termination.

3.1.3 Discuss the functionality and configuration of all products, including sequences of operation, per design requirements.

3.1.4 Discuss requirements for integration with other trades

CONTRACTOR INSTALLATION AND SERVICES

3.2 Contractor to install all devices and wiring in a professional manner. All line voltage connections to be tagged to indicate circuit and switched legs

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- 3.3 Contractor to install all room/area devices using manufacturer's factory-tested Cat 5e cable with pre-terminated RJ-45 connectors. If pre-terminated cable is not used for room/area wiring, the contractor is responsible for testing each field-terminated cable. The contractor shall supply the Project Engineer with test results.
 - 3.31 Performance of installed cables shall satisfy all current addendums to the EIA/TIA 568A standard for Category-5e wiring and the manufacturers installation requirements. The contractor must provide clear room by room, individual cable by cable testing of all UTP wiring provided for the lighting control system.
 - 3.3.2 Upon completion of testing all cable links used as a part of the lighting control system, the Contractor shall supply a copy of the original database files downloaded from the tester in original format on a USB Flash Drive. Contractor shall provide with the testing database files, an original copy of the tester's manufacturer software program (included in original cost) for record management and archiving, in a Window format (i.e., Fluke Linkware software program).
 - 3.3.3 The manufacturer's software program will be used by the Project Engineer to review all test results, and then turned over to the District to keep as their record copy with the final approved test results. Provide (3) copies of tests on USB Flash Drives. Do not submit test results for review in Excel or PDF file formats, as the submittal will be rejected and not reviewed.
 - 3.3.4 Contractor to install any room to room network devices using manufacturer-supplied LM-MSTP network wire. Network wire substitution is not permitted and may result in loss of product warranty per DLM SEGMENT NETWORK section of specification.
 - 3.3.5 Low voltage wiring topology must comply with manufacturer's specifications. Contractor shall route network wiring as shown in submittal drawings as closely as possible, and shall document final wiring location, routing and topology on as built drawings
- 3.4 Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated. Before start up, contractor shall test all devices to ensure proper communication
- 3.5 Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings
 - 3.5.1 Adjust time delay so that controlled area remains lighted while occupied
- 3.6 Provide written or computer-generated documentation on the configuration of the system including room by room description including:
 - 3.6.1 Sensor parameters, time delays, sensitivities, and daylighting setpoints.
 - 3.6.2 Sequence of operation, (e.g. manual ON, Auto OFF. etc.)

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3.6.3 Load Parameters (e.g. blink warning, etc)

- 3.7 Post start-up tuning – After 30 days from occupancy contractor shall adjust sensor time delays and sensitivities to meet the Owner's requirements. Provide a detailed report to the Architect / Owner of post start-up activity

FACTORY SERVICES

- 3.8 Upon completion of the installation, the manufacturer's factory authorized representative shall start up and verify a complete fully functional system
- 3.9 The electrical contractor shall provide both the manufacturer and the electrical engineer with three weeks written notice of the system start up and adjustment date
- 3.10 Upon completion of the system start up, the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system

COMMISSIONING SUPPORT SERVICES

- 3.11 On this project, a commissioning agent will be hired to verify the installation and programming of all building systems, which includes the lighting control system. Manufacturer should include an extra day of technician's time to review the functionality and settings of the lighting control hardware with the commissioning agent, including reviewing submittal drawings and ensuring that instructions on how to configure each device are readily available. Manufacturer is NOT responsible for helping the commissioning agent inspect the individual devices. It will be the commissioning agent's responsibility to create and complete any forms required for the commissioning process, although the manufacturer or contractor may offer spreadsheets and/or printouts to assist the agent with this task.
- 3.12 The commissioning agent shall work with the electrical contractor during installation of the lighting control hardware to become familiar with the specific products. The agent may also accompany the manufacturer's technicians during their start-up work to better understand the process of testing, calibration and configuration of the products. However, the contractor and manufacturer shall ensure that interfacing with the agent does not prevent them from completing the requirements outlined in the contract documents

ACCEPTANCE TESTING SUPPORT SERVICES

- 3.13 On all California projects, a certified lighting controls acceptance test technician (CLCATT) must verify the installation of the lighting control system. Manufacturer should include an extra day of factory technician's time to assist the CLCATT review the functionality and settings of the lighting control hardware per the requirements in the California State forms. It will be the CLCATT's responsibility to create and complete any forms required for the commissioning process, although the manufacturer or contractor may offer spreadsheets and/or printouts to assist the CLCATT with this task

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END OF SECTION

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SPECIFICATIONS

SECTION 26 22 13

DRY TYPE TRANSFORMERS

PART 1 – GENERAL

- 1.1 Furnish and install where indicated on the drawings dry type transformers with voltage and phase as shown on the drawings. The transformers shall be 60 Hz with KVA rating as shown on the drawings.
- 1.2 Submit shop drawings and manufacturer's data for each transformer including:
 - 1.2.1 Incident energy level calculations
- 1.3 **Common submittal mistakes which will result in the submittal being rejected:**
 - 1.3.1 Not including all items listed in the above itemized description.
 - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
 - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
 - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

- 2.1 Acceptable manufacturers are Square D, Eaton-Cutler Hammer, Siemens or ABB.
- 2.2 Equipment manufactured by any other manufacturers not specifically listed in Section 2.1 are not considered equal, or approved for use on this project.
- 2.3 Energy efficient transformers shall be provided in compliance with NEMA TP-1 and requirements as outlined in the California Code of Regulations, Title 20: Division 2, Chapter 4, Article 4, Sections 1601-1609: Appliance Efficiency Regulations and California Code of Regulations, Title 24: part 6, Subchapter 2, Sections 110-11: Building Standards. Transformers shall also meet the Class 1 Efficiency levels for distribution transformers specified in Table 4-2 of the National Electrical Association (NEMA) TP-102002, Guide for Determining Energy Efficiency for Distribution Transformers" The TP-1 efficiency rating will apply to both conventional transformers and K-rated transformers.
- 2.4 Transformers shall comply with the latest NEMA and ANSI standards.

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- 2.5 Transformers shall be encased in a sheet steel enclosure. Ten (10) KVA and smaller shall be non-ventilated, and above 10 KVA shall be ventilated, self-cooled. The core and coil assembly shall be completely isolated from the enclosure by means of neoprene rubber isolation pads or other acceptable vibration isolators. Transformers installed outdoors shall be provided with suitable rain shields and shall be UL listed for outdoor installation.

2.5.1 Fan cooled transformers will not be accepted.

- 2.6 Transformers shall have a 185°C insulation system and shall not exceed 115°C rise above a 40°C ambient under full load conditions.
- 2.7 Transformers shall be capable of operating at 100 PCT. for taps below normal. Transformers rated 30 KVA and larger shall be 6 - 2-1/2 PCT., four below, and two above normal.
- 2.8 Transformer cable termination compartment shall be rated at not more than 75 degrees C.
- 2.9 Transformers shall have aluminum windings.
- 2.10 Sound outputs of transformers shall not exceed the following levels, based on NEMA standard testing procedures:

<u>KVA Rating</u>	<u>Decibel Sound Output</u>
0 - 9	40
10 - 50	45
51 - 150	50
151 - 300	55
301 - 500	60

PART 3 – EXECUTION

- 3.1 Dry type transformers larger than 112.5KVA rating shall have a minimum of twelve inches clearance between transformer ventilation openings and adjacent structure. Transformer connections shall be made with flexible conduit.
- 3.2 All lugs shall be torque tested in the presence of the inspector of record.
- 3.3 Transformers shall be anchored to the structure to resist seismic activity in accordance with Zone 4 requirements. Provide a minimum of four (4) ½-inch diameter anchor bolts for floor or roof mounted transformers.
- 3.4 Transformers mounted on roofs shall be installed on a roof curb. All conduits shall enter the transformer enclosure within the curbed area.

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3.5 Arc Flash and Shock Hazard

- 3.5.1 The Contractor is to provide, and submit to the engineer for approval, incident energy level calculations as determined using the methodologies described in NFPA 70E or IEEE standard 1584-2018.
- 3.5.2 A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with NFPA 70E, section 110.16. Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high.
- 3.5.3 The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department.
- 3.5.4 The design goal is to minimize the incident energy to which a maintenance employee may be exposed.

END OF SECTION

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PANELBOARDS

PART 1 – GENERAL

- 1.1 Furnish and install branch circuit panel boards as specified herein and as indicated on the drawings. Submit manufacturers' data on all items.
- 1.2 Submit manufacturers' data on all panel boards and components including:
 - 1.2.1 Enclosures and covers
 - 1.2.2 Breakers
 - 1.2.3 Surge Protective Device (SPD) equipment
 - 1.2.4 Coordination Study & Incident energy level calculations
 - 1.2.5 Common submittal mistakes which will result in the submittals being rejected:
 - 1.2.5.1 Not arranging the circuit breakers in panels to match the orientations indicated on the drawings. In other words, if a 30 amp breaker is shown on the drawing in Space #2, this must be the location it appears on the submittal schedule. Standard factory arrangements will not be accepted.
 - 1.2.5.2 Not including all items listed in the above itemized description.
 - 1.2.5.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
 - 1.2.5.4 Not including actual manufacturer's catalog information of proposed products.
 - 1.2.5.5 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

- 2.1 The interrupting rating of circuit breakers shall be 10,000 amps for the 120/208 system and 14,000 amp for 277/480 volt systems unless otherwise required to be higher based on the coordination study. Refer to drawings for higher interrupting rating requirements. All components and equipment enclosures shall be

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manufactured by the same manufacturer. Circuit breakers shall be permitted to be series rated to limit the available fault current to no more than the above ratings.

- 2.2 All panels shall be fully bussed. Recessed panel enclosures shall be a maximum of 20" wide and 5-3/4" deep for all panels 600 amp rated and less.
- 2.3 All busses shall be tin-plated aluminum and shall be located in the rear of the panelboard cabinet. Individual circuit breakers shall be bolt on type and removable from the cabinet without disturbing the bussing in any way. All panel boards shall contain ground busses.
- 2.4 Panel covers shall be door in door style, with one lock. Door lock shall allow access to breakers only. Access to wireways without removal of cover shall be permitted by (non removable) screws behind the locked door. Panel cover shall be provided with full length piano hinge. All locks for all panels provided in this project shall be keyed alike.
- 2.5 Each panel shall have a two-column circuit index card set under glass or glass equivalent on the inside of the door. Each circuit shall be identified as to use and room or area. Areas shall be designated by room numbers. Room numbers shown on the drawings may change and contractor shall verify final room numbers with the architect prior to project completion.
- 2.6 Tandem mounted or wafer type breakers are not acceptable.
- 2.7 Multi-pole breakers shall have one common trip handle or be internally connected. Handle ties are not acceptable.
- 2.8 Circuit breakers for a multi-wire branch circuit shall be tied together with a factory breaker handle tie.
- 2.9 Breaker arrangements shown in the drawings shall be maintained. The circuit breakers in panels must match the orientations indicated on the drawings. In other words, if a 30 amp breaker is shown on the drawing in Space #2, this must be the location it appears on the submittal schedule. Standard factory arrangements will not be accepted.
- 2.10 Where conductor sizes exceed the standard breaker lug wire range, or where multiple conductors per phase are required, the panelboard manufacturer shall provide the breaker with suitable lugs for terminating the specified conductors.
- 2.11 Acceptable manufacturers are Square D, Eaton, Siemens or ABB.
- 2.12 Equipment manufactured by any other manufacturers not specifically listed in Section 2.10 are not considered equal, or approved for use on this project.

Surge Protective Device (SPD)

- 2.13 Surge Protective Device (SPD) panelboards, shall be provided with an integrated circuit breaker panelboard and parallel connected suppression / filter system in a

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single enclosure. The SPD panelboard shall meet the following parameters: IEEE C62.41.1, IEEE C62.41.2, IEEE C62.45, UL 1283 and the UL 1449, Third Edition, effective September 29, 2009.

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

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

2.16 SPD shall meet or exceed the following criteria:

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

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

<u>VOLTAGE</u>	<u>L-N</u>	<u>L-G</u>	<u>N-G</u>	<u>L-L</u>	<u>MCOV</u>
208Y/120	700V	700V	700V	1200V	150V
480Y/277	1200V	1200V	1200V	2000V	320V

2.16.3 SPD shall be UL labeled with 100kA Short Circuit Current Rating (SCCR).

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

<u>VOLTAGE</u>	<u>L-N</u>	<u>L-G</u>	<u>N-G</u>	<u>L-L</u>	<u>MCOV</u>
208Y/120	700V	700V	700V	1200V	150V
480Y/277	1200V	1200V	1200V	2000V	320V

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

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

<u>System Voltage</u>	<u>Allowable System Voltage Fluctuation (%)</u>	<u>MCOV</u>
208Y/120	25%	150V
480Y/277	15%	320V

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

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

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

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- 2.23 SPD shall be equipped with the following diagnostics:
 - 2.23.1 Visual LED diagnostics including a minimum of one green LED indicator per phase, and one red service LED.
 - 2.23.2 No other test equipment shall be required for SPD monitoring or testing before or after installation.
- 2.24 SPD shall have a response time no greater than 1/2 nanosecond
- 2.25 SPD shall have a 10 year warranty
- 2.26 The SPD panelboard shall have removable interior
- 2.27 The SPD panelboard main bus shall be aluminum and rated for the load current required
- 2.28 The SPD panelboard shall include a 200% rated neutral assembly with copper neutral bus
- 2.29 The unit shall be provided with a safety ground bus

(SPD) Quality Assurance

- 2.30 Manufacturer Qualifications: Engage a firm with at least 5 years experience in manufacturing transient voltage surge suppressors.
- 2.31 Manufacturer shall be ISO 9001 or 9002 certified.
- 2.32 The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- 2.33 The SPD shall be compliant with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

PART 3 – EXECUTION

- 3.1 Painting of panelboard covers in finished areas shall be done by the general contractor.
- 3.2 Provide a spare 3/4" conduit stubbed to an accessible area for each of every three (3) spares or spaces provided in recessed panel boards.
- 3.3 All lugs shall be torque tested in the presence of the inspector of record.

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Short Circuit & Coordination Study

- 3.4 The contractor shall provide the following studies; a time current and complete short-circuit study, equipment-interrupting or withstand evaluation, and a protective-device coordination study as described below for the distribution system. The equipment study shall be included with the equipment submittals. The studies shall include all portions of the electrical distribution system from the normal and alternate sources of power throughout the low-voltage distribution system. Normal system operating method, alternate operation, and operations which could result in maximum-fault conditions shall be thoroughly covered in the study. The studies are to be reviewed by a Professional Engineer registered in the State of California.

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

3.5 Short-Circuit Study

- 3.5.1 The study shall be in accordance with applicable ANSI and IEEE standards.
- 3.5.2 The study input data shall include the short-circuit single- and three-phase contributions from all sources, with the X/R ratio, the resistance and reactance components of each branch impedance, motor and generator contributions, base quantities selected, and all other applicable circuit parameters.
- 3.5.3 Short-circuit momentary duties and interrupting duties shall be calculated on the basis of maximum available fault current at each switchgear bus, switchboard, motor control center, distribution panelboard, pertinent branch circuit panelboards, and other significant locations through the system.
- 3.5.4 For the portions of a system utilizing medium- and high-voltage breakers, separate calculations shall be made for one-half cycle (close and latch) currents and interrupting currents. Calculations shall be for three-phase and phase-to-ground faults at each bus under consideration.
- 3.5.5 For the portions of a system utilizing low-voltage breakers (less than 1,000 volts), calculations shall be made for three-phase and phase-to-ground interrupting currents at each bus under consideration.

3.6 Equipment Evaluation Study

- 3.6.1 An equipment evaluation study shall be performed to assure the adequacy of circuit breakers, controllers, surge arresters, busways, switches, and fuses by tabulating and comparing the short-circuit ratings of these devices with the maximum short-circuit momentary and interrupting duties. Series rating of over current protective devices shall be permitted to reduce the maximum available short circuit current to panelboard branch circuit

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breakers to no more than 10,000 amps symmetrical for the 120/208 volt system and 14,000 amps symmetrical for the 277/480 volt system.

3.7 Protective-Device Coordination Study

- 3.7.1 A protective-device coordination study shall be performed to select or to verify the selection of power fuse ratings, protective-relay characteristics and settings, ratios, and characteristics of associated voltage and current transformers, and low-voltage breaker trip characteristics and settings. Time current curves are to be colored to clearly indicate coordination.
- 3.7.2 The coordination study shall include all voltage classes of equipment from the source's incoming line protective device down to and including each motor control center and/or panelboard. The phase and ground over current protection shall be included as well as settings for all other adjustable protective devices. Ground fault settings are to, as a minimum coordinate with a downstream 50 amp branch circuit breaker.
- 3.7.3 Protective device selection and settings shall be in accordance with requirements of the National Electrical Code and the recommendations of the ANSI/IEEE Standard 399, as applicable.

3.8 Study Report

- 3.8.1 The results of the power-system studies shall be summarized in a final report. The report shall include the following sections:
 - 3.8.1.1 Description, purpose, basis, and scope of the study and a single-line diagram of the portion of the power system which is included within the scope of study.
 - 3.8.1.2 Tabulations of circuit breaker, fuse, and other equipment ratings versus calculated short-circuit duties and commentary regarding same.
 - 3.8.1.3 Protective device coordination curves, with commentary.
 - 3.8.1.4 The selection and settings of the protective devices shall be provided separately in a tabulated form listing circuit identification, IEEE device number, current transformer ratios, manufacturer, type, range of adjustment, and recommended settings. A tabulation of the recommended power fuse selection shall be provided for all fuses in the system.
 - 3.8.1.5 Fault-current tabulations including a definition of terms and a guide for interpretation.
 - 3.8.1.6 The report must be submitted with the material submittal for the engineer's approval.

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3.9 Implementation

- 3.9.1 The equipment manufacturer is to be responsible for providing over current devices which are in compliance with the results of the above study.
- 3.10 A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with NFPA 70E, section 110.16. Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high.
- 3.11 The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department.
- 3.12 The design goal is to minimize the incident energy to which a maintenance employee may be exposed.

END OF SECTION

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SECTION 26 27 26

SWITCHES AND RECEPTACLES

PART 1 – GENERAL

- 1.1 Furnish and install all wiring devices as shown on drawings and as herein specified. Unless otherwise noted, device and plate numbers shown are Hubbell and shall be considered the minimum standard acceptable. Other acceptable manufacturers are Pass and Seymour, Leviton, General Electric and Bryant.
- 1.2 Submit manufacturers' data on all items.
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
 - 1.3.1 Not correctly indicating ampacity rating of proposed devices.
 - 1.3.2 Not including all items listed in the above itemized description.
 - 1.3.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
 - 1.3.4 Not including actual manufacturer's catalog information of proposed products.
 - 1.3.5 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

- 2.1 All switches shall be of the quiet mechanical type, Specification Grade, 20 amp, 120/277 volt AC as follows:

	<u>HUBBELL</u>	<u>LEVITON</u>	<u>PASS & SEYMOUR</u>
Single Pole	CS120	CS1202	CS20AC1
Two Pole	CS1222	CS2202	CSB20AC2
Three-way	CS320	CS3202	CS20AC3
Key Switch	HBL1221L	1221-2L	PS20AC1-L

- 2.2 All switches shall have the "on" and the "off" position indicated on the handle. If switches of higher ampere ratings are required, they shall be of similar type and quality as those shown above. Groups of switches shown at one location shall be installed under a single plate up to a maximum of six where more than six switches are shown coordinate arrangement with the Architect.

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- 2.3 Dimmer switches for incandescent lamp loads shall be square-law type, slide control dimmer with OFF position, Lutron or Hubbell "Nova-T" Series NT-600 (0-500 watt load), NT-1000 (501-900 watt load), NT-1500 (901-1500 watt load), or equal (no known equal).
- 2.4 All convenience receptacles and special outlets throughout shall be grounding type. Convenience receptacles shall be side wired, parallel slot, two pole, three wire, 20 amp as follows:

	<u>HUBBELL</u>	<u>LEVITON</u>	<u>PASS & SEYMOUR</u>
Duplex	5352	5362	PS5362
GFCI	GFR5362	7899	2097
Isolated Ground	IG5362	5362IG	IG6300
Tamper Proof	-----	8300SG	TR63H
USB	-----	T5832	----- min. 3.6 amp charging capability
Controlled Type	BR20C2GN	5362-S2N	5362CDGN

- 2.5 All safety or tamper proof receptacles shall have no exposed external current carrying metal parts, and shall have integral wiring leads suitable for two or three wire installations. All Controlled Receptacles shall be solid color 'Green' marked "Controlled" and with Universal Power Symbol.
- 2.6 Special receptacles shall be as noted on the drawings.
- 2.7 Weatherproof plates shall be designed to meet CEC Article 410-57, wet location listed with cover "open." Where weatherproof receptacles have been identified to be provided with locking covers, the cover shall be as manufactured by Pass & Seymour #4600-8 or Cole Lighting 310 Series. Rough-in requirements vary between manufacturers. Contractor to field verify requirements prior to installation.
- 2.8 All plates throughout shall be stainless steel. Where wiring devices are installed in concrete block walls, provide oversized 3-1/2" x 5" coverplates.
- 2.9 All devices shall be white unless otherwise noted or a special purpose outlet.
- 2.10 Unless where specifically detailed on the drawings, floor boxes shall be PVC suitable for concrete poured floors of minimum 3-1/2" depth, with a modular design to gang two or three sections together.
- 2.10.1 Carlon #E976 series or approved equal
- 2.10.2 Provide brass cover with brass carpet flange unless otherwise detailed.

PART 3 – EXECUTION

- 3.1 All receptacles and line voltage switches shall be labeled on faceplate utilizing white Dymo-Tape with black lettering. Labeling format shall be 'XX-YY'. XX represents panel name and YY represents circuit number. Labels shall be placed

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below the top faceplate fastener and above the top edge of faceplate opening. In no circumstance shall they overlap the fastener or the receptacle.

- 3.2 Switches for room lighting shall be located no more than 12" center line from door jamb at plus 48" center line above finished floor or +46" to top of devices where located over casework, reference CBC Figure 11B-5D.
- 3.3 All receptacles shall be mounted at plus 18" to center line above finished floor unless noted or shown otherwise. All receptacles shall be installed with the ground pin up, at the top of the receptacle to comply with IEEE 602-1986.
- 3.4 Furnish and install wall plates for all wiring devices, and outlet boxes, including special outlets, sound, communication, signal, and telephone outlets, etc. as required. All cover plates shall be appropriate for type of device.

END OF SECTION

SWITCHES AND RECEPTACLES

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SECTION 26 28 16

DISCONNECTS

PART 1 – GENERAL

- 1.1 Furnish and install all disconnect switches as shown on the drawings and as required by the CEC.
- 1.2 Submit manufacturers' data for all disconnects and fuses.
 - 1.2.1 Disconnects
 - 1.2.2 Fuses
- 1.3 **Common submittal mistakes which will result in the submittals being rejected:**
 - 1.3.1 Not including all items listed in the above itemized description.
 - 1.3.2 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
 - 1.3.3 Not including actual manufacturer's catalog information of proposed products.
 - 1.3.4 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PART 2 – PRODUCTS

- 2.1 Acceptable manufacturers shall be Square D, Cutler Hammer, Siemens or General Electric.
- 2.2 Equipment manufactured by any other manufacturers not specifically listed in Section 2.1 are not considered equal, or approved for use on this project.
- 2.3 All switches shall be heavy-duty type, externally operated, quick-make, quick-break, rated 600 volts or 240 volts as required, with the number of poles and ampacity as noted. All switches for motors shall be HP rated. Switches shall have NEMA-Type 1 enclosures, except switches located where exposed to outdoor conditions shall have NEMA Type 3R enclosure. Switches generally shall be fused except where noted to be non-fused on the drawings.
- 2.4 Where fuses are indicated, fuses shall be Bussman or Littlefuse (no known equal). Fuses shall be current limiting type with time delay characteristics to suit the equipment served.

DISCONNECTS

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PART 3 – EXECUTION

- 3.1 Mount all switches to structure or U-channel support. U-channel supports shall be cleaned and painted to prevent rust.
- 3.2 Switches shall be accessible with proper clearances in front per CEC 110-16.
- 3.3 All lugs shall be torque tested in the presence of the inspector of record.
- 3.4 Arc Flash and Shock Hazard
 - 3.4.1 The contractor is to provide, and submit to the engineer for approval, incident energy level calculations as determined using the methodologies described in NFPA 70E or IEEE standard 1584-2002.
 - 3.4.2 A warning label, as specified in the above standard, shall be placed on each switchboard, panelboard, and safety switch indicating the incident energy levels on the equipment to warn qualified personnel in accordance with NFPA 70E, section 110.16. Labels shall be laminated white micarta with black lettering on each. Letters shall be no less than 3/8" high.
 - 3.4.3 The incident level calculations for each piece of equipment shall be given to the owner and maintained on file by the maintenance department.
 - 3.4.4 The design goal is to minimize the incident energy to which a maintenance employee may be exposed and in no case more than 8 cal./cm².

END OF SECTION

DISCONNECTS

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SECTION 26 51 14

LED LIGHTING FIXTURES AND LAMPS

PART 1 – GENERAL

- 1.1 Furnish and install all lighting fixtures with lamps as specified and as shown on the drawings. Fixtures shall be complete including canopies, hanger, diffusers, ballasts, etc.
- 1.2 Submit manufacturer's data for each fixture type including the following:
 - 1.2.1 Lighting fixture catalog data and photometry.
 - 1.2.2 Lamp catalog data for each fixture type.
 - 1.2.3 Driver catalog data for each fixture type.
 - 1.2.4 Fixture warranty.
- 1.3 **Common submittal mistakes which will result in the submittal being rejected:**
 - 1.3.1 Not including lamp and driver information for each fixture type.
 - 1.3.2 Not including all items listed in the above itemized description.
 - 1.3.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
 - 1.3.4 Not including actual manufacturer's catalog information of proposed products.
 - 1.3.5 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

PRODUCT SUBSTITUTION

- 1.4 All substitutions or alternate fixtures to those indicated on the project fixture schedule shall be submitted for approval (7) business days prior to the project bid date. Approvals when accepted will be issued in the form of an addendum. No consideration for substitutions will be provided after the award of the contract.
 - 1.4.1 The substitution request must include a statement indicating the difference in price of both the specified and alternate product, both contractor and list price. The substitution request must include a comparison of the total fixture wattage, total fixture lumens, fixture efficiency and warranty comparison.
 - 1.4.2 When proposing to substitute lighting fixture and/or fixture retrofit, a point by point photometric calculation of a typical application as used in this project

LED LIGHTING FIXTURES AND LAMPS

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shall be included. A calculation of the specified and the proposed alternate shall be included.

PART 2 – PRODUCTS

- 2.1 All catalog numbers are given for manufacturer's identification and shall not relieve Contractor from responsibility of full conformance to all applicable written description requirements governing material and fabrication, either in the general or specific sections. Where catalog numbers are indicated as modified, no modification will be required if the standard unit fully conforms to descriptive requirements in the Specifications and matches specified ceiling.
- 2.2 All fixtures of the same type shall be of one manufacturer and of identical finish and appearance. All fixtures and component parts shall bear the UL label.
- 2.3 All steel parts shall be phosphate treated in multistage power spray system for corrosion resistance and paint adhesion. Final finish shall be electrostatically applied baked white enamel of not less than 87 pct. reflectance on reflecting surfaces.
- 2.4 Each fixture shall have a continuous light-seal gasket seated in such manner as to prevent any light leak through any portion or around any edge of the trim frame.
- 2.5 Diffusers shall be framed in a hinged, continuous assembly. Diffuser frame latches shall be spring-loaded or cam-operated.
- 2.6 All recessed fixtures shall be provided with frames appropriate for the type of ceiling involved. No fixtures shall be ordered until the ceiling construction has been verified by the Contractor.

MINIMUM LUMINARY REQUIREMENTS

- 2.7 Electrical Components, Devices and Accessories: Listed and labeled as defined in CEC by a qualified testing agency, and marked for intended location and application.
- 2.8 Recessed Fixtures: Comply with NEMA LE 4.
- 2.9 CRI of **minimum 80 CCT of 4100 K.**
- 2.10 Rated lamp life of 50,000 hours minimum.
- 2.11 Lamps dimmable from 100 percent to 0 percent of maximum light output.
- 2.12 Nominal Operating Voltage: **120 V / 277 V ac**

LED LIGHTING FIXTURES AND LAMPS
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PART 3 – EXECUTION

- 3.1 All lighting fixtures shall be supported as follows:
 - 3.1.1 From the outlet box by means of a metal strap where its weight is less than five pounds.
 - 3.1.2 From its outlet box by means of a hickey or other threaded connection where its weight is from five to fifty pounds.
 - 3.1.3 Directly from the structural slab or joists where its weight exceeds fifty pounds.
 - 3.1.4 Lighting fixtures shall be supported independent of the ceiling system or additional ceiling support must be added to carry the weight of the lighting fixtures. Recessed lighting fixtures supported from ceiling grid tees shall be furnished with hold down clips in conformance with CEC 410 - 16, spring clips will not be permitted. All fixtures which the manufacturer has not provided UL approved clips, must be attached to the fixture and ceiling grid by metal screws.
- 3.2 Furnish and install supplementary blocking and support as required to support fixture from structural members. Contractor shall submit proposed blocking method for all suspended lighting fixtures for approval prior to rough in.
- 3.3 Suspended and/or pendant mounted fixtures shall be provided with four aircraft safety cables extending in opposite directions, attached to the fixture, and supported from a structural member. The contractor shall submit proposed fixture mounting and aircraft cable attachment methods for approval prior to fixture rough in.
- 3.4 Class 1 wiring to the fixture must be installed either conduit or type MC-PCS cabling no open wiring shall be permitted.
- 3.5 Chain suspension may be used only where specifically permitted on the drawings. Chain shall be heavy duty, nickel or cadmium plated, suitable for weight of specific fixture.
- 3.6 Shop drawings shall be furnished for each fixture type. Catalog cuts, illustrating conformance with specifications, will be acceptable for standard units. Shop drawings shall indicate materials, assembly, finish and dimensions.
- 3.7 Photometric data shall be furnished for any fixture substituted for those listed on the schedule.
- 3.8 Any driver which produces a greater than normal amount of noise shall be replaced by the contractor. Normal will be determined by the level of sound produced by other similar fixtures operating in the area.

END OF SECTION

LED LIGHTING FIXTURES AND LAMPS

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SECTION 26 90 90

ELECTRICAL CLOSEOUT

PART 1 – GENERAL

- 1.1 Upon completion of the electrical work, the entire installation shall be tested by the Contractor, and demonstrated to be operating satisfactorily to the Architect, Engineer, Inspector and Owner.
- 1.2 All testing and corrections shall be made prior to demonstration of operation to the Architect, Engineer, Inspector and Owner.
- 1.3 In addition to the demonstration of operation, the Contractor is also required to review the content and quality of instructions provided on items demonstrated with the Architect, Engineer, Inspector and Owner.

PART 2 – EXECUTION

- 2.1 Wiring shall be tested for continuity, short circuits and/or accidental grounds. All systems shall be entirely free from “grounds,” “short circuits,” and any or all defects.
- 2.2 Motors shall be operating in proper rotations, and control devices functioning properly. Check all motor controllers to determine that properly sized overload devices are installed, and all other electrical equipment for proper operation.
- 2.3 Tests and adjustments shall be made prior to acceptance of the electrical installation by the Architect, and a certificate of inspection and acceptance of the electrical installation by local inspection authorities shall be provided.
- 2.4 All equipment or wiring provided which tests prove to be defective or operating improperly shall be corrected or replaced promptly, at no additional cost to the Owner.
- 2.5 Test all motor and feeder circuits with a “megger” tester to determine that insulation values conform to Section 110-20, California Electrical Code (CEC). Test reports must be submitted and approved by the engineer before final acceptance.
- 2.6 Test all grounding electrode connections to assure a resistance of no more than 10 ohms is achieved. Augment grounding until the ohmic value stated above is achieved. Provide certified test results to the Architect, Engineer and Inspector.

END OF SECTION

ELECTRICAL CLOSEOUT

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SPECIFICATIONS

SECTION 27 01 00

COMMUNICATIONS GENERAL PROVISIONS

PART 1 - SUMMARY

- 1.1 This Division of the specifications outlines the provisions of the contract work to be performed as a sub contract under the Division 26 scope of work. Reference the Division 26 Electrical General Provisions for scope of work and general requirements.
- 1.2 In addition, work in this Division is governed by the provisions of the bidding requirements, contract forms, general conditions and all sections under Division 1 requirements.

END OF SECTION

**COMMUNICATIONS GENERAL PROVISIONS
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SECTION 27 10 00

VOICE-DATA-IP-PAGE INFRASTRUCTURE

PART 1 – GENERAL

- 1.1 Include all labor, equipment and materials necessary for providing a complete networking infrastructure system as described herein and/or as indicated on the drawings.
- 1.2 Related specification sections:
 - 1.2.1 Section 26 01 00 - General Provisions.
 - 1.2.2 Section 26 05 33 - Conduit and Fittings.
 - 1.2.3 Section 26 05 19 - Conductors.
 - 1.2.4 Section 26 05 34 – Outlet and Junction Boxes.
- 1.3 Approved minimum Product and Contractor Extended Warranty Certifications;
 - 1.3.1 All components shall be manufactured by one of approved manufacturers, the installing Contractor must have the accompanying certification from the product manufacturer(s) for installation of a “Extended Warranted System” as required by each manufacturer and as indicated in these specifications.
 - 1.3.1.1 Specified system warranties are to be established between the component and cable manufacturers and the City, warranties between the cable manufacturer only or installing Contractor and the City are not considered equal.
 - 1.3.1.2 Warranty shall be a full “Performance Warranty” installed by a “Certified Contractor” as specified by one of the approved manufacturer’s. A “Component Warranty” will not be considered equal. All components, labor, and “Performance Criteria” shall be warranted by one of the approved manufacturers;
- 1.4 Acceptable manufacturers are:
 - 1.4.1 **Leviton / Berk-Tek**
 - 1.4.1.1 Installing Contractor must be LEVITON Network Solutions Premier certified to install this system.

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- 1.4.1.2 Warranty provision and training must be for the Leviton/Berk-Tek – Limited Lifetime Premium Performance Warranty program.
- 1.4.2 **Commscope**
 - 1.4.2.1 Installing Contractor must be PartnerPro certified to install any of the systems under the Commscope Family of brand names.
 - 1.4.2.2 The Infrastructure System shall be provided with a 25-Year Warranty
- 1.4.3 **Belden**
 - 1.4.3.1 Belden's Training and Warranty programs.
 - 1.4.3.2 Installing Contractor must be certified Belden PartnerAlliance Networking Installers.
 - 1.4.3.3 Warranty provision and training must be for the Lifetime Application Assurance Program apply only to Belden Certified Networking Systems installed by the Certified PartnerAlliance
- 1.4.4 Warranty shall be to the City, for the period as defined by the Network Infrastructure System selected for installation, after City acceptance and sign-off of the completed system. The Contractor must provide documentation from one of the approved manufacturers, as indicated in Section 1.3, indicating their qualifications for installation of this system in compliance with the manufacturer's warranty period requirements as a warranted Contractor.
- 1.4.5 Equipment qualifications: It is the intent of these specifications that each bidder provides all hardware, components and installation services that are necessary to ensure a fully operational wiring system including warranties, as shown in the EIA/TIA Category-6 guidelines.
- 1.4.6 All components, parts, infrastructure, patch cables, termination panels and cables must be classified by the manufacturer or manufacturers as a part of the "Extended Warranty" program. Contractor may not mix in components from other certified programs or materials that are not considered part of the "Lifetime" warranty.
- 1.4.7 Systems or components as manufactured by any other manufacturer which, are not specifically listed in 1.3, are **not** approved for use on this project.
- 1.5 **Installing Contractor qualifications:** Firms and their personnel must be regularly engaged in the installation of data networking cabling and equipment for systems of similar type and scope. The Contractor must have a full-service office able to respond to emergency callouts during the warranty period. The Contractor must

VOICE-DATA-IP-PAGE INFRASTRUCTURE

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also provide complete installation of all wiring and devices or equipment. **Subcontracts with Electrical Contractors or other warranted or non-warranted Contractors for supervised installation of any part of this system are not approved.**

- 1.5.1 Contractor shall have on staff a minimum of (1) BICSI RCDD on staff as full-time employees.
- 1.5.2 The successful Contractor shall be a California licensed C7 or C10 Premise Wiring Contractor as defined in this specification.
- 1.5.3 All work shall be performed under the supervision of a company accredited and trained by the Manufacturer of the components and cable and such accreditation must be presented with the bid submittal. Contractor must be accredited a minimum of 180 days prior to bid submittal date. All personnel performing work on this project must have successfully completed the manufacturer's training courses to completely comply with the extended warranty requirements prior to performance of any work on this project. Accreditation will consist of individual employee certifications issued by the manufacturer or manufacturers.
- 1.5.4 All personnel engaged in the testing of premises fiber optic and copper UTP cable systems must have successfully completed the test equipment manufacturer's training courses. Certification of such training must be presented with the bid submittal. Cut sheets of the test equipment to be utilized shall be provided with the Phase I project material submittals.
- 1.5.5 If Contractor routes cables and/or associated pathways in another route than indicated on the drawings, they shall maintain all maximum cable installation distances as required by the manufacturer's distance limitations.
- 1.6 In order to ensure project cohesion, a single point of contact is required to provide a "TURNKEY" solution. The work covered under this section of the specification consists of furnishing all; labor; cabling; equipment; supplies; materials, and training. The Contractor will perform all operations necessary for the "TURNKEY" and fully completed installation in accordance with the specifications herein. As such, the successful Contractor must be factory trained on all aspects of Network Infrastructure Cabling System.
- 1.7 The drawings indicate a schematic routing of cables above ceilings. The Contractor shall field-verify the most appropriate routing of all above-ceiling cable prior to bid. Where cables penetrate through walls a conduit sleeve shall be provided. Where cables pass through fire rated walls, the conduit sleeve shall be sealed to maintain the rating of the wall assembly.
- 1.8 Unless otherwise noted in the project drawings or these specifications, the Division 26 Contractor shall provide the installation of all conduits, outlet and junction boxes, trenching and pull box installation.

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- 1.9 The Contractor shall provide a licensed, qualified electrical Contractor for installation of all conduits, outlet and junction boxes, trenching and pull box installations.

1.10 General Submittal Requirements

- 1.10.1 **Phase I Submittal** shall be made in electronic format within (20) working days after the award of the contract by the City. This submittal shall include the following:

- 1.10.1.1 Complete Bill of Materials in Excel Spreadsheet format with bills of quantities, including all materials, components, devices, and equipment required for the work. The bills of quantities shall be tabulated respective of each and every system as specified, and shall contain the following information for each Section listed:

- 1.10.1.2 Description and quantity of each product.

- 1.10.1.3 Manufacturer's Name and Model Number.

- 1.10.1.4 Material Cut Sheets shall provide detailed product information and shall be original manufacturer product bulletins. Copies of material information from vendor websites shall not be considered equal and will not be accepted.

- 1.10.1.5 Material Cut Sheet part number provided shall be highlighted or provided with an arrow directed at the corresponding part number.

- 1.10.1.6 Specification Item Number referenced for each required product or if not shown in the specifications, Drawing Detail Number being referenced. (ie; Spec. 271000 Item 2.1 or DWG E4.15/#1)

- 1.10.1.7 Include with submittals all warranty information and a description of support and maintenance services to be provided. Also include all licenses and maintenance agreements required for continued operation of the equipment.

- 1.10.2 **Phase II Submittal** shall be provided within (20) working days after the approval of the Phase I submittals and prior to any fabrication or field conduit installations. All shop drawings shall be engineered in a CAD Software. Submission shall include electronic print copies to match the contract drawings, and Phase II submittals drawings shall include the following.

- 1.10.2.1 MDF and IDF equipment rack or cabinet elevations will be required to be provided including cable routing, grounding,

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support, UPS, network electronics, etc. and position of all components in the rack or cabinet.

- 1.10.2.2 Provide labeling plan which identifies the proposed scheme for identifying all components including Racks, patch panels (fiber and copper), site distribution feed cables, horizontal station cables and site conduit systems (handholes, pullboxes, etc.).
- 1.10.2.3 Provide shop drawings showing all end device locations, tap values, paging zones and amplifier sizing for each zone for analog speakers and horns, including devices connected to IP-Based zone controllers.
- 1.10.3 Common submittal mistakes which will result in submittals being rejected:
 - 1.10.3.1 Not including the qualifications of the installing Contractor Company and Contractor's Staff.
 - 1.10.3.2 Not including all items listed in the above itemized description.
 - 1.10.3.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed (provided for the project) or crossing out the items which are not applicable.
 - 1.10.3.4 Not including actual manufacturer's cut sheets or catalog information of proposed products.
 - 1.10.3.5 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.
- 1.10.4 The Contractor shall make a written request directly to Johnson Consulting Engineers for electronic drawing files (CAD). As a part of the written request, please include the following information:
 - 1.10.4.1 Clearly indicate Project Name and Client, Johnson Consulting Job Number (located in bottom left corner of JCE Engineering Stamp) and each drawing Sheet Number required (i.e., E1.1, E2.1, E4.1 etc.).
 - 1.10.4.2 Identify the name, Company, Title, phone number, mailing address and e-mail address of the person to receive the files.
 - 1.10.4.3 Detail or Riser diagram sheets, System Schematic drawings or any other drawings other than floor plans or site plans, will not be made available to the Contractor.

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- 1.10.4.4 Files will only be provided in the AutoCAD format in which they were created (i.e., version 2015 or version 2016). Files will not be made available in REVIT format.
- 1.10.4.5 Requests for files will be processed as soon as possible; a minimum of 7 working days should be the normal processing time. The Contractor shall be completely responsible for requesting the files in time for their use and delays in requesting files will not alleviate the Contractor from submitting required documents within the required timeline.

PART 2 – PRODUCTS

- 2.1 Equipment racks have been detailed on the drawings and additional component information requirements have been described in the MDF or IDF products sections. The following is a list of approved manufacturers for each type of rack to be furnished.
 - 2.1.1 Alternate equipment manufacturers other than those indicated will not be reviewed or approved for use on this project.
 - 2.1.2 **(Open Frame – 4-Post Rack)** shall be manufactured by Chatsworth CPI QuadraRack or Middle Atlantic R4 Series. Reference drawing details and specifications for complete requirements.
- 2.2 **IDF Room Open Frame 4-Post Racks** - Furnish and install equipment mounting racks as shown on project floor plans and details. Furnish the following additional components and installation practices for the racks;
 - 2.2.1 Provide all accessories required whether shown on the project drawings or within these specifications. The drawings and specifications shall be considered a single document.
 - 2.2.2 The racks shall be provided with structural seismic bracing using cable runway to the top of the rack, with the width of runway as shown on the MDF Room drawings and details.
 - 2.2.3 Provide Standard 4-Post Racks, 19" mounting width by 84" High by 29" Deep with #12-24 mounting holes as shown in the IDF Room layout and details. See detail drawings for quantity of racks and additional requirements. Contractor shall be responsible for providing all racks and accessories as shown in the details. The 4-Post racks shall be as manufactured by CPI Model #50120-703 or approved equal by Middle Atlantic.
 - 2.2.4 Universal 12" cable runway shall be as manufactured by CPI Model 10250-712. The cable runway shall be furnished with the additional adapters, connectors, support components, bends and offsets and extensions as required to fit the room and layout as shown in the

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drawings. Cable runway shall be bonded together as shown in the detail drawings.

- 2.2.5 Anchor the cable runway to the wall with the appropriate width angle bracket and bolts as manufactured by CPI Model #11421-712.
- 2.2.6 The cable runway shall also be attached to the top of the rack with the appropriate adapter panel. Cable runway shall be directly attached to the 4-Post racks with J-Hooks.
- 2.2.7 The racks shall be structurally anchored to the floor with the anchors and bolts as shown in the detail drawings. Anchoring shall comply with all Local, State and National Codes.
- 2.2.8 Provide (1) adjustable full depth vented shelf for each 4-Post equipment rack as manufactured by CPI #16350-719.
- 2.2.9 Provide full length vertical wire managers, CPI Double-Sided Narrow Vertical Manager, Part #12096-703, on each side of each rack.
- 2.2.10 Provide horizontal wire managers between each patch panel or (1) manager per patch panel. Provide (1) spare manager per rack. Provide 1RMU height managers for each patch panel. CPI Part # 30139-719.
- 2.2.11 Provide (1) ground bus bar kit with lugs per IDF Room as detailed in the drawings. Ground Bus Bar kit as manufactured by CPI #40158-012 (or approved equal). Ground Bus Bar and all bonding conductors to the bus bar shall be labeled as shown in the drawing details. Grounding conductors shall be routed to the equipment racks, cable runway and electrical panel.
- 2.2.12 Furnish grounding to each rack as shown in the detail drawings. Each rack shall be provided with a grounding terminal block, #6 Ground wire from the rack to the busbar and a compression lug on the end of the ground wire at the busbar. Provide grounding components as manufactured by CPI #40167-001 terminal block and #40162-901 compression lug or approved equal.
- 2.2.13 All fiber optic feed cables routed to the IDF Room shall be provided with 20-feet of slack for a service loop mounted on the backboard behind the racks. Contractor shall provide a 24" diameter wall mounted service loop manager for the fiber optic feed cables as manufactured by Leviton #48900-OFR. Maximum of (3) fiber feed cables per manager. Provide quantity of managers as required to manage all service loops.
- 2.2.14 All cable runway, racks, accessories, supports and wire management shall be black in color. (Unless Otherwise Noted)
- 2.2.15 Provide all other items as detailed on the drawings

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Main Distribution Frame (MDF is existing in Building 'A')

- 2.3 The Main Distribution Frame (MDF) Room existing. The Contractor shall include the following items at this location;
- 2.3.1 Provide all accessories required whether shown on the project drawings or within these specifications. The drawings and specifications shall be considered a single document.
 - 2.3.2 Fiber Optic Feed Cable Patch Panels - Fiber optic termination equipment (rack mounted), including all associated installation hardware. The equipment must have sufficient number of ports to connect all fibers in every cable terminated at this location. Provide 25% spare capacity for future wiring requirements, including bulkheads in the fiber patch panel. Provide blank fillers for all used portions of the panel. All fiber feed cables shall be terminated in a single fiber optic patch panel up to 144 strands. Additional strands shall be terminated in the largest size required to contain the remaining fibers.
 - 2.3.2.1 Fiber optic patch panel for the New Building's fiber optic feed cables shall be installed in the existing MDF Room Building 'A' equipment rack.
 - 2.3.2.2 MDF Rack location shall be furnished with a minimum 24-Port fiber optic patch panel, fully loaded with bulkheads. Type of connectors in the bulkheads shall be determined by the type of connectors used for termination of the fiber feed cables.
 - 2.3.2.3 Contractor shall provide a minimum of 6-feet of slack on the fiber feed cable in the fiber optic patch panel as shown in the drawing details. The first 48" of a tight buffered cable or the first 24" of a loose tube cable shall not be stripped back in the patch panel. Each type of cable shall have a minimum of 24" of stripped slack within the patch panel.
 - 2.3.2.4 All fiber cables shall be secured to the patch panel with the Kevlar strength members at the manufacturer provided anchor point at the rear of the panel.

Additional items required for each MDF are as follows:

- 2.3.3 Changes/Updates to the MDF Room – Contractor shall provide the following items in the existing MDF Equipment Rack: Terminate new fiber optic feed cabling in the existing MDF Rack. Provide new fiber optic patch panel and service loop manager in the MDF Room. Provide all other requirements associated with the provision of new fiber feed cabling. The remainder of the MDF Room shall remain as-is. See details and drawings for additional installation requirements.

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- 2.3.4 Refer to the detail drawings and specifications for the termination requirements at the MDF and IDF locations.
- 2.3.5 All fiber optic feed cables routed to the MDF Room shall be provided with 20-feet of slack for a service loop mounted on the backboard behind the racks. Contractor shall provide a 24" diameter wall mounted service loop manager for the fiber optic feed cables as manufactured by Leviton #48900-OFR. Maximum of (3) fiber feed cables per manager. Provide quantity of managers as required to manage all service loops
- 2.3.6 Provide all other items as detailed on the drawings.

Intermediate Distribution Frame (IDF) Typical Requirements

- 2.4 The Intermediate Distribution Frame (IDF) Room shall be a secondary wiring and equipment location for the data networking system. The Contractor shall include the following items at this location.
 - 2.4.1 Provide backboard 8'-0" high x 3/4" thick, with a minimum 48" width. Refer to the floorplans for the actual layout of the backboard coverage. Plywood mounting backboard shall be flame resistant, painted with fire resistant paint "white" or color to match the room finish. Contractor shall provide minimum one side finish grade plywood. Backboard shall be mounted with finish side out, regardless of location of fire rating stamp. Show proof of fire rating stamp to IOR or Inspector prior to installation.
 - 2.4.2 Fiber Optic Feed Cable Patch Panels - Fiber optic termination equipment (rack mounted), including all associated installation hardware. The equipment must have sufficient number of ports to connect all fibers in every cable terminated at this location. Provide minimum 25% spare capacity for future wiring requirements. Provide blank fillers for all used portions of the panel and minimum number of connector bulkhead panels as noted. All fiber feed cables shall be terminated in a single fiber optic patch panel.
 - 2.4.2.1 Each IDF location shall be furnished with a minimum 24-Port fiber optic patch panel, fully loaded with bulkheads. Type of connectors in the bulkheads shall be determined by the type of connectors used for termination of the fiber feed cables.
 - 2.4.2.2 Contractor shall provide a minimum of 6-feet of slack on the fiber feed cable in the fiber optic patch panel as shown in the drawing details. The first 48" of a tight buffered cable or the first 24" of a loose tube cable shall not be stripped back in the patch panel. Each type of cable shall have a minimum of 24" of stripped slack within the patch panel.
 - 2.4.2.3 All fiber cables shall be secured to the patch panel with the Kevlar strength members at the manufacturer provided anchor point at the rear of the panel.

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- 2.4.2.4 All fiber optic feed cables routed to the IDF Room shall be provided with 20-feet of slack for a service loop mounted on the backboard behind the racks. Contractor shall provide a 24" diameter wall mounted service loop manager for the fiber optic feed cables as manufactured by Leviton #48900-OFR. Maximum of (3) fiber feed cables per manager. Provide quantity of managers as required to manage all service loops
- 2.4.3 Category-6 Modular Patch Panels (rack mounted) with RJ45 style connectors, for terminating all twisted pair cable from each Voice/Data, WAP, IP Page and IP Camera outlet, served from this location. Provide a minimum of 25% spare capacity for future wiring requirements. All patch panels shall be 48-Ports only, 24-Port patch panels shall not be accepted. Provide cable support bars at the rear of each patch panel all cables shall be secured to bars with velcro straps.

IDF UPS Requirements

2.5 General UPS Requirements –

- 2.5.1 Uninterruptible Power Supply (UPS) shall be furnished and installed by the Contractor. Division 26 Contractor shall furnish the required power outlet for the UPS at the IDF location.
- 2.5.2 The Contractor shall coordinate with the Division 26 Contractor to properly locate the UPS Power Receptacle connection in the IDF Room as shown on the drawings. The location shown on the Detail Drawings on the Equipment Rack is diagrammatical and has not been confirmed by the City IT Department. The Division 26 Contractor shall confirm the exact placement at the back of the Equipment Rack prior to installing UPS Receptacle.
- 2.5.3 All UPSs must be furnished with heavy duty mounting bracket kits from the manufacturer.
- 2.5.4 UPS Requirement for IDF Closet location with Single 4-Post Equipment Rack.
- 2.5.5 Minimum of (6) 15-amp, 120-volt, non-locking, NEMA 5-15R, output receptacles.
- 2.5.6 Input of (1) 15-amp, 120-volt, locking, NEMA 5-15P plug installed on 10'-0" power cord.
- 2.5.7 APC Model # SRT1500RMXLA-NC
- 2.5.8 Provide UPS with the integrated Network management Card 3 with environmental monitoring. Power Management Software to be included with all UPS models.

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2.5.9 Provide optional Environmental sensor/monitor for UPS with Temperature, Humidity and Digital Inputs, connected to the UPS and mounted to the top of the rack.

2.5.10 All UPS products shall be furnished with a 3-Year warranty.

2.6 Fiber Optic Patch Cords

2.6.1 Fiber optic patch cords shall be furnished and installed by the Contractor.

2.6.2 All fiber optic patch cords furnished by the Contractor shall match the grade and glass of the fiber optic feed cable installed for the network infrastructure cabling system. The Contractor shall confirm with the City IT Department the type of connector required at the network equipment prior to ordering or installing the patch cords.

2.6.3 Single Mode Fiber Optic Patch Cords - Patch cords shall be duplex 9/125um, OS2 grade optical glass. Fiber optic patch cords shall be furnished with LC connectors at the network switch port end and LC connectors at the fiber optic patch panel end. Fiber patch cords shall be furnished with ceramic ferrules. All Single Mode patch cords shall be Blue in color. Patch cords shall be 1-meter (3-feet) in length. Contractor shall confirm Patch Cord Length requirements prior to ordering. Provide (2) Fiber Optic Patch Cords at the IDF location and (2) Fiber Optic Patch Cords at the MDF location.

2.7 Copper Patch Cords

2.7.1 Copper patch cords shall be furnished and installed by the Contractor.

2.7.2 Provide Enhanced Category-6 rated (Patch Panel End) patch cords with pre-molded boot, provide quantity equal to:

2.7.2.1 Provide 100% of the total Enhanced Category-6 rated cable ports provided on the patch panels.

2.7.2.2 All patch cords to be installed by Contractor. Provide 100% of total copper patch cords required to be (4) feet in length.

2.7.3 Provide Enhanced Category-6 rated (Workstation End) patch cords with pre-molded boot, provide quantity equal to:

2.7.3.1 Provide 100% of the total Enhanced Category-6 rated cable ports provided on the patch panels.

2.7.3.2 All patch cords to be installed by Contractor. Provide 100% of total copper patch cords required for voice and data locations, to be (10) feet in length, unless otherwise noted.

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- 2.7.3.3 All patch cords to be installed by Contractor. Provide 100% of total copper patch cords required for IP-Based Speaker, IP Camera and WAP locations (2) feet in length.
- 2.7.4 Requirements for all copper patch cords furnished:
 - 2.7.4.1 Color of patch cords shall be determined by the color codes shown in the drawing details or as otherwise directed by the City IT Department.
 - 2.7.4.2 Patch cords shall be as manufactured by Leviton, Belden or Commscope, based on the network infrastructure system furnished by the Contractor.
 - 2.7.4.3 Definition of "Enhanced Category-6 Rated" patch cables – Since there is no official EIA/TIA rating level determined to be "Enhanced Category-6", the provision of any cables shall be based on the manufacturer's performance claims for the product.
 - 2.7.4.4 Patch cords furnished must be in compliance with the manufacturer's "Channel" warranty requirements. Patch cords not warranted through the selected manufacturer Channel warranty program will not be approved for use with the network infrastructure.
- 2.8 Campus Fiber Optic Feed Cable Requirements
 - 2.8.1 Provide one continuous fiber optic cable routed from the Main Distribution Frame fiber patch panel to each Intermediate Distribution Frame fiber patch panel, and/or other locations as shown on the drawings.
 - 2.8.2 For new Fiber Optic Feed Cables shown on the drawings and in the specifications; Fiber optic feed cables shall be installed in the existing and new pathways, unless otherwise shown on the drawings. Contractor shall not interrupt service to the users without a planned outage approved by the City.
 - 2.8.3 Provide (1) fiber optic feed cable to each IDF location from the existing MDF location as designated in the drawings and specifications. The cable shall contain all of the quantities and types of fibers required in the drawings and specifications.
 - 2.8.4 Outdoor Fiber Feed Cable Applications - Fiber optic cable shall be rated for indoor/outdoor riser rated applications. Construction shall consist of; all dielectric, indoor/outdoor Riser Rated Tight Buffer Style, flame retardant PVC or PE jacket, rated OFNR, Outer and Inner Layer of Dielectric Strength Yarns with central member constructed of Dielectric Strength Yarns, dry water-blocking compound, and blank fillers as required. Fiber shall be small form factor type fiber for use in existing

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conduit and pathways and shall not exceed an Overall Outside Diameter (OD) of .370". Central tube or loose tube type fiber will not be considered equal.

2.8.5 Fiber optic feed cables for the data infrastructure must be installed as follows:

2.8.5.1 Fiber Optic feed cable run – Provide a total of 6-strands of OS2-Rated Single Mode glass to the IDF location, unless otherwise directed in the drawings or specifications. Feed cables shall be clearly defined and labeled at each junction box or handhole.

2.8.6 Feed cables shall be clearly defined and labeled for each system. Provide color coding designations with a different color marker for the multimode and/or single mode fiber feed terminations in the fiber patch panels.

2.8.7 Each fiber optic feed cable shall contain one or all types of the fiber optic glass listed below:

2.8.7.1 Single mode 8.3/125 micron strands, minimum High Performance grade for dual mode operation at 1310 nm and 1550 nm wave lengths. Maximum attenuation at 0.7dB/km @ 1310nm and 0.7dB/km @ 1550nm. Quantity of fibers as per detail drawings. Single mode fibers shall be fully terminated and tested.

2.8.8 All fibers in the fiber optic feed cable shall be fully operational within the required performance characteristics as published by the manufacturer. If any individual fiber does not meet the minimum standards, the entire cable must be replaced, end to end, including connectors, without any additional expense to the customer.

2.8.9 All fiber optic strands shall be fully terminated and tested, unless otherwise noted in the drawings or in these specifications.

2.8.10 Refer to drawings for cable types required. Refer to acceptable cables section for additional information and approved manufacturers.

2.8.11 Acceptable cables shall be:

2.8.11.1 Berk-Tek Multimode — GIGALITE OS2 Single Mode

2.8.11.2 Commscope Multimode — Systimax LazrSpeed OS2

2.8.11.3 Belden Multimode OM4 Grade — OS2 Systems

2.8.11.4 Above glass types are an example of product names per manufacturer. Confirm requirements for indoor/outdoor and

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riser rated fiber cable with riser drawings and site plans. Part numbers for composite style cable will vary greatly. Confirm part numbers with manufacturer.

2.9 Category-6 Station Cable

- 2.9.1 Contractor shall provide a Category-6 UTP cable to each Data, Voice, WAP, Audio-Visual, IP-Based Page Speaker and IP Camera location indicated on the drawings and specifications. Provide quantity of cables as indicated on the drawings at each location.
- 2.9.2 Provide one Category-6, 4-pair, unshielded twisted pair (UTP) cable from the nearest MDF or IDF location to each RJ45 data outlet port indicated on the drawings. Dual port outlets will require two such cables. Four port outlets will require four cables. Refer to the drawing details for jacket color requirements for each type of connection. Color of cable jacket for each type of connection shall be determined by the drawing details. Confirm color of cable jackets prior to ordering with the City IT Director. Contractor shall be responsible for providing the correct jacket color per the drawings per City Standards.
- 2.9.3 Unless otherwise shown in drawing details, the color of the Category 6 UTP cables shall be blue, shall be copper wire, individually insulated and color coded.
- 2.9.4 The cables shall be UL or ETL rated and UL verified in compliance Category-6 EIA/TIA standards. Approved cables for Network Infrastructure System;
 - 2.9.4.1 Commscope — CS37R
 - 2.9.4.2 Superior Essex — NextGain Cat 6eX - #54-246-xA
 - 2.9.4.3 Belden — 2412
- 2.9.5 Manufacturer names and part numbers are shown as a point of reference and do not specifically designate required packaging or color for the cable. Contractor shall verify colors and packaging options shall be determined by Contractor preferences.
- 2.9.6 Definition of “Enhanced Category-6 Rated” cable – Since there is no official EIA/TIA rating level determined to be “Enhanced Category-6”, the provision of any cable shall be based on the manufacturer’s performance claims for the product.

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2.10 Category-6 Outlets

- 2.10.1 Unshielded twisted pair Category-6 outlets shall be an RJ45 Enhanced performance type 8-position / 8 conductor modular jacks, and shall comply with Category-6 performance requirements. Provide single port, dual port, four port or quantity as indicated on the floor plans at each outlet location. All outlets shall be wired in an EIA/TIA 568B configuration.
- 2.10.2 Provide Category-6 inserts, wired for EIA 568B. Provide installation kits for all locations furnished with Category-6 UTP cabling.
- 2.10.3 Refer to the detail drawings for color of the Category-6 outlets required. Contractor shall be responsible for confirming all color requirements prior to ordering.
- 2.10.4 Provide the following Category-6 UTP data connector per Network Infrastructure warranty requirements;
 - 2.10.4.1 Leviton eXtreme Cat6+ Quick Port Series 61110-R
 - 2.10.4.2 Uniprise (Commscope) UNJ 600 Series UNJ600
 - 2.10.4.3 Belden Cat-6+ Keyconnect "AX" Series Jacks

2.11 Outlet Faceplates

- 2.11.1 Provide a two-port faceplate for all one and two port outlet locations. Provide blanks for all unused openings.
- 2.11.2 Provide a four-port faceplate for all three and four port outlet locations. Provide blanks for all unused openings.
- 2.11.3 All fax/modem locations shall be provided as single port outlets. Requirements shall be the same as a single port data outlet as shown on the Technology Legend.
- 2.11.4 For single port voice outlet locations intended for wall telephone connections, a wall telephone type faceplate with attachment studs shall be provided. The wall telephone jack shall be 8-pin, RJ45 type and use IDC wire terminations only. Provide Category-6 insert, within stainless steel wall plate faceplate. Provide faceplate from the approved manufacturers listed in the specifications.
- 2.11.5 Provide single port or dual port Surface mount small surface mounted outlet box for IP-Based Page Speaker data outlets in the J-Box for the camera locations. Provide surface mount box by Leviton QuickPort Series 41089-xxx or equal by one of the approved manufacturers. The location shall also be furnished with a blank weather-tight faceplate to protect the data termination until the cameras are installed.

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- 2.11.6 Wireless Access Point data connections for ceiling mounted WAPs shall be terminated above the accessible ceiling at the wireless access point (WAP) location. Refer to the drawing details for additional requirements.
- 2.11.7 Wireless Access Point data connections for WAPs shall be terminated at the WAP location as shown in the drawing details. Provide surface mount box by Leviton QuickPort Series 41089-xxx or equal by one of the approved manufacturers. The location shall also be furnished with a blank inserts for the unused ports. Label the cables and faceplate the same as standard data outlets.
- 2.11.8 All faceplates and surface mount outlet boxes shall be furnished with label windows. All labeling shall be installed within the label window.
- 2.11.9 Confirm color of all faceplates prior to ordering. All data outlet faceplates shall have a unique sequential identification number applied to faceplate. Hand written labels are not permitted. All color schemes shall be approved by the customer prior to installation.
- 2.11.10 Colored inserts are required for this project. Refer to the detail drawings for the exact color scheme to be provided. Inserts submitted that do not follow the color and identification requirements will be rejected. Inserts installed that do not follow the color coding as shown in the detail drawings will be replaced at the Contractor's expense.
- 2.11.11 All labels will be installed under label windows. Labels adhered to the surface of the faceplate will not be accepted. Contractor must provide clear laminating type of cover material over the surface mounted labels where used.
- 2.11.12 Reference the drawings for special outlet configurations or plate requirements
- 2.11.13 All data outlet faceplates shall have a unique sequential identification number applied to faceplate. Refer to the detail drawings for labeling requirements. Hand written labels are not permitted. Faceplates, with the exception of wall telephone outlets, shall include color coded port inserts. All color schemes shall be approved by the City prior to installation.
- 2.11.14 Reference the drawings for special outlet configurations or plate requirements.

PART 3 – VIDEO SURVEILLANCE REQUIREMENTS

- 3.1 Provide (2) Category-6 UTP cables from the IDF Closet to each camera location. All cables installed in underground conduit shall be rated for Wet Location.
- 3.2 Provide Category-6 patch cords with pre-molded boot, provide quantity equal to 100% of the total camera cable drops provided. All patch cords to be installed by

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Contractor. Patch cords shall be in compliance with the manufacturer's "Channel" warranty requirements. Provide patch cords for both ends of the cable.

- 3.3 Furnish all materials, equipment and labor, and perform all operations in connection with video surveillance system work as indicated on the drawing, as specified herein and required to complete the work. Coordinate with the 28 23 00 Contractor for installation of cameras.

PART 4 – WIRELESS ACCESS POINTS (WAP)

- 4.1 Provide Category-6 UTP cables from the IDF location to each WAP location as shown on the Floor Plans. All cables installed in underground conduit shall be rated for Wet Location and shall be minimum OSP-Rated.
- 4.2 WAPs (Wireless Access Point) will be City furnished and Contractor installed. Programming will be provided by the City IT Department. The Contractor shall install each WAP as required and provide patch cord installation at the WAP. The Contractor shall provide a list including the room number, location, and MAC address of each device installed to the City IT Department. Provide minimum 10' slack cable at each WAP location as shown in the drawing details.
- 4.3 Refer to drawing details for installation requirements for WAP locations.
- 4.4 Provide Category-6 patch cords with pre-molded boot, provide quantity equal to 100% of the total WAP cable drops or ports provided. All patch cords to be installed by Contractor. Patch cords shall be in compliance with the manufacturer's "Channel" warranty requirements. Provide patch cords for both ends of the cable.

PART 5 - INSTALLATION

- 5.1 Upon completion of 10% of the cabling installation, the Contractor shall notify the Project Engineer for an inspection of the methods and types of materials used on the project. The Contractor shall give a minimum of 72 hours notification to the Project Engineer for the scheduling of the inspection. The Contractor will be given a written review of the findings, so if adjustments are required, they can be done before the project proceeds. The Contractor shall be responsible for adhering to the findings and a follow-up inspection will not be provided.
- 5.2 Pull strings shall be provided with all cable runs including but not limited to; conduit stub ups, conduit sleeves, cable trays, open wiring routes, innerduct, and point-to-point conduits. Pull strings shall be free from cable bundles in open wiring routes. Pull strings shall not be substituted for pull ropes for the exterior site conduits.
- 5.3 Velcro cable management straps are required on all Category-6 cable bundles, the last 20 feet or upon entry into equipment closet, a maximum of 12" apart. Cable bundles shall also be routed through cable management or "D" rings in the equipment closet.
- 5.4 Data Contractor shall supply protective bushings or slide on rings at the ends of all exposed conduits used for the data system cabling. This is to include all conduits

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installed for any future data cabling requirements. Contractor shall submit planned protection bushings prior to installation of cabling for approval.

- 5.5 Velcro cable management straps are required on the cabling in the rear section of the vertical managers on the equipment racks. Straps shall be a maximum of 12" apart. At a minimum, Velcro straps shall be provided at each point the cables are routed to the patch panels from the main bundle.
- 5.6 Every fiber in every fiber optic cable must be terminated at both ends on a fiber patch panel in the MDF/IDF closet or cabinet location. Termination shall be accomplished using the correct style of connectors as directed by the City with a strain relief boot. All connectors shall be of the same manufacture to ensure compatibility. Polarity of fiber strands must be observed at all times.
- 5.7 Labeling
 - 5.7.1 Each cable run shall be permanently labeled at each end with a unique sequential number which corresponds to a similar number provided for each data outlet and patch panel point. A printed label shall be placed at each of the following locations;
 - 5.7.1.1 On the cable at the rear of the patch panel or termination block. Requires the use of a self-laminating wrap around label. Brady Label self-laminating 1.2" by 1.5" wrap around label Part #29689 (NO ACCEPTABLE EQUAL).
 - 5.7.1.2 On each cable in the j-box behind the faceplate location. Requires the use of a self-laminating wrap around label. Brady Label self-laminating 1.2" by 1.5" wrap around label Part #29689 (NO ACCEPTABLE EQUAL).
 - 5.7.1.3 On the cable at the terminal strip prior to termination point. Requires the use of a self-laminating wrap around label. Brady Label self-laminating 1.2" by 1.5" wrap around label Part #29689 (NO ACCEPTABLE EQUAL).
 - 5.7.1.4 On the face of the patch panel, provide a 3/4" by 3/4" label with a letter or number identifying the patch panel designation. For special purpose data connections such as WAP, Audio-Visual, IP Page and IP Camera ports, the label shall be designated with colored label icon or marker.
 - 5.7.1.5 On the face of the faceplate in the label holder window. The label shall be clearly defined with a minimum #10 font size.
 - 5.7.2 Hand written labels are not permitted. Where cable ID includes room number identification, the Contractor shall obtain written verification of final room numbers prior to beginning labeling (numbers on plans do not always match final room numbers). Cable pulling cross reference lists will not be accepted with final documentation.

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- 5.7.3 Each patch panel port shall be identified with a unique sequential labeling scheme. Port identification labeling pattern shall be consistent throughout the project.
- 5.7.4 All faceplates shall be identified with permanent printed labels. Labels must not be subject to removal by incidental contact. Contractor shall be responsible for replacing defective labeling for a period of one year from date of final sign-off of project.
- 5.7.5 All fiber optic and UTP feed cables shall be identified with a permanent, water resistant, printed labels. Labeling information shall include closet identifications, quantity of conductors (UTP) or strands (fiber) and house pair designations (UTP). Cables shall be labeled in the IDF/MDF closets at the site conduit entrance point, Riser conduit entrance point and prior to entering either punch blocks or patch panels. Labels for fiber and copper feeds shall include both the name of the origination point and the destination point, house pair or house fiber strand count, cable composition (ie:12-Strand MM 50/125 LO; 6-Strand SM). See details for additional requirements.
- 5.7.6 Labeling will follow recommended EIA/TIA standards or as requested by the customer. Contractor will confirm labeling pattern prior to final identification or testing. All test results will be identified by the final labeling scheme. Contractor shall be required to have the labeling scheme approved in writing by the City IT Director prior to manufacture or installation of the labeling.
- 5.7.7 All fiber optic cables and/or innerduct shall be tagged with fiber optic warning tags in every manhole or pullbox. Fiber warning tags shall also be placed at each end of the cable in the termination closets in clear view. A minimum of (3) tags are required at each end, with a label tag on each cable in the service loop. Fiber warning tags shall be placed on fiber optic cable and/or innerduct routed through open ceiling environments at increments no less than 15 feet apart.
- 5.7.8 Refer to detail drawings for additional labeling requirements.
- 5.8 Where open wiring cables are run through the ceiling space (only permitted where specifically noted on the drawings), the wire shall be bundled together and supported above the ceiling.
- 5.9 All cables must be fastened to the building structure via "j-hooks" or an approved Category 6 suspension system, and not directly in contact with ceiling system. For "j-hooks" maximum fill capacity is as follows: 1-5/16" hooks – 35 cables; 2" hooks - 60 cables; 4" hooks - 120 cables. For quantities beyond 120 cables use a sling support system such as "Erico Cable Cat" or equal. Maximum fill capacity 200 cables. D-rings, "Caddy #WMX cable hangar", "Caddy Bridle Rings", drive rings or any other type of wire ring support is not allowed.

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- 5.10 All new cabling shall include the support systems (J-hooks, saddles, Velcro ties, etc.) regardless if the outlets are shown as new locations or existing locations where the cables are to be replaced.
- 5.11 Where cables pass through a fire-resistant portion of the structure, conduit sleeves shall be provided to maintain the rating of the wall penetrated. Sealing of all penetrations with an approved fire barrier is required. Conduits and sleeves must remain accessible for future use. Permanent sealants may not be used to seal sleeves and conduits.
 - 5.11.1 The 27 10 00 Contractor shall be responsible for fire-stopping all unused conduit sleeves in the ceiling or through rated walls. The Electrical Contractor shall be responsible for fire-stopping around the conduit or sleeve, unless the sleeve is installed by the 27 10 00 Contractor, in which case, the 27 10 00 Contractor shall be responsible for all fire-stopping requirements.
 - 5.11.2 Expanding foam is not an acceptable sealant for any conduit opening. Contractor shall be responsible for complete replacement of the conduit and cabling in any conduit filled with expanding foam used as a sealant.
- 5.12 Fiber optic feed cables connecting to equipment racks from the MDF Room or from an adjacent IDF location, shall be installed with not less than a 20-foot service loop between the rack and mounted on the backboard. See drawings for fiber optic service loop requirements.
- 5.13 Provide 6 inches of cable slack at computer data system outlets inside conduit box.
- 5.14 In an accessible ceiling area, provide a 10-foot (stored in a Figure-8 configuration) service loop above the all data/voice outlet locations. Service loop must be securely tied up off of ceiling tiles or ceiling surface and supported at two opposite points. Neatly coil cable without exceeding minimum bend radius limitations. Do not provide length in excess of 15 feet, as it may cause improper test results and errors.
- 5.15 Do not provide a service loop in the MDF/IDF Room on the UTP cables, unless otherwise noted. Cables shall be neatly routed around the perimeter of the room to the cable runway from the point of entrance into the room.
- 5.16 The minimum bending radius for all cables and the maximum pulling tension shall not exceed manufacturer's recommendations.
- 5.17 Cables installed in manholes and pullboxes shall be supported with Velcro ties or loosely fitted UV rated tie wraps, on wall mounted cable support racks. The cables shall be clearly labeled in the manhole or pullbox.
- 5.18 Provide a full 360-degree loop of slack cable around manhole and pullbox interiors. Cables entering handholes from the bottom, shall not be allowed to touch the bottom of the cover when closed and shall not be pinched or crushed in any way.

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- 5.19 Cable pulling shall use a split mesh grip over the cable jacket. Connection directly to optical fibers and copper wire conductors shall not occur.
- 5.20 When pulled through conduits, cable pulling lubricants shall be continuously applied to all cables and be specifically approved by the manufacturer.
- 5.21 Where cables are pulled through or pulled from a center of run, pull without splices or terminations, lead out the cables at all manholes, pullboxes, and conduits, taking care to feed them in again by hand for the next run.
- 5.22 For each cable pull where a cable direction change is required, flexible feed-in tubes, pullout devices, multi-segmented sheaves, etc., shall be used to ensure proper cable pulling tensions and side wall pressures. Cables shall not be pulled directly around a short right-angle bend. Any device or surface the cable comes in contact with when under pull-in tension shall have a minimum radius 50% greater than the final specified minimum installed cable bending radius. The maximum possible size radius sheaves and feed-in tubes, usable in the available working space, shall be provided in all situations, to ensure the minimum possible cable sidewall pulling pressure. Do not use devices with multi-segment "roller" type sheaves.
- 5.23 Cable lengths over 250 feet shall be machine pulled, not hand pulled. Cables shall be pulled in a continuous, smooth operation without jerking or stop-start motion after initiation of pull. Maximum cable pulling speed shall be less than 50 feet per minute. Minimum pulling speed shall be greater than 15 feet per minute.
- 5.24 A pull string shall be placed with all UTP and paging station cables at the time of installation. Conduit runs and surface raceway for station cabling shall be furnished with a minimum 2-Ply spiral wrap style, pull string rated for 240 ft/lbs. pulling strength, such as manufactured by Greenlee #431 or approved equal. Includes all conduit stubs and cables routed through open ceilings and cable trays. Pull strings shall be tied off in the junction box and in the ceiling. Provision for the installation of the pull string shall apply to all empty and spare conduits as well. Single ply type pull string will not be accepted as a substitute for the 2-ply pull string.
- 5.25 A measuring pull tape shall be placed with all feed cables at the time of installation. Indoor riser and Outdoor conduit runs between buildings designated for feed cabling, in excess of 150 feet shall be provided with a minimum ½" polyaramid style, measuring true tape pull string annotated with footage increments rated for 2500 ft/lbs. pulling strength, such as manufactured by Greenlee #39245 or approved equal. Conduit runs less than 150 feet shall be furnished with a ¼" polyaramid style, measuring true tape pull string annotated with footage increments rated for 1250 ft/lbs. pulling strength, such as manufactured by Greenlee #39243 or approved equal. Provision for the installation of the measuring pull tape shall apply to all empty and spare conduits as well. Standard twine style pull strings and standard nylon or polypropylene style pull ropes will not be accepted as a substitute for the polyaramid measuring tape type pull string.
- 5.26 When pulling cable through conduit, cables shall be pulled straight into or out of the raceway without bends at the raceway entrance or exit. Pull in cable from the end

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having the sharpest bend (i.e., bend shall be closest to the reel.) Keep pulling tension to minimum by liberal use of lubricant, hand turning of reel, and slack feeding of cable into duct entrance. Employ not less than one man at reel and one at manhole or pullbox during this operation. Cables shall be pulled directly from cable reels.

- 5.27 All cables shall be new and extend continuous from each MDF or IDF backboard or rack to all outlet locations.
- 5.28 Where cables are not installed in a conduit or other raceway system, they shall not be routed parallel with other line voltage equipment or wiring (120 volt and above) within 36" or within 12" of line voltage equipment or wiring where crossing.
- 5.29 Where OSP-Rated UTP cables or OSP-Rated fiber optic cables are routed exposed through ceilings for more than 50'-0", Contractor shall install the cable in innerduct or EMT conduit in the ceiling. Innerduct installed in the accessible ceiling space shall be a minimum of riser rated and a minimum of 1" in diameter. Innerduct shall be supported a minimum of every 3-feet to the structural members.

PART 6 - TESTING

- 6.1 All Category-6 cables shall be point to point (link) tested after installation/termination, and verified to operate at minimum 1000Mbps. Performance of installed cables shall satisfy all current addendums to the EIA/TIA 568A standard for Category-6 wiring. In addition, testing shall satisfy all proposed amendments to the existing ISO/IEC requirements. The wiring shall support all specified communication protocols. Testing shall support the Category-6 requirements by the EIA/TIA.
- 6.2 Upon completion of testing cable links for both copper and fiber optic cabling, the Contractor shall supply a copy of the original database files downloaded from the tester in original format on a USB Flash Drive. Contractor shall provide with the testing database files, an original copy of the tester's manufacturer software program (included in original cost) for record management and archiving, in a Windows format (i.e.; Fluke Linkware software program)
 - 6.2.1 The manufacturer's software program will be used by the Project Engineer to review all test results, and then turned over to the City to keep as their record copy with the final approved test results. Provide (3) copies of tests on USB Flash drive. Do not submit test results for review in Excel or PDF file formats, as the submittal will be rejected and not reviewed.
- 6.3 Contractor will repair or replace cable runs or connecting hardware that do not meet specified criteria.
- 6.4 Multimode fiber optic cables shall be tested bi-directionally at 850nm and 1300nm. All fiber strands shall be tested with an OTDR (Optical Time Domain Reflectometer). All fiber test results shall contain final source and destination information that matches IDF or MDF labeling shown on the fiber optic patch panels

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and final documentation. OTDR test results shall be included with the copper test results and submitted with the tester's software for review. Do not submit test results for review in Excel or PDF file formats, as the submittal will be rejected and not reviewed.

- 6.5 Test procedures shall comply with EIA/TIA 526-14 Method B. Test results shall meet the minimum following criteria:
 - 6.5.1 Fiber optic test results shall not exceed 2db total attenuation loss in addition to inherent loss published by manufacturer tested at minimum 2000 Mhz for 850nm and 500 Mhz for 1300nm for the fiber optic cable.
 - 6.5.2 Test all data cables minimum Category-6 UTP cable to test results for "Channel Testing" requirements @ 250 Mhz per current EIA/TIA requirements. Any cables which do not meet these minimum requirements shall be replaced or repaired at no cost to the City.
- 6.6 End to end attenuation testing shall be performed with a temporary test jumper cable at each end of the installed fiber cable. The test jumper utilized shall be the same fiber core size and grade of glass as the installed cable. The measured attenuation of the test jumpers, test connectors, and test interconnection sleeve between the two test jumpers shall be less than 1dB as calibrated at the time of the test at indicated wave lengths and frequencies. Test jumpers shall be "zeroed out" before testing of fiber strands begins.

PART 7 – CLOSE-OUT DOCUMENTATION

- 7.1 Final As-Built Drawing Submittals - Provide (1) hard bound copy of "E-size" As-Built drawings and (3) copies on USB Flash Drive in AutoCAD (2014 or newer version) format. A Hand marked-up copy of the original construction drawings will not be accepted as the final As-Built drawing submittal. Final As-Built drawings shall include copies of the floor plan drawings of each building, detailed elevations of each MDF or IDF locating all equipment, quantities outlets and speaker locations, locations of all sleeves and identification of all final cable routes. In addition, the drawings shall include all outlet locations with cable identification numbers.

END OF SECTION

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INTEGRATED AUDIO-VISUAL SYSTEM

PART 1 – GENERAL

SUMMARY

- 1.1 The Contractor shall furnish all labor, project management, materials, tools, equipment, and resources necessary for the installation, startup, and testing of the system shown on the plans and described in the specifications.
- 1.2 The Contractor shall furnish and install the system as defined by the plans and specifications. The Contractor must demonstrate to the Owner that the system is complete and complies with all operational requirements set forth in the plans and specifications.
- 1.3 The work covered under this section of the specifications consists of furnishing all labor, equipment, supplies and materials, and in performing all operations necessary for the turnkey and fully completed installation of an audio/ video system in accordance with the specifications and accompanying drawings, except as specifically noted otherwise.
- 1.4 Cables for the system shall be pulled through the conduit systems furnished by the building Contractor. The 27 20 00 Contractor shall be responsible for providing all cables required and for coordinating and supervising the cable installation. The 27 20 00 Contractor shall be responsible for insuring the integrity of the cables before and after installation.
- 1.5 Work Excluded:
 - 1.5.1 Excluded from this work shall be any and all general construction services regarding masonry and general carpentry services. Those services are to be provided and installed by the General Contractor.
 - 1.5.2 Conduit/raceways, sleeves, cable trays, electrical boxes, hand holes, pullboxes, etc. required for the system shall be furnished and installed by the Division 26 Contractor. The conduit/raceways and electrical boxes furnished and installed under Division 26 shall conform with the requirements of the drawings and specifications for the system.
- 1.6 In order to ensure project cohesion a single point of contact is required to provide a "TURNKEY" solution. The work covered under this section of the specification consists of furnishing all labor; cabling; equipment; software; supplies; materials and training. The Contractor will perform all operations necessary for the "TURNKEY" and fully completed installation in accordance with the specifications herein. As such, the successful Contractor must be factory trained on all aspects of system hardware. The successful Contractor shall be a California licensed C7 or 10 premise wiring Contractor as defined in this specification. Subcontractors may not be utilized in the implementation of the plant wiring installation.

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- 1.7 Approval to bid shall not release the Contractor from full specification compliance requirements. Final system acceptance testing shall govern final system acceptance and compliance with the specifications.
- 1.8 Failure to provide a functional equivalent shall result in the removal of the alternate system at the Contractor's expense.
- 1.9 These specifications contain statements which may be more definitive or more restrictive than those contained in the General Conditions. Where these statements occur, they shall take precedence over the General Conditions.
- 1.10 Where the words 'provide' or 'provision' is used, it shall be definitely interpreted as 'furnishing and installing complete in operating condition'. Where the words 'as indicated' or 'as shown' are used, it shall mean as shown on contract drawings.
- 1.11 Where items are specified in the singular, this division shall provide the quantity as shown on drawings plus any spares or extras mentioned on drawings or specifications. All specified and supplied equipment shall be new.

DEFINITIONS

- 1.12 Concealed: Hidden from sight, as in trenches, chases, hollow construction, or above furred spaces, hung ceilings - acoustical or plastic type, or exposed to view only in tunnels, attics, shafts, crawl spaces, unfinished spaces, or other areas solely for maintenance and repair.
- 1.13 Exposed, Non-Concealed, Unfinished Space: A room or space that is ordinarily accessible only to building maintenance personnel, a room noted on the 'finish schedule' with exposed and unpainted construction for walls, floors, or ceilings or specifically mentioned as 'unfinished'.
- 1.14 Finish Space: Any space ordinarily visible, including exterior areas.

CONTRACTOR QUALIFICATIONS

- 1.15 The successful bidder shall be a California licensed C7 Premise Wiring Contractor or C10 Electrical Contractor, with a specialization in the installation of Audio-Visual Systems as defined in this specification. Subcontractors may not be utilized in the implementation of the installation or programming of the Audio-Visual System components.
- 1.16 Be able to demonstrate applicable experience completing at least (3) similar projects in the last 3 years acceptable to the Client's representative. The Contractor's qualified Project Engineer shall be approved by the Client's representative for the project.
- 1.17 The successful bidder shall have Design Staff with;
 - 1.17.1 BICSI certified (RCDD) Registered Communications Distribution Designer.
 - 1.17.2 CTS-D certification
 - 1.17.3 Extron Advanced A/V Certifications.

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- 1.17.4 Extron XTP Systems Engineer
- 1.17.5 Extron TLP programming certifications
- 1.17.6 Extron Global Configurator Plus and Global Configurator Professional Software Configuration certifications
- 1.17.7 The successful bidder shall have Installation Staff with;
- 1.17.8 CTS-I certification
- 1.17.9 Extron Advanced A/V Certifications for a minimum of (4) current installation technicians.
- 1.18 All bidders must provide a listing of three similar size projects having the same scope of work using the proposed information delivery equipment. This listing shall be complete with facility names, completion dates, names of contacts, and their telephone numbers. Referenced projects must have been completed in the past 18 months.
- 1.19 The Contractor shall have a factory-trained service department, on call 24-hours a day, 365 days a year, to arrive and initiate on-site service within 24-hours notice of a service outage by the School City.
- 1.20 The Contractor shall employ factory-trained technical/service personnel for service and maintenance of the system. Their résumés shall be required to be submitted for approval. The factory-trained technical/service personnel shall have a minimum of two-years experience installing the proposed system or systems installed under this project. The Bidder shall submit the names and copies of the certificates issued by the factory along with training dates. The bidder shall instruct the Owner's technical personnel in the operation, care, and maintenance of the system. Service personnel shall be required to keep training up-to-date with equipment changes.
- 1.21 The Contractor shall employ factory-trained Supervisors or Lead Technicians for management and installation of the Audio-Visual systems. The Supervisor shall be responsible for the day-to-day operations of the on-site installation crew and coordination with other trades on the project job site.
 - 1.21.1 Provide all technical liaisons between the Contractor and the Client (City). This shall include participation in all meetings and conferences. Supervisor will be required to be present at the job site for final inspection, to prepare the operating and maintenance manuals, and to provide the specified instruction to designated members of the Client's staff.

CODE COMPLIANCE

- 1.22 All material and equipment shall be clearly listed, labeled, or certified by Underwriters Laboratories, Inc. All power supplies and computers shall be clearly UL Listed. Any system which is not UL Listed at time of bid will be rejected.

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- 1.23 All acceptable systems shall be approved under Part 15, Subpart B, Section 15.107b of the FCC Rules and Regulations. Bidders must provide the FCC Registration Number of the proposed system. Systems that are not in compliance with the FCC will not be considered. Any system that is not FCC compliant at time of bid will be rejected. All equipment must be clearly labeled with FCC compliance stickers.
- 1.24 The system shall be installed in accordance with local and national electrical codes.
- 1.25 The manufacturer and Contractor shall provide the Owner with a release for use of all copyright materials, corporate logos, and corporate trademarks at time of bid.

SUBMITTALS

General Submittal Requirements

- 1.26 **Phase I Submittal** shall be made in electronic format within (20) working days after the award of the contract by the City. This submittal shall include the following:
 - 1.26.1 Complete Bill of Materials in Excel Spreadsheet format with bills of quantities, including all materials, components, devices, and equipment required for the work. The bills of quantities shall be tabulated respective of each and every system as specified, and shall contain the following information for each Section listed:
 - 1.26.2 Description and quantity of each product.
 - 1.26.3 Manufacturer's Name and Model Number.
 - 1.26.4 Manufacturer's Specification Sheet or Cut Sheet. Material Cut Sheets shall provide detailed product information and shall be original manufacturer product bulletins. Copies of material information from vendor websites shall not be considered equal and will not be excepted.
 - 1.26.5 Material Cut Sheet part number provided shall be highlighted or provided with an arrow directed at the corresponding part number.
 - 1.26.6 Specification Item Number referenced for each required product or if not shown in the specifications, Drawing Detail Number being referenced. (ie; Spec. 271000 Item 2.1 or DWG E4.15/#1)
 - 1.26.7 Include with submittals all warranty information and a description of support and maintenance services to be provided. Also include all licenses and maintenance agreements required for continued operation of the equipment.

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- 1.27 **Phase II Submittal** shall be provided within (20) working days after the approval of the Phase I submittals and prior to any fabrication or field conduit installations. All shop drawings shall be engineered in a CAD Software. Submission shall include electronic print copies to match the contract drawings, and Phase II submittals drawings shall include the following.
- 1.27.1 MDF and IDF equipment rack or cabinet elevations will be required to be provided including cable routing, grounding, support, UPS, network electronics, etc. and position of all components in the rack or cabinet.
 - 1.27.2 Provide labeling plan which identifies the proposed scheme for identifying all components including Racks, patch panels (fiber and copper), site distribution feed cables, horizontal station cables and site conduit systems (handholes, pullboxes, etc.).
- 1.28 Common submittal mistakes which will result in submittals being rejected:
- 1.28.1 Not including the qualifications of the installing Contractor Company and Contractor's Staff.
 - 1.28.2 Not including all items listed in the above itemized description.
 - 1.28.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed (provided for the project) or crossing out the items which are not applicable.
 - 1.28.4 Not including actual manufacturer's cut sheets or catalog information of proposed products.
 - 1.28.5 Do not provide website sales pages instead of Material Cut Sheets. Printing the entire web page with advertising and non-applicable items or information will not be acceptable.
 - 1.28.6 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" or "to be determined later" statements. The products being submitted must be the products installed.
- 1.29 Component Mock-Ups and Samples
- 1.29.1 Provide one full size installation sample mock-up of a normal wall faceplate for approval. All samples are to be fully labeled per these specifications. Samples are to be delivered to the Construction Manager's office on site prior to installation.
 - 1.29.2 All sample mock-ups are intended to represent the components that are to be installed as part of this project. They are to be provided with all associated components and labeling necessary to make up a complete mock-up. Installation shall not proceed until the Owner's Representative has approved the samples. Once samples and other documents have been submitted and inspected by the Owners Representative approved, they shall be retained. Any installation that does

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not meet this standard shall be replaced or re-worked as approved by the Owners' Representative at no cost to the project.

- 1.30 The Contractor shall make a written request directly to Johnson Consulting Engineers for electronic drawing files (CAD). As a part of the written request, please include the following information:
 - 1.30.1 Clearly indicate Project Name and Client, Johnson Consulting Job Number (located in bottom left corner of JCE Engineering Stamp) and each drawing Sheet Number required (i.e., E1.1, E2.1, E4.1 etc.).
 - 1.30.2 Identify the name, Company, Title, phone number, mailing address and e-mail address of the person to receive the files.
 - 1.30.3 Detail or Riser diagram sheets, System Schematic drawings or any other drawings other than floor plans or site plans, will not be made available to the Contractor.
 - 1.30.4 Files will only be provided in the AutoCAD format in which they were created (i.e., version 2018 or newer version). Files will not be made available in REVIT format.
- 1.31 Requests for files will be processed as soon as possible; a minimum of (7) working days should be the normal processing time. The Contractor shall be completely responsible for requesting the files in time for their use and delays in requesting files will not alleviate the Contractor from submitting required documents within the required timeline.
- 1.32 Contractor shall be responsible for the complete provision and installation of all components as specified herein. The Contractor shall provide all tools, equipment, fixtures, appliances, ancillary piece parts and hardware as necessary to complete the assembly and installation as requested. The Owner's Representative may conduct scheduled or unscheduled inspections of the Contractor's work at any time during construction. All work included in the scope assigned to the Contractor that is associated with this project shall be accomplished in a workmanlike manner, installed and assembled plumb, level and square. The product shall be delivered to the Owner finished complete, and ready to operate according to the manufacturer's specifications.
- 1.33 All installation work shall be completed to the standard of the samples approved by the Owner's Representative during the submittal process. Any products not installed to the quality detailed in these specifications and approved in the submittal process shall be reworked by the Installer to the satisfaction of the Owners Representative at no additional cost to the Owner.
- 1.34 Products as manufactured by "Extron" have been specified to coordinate with an existing facility and other contracts to be issued for this project. Alternate products will not be approved.

SEISMIC ANCHORING

- 1.35 All sound systems, A/V equipment or enclosures shall be anchored to the structure. Where details have not been provided on the drawings, anchorage shall comply with CBC Section 1632A and Table 16-A0. The Contractor shall submit drawings signed by the

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Contractor's registered structural engineer indicating method of compliance prior installation.

CLEANUP

- 1.36 In addition to cleanup specified under other sections, thoroughly clean all parts of the equipment. Where exposed parts are to be painted, thoroughly clean off any spattered construction materials and remove all oil and grease spots. Wipe the surface carefully and scrape out all cracks and corners.
- 1.37 Remove any sheeting or protective materials such as plastic film, cardboard spacers or corner protectors, etc., used for shipping protection.
- 1.38 During the progress of the work, keep the premises clean and free of debris.

GENERAL COORDINATION

- 1.39 The A/V drawings may reference components by manufacturer which conflict with the written specification requirements, where this occurs the written specifications shall be followed.
- 1.40 Contractor shall provide a spreadsheet for the City provided asset tags for all newly installed AV equipment. Contractor shall provide the populated tag list at the end of the project as part of their turn-over documents.

PART 2 — PRODUCTS

ACTIVITY CENTER SOUND SYSTEM GENERAL REQUIREMENTS

- 2.1 Provide turn-key sound system installation for the Activity Center. Sound system equipment shall be housed in a Sound Cabinet in the Sound Control Room #108. Refer to the floor plans for Room build out requirements and electrical information.
- 2.2 All microphone inputs and sources shall be wired directly to the rack mounted mixing console located in the permanent rack location and shall be clearly color coded or numbered for easy identification.
- 2.3 Contractor shall provide engraving on the portable sound systems with the following text- "Property of City of La Puente". Engraving shall be clear and legible and shall be professionally applied.
- 2.4 The Contractor shall refer to the Audio/Video Patch Cable section of this specification for the descriptions of the type and style of patch cable to be furnished for the different Audio-Visual and data patch cable connections. Patch Cable Section includes the different requirements for cable runs based on length and style of connector. Individual patch cord specifications are not shown in the system descriptions, only the type of cable required will be shown.
- 2.5 Contractor shall furnish and install all Activity Center Sound System components as shown in the A/V system details and these specifications. Refer to the Activity Center Sound

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System Diagram for system requirements for additional information. The drawing details and specifications shall be considered as one overall document. Contractor shall provide all systems as complete turn-key operational Audio-Visual systems.

- 2.6 Provide installation of individual speakers for the Activity Center Sound System. The speakers shall be mounted vertically on the wall below the Shade Structure with specified support brackets as shown in the detail drawings. Speaker shall be mounted at the height shown on the floor plans and detail drawings. The support bracket shall match the hole pattern of the speaker. Coordinate the proper bracket with the speaker prior to ordering. Contractor shall provide all hardware including wall mount brackets, safety cables, stainless-steel hardware for outdoor installation and anchoring systems. Speakers must have the ability to be adjusted to be aimed to adjust the speaker coverage.
- 2.7 RF- Based Transmitter System - Install the ADA system RF Transmitter in the Sound System Rack. Mount antenna for transmitter securely to the exterior wall and test for proper coverage of the area. Provide antenna extension kit for exterior antenna location. Refer to the manufacturer's installation instructions for additional information. Provide RF-Based transmitter and receivers as shown in the specifications.
- 2.8 Contractor shall allow a minimum of 4 hours of meeting time with City Staff and shall provide meeting minutes of the system requirements and events that transpired during meetings. Contractor shall prepare 3-4 templates with written instructions that can be given to the City noting the settings and levels on the Digital Mixer for events such as; Meetings, Assemblies, Movies, and Background Music. Meet with City Activity Center Staff to determine the types of templates required. Templates shall be a representation of the Mixer and Output Settings from the programming pages in a three-ring binder to be kept in the Activity Center Office. Pages shall be laminated.
 - 2.8.1 Contractor shall provide Mixer presets from both the Mixer App and the Extron TLP Control Panel.
 - 2.8.2 Audio output frequency levels from the Mixer for each type of preset, shall use the baseline established from the SmaartLive testing. The baseline will establish a starting point for each level at the varying frequencies. The Contractor shall set the levels based on the application. The DSP settings shall be set in conjunction with the preset applications on the mixer.
 - 2.8.3 The Contractor shall contact Extron for the control codes to enable the ability to activate the presets from the TLP Control Panel. The Control Panel shall be programmed with easy to follow, simple step-by-step pages that activate and disable the Mixer and AV matrix switch page or event settings. Once the preset is selected from the Control Panel, the User shall not have access to the Mixer controls from the TLP Control Panel, only the event presets and the standard control buttons used for every event.
 - 2.8.4 All programming shall be furnished and provided by the Contractor. The Contractor shall build all control panel pages and function buttons for approval by the City Project Manager and Project Engineer prior to the actual programming being completed. The control panel shall provide simple, easy to follow pages and flow

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functionality with the access to changes to the programming being limited to the Administrator Level password protection.

- 2.8.5 The Apple iPad Tablet shall be provided with the Yamaha Apps to emulate, control and program the Mixer functions.
- 2.8.6 Each Page on the Control Panel shall have a "Home", "Volume Up", "Volume Down" and "Mute" Button. The "Home" Button shall take the User back to the first opening Control Page.
- 2.9 Contractor shall provide commissioning of the Activity Center Sound System. Provide test equipment and an operator to perform system commissioning. Commissioning will include equalization of speaker system to compensate for acoustics and setting, including but not limited to equalization, delay, level, limiting, and crossover frequencies. Test equipment must include a minimum of SmaartLive V8 or approved equivalent running on a software manufacturer approved computer, an Earthworks M30 calibrated measurement microphone or approved equivalent, and a Sound Devices USB Pre-microphone preamp or approved equivalent. Contractor's operator must have attended a factory training class for the DSP software used on the project. Operator must also have attended a minimum of one (1) factory training session in the use of SmaartLive software.
- 2.10 Contractor shall set the built-in DSP on the amplifiers in conjunction with the Manufacturer or a Manufacturer's Representative On-Site. The On-Site work must be done for the Sound System once the system is installed and during the commissioning stage of the testing. Contractor shall coordinate with the Manufacturer's Representative (Jeff Miranda -Allied ProTech – 949-436-4745) for the factory authorized personnel to come to the project location and set the amplifiers for the optimal performance.
 - 2.10.1 Built-in DSP Processing Functions - Set DSP functions on the amplifier to match the speaker/subwoofer ratings to the amplifier channel. The DSP setting shall also be set to provide optimal performance for the Activity Center Outdoor and Indoor spaces.
- 2.11 Provide design software plots of the speaker coverage and positioning using EASE Software. Show Sound Pressure Levels (in dB), Speaker Types and Speaker coverages for sound system application as required below. Contractor shall show coverage of audience areas on full size drawings, 30"x42" sheets (PDF acceptable) and submit them to the Project Engineer for approval prior to the installation of the system. Provide elevations of speaker coverages and horizontal/vertical positioning of speakers. Interior Speakers do not need to be plotted with EASE.
- 2.12 Provide installation of speakers for the Audio-Visual System. The speakers shall be mounted from the structural members as shown in the detail drawings. The speakers shall be mounted and held with the manufacturer's bracket. Coordinate the proper bracket with the speakers prior to ordering. Contractor shall provide all hardware including mounting brackets and safety cables. Speakers must have the ability to be adjusted to be aimed both horizontally and/or vertically to adjust the angle of the speaker coverage, whether physically or electronically. Refer to the Structural drawings and coordinate with the Structural Contractor the locations of the speakers.

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- 2.13 Contractor shall provide all hardware and structural support including, but not limited to, unistrut, brackets and stainless-steel hardware. Power shall be furnished by the Division 26 Contractor. All installations must comply with local codes and Zone 4 Seismic requirements.
- 2.14 Contractor shall insure that the Ethernet Switch is not plugged into the power sequencers or a power strip controlled by the sequencers. The TLP Control Panel will be powered from a POE port on the Ethernet switch and must not lose power to insure proper operation of all components controlled by the Control Panel. The Apple iPad Tablet shall be powered from the Sound Cabinet and must not lose power to insure proper operation of all components controlled by the Tablet.
- 2.15 Contractor shall provide and install all audio and video wiring and components required per the detail drawings and specifications. Contractor shall provide all necessary cables and connectors for routing of the audio to the Mixer.
- 2.16 The Contractor shall provide all individual Sound System hand-off components (microphones, charging bases, spare batteries, extra patch cables, etc.) for the Activity Center Sound System to the City Project Manager. The components shall be individually bagged up, identified with "Activity Center", boxed up and delivered to the Project Manager.

ACTIVITY CENTER SOUND SYSTEM REQUIREMENTS

- 2.17 Provide a Sound System for the Activity Center as shown in the project drawings and these specifications.
- 2.18 All system equipment shall be rack mounted in Roll-out Rotating Equipment Cabinet. Refer to detail drawings for sound system cabinet requirements. Location of cabinet shall be as shown on the floor plans. Refer to site plans and floor plans for additional requirements. Sound System Cabinet shall be mounted as shown on the detail drawings.
- 2.19 Digital Rack Mounted Mixer
 - 2.19.1 19" Rack Mountable
 - 2.19.2 All-in-One rack-style digital mixer
 - 2.19.3 Inputs: 16 mic/line (XLR/TRS combo) + 1 stereo line (RCA pin)
 - 2.19.4 Output: 16 (8 XLR + 8 TRS phone)
 - 2.19.5 Channels: 40 (32 mono + 2 stereo + 2 return)
 - 2.19.6 Aux Buses: 20 (8 mono + 6 stereo)
 - 2.19.7 Stereo Buses: 1
 - 2.19.8 Networked remote control for show setups with on-screen software editor via Ethernet

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- 2.19.9 Provide (1) Audio Interface Card (NY-64D)
- 2.19.10 Provide Yamaha TS Stage Mix and Monitor Mix Remote Software Package and APP with Apple Software interface and Apple iPad Tablet for remote mixing. Provide lockable protective wall mounted enclosure with Tablet mounted at the Activity Center Control Desk in the Activity Center Attendant Office. Software shall include all software updates up-to and including the date of final sign-off from the client.
- 2.19.11 Provide highest level of Yamaha TF firmware upgrade available at time of installation of mixer. The Mixer firmware shall be updated prior to any programming of the system. Provide a copy of the latest firmware version on a USB Flash Drive to be included with the Close-Out Package.
- 2.19.12 Contractor shall program Mixer and Tablet APP as a turn-key installation for control of the sound system. In addition to the Tablet, the Contractor shall program up to an additional (5) devices (Smartphone, Tablet, iPod, Laptop, etc.) of the City's choosing for any other Authorized Users of the Sound System.
- 2.19.13 Contractor shall allow for a minimum of 6 hours of additional programming time, above the amount allowed in the General Requirements, for changes made after the system has been installed and commissioned.
- 2.19.14 All programming shall be set up to disallow any changes to the mixer levels and system pre-sets to be done by an Administrator Level password access only. Standard users may only access live application sound processing and not be able to alter the pre-sets.
- 2.19.15 The 4-Port data outlet shall be furnished by the 27 10 00 Contractor at Sound Cabinet for Mixer and Ethernet connections. Connect mixer to network and coordinate the IP address requirements with the IT Department.
- 2.19.16 Provide (1) TF-RACK Digital Mixer with Software Apps and all TS Rack Software Packages including TS Stage Mix, TS Monitor Mix and TS Editor.
- 2.20 Provide a Wireless Wifi and Bluetooth Audio Streaming Receiver/Pre-Amp at the Sound Cabinet for Local User Input from a handheld device (Smartphone, Tablet, iPod, etc.) or wirelessly from a Laptop Computer, streaming music from the Internet and for Internet Radio station broadcasting. Streaming and Internet functions shall be controlled from a handheld device or computer with the manufacturer's APP for that purpose.
 - 2.20.1 The Wireless Wifi and Bluetooth Audio Streaming Receiver's main unit shall be installed in the Sound Cabinet, on a single 1RU shelf in the cabinet provided by the Contractor. The receiver shall be secured to the shelf using Velcro safety straps. The receiver installed outside the enclosure cabinet insures that it can clearly receive signals from the local Wi-Fi network and paired User Bluetooth devices.

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- 2.20.2 Provide (2) adjustable rack shelf straps to hold the Receiver in place and secure it to the shelf. Strap must be routed around the Receiver on the sides, not on the front/back of the Receiver where they can block any connections or indicators on the equipment. Straps shall be constructed of a nylon material, a minimum of 1" wide, with a plastic snap buckle. Provide Rack Shelf Straps as manufactured by Rack Solutions Part #1USHL-STRAP (or approved equal). Since straps come 72" in length, The Contractor shall trim off all but 12" of slack after securing the equipment to the shelf.
- 2.20.3 Provide a low-profile 1RU Universal Mounting shelf in the cabinet for the Wireless Wifi and Bluetooth Audio Streaming Receiver. Strap the Receiver to the shelf. Shelf may be used for securing power supplies or other ancillary equipment in the cabinet. Provide 11.5" Deep Universal Mounting Shelf by Middle Atlantic Model #UMS1-11.5 (or approved equal).
- 2.20.4 Route the RCA L/R Stereo Audio output on the Receiver to the Stereo Input terminals on the Matrix Switch. Set the output toggle switch to "Pre-Amp" on the output audio panel on the back of the Receiver. Provide a RCA Stereo (L/R) to ¼" bayonet Stereo (L/R) end cable to the ¼" input connection on the Mixer.
- 2.20.5 Provide IR Control extension cable to the Digital AV Matrix Switch. Connect the IR Control cable to the 3.5mm bayonet style "Remote In" port on the rear of the Receiver. The "Remote In" port on the Receiver is specifically provided for remote operations. Connect the IR Control cable to the IR Control Port on the Matrix Switch.
- 2.20.6 Contractor shall extend and mount the Bluetooth Antenna on the outside of the Sound Cabinet. The antenna connection shall be extended with a coaxial cable to the location on the outside of the cabinet. The antenna shall be installed clear of the top of the cabinet. The Contractor shall make the field modification to the cabinet and shall completely seal the penetration through the cabinet.
- 2.20.7 Provide a Category-6 patch cable from the Ethernet Switch in the Sound Cabinet to the Receiver's RJ45 network port. Set the "Wireless Switch" toggle switch on the back of the Receiver to the wired LAN port position for connectivity via the network WAPs and hard-wired connections. Coordinate with the City IT Department to insure that the system will allow for User Access from the APP on their wireless handheld devices. All connections shall be provided through the hard-wired LAN port. Coordinate IP addressing of the Receiver with the City IT Department.
- 2.20.8 Load the "Yamaha MusicCast" APP on the Apple iPad Tablet, the TLP Control Panel and the User's Smart Devices and provide training in the use of the MusicCast APP and how it is related to the exact set-up of the system for the Audio-Visual System. Load the "Yamaha MusicCast" APP on the iPad tablet and provide a page showing the APP's options.
- 2.20.9 Provide Wireless Wifi and Bluetooth Audio Receiver/Pre-Amp by Yamaha with IR Remote Control Model #WXC-50.

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- 2.20.10 Sirius Radio via the Internet Radio function on the Wireless Wifi and Bluetooth Audio Receiver/Pre-Amp, shall be furnished with a Sirius Radio Account for full access of Sirius Radio stations and full internet access through Sirius radio's APP. Contract shall include (3) years of Sirius Radio service. Contractor shall provide account information and training for access to the Staff. The Sound System shall use Sirius Radio account for the Receiver.
 - 2.20.10.1 Contractor shall provide (10) Sirius Radio station presets based on the input from the Administrative and Activity Center Staff and test all stations for proper operation.
 - 2.20.10.2 Contractor shall program (10) Internet Radio stations in addition to the Sirius Radio stations based on the input from the Administrative and Activity Center Staff and test for proper operation.
- 2.21 The 4-Port data connection shall be provided at the Sound Cabinet by 27 10 00 Contractor for Mixer and other network connections, per the floor plans. Provide a Category-6 UTP patch cable from the mixer to the data port in the Sound Cabinet, length as required.
- 2.22 Contractor shall furnish the Apple iPad Pro Tablet with the Mixer. Tablet shall be furnished with a cover case (Color as chosen by City). The Apple iPad Pro Tablet shall be furnished with the "Yamaha Mixer Apps" loaded on the tablet and fully programmed. Contractor shall insure that the latest version of the App available at the time is loaded on the Tablet device.
 - 2.22.1 Provide an Apple iPad Pro 11-inch (2022 Release) Diagonal Liquid Retina IPS Display Screen, Wi-Fi Only Model, 512-GB Memory, Apple M2 Chip (8-Core CPU, 10-Core Graphics GPU), 8GB RAM, iPad OS-16.1 Operating System, WQXGA 2388 x 1668 Resolution, 600nit Brightness and P3 Wide Color Display Range, Wi-Fi 6E (802.11a/b/g/n/ac/6e) with 2X2MIMO Wireless, Bluetooth 5.3 and Simultaneous Dual Band Operation, USB-C 4 Charging/Access Port, Li-Po 7538mAh (min.) Battery.
 - 2.22.2 Provide a full cover case for the Apple iPad Pro 11-inch Tablet - Model Smart Folio (10th Generation) Protective Cover – Color shall be Black. Tablet shall be stored with the microphones in the Storage Drawer.
 - 2.22.3 Contractor shall be responsible for all programming and set-up of the Tablet and the Yamaha TF-RACK Digital Mixer. Contractor shall submit program set-up and pre-sets for approval to Project Engineer and City IT Director prior to completing the full programming of system. Contractor shall program Mixer and Tablet as a turn-key installation for control of the sound system.
 - 2.22.4 The Tablet shall be stored in the lockable Storage Drawer in the Sound System Cabinet. Route charging cable from the power strip to the Storage Drawer so Tablet may be charged while unit is stored in the drawer.

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- 2.22.5 Provide programming presets for the Apple iPad Tablet for the Mixer DSP Software for that application. The Audio Only presets will provide built-in limitations for adjustment of the levels of the audio sources. The mixer shall be programmed with an Administrator level access that allows the Administrator to get into the fine adjustments and control of the programming. In addition, a User level access page will be programmed that will block out all but the volume levels, source selections, Mic level control and speaker output zone control. The Speakers shall be a set up with separate zones. Zones shall be programmed to operate independently or in conjunction with each other. Refer to the Amplifier and Speaker specs for the Speaker Zones.
- 2.22.6 Coordinate with the site Activity Center Director and the site Staff for additional information concerning presentation modes. The Contractor shall provide an additional (4) hours of programming of Mixer and iPad to be used for extra requirements after the initial set-up has been completed and system is actually in use by the City. The extra hours shall be used after all of the initial programming has been completed and the system has been tested.
- 2.23 Provide Extron TLP Pro 1025M Control Panel with #TLPA1 TouchLink Control Port Expansion Adapter (shown as the symbol "LC") with Custom Backbox at the location shown on the drawings for control of the Sound System Components and basic Sound functions from the Mixer. CoActivityehensive control functions for the Mixer shall be run from the Apple iPad Tablet with the Mixer APP. Control Panel shall be furnished with Extron LinkLicense for TLP Control Processor.
 - 2.23.1 Provide selection pages for the each of the (2) Laptop DTP Input Wallplates. Each of the HDMI Inputs on the Dual HDMI Wallplates shall be provided with a different identification name to differentiate which input is being controlled. Even though only one of the two inputs may operate at a time, it is possible to toggle between them.
 - 2.23.2 Provide selection pages for the Wifi/Bluetooth Audio Streaming Receiver/Pre-Amp, Blu-Ray Player and Projector on the control panel. Each of the Active Device input pages shall provide additional pages for full control of the device's features. Pages for the Wifi/Bluetooth Audio Streaming Receiver/Pre-Amp, Blu-Ray Player and Projector shall provide all control buttons such as play, stop, pause, search, Input/Output selection control etc.
 - 2.23.2.1 Contractor shall provide all programming codes for the device controls. If the device is not already provided with the proper code from Extron, the Contractor shall contact Extron and place a service request to have the codes written. All costs associated with code development shall be the responsibility of the Contractor and shall be included in the bid costs. Programming codes shall allow for complete button functionality emulating the device's Remote Control.
 - 2.23.2.2 Each Page on the Control Panel shall have a "Home", "Volume Up", "Volume Down" and "Mute" Button. The "Home" Button shall take the User back to the first opening Control Page.

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- 2.23.2.3 Each Page shall have a Power Up/Power Down button that triggers the Power Sequencer in the Sound System Cabinet for controlled power to the sound system equipment.
- 2.23.3 Provide control buttons for operation of the projection screen. The screen shall also be programmed to automatically drop when the projector is turned on and close when the projector is powered down. The system may be operated without the screen or projector for audio only operation.
- 2.23.4 Control Panel shall also be provided with Control Pages for Presets based on the type of presentation function desired such as; Meetings, Presentations, Banquets, Background Music and Sound System Reinforcement, etc. Confirm all programming and labeling requirements with the City prior to installing the software changes on the Control Panel. All page designs and flow charts shall be submitted for approval to the Project Engineer and the City Project Manager prior to installation.
- 2.23.5 The Control Panel shall also be programmed to allow zoning control of the system speakers, based on the presentation function chosen. Pages shall be programmed to allow presentation modes such as Presentation, Meeting, etc. based on input from the City. Each Speaker Zone shall be able to be used separately, together or simultaneously. Volume control of the speakers shall be provided on the Control Panel.
- 2.23.5.1 Exterior Speakers at Exterior Courtyard shall be set up on the Mixer and in the Control Panel Pages as a separate zone. The speakers may be used with or without the Main Speakers and Subwoofer.
- 2.23.6 Program the Laptop Computers to show a quick link on screen for emulation of the TLP's control buttons using the Extron APP. Presenter shall be able to control input access from either the TLP Control Panel or from iPad Tablet.
- 2.23.7 Provide Custom Recessed Mounted kit for the TLP Control Panel by Extron Model #RWM 2. The 27 20 00 Contractor shall furnish and install the custom Recessed Mount kit. Coordinate the installation so as to not delay the Division 26 Contractor for conduit installation during the rough-in phase of the construction. Refer to the manufacturer's recommendations for the size and depth of the Backbox installation. Conduit shall be stubbed off in the wall behind the mount by the Div. 26 Contractor.
- 2.23.8 The "Main Projector" Page on the control panel shall be furnished with Power "On/Off", full control of the Inputs/Outputs, focusing, aspect ratio and zooming, and basic functions of the projector. Advanced control pages will not be required.
- 2.23.9 The Integrated IPCP Control Processor in the Matrix Switch shall be used for Infrared (IR) and RS-232 Control as well as any required Control Contact Closure connections of the system components. Connect the equipment to the Matrix Switch as shown in the Audio-Visual System Diagram in the detail drawings.
- 2.23.10 Contractor shall provide a control cable from the Sequencer to the TLP Control Panel Port Expansion Adapter. Connect to the Contact Closure Port

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and program the Control Panel for activation of the Sequencer with a Normally Open or Normally Closed Contact based on the Sequencer manufacturer's instructions.

- 2.23.11 Contractor shall download and provide the Wifi/Bluetooth Receiver's User APP and the Extron DSP User APP on the Control Panel. Provide additional User APPs as required by the specifications. Coordinate with the Owner for additional requests for specialized APPs required for the District or Local School
- 2.23.12 The 27 20 00 Contractor shall provide a Category-6 Cable connection to the TLP Control Panel from the Sound Cabinet location. Connect the TLP Control Panel to a POE-Powered Ethernet Port on the Contractor furnished Gigabit AV Ethernet Switch in the Sound Cabinet and confirm that the port is activated. Coordinate the installation with the City IT Department for the IP Address functions and for access to the School's LAN.
- 2.24 (1) 4-Channel Power Amplifier for the All Speakers and Subwoofer:
 - 2.24.1 Power Output per Channel - 1500W @ 4-ohms
 - 2.24.2 Power Output per Channel - 1500W @ 8-ohms
 - 2.24.3 Power Output per Channel - 3000W @ 4-ohms bridged per channel pair
 - 2.24.4 Power Output per Channel - 1500W @ 70-Volts
 - 2.24.5 Frequency Response – 7Hz to 30kHz @ 4-Ohms, -2.5dB points
 - 2.24.6 Each Front Mains Speaker shall be connected to the amplifier, one per channel, at 8-ohms each, attaining stereo mode for speakers. Set limiters on the amplifier at 1200 watts for the channels connected to the Front Mains Speakers. Each individual speaker shall be wired to the amplifier on a separate channel at 1200W @8-Ohms. Do not overdrive speakers.
 - 2.24.7 Subwoofer shall be connected to the amplifier, (1) Subwoofer per channels at 8-ohms each. Set limiters on the amplifier at 1500 Watts for the channel connected to the Subwoofer. Subwoofer shall be wired to the amplifier connected to channel 1500W @8-Ohms.
 - 2.24.8 Exterior Outdoor Courtyard Speakers shall be connected to the amplifier @70V on the last channel. Set delays on fill speakers to insure timing matches Mains Speaker levels. Tap Speaker "Autoformer" Transformer @100 Watts each.
 - 2.24.9 Built-in DSP Processing Functions - Set DSP functions in the amplifier to match the speaker/subwoofer ratings to the amplifier channel. The DSP setting shall also be set to provide optimal performance for the Activity Room Space and adjusted during the commissioning of the system.

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- 2.24.10 Confirm and coordinate the power receptacle requirements with the Division 26 Contractor. Amplifier connects to 120V/30A Juice Goose POD in the rear of the Cabinet.
- 2.24.11 Linea Research Model # 44C06
- 2.24.12 Amplifiers shall be pre-set to limit the output to a maximum of the Speaker/Subwoofer's Program rating that is attached to the individual channel on the amplifier. The programming panel shall be furnished with a lockout password to deter alteration by unauthorized users.
- 2.25 Provide (1) Roll-out Rotating equipment cabinet with fixed base and pivoting equipment area:
 - 2.25.1 Height 89" x 33" overall depth (26" usable depth) x 24 width
 - 2.25.2 Provide solid front locking solid door
 - 2.25.3 (1) cabinet fan and control system, Model QBP-2A fan panel (120V, 100CFM, 32dB, Anodized)
 - 2.25.4 Automatic thermostatic fan control, Model #FC-2-215CA
 - 2.25.5 Provide side vent blockers for the vents on the top portion of the cabinet
 - 2.25.6 Blank panel – Middle Atlantic #SB-1 – Fill in all open spaces with blank panels
 - 2.25.7 Middle Atlantic #WR-44-32 series (or approved equal)
- 2.26 Rack Mounted Sequenced Power Control System in AV Cabinet
 - 2.26.1 Power Switched/Sequenced outlets for complete activation and shut down control via the rack mounted controller.
 - 2.26.2 Connect the rack mounted PDU/Controller to the sequenced power control "Pods" mounted in the rear of the AV Cabinet. See detail drawings for additional information. The Contractor shall be responsible for setting the proper sequencing for all Pods connected to the PDU/Controller and for all of the devices connected to the "Pods".
 - 2.26.3 The "Pods" shall be connected to the PDU/Controller with an Eight-wire, RJ45 low voltage patch cable. The patch cable connections do not follow standard EIA/TIA or BICSI standards for the wiring configuration. DO NOT USE CAT-5E or CAT-6 type data patch cables for the connections from the "Pods" to the PDU/Controller. Refer to the manufacturer's installation practices and manual to insure the proper wiring configuration to use.
 - 2.26.4 Rack Mounted PDU/Controllers; Provide (2) 19" rack mounted 120V 20-Amp PDU/Controllers with (3) sequenced duplex receptacles and (1) unswitched single receptacle on the rear of the PDU. PDU/Controller shall have a built-in circuit

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breaker, AC line surge protection, a multi-stage AC line filter and three event sequencing ability. PDU/Controllers shall be furnished with a 120V, 20-Amp, L5-20P input plug with 10-foot single phase power cord connection. Provide PDU/Controllers as manufactured by Juice Goose Model #CQ-1520 (or approved equal). Plug PDU/Controllers, one each into the (2) duplex receptacles in the rear of the cabinet.

- 2.26.5 Sequenced Power Control Pod; Provide (1) sequenced power control "Pod" in the rear of the AV cabinet to provide a sequenced power connection for the amplifier. Provide (1) 120V, 30-Amp "Pod" with (1) 30-Amp twist-lock receptacle in a self-contained junction box hard-wired to a 120V, 30-Amp circuit. "Pod" shall be connected to the CPU/Controller with the low voltage control patch cable. Provide sequenced power control "Pod" as manufactured by Juice Goose Model #CQ3000 (NEMA L5-30R). (or approved equal)
- 2.26.6 Power Strip; Provide (1) power strip for power to plug in the low powered equipment. The power strip shall be plugged into one of the PDU/Controllers so that the equipment connected to it may be brought up in the proper sequence. Mount in the rear of the cabinet. Power strip shall be provided with a 3-year warranty. Provide (1) Juice Goose Model #JG11.20. (or approved equal) Refer to the detail drawings for additional requirements.
- 2.26.7 Provide (2) 120V, 20-Amp duplex receptacles and (1) 120V, 30-Amp hard-wired 120V, 30-Amp circuit in the rear of the AV Cabinet for Sound System power connections. Contractor shall coordinate with the 260000 Electrical Contractor for location of duplex receptacle and hard-wired connections to the "Pods" in the rear of the AV cabinet.
- 2.26.8 (1) PDU/Controller shall be mounted in the cabinet, just above the amplifiers. (1) PDU/Controller shall be mounted in the cabinet, just above the Mixer and the power strip shall be mounted in the rear of the cabinet on the rear rack rails in a convenient location for plugging in the low powered equipment
- 2.26.9 Amplifier shall be connected to the Sequenced Power Control Pod, FIRST, then Mixer and other equipment shall be connected to the PDUs and power strip. Contractor shall evenly distribute the power requirements across the PDU circuits. Connect other equipment as shown in the Sound System Power Diagram.
- 2.26.10 Contractor shall furnish the Project Engineer with a detailed summary of the electrical connections to the PDU/Controller and sequencing Pod and the proposed outlet sequence to show proper delay for system start-up and shut down.
- 2.26.11 The Ethernet Switch, iPad Tablet Charger, LED Light, AV Matrix Switch and Microphone Battery Chargers in the AV Cabinet must not be plugged into any power sequencer or any outlet controlled by the sequencers. The Ethernet Switch, Android Tablet Charger and Microphone Battery Chargers shall be plugged directly into the Power Strip in the AV Cabinet as shown in the Sound System Cabinet Power Diagram.

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2.27 Provide wireless microphone system consisting of the following:

2.27.1 Digital Wireless Combo Quad Channel Systems Package by Shure Model #ULXD4Q (Or approved equal by Sennheiser). Provide Receiver with rack mount kit. All Digital Wireless System components shall be frequency matched.

2.27.2 Provide of extension of the Antennas for both Channels "A" & "B" from the Receiver. Provide antenna cable, cable type as required to reduce the gain loss, for the Antenna extension. Length of cable shall be as required. Routes cables from the Receiver to the antenna locations mounted in the Activity Room, as indicated on the drawings. Provide (2) Model #PA805 Directional Antennas. Antennas shall be placed where indicated on the floor plans.

2.27.3 Provide (4) Shure #ULXD1 Digital System Body Packs with ¼ wave antenna and frequency/power lockout. Body Packs shall be furnished with Model #SB900A Lithium-Ion battery with 9-hour battery life.

2.27.4 Digital System Body Packs shall be furnished with (2) #WL185 cardioid (130° Pickup) lavalier microphones and (2) Model #WCM16 Headworn Electret Condenser Microphones.

2.27.5 Provide (2) Shure #ULXD2 with SM58 (RPW112) Cardioid Cartridges and (2) Shure #ULXD2 with VP68 (RPW124) Omni-Directional Cartridges Digital System Handheld Microphones, On/Off/Mute Switch and frequency/power lockout. Body Packs shall be furnished with Model #SB900A Lithium-Ion battery with 12-hour battery life. Provide each Microphone with Model #A85WS Microphone Windscreen.

2.27.6 Provide Handheld Microphones each with Model #A58WS #A85WS Microphone Windscreen and Model #WA371 Microphone Clip.

2.27.7 Provide (4) Spare Model #SB900A Lithium-Ion batteries

2.27.8 Provide (1) Shure Model #SBRC Rack-Mount Battery Charger with (4) #SBC-AX Charging Modules for the Rack-Mount Battery Charger. All Charger Modules shall be provided with power cables.

2.27.9 Microphones and Body Packs shall be provided with storage bags. All microphones shall be stored in the lockable Storage Drawer.

2.28 Provide (2) Hard-Wired Handheld Microphones with minimum frequency response of 50Hz to 18kHz. Microphone shall have on-off switch with lock "on" feature and adjustable swivel adapter;

2.28.1 Provide Microphone Clip and Wind Screen for each microphone.

2.28.2 Provide (2) Shure Model #SM58S Cardioid Element Handheld Microphones. (Or approved equal by Sennheiser)

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- 2.29 Provide (2) full height microphone stands with booms;
 - 2.29.1 (2) "Ultimate" #Pro-X-T-T with telescoping boom (or approved equal)
- 2.30 Provide microphone input wallplates in the ACTIVITY Room where shown on the floor plans.
 - 2.30.1 Input wallplates shall be female XLR connections and wired directly to the mixer in the AV Cabinet. Wallplates shall be Decora style to match the color of the Audio-Visual input wallplates.
- 2.31 Mic Cables: Provide (2) 15'-0", (2) 25'-0" and (2) 50'-0" long, constructed with Canare L4E6S cable, 95% braid, shielded cable assemblies. Provide Microphone cable assemblies as manufactured by Whirlwind, Model MKQ Quad. (or approved equal)
- 2.32 Microphone Jacks: Provide Switchcraft J3FS or Neutrik wall jacks per drawings (or approved equal)
- 2.33 Provide a total of (2) Front Mains Speakers mounted to the wall at the front of the Activity Room, positioned where shown on the floor plans. The wall mounted support brackets shall be mounted per manufacturer's instructions and detail drawings and anchored to the wall. Contractor shall provide all hardware including wall mount brackets, safety cables and anchoring systems. The support brackets shall match the hole pattern of the speaker. Coordinate with the Architect and Structural Engineer for the backing required in the wall to support the weight of the Speaker. All hardware shall be minimum hardened Grade #5. Shown on floor plans as TYPE "A".
 - 2.33.1 Full range, passive two-way high output Loudspeaker
 - 2.33.2 15" LF woofer with 4" Voice Coil
 - 2.33.3 HF Driver - 1.4" exit with 3" voice coil coActivityession driver
 - 2.33.4 Rotatable Constant Directivity Horn
 - 2.33.5 Program Power rating 1200 watts @ 8 ohms (2400W Peak)
 - 2.33.6 Coverage pattern 60-100° horizontal x 60° vertical (Adjust Proper Coverage Pattern for the Room)
 - 2.33.7 Maximum 30" high x 18" wide x 15" deep x 77 Lbs., Black Finish
 - 2.33.8 Provide Speakers by Yamaha Pro Audio Model #IF2115/AS
 - 2.33.9 Provide Adaptive Technologies Group Model #MM-120 Wall Mount with Lateral Orientation and Vertical Tilt capability as shown in detail drawings. Provide Speaker mounting plate to match speaker hole pattern.

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- 2.33.10 Provide braided steel type safety cable attached to support bracket mounting plate behind speaker. Refer to drawing details for additional information.
- 2.34 Provide a total of (1) Subwoofer, flown on the wall at the front of the Activity Room, positioned where shown on the floor plans. Subwoofer shall be mounted at the height shown on the floor plans. The support brackets shall match the hole pattern of the Subwoofer, as recommended by the manufacturer. Coordinate the proper brackets with the Subwoofer prior to ordering. Contractor shall provide all hardware including wall mount brackets, flying cables, safety cables, and anchoring systems. Subwoofer must have the ability to be adjusted to be aimed both horizontally and vertically to adjust the angle of the speaker coverage. Coordinate with the Architect and Structural Engineer for the backing required in the wall to support the weight of the Subwoofer. All hardware shall be minimum hardened Grade #5. Shown on floor plans as TYPE "B".
 - 2.34.1 Compact Low Frequency subwoofer system
 - 2.34.2 18" low frequency cone loudspeaker with 4" voice coil
 - 2.34.3 Power rating 1400 watts @ 8 ohms (Peak 2800 Watts)
 - 2.34.4 Maximum 24" high x 24" wide x 28" deep x 97 Lbs., Black Finish
 - 2.34.5 Provide subwoofers by Yamaha Pro Audio Model #IS1118
 - 2.34.6 Provide Polar Focus Single Arm Speaker support as shown in drawing details
 - 2.34.7 Provide braided steel type safety cable attached to wall or to support bracket behind speaker. Refer to drawing details for additional information.
- 2.35 Provide (2) Exterior-Rated Outdoor Speakers mounted to the outside wall of the building at the South End of the Activity Center in the Covered Courtyard. Speakers shall be installed at the locations as shown on the floor plans. Speakers shall be wall mounted using the manufacturer recommended wall mount brackets and installed as shown in the drawing details. Speakers must have the ability to be adjusted to adjust the vertical coverage, aim speakers for the angle of the desired speaker coverage. Contractor shall provide all hardware including wall mount brackets, vandal-resistant hardware, safety cables and anchoring systems. Shown on Activity Center floor plans as TYPE "C".
 - 2.35.1 Passive Two-way High-Output surface mounted loudspeaker
 - 2.35.2 LF 6.5" Ferrite Driver with 1.5" Voice Coil
 - 2.35.3 HF 1 x 1" (25mm) direct radiating damped fabric dome diaphragm, ferrofluid and heatsink-cooled dual-neodymium motor
 - 2.35.4 Weather-resistant construction with powder-coated grilles and protected wiring ingress
 - 2.35.5 Power rating 500 watts (Program) @ 8 ohms

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- 2.35.6 Coverage pattern Conical coverage pattern of 100° Horizontal X 100° Vertical
- 2.35.7 Speaker shall be mounted Vertically, rotate horn as required to maintain proper coverage pattern
- 2.35.8 Maximum 14.3" high x 8" Wide x 9" Deep, 17 Lbs (With Bracket), White Finish
- 2.35.9 Community Model #IC6-1062WT00 Outdoor Rated Speaker – Color shall be Black (Unless otherwise directed by City).
- 2.35.10 Provide Speakers with Optional “Autoformer” Transformer for operation @70V
- 2.35.11 Provide Outdoor Rated Wall Mount U-Bracket by Biamp Community Model #IUB-1062. Anchor to the wall per the detail drawings.
- 2.35.12 Attach safety cable to M6 Threaded insert on rear of speaker and wall as shown in the detail drawings. Refer to drawing details for additional information.
- 2.35.13 Outdoor Speakers shall be zoned separately from the Main Speakers and Subwoofer Indoor Speakers in the Activity Room. Speakers may be with or without the Main Speakers.
- 2.35.14 Route speaker wire neatly from the junction box to the speaker. Junction box shall be furnished with a weather-tight gasketed blank stainless steel cover plate with a ½” hole for the cable to pass through. Seal all openings after speaker installation. Leave slack for future maintenance in the nearest J-Box.
- 2.35.15 Refer to Activity Center Sound System Diagram for additional information
- 2.35.16 All hardware shall be stainless steel and minimum Grade 5
- 2.36 A complete Assistive Listening system shall be integrated into the sound reinforcement system. Mount the transmitter in the audio-visual cabinet. Adjust as required for total coverage of seating area. Antenna shall be wall mounted on the front wall in the Activity Room where shown on the drawings. Provide Listen Technologies Model Assistive Listening System package shall include;
 - 2.36.1 Assistive Listening Systems shall be provided in accordance with CBC Section 11B-219 and shall comply with CBC Section 11B-706.
 - 2.36.2 Per ADA Assistive Listening System CBC Section 11B-706.3 – “The minimum number of receivers to be provided shall be equal to 4% of the total number of seats, but in no case less than two. 25% minimum of receivers provided, but no fewer than two, shall be hearing aid compatible.

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- 2.36.3 If the system provided is limited to specific areas or seats, then such areas or seats shall be within a 50-foot viewing distance of, and have a complete view of the stage or playing area per CBC Section 11B-219.4
- 2.36.4 (1) Transmitter - Listen technologies LT- 803-072-01
- 2.36.5 (12) Receivers with integrated neck loop/lanyard with ear speaker - Listen technologies LR-5200-072-P1
- 2.36.6 (1) Antenna - Wall Mount antenna with antenna cable extension to the location shown on the floor plans from the Sound Cabinet
- 2.36.7 (1) Transmitter rack mount assembly
- 2.36.8 (1) Carrying and charging case for receivers – LA-311
- 2.36.9 (5) ADA Signs for entrances to the Activity Room – Model LA-303 - To be installed by the 27 20 00 Contractor at locations designated by the Architect
- 2.36.10 (2) Packs of disinfecting wipes Model #LA-901.
- 2.36.11 Provide a sterilization kit of 100 wipes for the ear buds, Model #LA-902 (provide total of 5-20 count individually wrapped wipes).

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- 2.37 Install Digital AV Matrix Switch in the sound system cabinet. All audio and video from the Interface wallplates in the Activity Room, Wireless Wi-Fi/Bluetooth Audio Streaming Receiver/Pre-Amp and the Blu-Ray Player in the AV Cabinet shall be routed to the Digital AV Matrix Switch. The video and audio outputs from the matrix switch shall be routed to the Projector and Sound System Mixer respectively. Refer to the Activity Room AV Diagram for additional requirements.
- 2.38 Laptop Interface Locations; Provide (2) Laptop interface (LO) connections at the locations shown on the floor plans. Provide Dual HDMI Input connections at the wallplate. Provide (2) Extron Model #DTP T HWP 4K 232 D Wallplates for Video and Audio connections to the Digital AV Matrix Switch in the AV cabinet. Provide Extron Cat-X cables from the wallplates to the Digital AV Matrix Switch in the AV Cabinet.
- 2.39 Contractor shall furnish and install the Extron HDMI Ultra Series High Speed Patch Cables for the Laptop Input (LO) wallplate locations. Provide a total of (2) HDMI Patch Cables for the (LO) wallplate connections. Refer to the Audio-Visual Patch Cables Section for requirements. All patch cables shall be 12 feet in length at the (LO) Input Wallplate locations.
 - 2.39.1 Provide (1) HDMI to DisplayPort Adapter for the Input Wallplate locations. The Adapter shall be a female HDMI to Male DisplayPort dongle as manufactured by Star-Tech and shall support 4K Active DP 1.2 to HDMI. Provide Star-Tech Model #DP2HD4KS (or Approved Equal).

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- 2.39.2 Provide (1) HDMI to USB-C Adapter for the Input Wallplate locations. The Adapter shall be a female HDMI to Male USB-C dongle as manufactured by Star-Tech and shall support USB-C to HDMI 2.0 Adapter - 4K 60Hz. Provide Star-Tech Model # CDP2HD4K60 (or Approved Equal).
- 2.40 Provide HDMI and/or Stereo Audio connections for the equipment in the AV Cabinet, as shown in the AV Wiring Diagram to the Digital AV Matrix Switch in the rack. Provide RS-232/IR Control for all equipment from the #IN1608 xi IPCP Q SA Matrix Switch via the built-in IPCP Pro Controller.
- 2.41 Provide an Eight Input HDCP-Compliant Scaling Presentation Switcher with DTP Extension, HDMI/HDBT, Audio-Visual Matrix Switch with IPCP Controller, Integrated 3-Port AV LAN Switch and Stereo Audio Amplifier for Distribution of the digital video and audio signals for the Activity Room. Switch shall be furnished with the LinkLicense Option.
 - 2.41.1 Provide HDMI, DTP, Ethernet, Control and/or Stereo Audio connections for the equipment in the AV Cabinet to the Matrix Switch in the Cabinet as shown in the AV Wiring Diagram. Provide RS-232 or IR Control for all equipment shown in the AV Diagram from the Matrix Switch's integrated IPCP Controller. Route the RS-232 or IR control cabling from the Matrix Switch to the control port on the equipment. Provide Ethernet Switch Port connections to the Matrix Switch to the Control Panel and Data Outlet.
 - 2.41.2 The switch shall be provided with HDMI, DTP and VGA Video/Embedded Audio Inputs and HDMI, HD Base-T and DTP Video/Embedded Audio outputs, IR and RS-232 controls, 4-Port Ethernet Switch and 50W Stereo Amplifier.
 - 2.41.3 The AV Switch shall be provided with an Ethernet LAN connection from the Campus LAN Data Outlet in the Audio-Visual Cabinet. Provide Cat-6 patch cable from 4-Port Data Outlet to AV Matrix Switch.
 - 2.41.4 Provide an Extron Cat-X Cable from the Matrix Switch's DTP output to the DTP Receiver at the Projector location. The cable connection shall be used to provide the HDMI video and RS-232 control to the Projector from the Matrix Switch. The cable shall be terminated at the Matrix Switch and connected to the DTP Receiver at the Projector location. Terminate cable at the DTP Receiver and Matrix Switch.
 - 2.41.5 Provide Extron Cat-X cables to the Matrix Switch's DTP Input Ports from the DTP Laptop Wallplate locations. The cables shall be terminated at the wallplate and Matrix Switch. Provide an Extron Dual HDMI Input wallplates at the Local Origination (LO) locations shown on the floor plans and in the Activity Room AV System Diagram.
 - 2.41.6 Provide Stereo Audio and Balanced Audio Input cables from the Wifi/Bluetooth Streaming Receiver and Blu-Ray Player respectively to the Matrix Switch. Provide HDMI Video Cable from the Blu-Ray Player to the Matrix Switch in the Sound Cabinet. The Matrix Switch shall serve as the main controller and router for the audio and video signals from the AV equipment unless otherwise shown in the ACTIVITY Room AV System Diagram.

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- 2.41.7 The Main Balanced Audio Output from the AV Matrix Switch shall be routed to the Mixer in the AV Cabinet. Refer to the Activity Room AV System Diagram for additional requirements
- 2.41.8 Contractor shall furnish the Extron LinkLicense Option for the Matrix Switch for Secondary Control of the Activity Room AV System from a Tablet, Laptop or Smart Phone. The LinkLicense will be utilized for secondary control loaded and configured on the Contractor Furnished Tablet or Owner Furnished Laptop or Smart Phone. Coordinate with the City Project Manager for devices to be provided with the APP. Contractor shall program up to (3) Owner's Devices with the Extron Control APP.
- 2.41.9 Provide the Eight Input HDCP-Compliant Scaling Presentation Switcher with DTP Extension in the AV Cabinet by Extron IN1608 xi IPCP Q SA with LinkLicense.
- 2.42 Provide a DTP Receiver at the Projector location for transmission of the Video and Control signals to the Projector. Provide Extron DTP Receiver Model #DTP HDMI 4K 230RX. Power for the DTP Receiver shall be furnished from the AV Matrix Switch. Connect the HDMI Output and RS-232 Control Port from the DTP Receiver to the Projector HDMI Input and RS-232 connection. Contractor shall furnish and install the HDMI patch cable at the minimum length required. See Patch Cable section for patch cable requirements. Provide Extron Cat-X Cable from the AV Matrix Switch location in the Sound Cabinet to the DTP Receiver at the Projector location.
 - 2.42.1 Contractor shall furnish and install the Extron HDMI Ultra Series High Speed Patch Cable a minimum 3-Feet in length for the HDMI connection from the DTP Receiver to the Projector.
 - 2.42.2 The DTP Receiver shall mounted to the PMK155 Adapter Plate on the Projector Mount Pole. See the Projector requirements in the specifications.
- 2.43 Provide a Blu-Ray Player mounted in the AV cabinet.
 - 2.43.1 The Blu-ray Player's HDMI output shall be routed to the Matrix Switch as an input device. Provide HDMI patch cable, length as required, for the connection to the Matrix Switch and balanced audio output to Matrix Switch.
 - 2.43.2 Provide RS-232 control of the Blu-Ray Player from the TLP Control Panel. Provide control cabling to the Digital Matrix Switch from the Blu-ray Player.
 - 2.43.3 Provide full control of the Blu-Ray Player from the TLP Control Panel and Tablet. Control Panel pages shall include full Internet Access options as well as basic functions such as Stop, Pause, Start and On/Off.
 - 2.43.4 Provide a Category-6 UTP patch cable to the Ethernet Switch from the Blu-Ray Player for LAN and Internet access. Test Player to insure full functionality is attained and the Player can play back media as well as connect to the internet. Downloading internet content shall be coordinated with the District IT Department.

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- 2.43.5 Provide a low-profile shelf in the AV Cabinet to hold the Blu-Ray Player. Provide shelf as manufactured by Middle Atlantic Model #UMS1-11.5 or approved equal. Strap the Player to the shelf with Velcro tie material.
- 2.43.6 Provide Blu-Ray Player as manufactured by Denon Model Tascam Model #BD-MP4K (Or Approved Equal).
- 2.44 Provide Ethernet switch in the Audio-Visual Rack exclusively for the AV system component connections. The audio-visual system components shall all be connected to the same switch unless otherwise noted on the drawings and wiring diagrams.
 - 2.44.1 Managed Ethernet switch shall be provided with (12) 10/100/1000 POE network ports, with a minimum of (2) Uplink ports on the rear and (10) POE+ powered ports on the front panel. Each port shall have Gigabit Ethernet network connection capability. Switch shall be rack mounted in the back of the cabinet on a rack mounted adapter panel by the manufacturer. Contractor shall furnish and install rack mount panel. Provide Luminex Model #GigaCore 12 Ethernet switch with Optional 150W POE Power Supply Model #LU 01 00051-GC12. (or approved equal).
 - 2.44.2 Provide Category-6 UTP patch cables as required to provide a full turn-key installation for the audio-visual system. See AV Wiring Diagram for additional requirement.
 - 2.44.3 Provide Ethernet connections to the Blu-Ray Player, AV Matrix Switch, TLP Control Panel, WI-Fi/Bluetooth Receiver and 4-Port Data Outlet.
- 2.45 All wall plates shall be the Extron Decora style for Audio/Video input locations. Provide a Decora trim ring as required at each location. Color of plates is to be confirmed by the Contractor prior to installation. Refer to the AV wiring diagram for input locations and wallplate requirements.
- 2.46 Contractor shall test all equipment for each system to insure proper operation with Laptop Input Wallplates and all other input devices from the AV cabinet.
- 2.47 Tie the audio from all sources and microphone outlets into the sound system cabinet and provide control for the audio and microphone inputs to work in conjunction with the video from the projector. Provide level control at the mixing board for the sources. Label clearly on mixing board and set up all programming for the Tablet Mixer controls.
- 2.48 Projector shall be Contractor Furnished and installed. Provide (1) projector and (1) lens for the projection system in the Activity Room. The Laser Projector shall be as manufactured by Epson, Model Pro EB-PU2216W, 3LCD, 16,000 Lumens (ANSI), 1920X1200 Native Resolution @16:10 Aspect Ratio (or approved equal) with Model #ELPLM11 Middle Zoom #4 Lens (based on actual throw length required). The projector shall be provided with all mounting systems and control systems.
 - 2.48.1 Contractor shall field verify lens required for the application prior to ordering the projector and lens. The installation throw distance is required to be confirmed and

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may require moving up or down to the next lens model based on the actual location of the projector.

- 2.48.2 Contractor shall refer to the drawing details for the installation requirements for the projector. The projector mount shall be anchored to the structure and connected to the joists in the ceiling as shown in the drawing details or as required by the Structural Engineer Mounting Details.
- 2.48.3 Detail drawings are intended to provide a minimum requirement for structural support and are to be used as a guideline. The Contractor shall be responsible for final design and installation of the projector structural support that shall meet at least the minimum requirements shown in the details. Contractor shall submit the installation details to the Project Engineer for approval prior to installation. The Contractor shall confirm the existing structural members that will be used for support of the projector and the projector mounting system.
- 2.48.4 Provide heavy duty projector wall mount mounted to the structural members of the wall with bracing as shown in the drawing details. Refer to the details for additional information on the projector installation and mounting requirements. Height of support shall be as shown on the floor plans. Provide heavy duty projector wall mount arm support as manufactured by Chief Manufacturing, Model #WMA2S. (or approved equal). Provide length of 1.5" NPT Adjustable Column Pole by Chief CMS Series as required to install the Projector. Pole must be a minimum of 9" in length to attach Extron DTP Receiver Adapter Bracket.
- 2.48.5 Projector shall be provided with a Heavy-Duty Universal Mount for attachment to the 1.5" NPT Support Pole. Provide Premier Mounts Model # PBM-UNI in white finish. Mount shall have 360° of rotation when used with NPT Pipe, +/- 6° of Tilt and +/- 3° of roll with positive locking of set angles. (No Approved Equal)
- 2.48.6 If the specified projector has been discontinued or out-of-production at the time of installation, the Contractor shall submit a viable alternative for approval by the Project Engineer, with a copy of the projector product cut sheets, image calculator and recommended lenses. Associated cost or change order requests shall be approved by the Project Engineer prior to ordering the proposed replacement.
- 2.48.7 Projector shall be furnished with a minimum (5) year warranty from the manufacturer. If the projector is not furnished with a warranty period of (5) years, the Contractor shall furnish the additional warranty coverage in the project to bring the warranty up to the required period.
- 2.48.8 If the specified projector has been discontinued or out-of-production at the time of installation, the Contractor shall submit a viable alternative for approval by the Project Engineer, with a copy of the projector product cut sheets, image calculator and recommended lenses. The calculation must show the foot-lamberts brightness on the projection screen for the proposed replacement. Associated cost or change order requests shall be approved by the Project Engineer prior to ordering the proposed replacement.

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- 2.49 Provide Extron DTP Receiver Adapter Bracket at the projector location. Mount DTP Receiver to the 1-1/2" NPT mounting pole with the adapter mounting bracket by Extron Model #PMK 155. Match color of the bracket to the mounting pole. Refer to the AV Wiring Diagrams for the exact receiver configuration. The cables to the projector shall be dressed into the cable pathway on the projector mount.
- 2.49.1 Furnish and install a High-Speed HDMI Patch Cable to the Projector from the DTP Receiver. Refer to the DTP Receiver section for the HDMI patch cable requirements. Patch cable shall be neatly dressed with Velcro ties.
- 2.49.2 Furnish an RS-232 cable from the DTP Receiver to the RS-232 Control port on the Projector. Patch cable shall be neatly dressed with Velcro ties.
- 2.50 Provide electric front projection, tab tensioned screen wall mounted at the front of the Activity Room where shown on the drawings. Contractor shall provide all hardware including, but not limited to, Unistrut Support, hardware, support systems and brackets per detail drawings. Detail drawings are intended to provide a minimum requirement for structural support and are to be used as a guideline. The Contractor shall be responsible for final design and installation of the projection screen structural support that shall meet at least the minimum requirements shown in the details. Contractor shall submit the installation details to the Project Engineer for approval prior to installation.
- 2.50.1 Projection screen shall be ordered with an additional set of mounting brackets for support of the center section of the screen.
- 2.50.2 Coordinate the screen location with the installation of the projector. Screen shall be mounted to allow for the projector to be mounted with the proper image drop of the screen's usable image area or with a drop as recommended by the manufacturer's throw calculator. Screen must be aligned with projector to create the proper image size and orientation.
- 2.50.3 Mount screen to the structural members of the wall and bracing. Refer to the Architectural Drawings for structural support members. Contractor to field verify the exact conditions prior to installation of the screen.
- 2.50.4 Contractor shall provide screen control wiring and low voltage control wallplate at the location shown on the drawings. Provide connection to the Draper Internal LVC-IV Internal Low Voltage Module from the Wall Mounted Control Switch.
- 2.50.5 Provide conduit sizes as indicated on the floor plans.
- 2.50.6 Draper Model "Acumen XL V Series" projection screen, 105" High by 168" Wide by 198" Diagonal at 16:10 aspect ratio loaded with front projection screen surface by Draper Model "Techvision CS1200X ALR" with a 1.2 Gain. (or approved equal). Provide with (1) additional set of mounting brackets.
- 2.50.7 Provide quantity of blackout drop at the top of the screen as required to allow for the proper image size and location, minimum of 6" of blackout. The amount of blackout required will be based on the final installation height of the screen and must be verified prior to ordering the screen. Image area must be able to be

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dropped to allow for full use of the screen. Field verify dimensions and blackout requirements prior to ordering the screen.

2.50.8 Provide Draper Internal LVC-IV Internal Low Voltage module option with RS-232 Control for remote control of the screen from the Matrix Switch and Control Panel. Provide cabling from the screen control module to the Digital AV Matrix Switch in the AV Cabinet and the Manual Screen Control via the conduits/raceway located at the projector. See the floor plans for further information. Provide the 3-Button Low Voltage Wall Switch for control of the screen manually.

2.50.9 Provide cabling from the Internal LVC-IV Internal Low Voltage module to the Manual Low Voltage Wall Switch. The screen shall also be controlled from the TLP Control Panel. Provide programming and wiring connections to allow for screen up/down, on/off controls and pages from the TLP Control Panel. Provide Draper 24V 3-Button Wallplate Control Switch Model #LVC-S.

2.51 Provide any additional items as shown on the A/V wiring details and floor plans.

ACTIVITY CENTER SOUND SYSTEM TRAINING

2.52 Spares supplied to the designated representative of the Client, along with complete documentation of the materials provided. Where applicable, deliver portable equipment in the original manufacturer's supplied packaging.

2.53 **Contractor will provide a minimum of 8 clock hours of on-site training for site staff on the Activity Center AV System.** Training for personnel shall be provided by certified technology specialists. The scope of training shall encompass system operation and procedures. Technician training should include an integrated information overview, media retrieval procedures as well as operation procedures for local control configurations. The Contractor shall provide a detailed written outline clearly describing the proposed plan for all training, for approval by the Engineer and Owner's representative.

2.54 Training for staff will include basic system concepts. Faculty and staff will need to know how to power on/off the system, and how to access one or more media resources via remote control. Training should include use and operation of audio/video devices and techniques and troubleshooting tips. Trainers should incorporate hands-on techniques to maximize staff opportunity to incorporate and develop curriculum that is both meaningful and targeted for their student needs. Clearly written support materials should be provided to all training participants. Manual describing operation and use of the system shall also be provided.

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- 2.55 **Contractor will provide a minimum of 4 clock hours of on-site training for City Technical staff on AV Systems.** Training for personnel shall be provided by certified Audio specialists. The scope of training shall encompass system operation and procedures. Technician training should include an integrated information overview, sound control procedures as well as operation procedures for all equipment in the sound rack. The Contractor shall provide a detailed written outline clearly describing the proposed plan for all training, for approval by the Engineer and Owner's representative. Contractor shall submit at training schedule to the City to coordinate which City Technical staff shall be trained.
- 2.55.1 Training for Teaching and Technical staff will include basic system concepts. Faculty and staff will need to know how to power on/off the system, control volume, access inputs, attach microphones, replace batteries, and test system for basic operations and all other operational requirements for daily use of the systems. Training should include use and operation of audio devices, techniques and troubleshooting tips. Trainers should incorporate hands-on techniques to maximize staff opportunity to incorporate into their curriculum that is both meaningful and targeted for their student needs. Clearly written support materials should be provided to all training participants. Manual describing operation and use of the system shall also be provided.
- 2.56 Trainers shall provide Site or City Technicians with an in-depth technical overview of sound system equipment. Training should include basic overview of all equipment manuals and troubleshooting concepts. Site and City Technicians will be trained to provide setup, operation and application of sound systems. Technicians shall be instructed in the proper operation to replace all components of the sound systems. Clearly written documentation and support materials must be provided for each system. Provide support materials in a three ring binder clearly for each system. A training manual describing operation and use of the system shall also be provided

PART 3 - AUDIO/VIDEO PATCH CABLES

- 3.1 All patch cables must be factory manufactured. Cables may not be field modified or altered. Length of cable shall be as required by the specification section. If length is not specified, the cables shall be the nearest factory manufactured length above the minimum distance required. All patch cables shall be in a length as required to provide the proper operation of the equipment, unless otherwise noted. Contractor is responsible for confirming all connector gender requirements prior to ordering.
- 3.1.1 Audio Cable Assemblies 25-feet in length or less; All 3.5mm stereo audio cable assemblies shall be a male to male cable fully shielded cable with 3.5mm bayonet style connectors. Extron Mini Audio Cables Series (or approved equal). Provide minimum length of 6 feet.
- 3.1.2 HDMI Patch Cables 3-Meters in length or less; All HDMI patch cables must be 4K120/8K60/10K verified and must conform to the HDMI 48 Gbps bandwidth, Ultra High-Speed cable standards. Patch cable shall be Liberty AV HDMI Nebula Series High-Speed, ultra-flexible patch cables (or approved equal). Length of patch cable shall be 1-3 Meters as required for proper operation.

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- 3.1.3 HDMI Patch Cables 6-feet to 15-feet in length; All HDMI patch cables must be 4K/60 verified and must conform to the HDMI Premium (6-15 feet) cable standards. Patch cable shall be Extron HDMI Ultra Series High Speed patch cables (or approved equal by Liberty AV Kinetic Series). Length of patch cable shall be as required for proper operation. Patch cables for Flat Panel Monitor locations shall be furnished with a 90-Degree connector on one end of the cable for the AV Wallplate connection.
- 3.1.4 HDMI Cable Assemblies 16-feet to 33-feet (5, 8 & 10-Meters) in length; All HDMI patch cables must be 4K/60Hz verified and must conform to the HDMI Premium and High-Speed cable standards. Cables shall be furnished with Hybrid Fiber/Copper construction, Liberty AV Solutions "Halo-P" high-Speed 18Gbps Bandwidth cables (or approved equal). Length of patch cable shall be as required for proper operation.
- 3.1.5 HDMI Patch cables for Flat Panel Monitor locations shall be furnished with a 90-Degree connector on one end of the cable for the AV Wallplate connection. Premium Ultra High Speed HDMI Cable Supporting 8K60Hz and 48Gbps, Right Angle Right Male-Plug to Straight Male-Plug by L-Com (Or approved equal)
- 3.1.6 Category-6 Patch Cables 25-feet or Less; Category-6 UTP patch cables shall be as manufactured by Commscope, Leviton or approved equal. Patch cables shall be provided with standard patch cable material.
- 3.1.7 ¼" TRS patch cables shall be as manufactured by Whirlwind TRS Cable Series (ST+) or approved equal.
- 3.1.8 Microphone XLR cables, 10-feet or greater in length, shall be constructed with Canare L4E6S cable, 95% braid, shielded cable assemblies. Provide Microphone cable assemblies as manufactured by Whirlwind, Model MKQ Quad (or Approved Equal). Exact lengths shall be as specified for each system.

PART 4 - INSTALLATION AND EXECUTION

- 4.1 Verify that all electrical requirements including junction boxes, empty conduit and power circuits and receptacles are in place as shown on the drawings.
- 4.2 Receive, check, unload, handle, store, and adequately protect equipment and materials to be installed as part of the contract. Store in areas as directed by the owner's representative. Include delivery, unloading, setting in place, fastening to walls, floors, ceilings, or other structures where required, interconnecting wiring of system components, equipment alignment and adjustment, and other related work whether or not expressly defined herein.

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- 4.3 Installation practices shall follow “standard broadcast wiring” and installation practices, as excerpted from “Recommended Wiring Practices, “Sound System Engineering”, (2nd Edition) D. Davis, and Performed to the highest standards of acknowledged industry practices. Upon request the A/V Contractor shall furnish all equipment and labor to verify the compliance with the following:

Audio System:

- 4.3.1 Signal-to-noise ratio (including crosstalk): 55-dB minimum.
- 4.3.2 Total harmonic distortion: 0.1% maximum from 30 Hz to 15,000 Hz.
- 4.3.3 System frequency response: ± 1.0 dB, 20 Hz to 20,000 Hz.
- 4.3.4 Program reproduction system with point-source loudspeakers: Flat response from 63 Hz to 2.5 kHz ± 2 -dB, decreasing uniformly from a relative level of 0-dB at 2.5 kHz to a relative level of -10 -dB at 10 kHz as measured on axis of loudspeaker.
- 4.3.5 Sound output capability: Program levels of not less than 100 dB without objectionable distortion, rattles, or buzzes.
- 4.3.6 Hum and noise is inaudible (below the background noise level of the space) under normal operation and as observed in normal seat locations.

Radio Frequency (RF) System:

- 4.3.7 Visual Carrier level: +0 dBmV minimum and +16 dBmV maximum at system outlets for utilized channels.
 - 4.3.8 Adjacent Channel Visual Carrier: 3-dB maximum differential at system outlets.
 - 4.3.9 Non-adjacent Channel Visual Carrier: 0-dB maximum differential at system outlets.
 - 4.3.10 Carrier-to-Noise Ratio: 42-dB minimum
 - 4.3.11 Amplitude Response: Flat ± 1.0 Db
 - 4.3.12 Signal-to-Noise Ratio: 45-dB minimum for the maximum level of the signal and the interference resulting from cross modulation from other signals on the system, after demodulation.
 - 4.3.13 Outlet-to-Outlet Isolation: 25-dB minimum.
- 4.4 Adhere to manufacturer's published specifications for pulling tension, minimum bend radii, and sidewall pressure when installing cables.
- 4.5 Where manufacturer does not provide bending radius information, minimum bending radius shall be 10 times cable diameter. Arrange and mount equipment and materials in a manner acceptable to the engineer and the owner.

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- 4.6 Attach cables to permanent structure with suitable attachments at intervals of 48 to 60 inches. Support cables installed above removable ceilings. Install adequate support structures for 10 foot cable service loops at each TC.
- 4.7 Mark all cables and patch cords or jumpers with permanent, non-handwritten number or letter cable markers within six inches of both ends. All cables shall be marked. Cable marking codes shall correspond to run sheets.
- 4.8 Furnish screw-type terminal blocks, boards, strips or connectors for cables that interface with racks, cabinets, consoles or equipment modules. Attach wires terminating at screw-type terminals with crimp-on lugs. "Telephone-style" punch down blocks are not acceptable for signal or data wiring.
- 4.9 Group cables according to signals being carried. To reduce signal contamination, form separate groups for the following:
 - 4.9.1 Power cables.
 - 4.9.2 Control cables.
 - 4.9.3 Audio cables for signals less than minus 20 dBm.
 - 4.9.4 Audio cables for signals between minus 20 dBm and plus 30 dBm.
 - 4.9.5 Audio cables for signals above plus 30 dBm.
 - 4.9.6 Broadband RF cables.
- 4.10 Run power cables, control cables, and high level cables on the left side of an equipment rack as viewed from the back. Run other cables on the right side of an equipment rack.
- 4.11 Cut cables (except video, camera and RGBS cables, which must be cut to electrical length) to the length required by the run. All wire and cable shall be continuous and splice-free for the entire length of run. For equipment mounted in drawers or on slides, provide the interconnecting cables with a service loop of appropriate length.
- 4.12 Install no cable with a bend radius less than that recommended by the manufacturer.
- 4.13 Provide strain relief for cables. Provide connectors with metal shell/casings. Provide a minimum of three feet of free cable coiled in a floor pocket. Use spiral wrap to group similar cable types.
- 4.14 All shielded cables shall be insulated. Do not permit shields to contact conduit, raceway, boxes, panels, or equipment enclosures. Tin all terminated shield drain wires and insulate with heat-shrink tubing.
- 4.15 Land all field loudspeaker wiring entering each rack at terminal devices prior to connection to equipment or devices. Land loudspeaker level control cables at screw or tubular clamp type barrier blocks on the left side of the equipment rack as viewed from the rear. Make all

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connections to screw-type barrier blocks with insulated crimp-on spade lugs. Size all lugs properly to assure low-resistance connections.

- 4.16 Separately dress, route and land microphone and line level cables directly to equipment.
- 4.17 Use only rosin core 60/40 tin/lead solder for all solder connections.
- 4.18 Lace, tie or harness wire or cable in accordance with accepted professional practice. Dress, lace or harness all wire and cable to prevent mechanical stress on electrical connections; no wire or cable shall be supported by a connection point. Provide service loops where harness of different classes cross or where hinged panels are to be interconnected.
- 4.19 Speakers must be individually cabled as home runs to the sound system cabinet unless otherwise noted in the specifications or drawings. Speaker cable shall be heavy-duty 2-conductor, unshielded, PVC (indoor) or UV-Resistant PVC (outdoor) jacketed cable. Provide speaker cable (18-12AWG) West Penn Cable Series #224-227 (indoor) or #AQ224-AQ227 (outdoor) or approved equal. Provide speaker cable (10-6AWG) West Penn Large Venue Speaker Cable Series for large gauge cable #HA210 (indoor) or #C208-C210 (outdoor) or approved equal. Provide speaker cable gauge sizes per the following overall run distance chart.

Required Speaker Cable Distance
Provision (4 Ohm Speakers)

Length	Speaker Cable AWG
0 - 50 Feet	14 AWG
51 - 140 Feet	12 AWG
141 - 225 Feet	10 AWG
226 - 550 Feet	8 AWG

Required Speaker Cable Distance
Provision (8 Ohm Speakers)

Length	Speaker Cable AWG
0 - 100 Feet	16 AWG
101 - 175 Feet	14 AWG
176 - 280 Feet	12 AWG
281 - 450 Feet	10 AWG

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Required Speaker Cable Distance
Provision (16 Ohm Speakers)

Length	Speaker Cable AWG
0 - 140 Feet	18 AWG
141 - 220 Feet	16 AWG
221 - 350 Feet	14 AWG
350 - 550 Feet	12 AWG

- 4.20 Patch Panel Assignments: Wire patch panels so that signal “sources” (outputs from) appear on the upper row or a row pair and “loads” (input to) appear on the lower row of a row pair.
- 4.21 Patch Panel Designation Strips: Use alphanumeric identifications and descriptive information on patch panel designation strips. Number the jack positions in each horizontal row sequentially from left to right. Letter the horizontal jack rows sequentially from top to bottom. Include the alphanumeric identification of each jack on the functional block drawings, and on reproductions of these drawings that shall be mounted in an appropriate location near the patch bays.
- 4.22 Each major component of equipment shall have the manufacturer's name, address, model number, and rating on a plate securely affixed in a conspicuous place. NEMA code ratings, UL label, or other data which is die-stamped into the surface of the equipment shall be stamped in a location easily visible.
- 4.23 Upon completion of the work, remove all refuse and rubbish from and about the premises, and leave the relevant areas and equipment clean and in an operational state.
- 4.24 During the installation, and up to the date of final acceptance, protect finished and unfinished work against damage and loss. In the event of such damage or loss, replace or repair such work at no cost to the owner.
- 4.25 Prior to final acceptance, provide minimum of three complete sets of drawings showing all cable numbers and construction details in accordance with the actual system installation. Revise the device layout drawings to represent actual installation locations and coordinate these with the electrical Contractor. The operation manual shall contain all instructions necessary for the proper operation of the installed system and manufacturer's instructions. The maintenance manual shall contain all information required for the "proof of performance" as required and all manufacturers' maintenance information.

INSPECTION AND TESTING

- 4.26 Check out and final connections to the system shall be made by a factory-trained technician in the employ of a manufacturer of the products installed. In addition, factory-trained technicians shall demonstrate operation of the complete system and each major component to the Owner.

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- 4.27 System field wiring diagrams shall be provided to the owner by the system manufacturer prior to completion of the installation.
- 4.28 All materials and installation shall be guaranteed to be free of defects in material and workmanship for two years after final acceptance of installation and test.
- 4.29 Upon completion of the installation, four (4) copies of complete operational instructions shall be furnished, complete with record drawings. Instructions shall include part numbers and names, addresses, and telephone numbers of parts source. Final payment shall not be made until operational and maintenance manuals have been received.
- 4.30 Upon completion of the installation of the equipment, Contractor shall provide to the owner a signed statement from the equipment manufacturer that the system has been tested and functions properly according to the specifications.
- 4.31 The Contractor shall be responsible to provide service within 24 hours (or by mutual consent) after notification by the Owner or his representative, within the hours of 8:00 AM to 5:00 PM from Monday through Friday. Service request forms shall be supplied by the Contractor and the faxing or mailing of such a request form shall constitute notification by the Owner of a service request.
- 4.32 The Contractor shall provide two "preventative maintenance" service calls, spaced six months apart, for cleaning of all source devices and overall inspection of the system.

PROJECT CLOSEOUT

- 4.33 Prior to completion of project, compile a complete equipment maintenance manual for all equipment supplied under sections of this division, in accordance with these specifications and as described below.
- 4.34 Equipment Lists and Maintenance Manuals:
 - 4.34.1 Prior to completion of job, Contractor shall compile a complete equipment list and maintenance manuals. The equipment list shall include the following items for every piece of material equipment supplied under this section of the specifications:
 - 4.34.1.1 Name, model, and manufacturer.
 - 4.34.1.2 Complete parts drawings and lists.
 - 4.34.1.3 Local supply for parts and replacement and telephone number.
 - 4.34.1.4 All tags, inspection slips, instruction packages, etc., removed from equipment as shipped from the factory, properly identified as to the piece of equipment it was taken from.
- 4.35 Maintenance manuals shall be furnished for each applicable section of the specifications and shall be suitably bound with hard covers and shall include all available manufacturers' operating and maintenance instructions, together with "as-built" drawings to properly operate and maintain the equipment. The equipment lists and maintenance manuals shall

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be submitted in duplicate to the Architect for approval not less than 10 days prior to the completion of the job. The maintenance manuals shall also include the name, address, and phone numbers of all subContractors involved in any of the work specified herein. Four copies of the maintenance manuals bound in single volumes shall be provided.

RECORD DRAWINGS

- 4.36 The Contractor shall maintain record drawings as specified in accordance with these specifications, and as noted below.
- 4.37 Drawings shall show locations of all concealed and exposed conduit runs, giving the number and size of conduit wires. Underground ducts shall be shown with cross section elevations and shall be dimensioned in relation to permanent structures to indicate their exact location. Drawing changes shall not be identified only with referencing CORs and RFIs, the drawings shall reflect all the actual changes made.
- 4.38 Final As-Built Drawing Submittals - Provide (1) hard bound copy of "E-size" As-Built drawings and (3) copies on USB Flash Drive in AutoCAD (2021 or newer version) format. A Hand marked-up copy of the original construction drawings will not be accepted as the final As-Built drawing submittal. Final As-Built drawings shall include copies of the floor plan drawings of each building, detailed As-built AV Diagrams including wire and connection type, elevations of all AV Cabinets, quantities of mic outlets and speaker locations, locations of all final cable routes, including conduits. In addition, the drawings shall include all outlet locations with cable identification label information.

END OF SECTION

SPECIFICATIONS

SECTION 28 01 00

ELECTRONIC SAFETY AND SECURITY GENERAL PROVISIONS

PART 1 - SUMMARY

- 1.1 This Division of the specifications outlines the provisions of the contract work to be performed as a sub contract under the Division 26 scope of work. Reference the Division 26 Electrical General Provisions for scope of work and general requirements.
- 1.2 In addition, work in this Division is governed by the provisions of the bidding requirements, contract forms, general conditions and all sections under Division 1 requirements.

END OF SECTION

**ELECTRONIC SAFETY AND SECURITY GENERAL PROVISIONS
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SECTION 28 13 00

SECURITY SYSTEM

PART 1 – GENERAL

- 1.1 Furnish all materials, equipment and labor, and perform all operations in connection with systems work as indicated on the drawing, as specified herein and required to complete the work.
- 1.2 Related Specification Sections:
 - 1.2.1 Division 26 05 33 – Conduit and Fittings
 - 1.2.2 Division 26 05 19 or 26 05 13 – Conductors
 - 1.2.3 Division 26 05 34 – Outlet and Junction Boxes
- 1.3 All security system components shall be manufactured by and wiring shall be furnished and installed by a factory authorized contractor and distributor. The Contractor shall hold a license from the State of California for the purpose of installing security systems.
- 1.4 The contractor shall be regularly engaged in the installation and repair of the type of equipment to be installed.
- 1.5 City Approved Contractor **Superior Alarm Systems** Only, 9001 Canoga Avenue, Canoga Park, CA 91304. Contact Bruce Brown – 818-700-7100 Ext. 217 (No Approved Alternate)
- 1.6 The conduit, outlets, terminal cabinets, device backboxes, etc., which form a part of the rough-in work, shall be furnished and installed complete by the Contractor. Security system components as listed under products shall be furnished and installed by the authorized subcontractor.
- 1.7 The subcontractor shall furnish all equipment, accessories and material required for the complete installation of a security system in accordance with specifications and as shown on the drawings. Any material and/or equipment necessary for the proper operation of the system not specified or described herein shall be deemed part of this specification. The distributor must also provide complete installation of all wiring and devices or equipment. Supervised installation for the wiring and devices shall be permitted with the following conditions:
 - 1.7.1 A letter will be required from the security system manufacturer's representative certifying that the cable installation was completed in compliance with the manufacturer's recommended installation requirements.

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- 1.7.2 The cables shall be tested in the presence of the manufacturer's representative. These tests will then be submitted to the electrical engineer.
- 1.7.3 The security system shall be warranted by the manufacturer's representative per the contract agreement.
- 1.8 Phase I Submittal shall be made within (20) working days after the award of the contract by the City. This submittal shall include the following:
 - 1.8.1 Complete bills of quantities, including all materials, components, devices, and equipment required for this work. The bills of quantities shall be tabulated respective of each and every system as specified, and shall contain the following information for each item listed:
 - 1.8.1.1 Description and quantity of each item.
 - 1.8.1.2 Manufacturer's Name and Model Number.
 - 1.8.1.3 Manufacturer's Specification Sheet.
 - 1.8.1.4 Description of any specialty backbox requirements.
- 1.9 Phase II submittal shall be provided within (20) working days after the approval of the Phase I submittals and prior to any fabrication or field conduit installations. All shop drawings shall be engineered and drawn on a CAD System.
 - 1.9.1 Provide complete shop drawings to include:
 - 1.9.1.1 Complete floor plans showing the locations throughout the project of all receptacles, conduits, wireways, tray, pullboxes, junction boxes, equipment locations, and other devices.
 - 1.9.1.2 Typical system riser diagrams, specialty equipment or rack elevations will be required to be provided.
- 1.10 Common submittal mistakes which will result in submittals being rejected:
 - 1.10.1 Not including the qualifications of the installing contractor.
 - 1.10.2 Not including all items listed in the above itemized description.
 - 1.10.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting underlining or clouding the items to be reviewed, r crossing out the items which are not applicable.
 - 1.10.4 Not including actual manufacturer's catalog information of proposed products.

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- 1.10.5 Do not include multiple manufacturers for similar products and do not indicate “or approved equal” statements, or “To be determined later” statements. The products being submitted must be the products installed.
- 1.11 The Contractor shall make a written request directly to Johnson Consulting Engineers for electronic drawing files (CAD). As a part of the written request, please include the following information:
 - 1.11.1 Clearly indicate Project Name and Client, Johnson Consulting Job Number (located in bottom left corner of JCE Engineering Stamp) and each drawing Sheet Number required (i.e., E1.1, E2.1, E4.1 etc.).
 - 1.11.2 Identify the name, Company, Title, phone number, mailing address and e-mail address of the person to receive the files.
 - 1.11.3 Detail or Riser diagram sheets, System Schematic drawings or any other drawings other than floor plans or site plans, will not be made available to the Contractor.
 - 1.11.4 Files will only be provided in the AutoCAD format in which they were created (i.e., version 2015 or version 2016). Files will not be made available in REVIT format.
 - 1.11.5 Requests for files will be processed as soon as possible; a minimum of 7 working days should be the normal processing time. The Contractor shall be completely responsible for requesting the files in time for their use and delays in requesting files will not alleviate the Contractor from submitting required documents within the required timeline

PART 2 – PRODUCTS

Building Security (Intrusion) System – Control Panel

- 2.1 Control Panel in the location shown in the specifications and the drawing details. The existing Security System on the campus is as manufactured by **Bosch**. The new security components shall match the existing campus system.
- 2.2 Provide Zone Expansion Panel as manufactured by **Bosch**. Provide Expansion Panel in Activity Center IDF Closet.
- 2.3 The system must be able to provide the following minimum functions:
 - 2.3.1 Up to 500 wired or wireless LX Bus devices
 - 2.3.2 Central Station reporting via ethernet connection (IP) and simultaneous digital dialer for multiple central station receivers.
 - 2.3.3 Interface with the City central monitoring system to report all addressable devices individually (by site, building and room) and to be remotely

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- programmable from the City central system for maintenance and changes to the system.
- 2.3.4 U.L. listed for Burglary
 - 2.3.5 Battery backup included
 - 2.3.6 Capability to extend keypad or sensor wiring bus lengths to a minimum of 15,000 ft.
 - 2.3.7 Systems or components as manufactured by DMP, Honeywell, Radionics or any other manufacturer's which are not specifically listed in 2.1, are not approved for use on this project
- 2.4 Provide a complete and operable supervised Building intrusion detection system including, but not limited to; Expansion panel, keypad stations, glass break sensors, motion detectors, door contacts, zone expanders and repeaters and a digital communicator.
- 2.4.1 The new Expansion Panel shall be provided with a network data drop provided by the 27 10 00 Contractor for notification of an alarm status. Connect the Control Panel to the data drop with a Contractor provided Category-6 patch cable. Coordinate the location of the data outlet with the 27 10 00 Contractor.
 - 2.4.2 Upon detection of an intruder by initiation of any device in the system, the system shall cause alarm information to be sent by (IP) to the City central station and by digital dialer to an independent alarm monitoring agency. Each motion sensor and or door contact shall have a distinct address and each address shall report to the monitoring agency including the site name, building name, and room number identifications associated with each device. The installing contractor must submit a list of all devices and their reporting identifications to the City for review and approval prior to any programming. Naming and room numbers must be consistent with actual facility identifications, which may vary from identifications included in the bid construction documents. An operational test of each installed system must be able to confirm compliance with the above requirements for each device installed, before the system will be considered complete and operational.
 - 2.4.3 Coordinate with the City IT Department for integration with the existing campus security system for access to the Administrative Level software for system programming.
 - 2.4.4 Upon detection of an intruder by any initiation device in the system, the system shall cause a prerecorded message to be played over the campus intercom system. The intercom system shall play the message over all INTERIOR only speakers. The message shall repeat (2) times "An unauthorized entry to the facility has been detected, authorities have been contacted "in both English and Spanish.

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- 2.5 Systems shall detect the entry and/or the motion of a body taking not more than four steps in an area secured with motion detection equipment where entry doors or windows are possible access.
- 2.6 New Activity Center Building shall be zoned and controlled separately and each sensor individually addressable so that portions of the facility may be secured while others remain unsecured. All zones for the New Building shall be able to be armed or disarmed from the new keypads. Provide cabling from the Expansion Panel in the New Activity Center Building to the new keypad locations.

2.6.1 New Activity Center Building Standard Keypad

- 2.6.1.1 A new keypad will be provided for the New Activity Center Building at the locations shown on the floor plans. Coordinate the final location of the keypad with the City Facilities Department. Control will be provided from this Keypad for arming or disarming the zones in the New Activity Center Building.
- 2.6.1.2 When staff arrives, they would present their code to the keypad. This would disarm the building in which the staff works, and the not armed indicator light at the annunciator will be triggered.
- 2.6.1.3 When staff is leaving, (and presumably is the last one from their building leaving) they would press the "Command" button, then select "Arm", then select "All". The building would arm, and the armed indicator light at the annunciator will be triggered

2.6.2 New Expansion Panel

- 2.6.2.1 Contractor shall furnish and install an expansion panel cabinet in the Activity Center Building for the separate security zone. Expansion Panel shall be provided with a standard cabinet enclosure, D7412GV4 Expansion Board, battery and devices as shown on the floor plans. Coordinate power with the Division 26 Contractor.
- 2.6.2.2 Contractor shall provide multi-conductor wet location site cabling as required from the Existing Main Security Panel to the Activity Center IDF Closet for the expansion panel connection to the Main Security Panel.

Building Security System – System Devices

- 2.7 Provide the Security System Devices as shown on the project floor plans. Every type of device described below may or may not be shown on the floor plans. Devices shall be provided to match the existing Main Security System.

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- 2.8 Keypads - Keypads shall be 5-Line ATM Style alpha-numeric LCD display series capable of displaying system status and controlling the alarm system. Unit shall receive its operating power from the control panel.
 - 2.8.1 Provide keypads at locations where on drawings for coverage of the zones as required by City. Each building or zone shall be furnished with a keypad, unless otherwise noted on the drawings or in these specifications. Provide 5-line Alphanumeric, 21-characters per line, LCD display keypad by Bosch Model #B930 Series Keypads (No Approved Equal).
- 2.9 Motion Sensors - Motion sensors shall be Passive infrared and microwave Doppler radar detection with First Step Processing. Sensor coverage patterns shall be as required for optimum coverage at each individual location. Sensor shall be wall mounted at the locations as shown on the drawings.
 - 2.9.1 Wall Mounted Motion Sensors – Bosch Model #ISC-CDL1-WA12G (No Approved Equal). TriTech PIR, Microwave with anti-mask wall mounted sensor with a minimum coverage pattern capability of 40-feet by 40-feet.
 - 2.9.2 Contractor shall furnish and install the wall mount brackets for the wall mounted motion sensors. Type of bracket provided shall be based on desired coverage for the sensor.
 - 2.9.3 Ceiling Mounted Motion Sensors in Rooms with Accessible Ceilings – Bosch Model #DS9370 (No Approved Equal). Rooms with accessible ceiling, between 8-12 feet in height, shown with ceiling mounted sensors shown on the floor plans, shall be furnished with a Trittech Technology ceiling mounted sensor with a minimum coverage pattern capability of 23-feet to 46-feet in diameter.
- 2.10 Glass Break Sensors – Glass Break sensors shall be microprocessor-based sound analysis technology (SAT) to listen for the specific frequencies associated with breaking glass. Sensor shall have built-in environmental test feature to alert the installer to false alarm hazards in harsh environments. Sensor shall be wall mounted at the locations as shown on the drawings.
 - 2.10.1 Glass Break Sensors – Bosch Model #DS1103i Flush Mounted Glass Break Sensor (No Approved Equal).
- 2.11 Door Contacts – Door contacts shall be provided at all exterior doors and at all roof hatches. Contractor shall refer to the drawings for the locations of the doors and roof hatches. In addition, all roll-up type garage doors or security shutters shall be provided with door contacts.
 - 2.11.1 Door contacts for standard doors at drywall walls or accessible walls shall be installed as recessed contacts. Provide Bosch Model #ISN-CSTB-10 Magnetic Terminal Contacts (No Approved Equal).
 - 2.11.2 Door contacts for standard doors at concrete or CMU walls or non-accessible walls shall be installed as surface mounted contacts. Provide

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Bosch Model #ISN-CSM20-WGW Magnetic Wide Gap Terminal Contacts (No Approved Equal).

- 2.11.3 Door contacts for overhead roll-up garage doors or security shutters shall be surface mounted heavy-duty, industrial wide gap type with 36" armored cable by Bosch Model #ISN-CMET-4418 Overhead Door Contact Magnetic Terminal Contacts (No Approved Equal).
- 2.11.4 Door contacts must be installed using the screws and the adhesive contact sheet provided with the door contact or with the screws alone. Installation using the adhesive contact sheet alone is not allowed.
- 2.11.5 Cable splice connections for the armored cable provided with overhead roll-up garage door contacts shall be provided inside a dual gang junction box in an accessible location for future maintenance. The junction box shall be provided with a blank cover labeled with a permanent type-written label showing the unique device number and any zone information or door number.

Building Security System – System Cable

- 2.12 Wire and Cable - Cabling shall be as required for system operation or as shown in the specifications and detail drawings. Refer to the floor plans for additional requirements.
 - 2.12.1 Interior Riser Rated Keypad Cable - Provide (4) conductor, 18-AWG, Polypropylene coated stranded bare copper conductors with PVC jacketed, Riser-rated cable for keypad locations within a building. Provide Honeywell Part #2115 or West Penn Part #244.
 - 2.12.2 Exterior Riser Rated Keypad Cable - Provide (4) conductor, 18-AWG, stranded bare copper conductors with PVC jacketed, Outdoor-rated, direct burial type cable for keypad locations between buildings. Cable shall be used for all exterior cable runs. Provide Honeywell Part #4157 or West Penn Part #AQ244.
 - 2.12.3 Interior Riser Rated Motion Detector Cable - Provide (4) conductor, 22-AWG, Polypropylene coated stranded bare copper conductors with PVC jacketed, Riser-rated cable for motion detector locations within a building. Provide Honeywell Part #2104 or West Penn Part #241.
 - 2.12.4 Interior Riser Rated Door Contact Cable - Provide (2) conductor, 22-AWG, Polypropylene coated stranded bare copper conductors with PVC jacketed, Riser-rated cable for door contact locations within a building. Provide Honeywell Part #2102 or West Penn Part #221.
 - 2.12.5 All cables shall be permanently labeled with a permanent type-written label showing a unique cable number a minimum of two locations, one within 6" and one 24" from the point of termination at the end of the cable.

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- 2.13 Provide other items as shown in the drawings or specifications.

PART 3 – EXECUTION

- 3.1 All connections throughout the system shall be soldered, crimped by means of AMP lugs, fastened with screw type terminals, made by spring tension clip "punch block" terminals or made by standard plugs and receptacles. All conductors in terminal cabinets shall be neatly routed and dressed with Velcro style cable ties in a workmanlike manner. The cable ties shall not cover any labeling at the ends of the cables.
- 3.2 All security system cabling shall be installed in conduit where indicated on the drawings or where routed exposed and shall be open wiring where routed above accessible ceilings or in walls.
- 3.3 Locate motion sensors on walls to provide optimum coverage of the space and to not conflict with the architectural aesthetics of the building. Locations of motion sensors as shown on the electrical plans are diagrammatic only.
- 3.4 Keypads shall be wired not to exceed 1000 ft cable run from the main control panel and no more than two (2) keypads per 1000-foot cable run. Provide #18AWG minimum. **All Cables routed underground shall be suitable for wet location provided with UL listed wet location insulation or flooded type cable construction.**
- 3.5 All wet location cables routed through handholes or manholes shall be provided with a service loop inside the handhole or manhole. The cable shall be provided with a minimum of one entire loop around the inside of the perimeter of the handhole.
- 3.6 Pull strings shall be provided with all cable runs including but not limited to; conduit stub ups, conduit sleeves, cable trays, open wiring routes and point-to-point conduits. Pull strings shall be free from cable bundles in open wiring routes. Pull strings shall not be substituted for pull ropes for the exterior site conduits.
- 3.7 Velcro cable management straps are required on all Security System cable bundles the last 20 feet or upon entry into equipment closet a maximum of 12" apart. Cable bundles shall also be routed through cable management or "D" rings in the equipment closet to the Security System backboard location shown on the floor plans.
- 3.8 The 28 13 00 Contractor shall supply protective bushings or slide on rings at the ends of all exposed conduits used for the security system cabling. This is to include all conduits installed for any future data cabling requirements. Contractor shall submit planned protection bushings prior to installation of cabling for approval.
- 3.9 Where open wiring cables are run through the ceiling space the wire shall be bundled together and supported above the ceiling.

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- 3.10 The 28 13 00 Contractor may not use the cable suspension system installed by the 27 10 00 Contractor (for data cabling) for the security cabling. The 28 13 00 Contractor shall furnish and install a separate suspension system for the security system cabling.
 - 3.10.1 All cables must be fastened to the building structure via “j-hooks” or an approved suspension system, and not directly in contact with ceiling system. For “j-hooks” follow the maximum fill capacity as recommended by the manufacturer based on the outside diameter of the security cables. For large quantities of cables, use a sling support system such as “Erico Cable Cat” or equal. D-rings, “Caddy #WMX cable hangar”, “Caddy Bridle Rings”, drive rings or any other type of wire ring support is not allowed.
- 3.11 Where cables pass through a fire-resistant portion of the structure, conduit sleeves shall be provided to maintain the rating of the wall penetrated. Sealing of all penetrations with an approved fire barrier is required. Conduits and sleeves must remain accessible for future use. Permanent sealants may not be used to seal sleeves and conduits.
 - 3.11.1 The 28 13 00 Contractor shall coordinate with the 27 10 00 Contractor, 27 20 00 Contractor, 28 23 00 Contractor and any other Low Voltage Contractor working on the project, for use of the sleeve penetrations shown on the drawings.
 - 3.11.2 The 28 13 00 Contractor shall be responsible for replacing the fire-stopping materials on any sleeve penetration used that was previously sealed. The firestopping material used for the replacement must match the existing materials.
 - 3.11.3 If there are no existing conduit sleeves through the rated walls that must be penetrated, the 28 13 00 Contractor shall be responsible for providing the conduit sleeve and the fire-stopping materials as shown in the drawing details.
 - 3.11.4 Expanding foam is not an acceptable sealant for any conduit opening. Contractor shall be responsible for complete replacement of the conduit and cabling in any conduit filled with expanding foam used as a sealant.
- 3.12 The minimum bending radius for all cables and the maximum pulling tension shall not exceed manufacturer's recommendations.
- 3.13 Provide a full 360-degree loop of slack cable around pullbox interiors. Cables entering pullboxes from the bottom, shall not be allowed to touch the bottom of the cover when closed and shall not be pinched or crushed in any way.
- 3.14 When pulled through conduits, cable pulling lubricants shall be continuously applied to all cables and be specifically approved by the manufacturer.

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- 3.15 Where cables are pulled through or pulled from a center of run, pull without splices or terminations, lead out the cables at all manholes, pullboxes, and conduits, taking care to feed them in again by hand for the next run.
- 3.16 A pull string shall be placed with all security device cables at the time of installation. Conduit runs and surface raceway for station cabling shall be furnished with a minimum 2-Ply spiral wrap style, pull string rated for 240 ft/lbs. pulling strength, such as manufactured by Greenlee #431 or approved equal. Includes all conduit stubs and cables routed through open ceilings and cable trays. Pull strings shall be tied off in the junction box and in the ceiling. Provision for the installation of the pull string shall apply to all empty and spare conduits as well. Single ply type pull string will not be accepted as a substitute for the 2-ply pull string.
- 3.17 A measuring pull tape shall be placed with all OSP-Rated Site Security cables at the time of installation. Outdoor conduit runs between buildings designated for feed cabling, in excess of 150 feet shall be provided with a minimum ½" polyaramid style, measuring true tape pull string annotated with footage increments rated for 2500 ft/lbs. pulling strength, such as manufactured by Greenlee #39245 or approved equal. Conduit runs less than 150 feet shall be furnished with a ¼" polyaramid style, measuring true tape pull string annotated with footage increments rated for 1250 ft/lbs. pulling strength, such as manufactured by Greenlee #39243 or approved equal. Provision for the installation of the measuring pull tape shall apply to all empty and spare conduits as well. Standard twine style pull strings and standard nylon or polypropylene style pull ropes will not be accepted as a substitute for the polyaramid measuring tape type pull string.
- 3.18 All cables shall be new and extend continuous from each MDF Closet Security backboard or IDF Closet Security backboard to all outlet locations.
- 3.19 Where cables are not installed in a conduit or other raceway system, they shall not be routed parallel with other line voltage equipment or wiring (120 volt and above) within 36" or within 12" of line voltage equipment or wiring where crossing.
- 3.20 Labeling
 - 3.20.1 Each cable run shall be permanently labeled at each end with a unique sequential number which corresponds to a similar number provided for each security device. A printed label shall be placed at each of the following locations;
 - 3.20.1.1 On the cable at the point of termination or termination block. Requires the use of a self-laminating wrap around label. Brady Label self-laminating 1.2" by 1.5" wrap around label Part #29689 (NO ACCEPTABLE EQUAL).
 - 3.20.1.2 On each cable in the j-box behind the device location or on the cable before the point of termination at the device, for devices without a j-box. Requires the use of a self-laminating wrap around label. Brady Label self-laminating 1.2" by 1.5" wrap around label Part #29689 (NO ACCEPTABLE EQUAL).

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- 3.20.1.3 On the cable at the terminal strip or pop-it prior to termination point. Requires the use of a self-laminating wrap around label. Brady Label self-laminating 1.2" by 1.5" wrap around label Part #29689 (NO ACCEPTABLE EQUAL).
- 3.20.1.4 The label shall be clearly defined with a minimum #10 font size.
- 3.20.2 Hand written labels are not permitted. Where cable ID includes room number identification, the Contractor shall obtain written verification of final room numbers prior to beginning labeling (numbers on plans do not always match final room numbers). Cable pulling cross reference lists will not be accepted with final documentation.
- 3.20.3 Labeling will follow recommended identification standards or City Standards as directed by the customer. Contractor will confirm labeling pattern prior to final identification or testing. All device identification designations shall match the final identification information shown on the Final As-Built Drawings. Contractor shall be required to have the labeling scheme approved in writing by the City Facilities Director prior to manufacture or installation of the labeling.
- 3.20.4 All OSP-rated cables routed through underground conduits shall be tagged with waterproof label tags in every manhole or pullbox. Waterproof label tags shall also be placed at each end of the cable in the termination closets or terminal cabinets in clear view at the point where the conduit transitions up out of the slab or where the conduit enters the terminal cabinet. A minimum of (2) tags are required in each handhole or manhole.
- 3.20.5 Refer to detail drawings for additional labeling requirements
- 3.21 Final System Acceptance
 - 3.21.1 The system will be accepted only after a satisfactory test of the entire system has been accomplished by a Factory-Trained Contractor in the presence of the Owner's Representative. This contractor shall provide all personnel, ladders and testing equipment to assist in completing this test. Actuate each device and verify that the system performs as specified.
 - 3.21.2 Once the system has been tested, the contract shall not be considered complete until after City training has been completed. The Contractor shall notify in writing their intent to provide the training for the system. This notification shall be given to the Architect and the Project Engineer a minimum of two weeks prior to the scheduled training session. The 28 13 00 Contractor shall be responsible for notifying the City to confirm that the appropriate City personnel will be made available for this training session. If the City does not receive confirmation that the training session can be performed on the proposed date, than another time shall be provided. The training shall consist of the following:

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- 3.21.2.1 Provide a minimum of one (1) two-to-four-hour training period located at the project site, to instruct City personnel in proper operation of all systems.

PART 4 – CLOSE-OUT DOCUMENTATION

- 4.1 Final As-Built Drawing Submittals - Provide (1) hard bound copy of “E-size” As-Built drawings and (3) copies on USB Flash Drive in AutoCAD (2021 or newer version) format. A Hand marked-up copy of the original construction drawings will not be accepted as the final As-Built drawing submittal. Final As-Built drawings shall include copies of the floor plan drawings of each building, detailed elevations of each MDF or IDF locating all equipment, quantities devices and locations, locations of all sleeves and identification of all final cable routes. In addition, the drawings shall include all device locations with unique cable identification numbers.

END OF SECTION

SECURITY SYSTEM

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CITY OF LA PUENTE ACTIVITY CENTER

SPECIFICATIONS

SECTION 28 16 00

ACCESS CONTROL

PART 1 – GENERAL

1.1 Summary

- 1.1.1 Field installed wired and wireless door access control equipment connections and field installed cabling connecting all components, basic programming, and licensing of all components on site and providing a direct Ethernet connection to the City Central Station door access control network.

1.2 Related Specification Sections:

- 1.2.1 Division 26 05 33 – Conduit and Fittings
- 1.2.2 Division 26 05 13 or 26 05 19 – Conductors
- 1.2.3 Division 26 05 34 – Outlet and Junction Boxes
- 1.2.4 Division 8 – Door Hardware

1.3 Definitions

- 1.3.1 Wi-Fi: Wireless Communication (802.15.4 – ZigBee)
- 1.3.2 WAN: Wide area network.
- 1.3.3 LAN: Local area network
- 1.3.4 POE: Power Over Ethernet
- 1.3.5 PIM: Panel Interface Module

1.4 Installer Qualifications:

- 1.4.1 The installer must be factory trained and certified by the access control equipment manufacturer; and must have a minimum of Seven (7) years installation experience with the manufacturer's products.
- 1.4.2 The installing contractor may not use sub-contractors for installing any part of the system. All wiring terminations of any kind, device or equipment installations and programming must be done by a certified access control certified contractor. Known certified installers are:
- 1.4.3 City Approved Contractor **Superior Alarm Systems** Only, 9001 Canoga Avenue, Canoga Park, CA 91304. Contact Bruce Brown – 818-700-7100 Ext. 217 (No Approved Alternate)

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SPECIFICATIONS

- 1.4.4 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.
- 1.4.5 Comply with NFPA 70, "National Electrical Code."
- 1.5 General Submittal Requirements
 - 1.5.1 Phase I Submittal shall be made in electronic format within (20) working days after the award of the contract by the City. This submittal shall include the following:
 - 1.5.1.1 Complete Bill of Materials in Excel Spreadsheet format with bills of quantities, including all materials, components, devices, and equipment required for the work. The bills of quantities shall be tabulated respective of each and every system as specified, and shall contain the following information for each Section listed:
 - 1.5.1.2 Description and quantity of each product.
 - 1.5.1.3 Manufacturer's Name and Model Number.
 - 1.5.1.4 Material Cut Sheets shall provide detailed product information and shall be original manufacturer product bulletins. Copies of material information from vendor websites shall not be considered equal and will not be accepted.
 - 1.5.1.5 Material Cut Sheet part number provided shall be highlighted or provided with an arrow directed at the corresponding part number.
 - 1.5.1.6 Specification Item Number referenced for each required product or if not shown in the specifications, Drawing Detail Number being referenced. (ie; Spec. 281600 Item 2.1 or DWG E4.15/#1)
 - 1.5.1.7 Include with submittals all warranty information and a description of support and maintenance services to be provided. Also include all licenses and maintenance agreements required for continued operation of the equipment.
 - 1.5.2 Phase II Submittal shall be provided within (20) working days after the approval of the Phase I submittals and prior to any fabrication or field conduit installations. All shop drawings shall be engineered in a CAD Software. Submission shall include electronic print copies to match the contract drawings, and Phase II submittals drawings shall include the following:
 - 1.5.2.1 Complete floor plans showing the locations throughout the project of all receptacles, conduits, wireways, tray, pullboxes, junction boxes, equipment locations, and other devices.

SPECIFICATIONS

- 1.5.2.2 Typical system riser diagrams, specialty equipment or rack elevations will be required to be provided.
- 1.5.3 Common submittal mistakes which will result in submittals being rejected:
 - 1.5.3.1 Not including the qualifications of the installing Contractor Company and Contractor's Staff.
 - 1.5.3.2 Not including all items listed in the above itemized description.
 - 1.5.3.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed (provided for the project) or crossing out the items which are not applicable.
 - 1.5.3.4 Not including actual manufacturer's cut sheets or catalog information of proposed products.
 - 1.5.3.5 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.
- 1.5.4 The Contractor shall make a written request directly to Johnson Consulting Engineers for electronic drawing files (CAD). As a part of the written request, please include the following information:
 - 1.5.4.1 Clearly indicate Project Name and Client, Johnson Consulting Job Number (located in bottom left corner of JCE Engineering Stamp) and each drawing Sheet Number required (i.e., E1.1, E2.1, E4.1 etc.).
 - 1.5.4.2 Identify the name, Company, Title, phone number, mailing address and e-mail address of the person to receive the files.
 - 1.5.4.3 Detail or Riser diagram sheets, System Schematic drawings or any other drawings other than floor plans or site plans, will not be made available to the Contractor.
 - 1.5.4.4 Files will only be provided in the AutoCAD format in which they were created (i.e., version 2015 or version 2016). Files will not be made available in REVIT format.
 - 1.5.4.5 Requests for files will be processed as soon as possible; a minimum of 7 working days should be the normal processing time. The Contractor shall be completely responsible for requesting the files in time for their use and delays in requesting files will not alleviate the Contractor from submitting required documents within the required timeline

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CITY OF LA PUENTE ACTIVITY CENTER

SPECIFICATIONS

1.6 Warranty

1.6.1 Special Warranty: Manufacturer's standard form in which manufacturer and installer agree to repair or replace components of access control devices and equipment that fail in materials or workmanship with specified warranty period.

1.6.2 Warranty Period: (Two years) from date of Substantial Completion

1.6.3 The warranty shall cover all costs for service, including parts.

1.6.4 On-site support shall be provided by the Access Control Contractor.

1.6.5 Software version upgrades shall be available at no charge during the warranty period.

1.6.5.1 All software related licensing, support agreements and control operational licenses to be provide for a period of Two (2) years.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURER

2.1 Genetec Synergis Access Control System– to match existing City systems. Contractor shall provide Access Control Systems hardware and programming to match the City's Standard Access Control compliance requirements.

2.2 Substitutions: No Approved Alternate

2.3 The system shall provide wired readers to secure perimeter doors. Card Readers shall match Genetec Synergis Access Control System requirements.

2.4 The system shall be centrally managed by the existing City's Genetec single database/software application and one single credential system for all doors in the System.

2.5 Basic System Performance Requirements

2.5.1 Shall provide central management of user rights, access policies, and credentialing through the existing City system.

2.5.2 The application shall be capable of implementing access policies through the assignment of entry permission based on door groupings and time schedules.

2.6 System and Software

2.6.1 Provide Genetec Security Center - Synergis Cloud Link Access Control System software licenses for each door installed. Coordinate installation

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SPECIFICATIONS

and programming of Access Control Systems with the City IT and Facilities Departments.

- 2.6.2 Contractor shall be responsible for all programming of the Access Control System for the doors and Card Readers to match the City's requirements. Confirm programming requirements with the City's Project Manager.

2.7 Equipment

- 2.7.1 Control Panels, Card Readers, Power Supplies, Cabinet Enclosures, REX Motion Detectors and Door Contacts and shall be provided by the 28 16 00 Contractor as shown in the Drawing Details and as noted in these specifications. Refer to the Drawing Details for the Wiring Diagrams detailing the required components.

- 2.7.2 Provide EACH Genetc Mercury Security Model #LP1502 2-Door Controller Panel in the IDF Closet:

- 2.7.2.1 Power Enclosure and Back-Up Batteries sized per manufacturer's instructions – LifeSafety Power Model #FPO150/250-2C83D8PE6M1/P16-A (No Approved Equal)

- 2.7.3 Provide HIF Signo Card Reader licensed for use with Synergis software at the Entry Doors as shown on Drawings. Provide Model #20, 20K, 40 or 40K as designated by the door type. Contractor to confirm which Model to use with the City Project Manager.

- 2.7.3.1 Provide cabling from the Card Reader to the Access Control Panel located in the IDF Closet. Provide a composite cable containing all of the following conductors; 18AWG, 4-Conductor, Shielded; 22AWG, 3-Pair, Shielded; 22AWG, 2-Conductor Shielded; 22AWG, 4-Conductor Shielded; Plenum-Rated Communications Cable, Communications Supply Corp. #588343 (or approved equal in Non-Plenum CMR Version).

- 2.7.4 Request-To-Exit Motion Sensor in the Door Types per the Drawing Details

- 2.7.5 The 28 16 00 Contractor shall be responsible for installation of all cabling from the Door locations to the Control Panels in the IDF Room or Cabinet locations.

- 2.7.6 All cables shall be permanently labeled with a permanent type-written label showing a unique cable number a minimum of two locations, one within 6" and one 24" from the point of termination at the end of the cable.

- 2.7.7 Provide other items as shown in the drawings or specifications.

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SPECIFICATIONS

PART 3 - EXECUTION

- 3.1 Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.
- 3.2 Examine roughing-in for cable-connected devices to verify actual locations of conduit and back boxes before device installation.
- 3.3 Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.4 Comply with NECA 1, "Good Workmanship in Electrical Construction."
- 3.5 Wiring Method: Install wiring in raceway and/or cable tray as indicated on Drawings except within consoles, cabinets, desks, and counters. Conceal raceway and wiring except in unfinished spaces.
- 3.6 Boxes and enclosures containing security-system components or cabling, shall not be installed in locations which are easily accessible to employees or to the public boxes above ceiling level in occupied areas of the building shall not be considered accessible. Junction boxes and small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamperproof screws.
- 3.7 Unit shall be mounted on a properly prepared surface adequate for the size and weight of the module. The placement of the unit shall allow provision for installation and maintenance as indicated on the approved detail drawings and in accordance with the installation manual.
- 3.8 Comply with Section 26 05 26 "Grounding and Bonding for Electrical Systems."
- 3.9 Comply with IEEE 1100, "Recommended Practice for Power and Grounding Electronic Equipment."
- 3.10 **PREPARATION**
 - 3.10.1 Coordinate with Owner Representative for all IP address, network switch ports and permissions, Firewall settings and other Owner Supplied LAN equipment and settings required for an operational PACS
 - 3.10.2 Verify any Owner provided equipment, or network infrastructure meets, or exceeds manufacturer's requirements.
- 3.11 **INSTALLATION**
 - 3.11.1 Prior to hardware installation, the General Contractor shall setup a meeting with the Door Hardware Supplier, Installer, and this Contractor to ensure all understand the manufacturer's installation requirements for all items

SPECIFICATIONS

3.11.2 All equipment shall be installed to comply with manufacturer's written instructions. Where cutting and fitting are required, the contractor shall insure that all such preparation is done to minimize cosmetic impact. If installation requiring cutting onto or into surfaces that are later to be painted or finished, the contractor shall coordinate removal, storage, and reinstallation of surface protective trim units (trim rings, etc.), as required. Do not install surface-mounted items until finishes have been completed on substrates involved

3.12 FIELD QUALITY CONTROL

3.12.1 Perform final inspection with hardware installer and hardware supplier present to ensure correct installation and operation and check for damaged or defective items before installing additional devices. Observe and inspect that all hardware has been installed to its correct destination in proper working order.

3.12.2 The contractor will perform at least one test of the system after commissioning with the Owner and General Contractor present to confirm problem-free operation and compliance with the design specifications in this Section.

3.13 ADJUSTING

3.13.1 Initial Survey: Check each operating item of door hardware and each door to ensure proper operation or function of every unit. Report items out of adjustment, or that do not operate as intended to General Contractor

3.13.2 Ensure all openings have been adjusted properly prior to commissioning and system testing

3.13.3 At completion of the installation and prior to Substantial Completion, final adjustments should be made to all devices. Leave all hardware clean and fully operable. Should an item be found to be defective, it shall be repaired or replaced as directed

3.14 CLEANING AND PROTECTION

3.14.1 Clean adjacent surfaces soiled by the installation.

3.14.2 Clean operating items as necessary to restore proper finish.

3.14.3 Provide final protection and maintain conditions that ensure all hardware is without damage or deterioration at time of Substantial Completion

3.15 DEMONSTRATION & TRAINING

3.15.1 Provide a minimum of four (2) hours of software instruction to Owner's Personnel in proper setup and operation of the system at final installation

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- 3.15.2 In addition to instruction, after the system is installed and adjusted, the contractor shall demonstrate the functionality and proper use to Owner's Personnel of the system.

END OF SECTION

ACCESS CONTROL SYSTEM
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CITY OF LA PUENTE ACTIVITY CENTER

SPECIFICATIONS

SECTION 28 23 00

VIDEO SURVEILLANCE SYSTEM

PART 1 – GENERAL

- 1.1 Contractor shall provide additional cameras to the existing campus-wide video surveillance system. Furnish all materials, equipment and labor, and perform all operations in connection with video surveillance system work as indicated on the drawing, as specified herein and required to complete the work. The video surveillance system for the Activity Center shall be managed by the City of La Puente IT Department. The new cameras shall be tied into the existing City-wide Video Surveillance System.
- 1.2 Related Specification Sections:
 - 1.2.1 Section 28 01 00 - General Provisions
 - 1.2.2 Section 26 05 33 - Conduit and Fitting
 - 1.2.3 Section 26 05 19 - Conductors
 - 1.2.4 Section 26 05 34 - Outlet and Junction Boxes
- 1.3 All security video surveillance system components and wiring shall be furnished and installed by a factory authorized Contractor and Distributor. The Contractor shall hold a C10 or C7 license from the State of California for the purpose of installing surveillance systems. The Contractor shall meet the requirement of the 28 23 00 Section for warranted installations.
- 1.4 Installing Video Surveillance Contractor qualifications: Firms and their personnel must be regularly engaged in the installation of video surveillance system cabling and equipment for systems of similar type and scope. The Contractor must have a full-service office able to respond to emergency callouts during the warranty period.
 - 1.4.1 City Approved Contractor **Superior Alarm Systems** Only, 9001 Canoga Avenue, Canoga Park, CA 91304. Contact Bruce Brown – 818-700-7100 Ext. 217 (No Approved Alternate)
 - 1.4.2 Subcontractors will not be approved for the installation of any portion the video surveillance systems, except those noted in these specifications.
- 1.5 Existing City-Wide Video Surveillance System is warranted by Superior Alarm Systems.
- 1.6 All cameras provided by the Contractor must match existing system components currently installed on the City Network and approved by the City IT Department. **The City Standard Cameras shall be as manufactured by Axis (No Approved Equal).** Different manufacturers will not be considered equal.

VIDEO SURVEILLANCE SYSTEM

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CITY OF LA PUENTE ACTIVITY CENTER

SPECIFICATIONS

- 1.7 The City's existing video surveillance software is **Genetec OmniCast**. The Contractor shall confirm with the City IT Department which version of the software is to be locally installed and which version is currently on the Main System Server at the City Offices.
 - 1.7.1 The Contractor shall furnish all of the MAC addresses of the cameras to the City IT Department as soon as possible upon receipt of the cameras.
- 1.8 The Network Infrastructure portion of the project shall be completed by the 27 10 00 Contractor. Coordinate with the 27 10 00 Contractor for the locations of the data cables for the network cameras. The 28 23 00 Contractor shall install all patch cables in the IDF Closet and at the camera location. Refer to the camera section for additional instructions.
- 1.9 Acceptable camera and accessory manufacturers shall be as shown in this specification.
- 1.10 Equipment manufactured by any other manufacturers not listed in these specifications have been reviewed and are not considered equal or approved for use on this project. Equivalent products for items listed with "or equal" must be submitted, reviewed and approved by the Project Engineer before they are considered an equal for the item specified, and approved substitutions shall be included in the Contractor's submittal package.
- 1.11 The handholes, junction boxes, conduit, outlets, terminal cabinets, device backboxes, etc., which form a part of the rough-in work, shall be furnished and installed complete by the Division 26 Contractor.
- 1.12 **Provide 3-year extended equipment and installation warranty on all active video surveillance components including cameras and servers.** If the individual product does not carry a 3-year warranty, the Contractor shall include the extended warranty required to meet the requirement from the manufacturer. Contractor originated warranties on manufactured components will not be accepted as equal.
- 1.13 In order to ensure project cohesion, a single point of contact is required to provide a "TURNKEY" solution. The work covered under this section of the specification consists of furnishing all labor; warranties; equipment; software; supplies; materials; and training. The Contractor will perform all operations necessary for the "TURNKEY" and fully completed installation in accordance with the specifications herein. As such, the successful Contractor must be factory trained on all aspects of system hardware.

VIDEO SURVEILLANCE SYSTEM

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CITY OF LA PUENTE ACTIVITY CENTER

SPECIFICATIONS

- 1.14 Phase 2 Submittal shall be made within (10) working days after the award of the contract by the City. This submittal shall include the following:
 - 1.14.1 Complete bills of quantities, including all materials, components, devices, and equipment required for this work. The bills of quantities shall be tabulated respective of each and every system as specified, and shall contain the following information for each item listed:
 - 1.14.1.1 Description and quantity of each item.
 - 1.14.1.2 Manufacturer's Name and Model Number.
 - 1.14.1.3 Manufacturer's Specification Sheet.
 - 1.14.1.4 Description of any specialty backbox requirements.
 - 1.14.1.5 All wiring types required for installation of this system.
 - 1.14.1.6 Extended warranty documentation
- 1.15 The City of La Puente's Main Offices shall be considered the City's central control point for all cameras and servers within the City-wide Surveillance System. Contractor shall provide any programming required for the overall administrative tasks associated with the project, to be provided from this location and any local programming required for the cameras on the server in the existing MDF Room.
- 1.16 The Contractor shall set up and coordinate meetings for interviews with the City IT Director or Approved Contact, Local Police Supervisor and the Administrative Staff to confirm the exact coverage area for each camera. The Contractor shall document the camera coverages from those meetings and use the information to set up and focus the cameras. Time and labor for this function shall be included in the Contractor's bid.

PART 2 – PRODUCTS

Video Surveillance System – General Requirements

- 2.1 The Video Surveillance System is an IP-based delivery system utilizing digital network cameras for surveillance of the campus and adjacent grounds. Contractor shall be responsible for providing all components of the cameras including, but not limited to; cameras, lenses, housings, mounts, cabling (except Network Infrastructure provided by the 27 10 00 Contractor), power supplies, software, programming and support hardware.
- 2.2 The City shall be responsible for providing the POE network switch ports required to operate the Ethernet connections to the cameras. Programming of the switch ports for the additional cameras shall be set up by the City IT Department and final programming of the camera management software within the virtual network shall be completed by the Contractor. Coordinate all IP Addressing with the City IT Department.

**VIDEO SURVEILLANCE SYSTEM
28 23 00-3
CITY OF LA PUENTE ACTIVITY CENTER**

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- 2.3 IP cameras will be powered via PoE (Power over Ethernet) unless otherwise noted. Camera types and models are listed in the specifications.

Video Surveillance Software

- 2.4 Existing Video surveillance software shall be as manufactured by Genetec. Provide any software updates with the delivery package as required to complete the installation with the latest versions of software package.
- 2.5 Contractor shall program the video surveillance operational software on the sever at the local campus as required to provide a complete turn-key installation. Contractor shall also be responsible for setting programming for all camera locations including, but not limited to; blanking or masking parameters, dynamic range adjustments, recording parameters, coverage areas, scheduled and pre-alarm event management, playback and search parameters, access and control groups for multiple users, Administrative access per City IT Department instructions, etc. Contractor will responsible for interviewing the Client for information regarding programming requirements and shall include a minimum of 6 man-hours with the Contractor's Programmer. Contractor shall provide meeting minutes of the interview to the Project Engineer, Architect, Construction Manager and the City Project Manager.
- 2.6 The Contractor shall load all user interface software on the local computers and wireless devices of the Staff and Police or Security that will be monitoring the video surveillance system cameras for the campus. The Contractor shall be responsible for setting up any programming, or fine tuning, to allow the user to access the system per their pre-determined level of access, as required by the City IT Director, Administration and the Police or Security Officers.

Cameras and Enclosures

Networked Cameras

- 2.7 Provide quantity of cameras as shown in project drawings. Refer to both the floor plans and the site plans for a complete count of all cameras as some cameras may be located in remote areas. The Contractor shall provide a complete turn-key installation of all cameras and provide all accessories, including mounts for each of the camera locations. The cameras shall be connected to the City's Ethernet switches in the IDF Room. Each camera's storage requirements shall be recorded at the frame rate required by the City.
- 2.8 Cameras shall be installed in a clear dome vandal resistant, weather-tight housing with mount as required for the mounting location shown on the drawings. See detail drawings for additional camera mounting requirements. Power for camera and housings shall be provided from the POE switch located in the IDF closet. Contractor shall furnish and install all cabling and mounting hardware for the camera installation. All fasteners and mounting hardware shall be vandal resistant stainless steel.

VIDEO SURVEILLANCE SYSTEM

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CITY OF LA PUENTE ACTIVITY CENTER

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- 2.9 Provide Axis Series 5MP IP Dome Camera – Model P3267-LVE with IR Emitters (No Approved Equal) for all camera locations shown on the drawings.
- 2.10 Provide all mounting adapters and vandal resistant hardware, per the specifications, detail drawings and manufacturer's recommendations. See detail drawings for additional requirements. Route cabling through mounts adapter to camera. Contractor shall be responsible for field modifications required to adapt the camera mounts to the building's interior and exterior surfaces.

General Camera Installation Requirements

- 2.11 Cameras and mounts shall be furnished and installed by the Contractor. The Contractor shall be responsible for all mounting hardware and any additional support materials. Contractor shall also be responsible for providing and installing any specialized mounting requirements as required to properly mount the cameras and provide the proper coverage area. Contractor shall refer to the floor plans and drawing details for additional requirements.
- 2.12 Contractor must field verify and confirm all camera heights with the Project Engineer and the City IT Director prior to installation of any cameras. The Contractor shall submit a spreadsheet detailing the camera location, proposed mounting height, camera mount type, proposed adapters (as required).
- 2.13 Contractor shall submit camera heights and confirm coverage patterns for the cameras to the City IT Director and the Project Engineer (JCE) prior to installation of the conduit or cameras.
- 2.14 The Contractor shall be responsible aiming all cameras and confirming coverage for the cameras until the project is signed off by the City IT Director. The camera coverage areas shall coincide with the information derived from the meetings with the local Administration and Police Department.

Additional Scope of Work, Labor and Materials

- 2.15 The Contractor shall provide in their bid (8) labor hours for re-adjustment of the cameras on the school's campus six weeks (to be scheduled by mutual agreement between Contractor and City) after the initial installation is completed. The labor shall include all tools and miscellaneous materials required to re-aim, re-focus or re-program the new cameras. The adjustments may be required as the campus reviews the use of the cameras after installation. Labor provision shall not include drive time to the locations. The Contractor shall keep a log of the work completed and the hours used for this portion of the contract and submit it to Construction Manager and Project Engineer for approval before final payment of the project can be released.
- 2.16 In addition to the installation of the cameras and adjustment allowance, the Contractor shall document all operational cameras on the as-built drawings and what the camera identification names or numbers shown in the software system.

VIDEO SURVEILLANCE SYSTEM

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CITY OF LA PUENTE ACTIVITY CENTER

SPECIFICATIONS

Accessories and Mounts

- 2.17 Provide corner mount adapters for wall mount applications, where required, for proper coverage per the camera locations on the drawings. The corner mount adapters shall be as manufactured by Axis Model #T94R01B (No Approved equal) (This mount requires Wall Mount Bracket #T91E61 to mount Camera)
- 2.18 Provide wall mount adapters for wall mount applications, where required, for proper coverage per the camera locations on the drawings. The wall mount adapters shall be as manufactured by I-Pro Model #T91E61 (No Approved equal)
- 2.19 The Contractor shall use the manufacturer provided adapters provided with the camera to as required to properly install the camera. Refer to the manufacturer's installation instructions for additional requirements and guidelines.
- 2.20 All camera enclosures shall be securely anchored to the wall or ceiling as shown in the drawing details. Fasteners shall be rated for twice the combined weight of camera and mounts.
- 2.21 Provide signage with lettering ("Notice Video Surveillance in use on these premises" or similar) and camera symbol, 18" x 12". Provide a total of (8) signs, color on white, Engineer Grade reflective signs on campus. The exact verbage to be placed on the sign shall be verified and signed off by the City Facilities Director, prior to the manufacture of the signs. All signs shall be bolted to the building, fence or post location chosen by the City. Verify exact locations with City Facilities Director. All mounting hardware shall be stainless steel and vandal resistant. Signs shall be mounted with a minimum of four attachment points or a minimum of (6) attachment points if the sign is being attached to fencing.
 - 2.21.1 All signs mounted on fencing shall be mounted with a minimum of ½" bolt, washers and nuts through sign at all four corners.
 - 2.21.2 Signs may not be attached with wire, ty-wraps, staples, screws or any other form of attachment that may allow for the sign to be pulled through the support.

PART 3 – EXECUTION

- 3.1 All connections throughout the system shall be crimped or fastened with screw type terminals or made by spring tension clip "punch block" terminals or made by standard connectors and bulkheads. Each wire twisted pair or cable shall be tagged throughout the site with EZ markers with the room number it serves. All conductors in terminal cabinets shall be carefully formed and harnessed in a workmanlike manner.
- 3.2 All camera system cabling shall be installed in conduit where indicated on the drawings or where routed exposed and shall be open wiring where routed above accessible ceilings or in walls.

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SPECIFICATIONS

- 3.3 Locations of cameras as shown on the electrical plans are diagrammatic only. Prior to beginning installation, Contractor shall schedule a site coordination meeting with the City and Project Engineer to confirm the exact locations.
- 3.4 Labeling
 - 3.4.1 Each cable run shall be permanently labeled at each end with a unique sequential number which corresponds to a similar number provided for each data outlet and punch down point. A printed label shall be placed at each of the following locations;
 - 3.4.1.1 On the cable at the rear of the patch panel or termination block. Requires the use of a self-laminating wrap around label. Brady Label self-laminating 1.2" by 1.5" wrap around label Part # 29689 (NO ACCEPTABLE EQUAL).
 - 3.4.1.2 On each cable in the j-box behind the faceplate location. Requires the use of a self-laminating wrap around label. Brady Label self-laminating 1.2" by 1.5" wrap around label Part # 29689 (NO ACCEPTABLE EQUAL).
 - 3.4.1.3 On the face of the patch panel, provide a 3/4" by 3/4" label with a letter or number identifying the patch panel designation.
 - 3.4.1.4 On the termination block in the base of the camera housing.
 - 3.4.2 Hand-written labels are not permitted. Where cable ID includes room number identification the Contractor shall obtain written verification of actual room numbers prior to beginning labeling (numbers on plans do not always match actual room numbers). Cable pulling cross reference lists will not be accepted with final documentation.
 - 3.4.3 Each patch panel port shall be identified with a unique sequential labeling scheme. Port identification labeling pattern shall be consistent throughout the project.
 - 3.4.4 All cables shall be identified with permanent printed labels. Labels must not be subject to removal by incidental contact. Contractor shall be responsible for replacing defective labeling for a period of one year from date of final sign-off of project.
 - 3.4.5 Labeling will follow recommended EIA/TIA standards or as requested by the customer. Contractor will confirm labeling pattern prior to final identification or testing. All test results will be identified by the final labeling scheme.
 - 3.4.6 All cameras shall be labeled with permanent type written labels with the naming convention agreed upon by the City while programming the software system. The names on the labels will match the names that appear on the screen of the viewing station when the camera image or

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video is accessed. The labels shall be a minimum of ½" in height and shall be placed in a location visible from the ground.

3.4.7 Refer to detail drawings for additional labeling requirements.

3.5 Contractor shall coordinate IP addressings and access to the City's network with the City IT Administrator. It is the Contractor's responsibility to set-up, program, and test all features for the camera's software and functionality. City IT Department shall provide PoE Network Switch Ports as necessary to service the IP cameras at the IDF Room location.

3.6 Final Systems Acceptance

3.6.1 The system will be accepted only after a satisfactory test of the entire system has been accomplished by a Factory-Trained Contractor in the presence of the Project Engineer and the City's Representative. The Contractor shall provide all personnel, ladders and testing equipment to assist in completing this test.

3.6.2 Provide a minimum of two (2) complete as built sets of drawings for the City records, including (1) copy on a USB Flash Drive of the updated AutoCAD plans including all ASI, Change Orders and Field Modifications.

3.6.3 The As-Built drawings shall show the camera locations, cable paths, MDF/IDF locations, camera labels and naming conventions, switch port assignments and IP Addresses.

3.6.4 Upon completion of testing cable links, the Contractor shall supply a copy of the original database files downloaded from the tester in original format on disk. Contractor shall provide with database files an original copy of the tester's manufacturer software program (included in original cost) for record management and archiving, in a Windows format (e.g., MicroTest's software program - ScanLink ver.)

END OF SECTION

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SECTION 28 30 01

FIRE ALARM VOICE EVACUATION SYSTEM

PART 1 – GENERAL

- 1.1 Work Included:
 - 1.1.1 Furnish and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a complete and operating fire alarm system.
- 1.2 Related Work:
 - 1.2.1 Division 26 01 00: Electrical General Provisions
 - 1.2.2 Division 26 05 33: Conduit and Fittings
 - 1.2.3 Division 26 05 34: Outlet and Junction Boxes
- 1.3 The equipment and installation shall comply with the current applicable provisions of the following standards:

NFPA 72-2022. National Fire Alarm Code with California Amendments.
CBC - 2022. California Building Code (CBC), Part 2, Title 24, CCR.
CEC - 2022. California Electrical Code, (CEC), Part 3, Title 24, CCR.
CFC - 2022. California Fire Code (CFC), Part 9, Title 24, CCR.
- 1.4 The system and all components shall be listed by Underwriters Laboratories, Inc. for use in Fire Protective Signaling Systems.
- 1.5 Only Fire Alarm Control Panel Equipment and Peripheral Field Devices have been shown on the Contract Bid Single Line Block Diagram. Specific and complete wiring between Control Equipment and Peripheral Equipment has been deleted for clarity.
- 1.6 Fire Alarm system and installation shall meet all of the following DSA Requirements:
 - 1.6.1 Applicable Standard NFPA 72, as adopted and amended in CBC Chapter 35
 - 1.6.2 A stamped set of approved fire alarm design documents shall be on the job site and used for installation.
 - 1.6.3 Any discrepancies between the drawings and the code or recognized standards shall be brought to the attention of DSA and the architect/engineer of the project.
 - 1.6.4 Wall mounted visible notification devices shall have their bottoms mounted at 80" minimum and 96" maximum from finished floor.

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- 1.6.5 Wall mounted Audible devices shall have their tops mounted at 90" minimum and 100" maximum from finished floor and no closer than 6" to a horizontal structure.
- 1.6.6 Audible devices shall provide a sound pressure level of 15 decibels (dBA) above the average ambient sound level or five dBA above the maximum sound level having a duration of at least 60 seconds, whichever is greater, in every occupiable space within the building.
- 1.6.7 Audible devices shall be synchronized temporal code 3 pattern.
- 1.6.8 The contractor shall adjust/install all devices to maximize performance and minimize false alarms.
- 1.6.9 Visible devices shall not exceed two flashes per second and should not be slower than one flash every second. The device shall have a pulsing light source not less than 15 candela. Visible devices within 55' from each other shall be synchronized.
- 1.6.10 Underground and exterior conduits to have watertight fittings and wire to be approved for wet locations.
- 1.6.11 All fire alarm wiring shall be FPLOR FPLP (fire power limited or fire power limited plenum) as required for application. Wiring in conduit above grade may be type THHN or THWN.
- 1.6.12 Smoke detectors shall not be any closer than 1' from fire sprinklers or 3' from any supply diffuser. In area of construction or possible damage/contamination on newly installed fire alarm, devices shall be covered until that area is ready to be turned over to owner.
- 1.6.13 Fire alarm panel, remotes, and components shall be secured to mounting surfaces per manufacturers specifications. No single device shall exceed 20 lbs without special mounting details.
- 1.6.14 A dedicated branch circuit shall be provided for fire alarm equipment. This circuit shall be energized from the common use area panel and shall have no other outlets. The breaker shall have a red locking device to block the handle in the "on" position. The circuit breaker shall be labeled "Fire Alarm Circuit Control" Circuit ID to be labeled at fire alarm panel/extendors.
- 1.6.15 The installing contractor shall provide a completed "System Record of Completion" per NFPA 72, figure 17.8.2.
- 1.6.16 Fire alarm control panels and remote annunciators shall be installed with their bottoms mounted at 48" above the finished floor.

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- 1.6.17 Microphones associated with emergency voice alarm communication systems (EVAC) shall be accessible for use. Installed in compliance with CBC sections 11B-305 and 11B-308.
- 1.6.18 The installing contractor shall provide system programming for supervisory monitoring per CBC section 901.6.2.
- 1.6.19 Supervisory monitoring shall be tested and verified as sending correct signals in conjunction with final acceptance test.
- 1.6.20 Owner shall be responsible for establishing a fire system monitoring contract or provisions.
- 1.7 Submittal shall be made **in accordance with Division 26 01 00 – Shop Drawings and Submittals.** This submittal shall include the following:
 - 1.7.1 Complete bills of quantities, including all materials, components, devices, wiring and equipment required for this work. The bills of quantities shall be tabulated respective of each and every system as specified, and shall contain the following information for each item listed:
 - 1.7.1.1 Quantity of each type of equipment item.
 - 1.7.1.2 Quantities of 10% spare devices as per 1.16.
 - 1.7.1.3 Description of each item.
 - 1.7.1.4 Manufacturer's Name and Model Number.
 - 1.7.1.5 Manufacturer's Specification Sheet.
 - 1.7.1.6 Back box type and dimensions per device type.
 - 1.7.1.7 California State Fire Marshall Listing Sheets for all components.
 - 1.7.1.8 Equipment items which have individual components, will require that all component parts be listed individually.
- 1.8 Phase II Submittal shall be provided **within (20) working days** after the approval of the Phase I submittals and prior to any fabrication or field conduit installations. All shop drawings shall be engineered and drawn on a CAD System. Each submission shall include 'D' or 'E' size print copies to match the contract drawings, and one (1) data disk copy with files in an AutoCAD 2000i or 2004 format. Building floor plan CAD files on disk, will be made available via express mail **after the receipt of payment** of \$50.00 per building floor plan, or \$300.00 minimum which ever is **less**. Contractor shall make the request for drawings in writing directly to Johnson Consulting Engineers, confirmation of the request and a release form will be forwarded to the contractor to include a signed copy with payment prior to release of files. Detail or riser diagram sheets or any other drawings other than floor or site plans, will not be made available to the contractor.
 - 1.8.1 **Provide complete shop drawings to include the following:**

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- 1.8.1.1 Complete floor plans, at scale of contract documents, showing the locations throughout the project of all devices, panels conduits, wireways, tray, pullboxes, junction boxes, number and type of conductors, and other devices.
- 1.8.1.2 Point to point wiring diagrams showing wiring from panel terminals to each device.
- 1.8.1.3 Riser diagram indicating all wiring and circuits.
- 1.8.1.4 Current State Fire Marshal listing sheets for all components and devices.
- 1.8.1.5 Provide battery power supply calculations, indicate point of power supply connection, means of disconnect, over-current protection, etc. for each panel.
- 1.8.1.6 Provide detailed information on conductors to be used- manufacturer, type, size, insulation, etc.
- 1.8.1.7 Provide voltage drop calculations for all conductor run is from each panel (i.e., main FACP, remotes, power extenders, etc.) for each panel.
- 1.8.1.8 Provide written sequence of system operation matrix.
- 1.8.1.9 Provide list of zones. (Every device that is addressable.)
- 1.8.1.10 Provide detailed drawing for annunciator panel indicating all zones and initiating devices.

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

- 1.9.1 Not including the qualifications of the installing contractor.
- 1.9.2 Not including all items listed in the above itemized description.
- 1.9.3 Including catalog cut sheets which have several items on a page, and not clearly identifying by highlighting, underlining or clouding the items to be reviewed, or crossing out the items which are not applicable.
- 1.9.4 Not including actual manufacturer's catalog information of proposed products.
- 1.9.5 Do not include multiple manufacturers for similar products and do not indicate "or approved equal" statements, or "to be determined later" statements. The products being submitted must be the products installed.

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- 1.10 All equipment and material shall be new and unused, and listed by Underwriter's Laboratories for the specific intended purpose. All control panel components and field peripherals shall be designed for continuous duty without degradation of function or performance. All equipment covered by this specification or noted on Installation. Drawings shall be equipment suited for the application and shall be provided by a single manufacturer or be recognized and UL listed as compatible by both manufacturers.
- 1.11 It will be the responsibility of the Contractor to ensure proper specification adherence for system operation, final connection, test, turnover, warranty compliance, and after-market service. The distributor of the equipment specified must be factory-trained and certified.
- 1.12 Basic System Functional Operation, upon operation of any automatic, manual or other initiation device the following shall occur:
 - 1.12.1 The system alarm LED shall flash.
 - 1.12.2 A local piezo electric signal in the control panel shall sound.
 - 1.12.3 A backlit 80-character LCD display shall indicate all information associated with the fire alarm condition, including the alarm point and its location within the protected premises.
 - 1.12.4 History storage equipment shall log the information associated with each new fire alarm control panel condition, along with time and date of occurrence.
 - 1.12.5 All system output programs assigned via control by event equations to be activated by the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.
 - 1.12.6 LED display and audible signaling at the remote annunciator indicating building, fire zone, and type of device. Annunciator shall also provide a separate audible signal for CO detection with a green flashing light, with classroom number indication.
 - 1.12.7 Automatic retransmission to a UL central station for fire department notification.
 - 1.12.8 Automatic shut down of air conditioning units shall be performed by control modules at each unit when required as part of a complete area coverage design scheme. Each building shall shut down all A/C units and dampers within that building as one zone.
- 1.13 All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and

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listed by a nationally recognized approval agency for use as part of a protective signaling system.

- 1.14 All equipment and components shall be installed in strict compliance with manufacturer's recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.
- 1.15 All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place. Fasteners and supports shall be adequate to support the required load.
- 1.16 All wiring shall be installed in a conduit system.
- 1.17 The contractor shall provide as a part of this contract additional control modules, heat detectors, smoke detectors, CO detector, duct detectors, manual pull stations, strobes, speakers, speaker/strobes exterior speakers devices etc. along with all required programming, to equal 10% of the total quantity of devices shown on the drawings, or a minimum of three (3) for each type, whichever is greater. Installation of 50' of conduit, boxes and all wiring for each of the devices shall be included, and required locations coordinated with CSFM final approved shop drawings. Any devices not required to be included during construction shall be delivered to the District at the completion of the project. The quantities of these devices shall be listed as a part of the Phase I submittals.
- 1.18 The installing contractor shall provide a copy of current documentation, indicating that the contractor installing the fire alarm systems or devices and wiring, is certified by Underwriters Laboratories (UL) in its product directories under the listing category "PROTECTIVE SIGNALING SERVICES - LOCAL, AUXILIARY, REMOTE STATION, AND PROPRIETARY." The contractor shall be certified by the manufacturer to install and program the system. The contractor must also provide complete installation of all wiring and equipment, and software programming. Supervised installation of the wiring, devices and/or any software programming shall not be permitted.
 - 1.18.1 The installing contractor must also be an "authorized dealer" by the equipment manufacturer, and must have completed all required training prior to the bid of this project.
 - 1.18.2 The fire alarm system installation shall be warranted by the manufacturer's representative.
 - 1.18.3 The Contractor shall have a current California C-10 or C-7 Contractor's License, and all individuals working on this project shall have passed the Department of Industrial Relations Division of Apprenticeship Standards – "Fire / Life Safety Certification Program."
 - 1.18.4 The installing contractor shall provide, at the time of submittal, a letter of intent to provide an extended service warranty. This warranty shall extend

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for a total of three (3) years, starting at the completion, testing, and training of this project. The service warranty shall cover all material and labor to keep operational all system devices installed under this project, and shall include two (2) complete U.L. system's tests and cleaning of all devices at year two (2) and year three (3) of the warranty. Routine cleaning of devices, other than at the two (2) specified U.L. system's testing periods, will not be included as a part of this warranty.

1.18.5 The installing contractor shall provide, at the time of submittal, a letter indicating that the installation crew for this project meets the following NICET certifications:

1.18.5.1 25% of the installing field personnel must have completed NICET Level 2 Certification.

1.18.5.2 One of the installing field personnel and /or supervisor must have completed NICET Level 3 Certification.

1.18.5.3 Contractor shop drawings shall be signed by an individual who has completed NICET Level 4 Certification.

1.19 All conduit and standard backboxes will be furnished and installed by the Division 26 Contractor. Specialty boxes will be furnished by the equipment supplier to be installed by the Division 26 Contractor.

1.20 Equipment and materials shall be the standard product of **Fire Lite**

1.21 Alternate equipment as manufactured by any other manufacturer not specifically listed above will not be approved for use on this project.

PART 2- PRODUCTS

2.1 Main Fire Alarm Control Panel:

2.1.1 Fire alarm control panel shall be Fire Lite ES-1000X and provide Voice Evacuation.

2.1.2 The system shall be controlled and supervised by a microprocessor based monitoring fire alarm control panel. The systems shall be addressable, field configurable, programmable and editable. The system shall continuously scan devices for change of status. Each device shall have its own unique address, but shall also be grouped by building as a separate zone for remote annunciation and alarm report purposes.

2.1.3 The fire alarm control panel shall be housed in a lockable, code gauge steel cabinet with 80character LCD display, master controller operators panel, indicating lamps, silence switch and reset switch mounted on cabinet front. The fire alarm control panel shall be physically and visually located in the general office for monitoring by staff, and shall sound the

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- “Voice Message” in all zones. Signal duration shall be field programmable and initially set at three minutes. Provide all control modules, synchronous modules, etc., to provide a complete working system per all codes that apply.
- 2.1.4 The fire alarm control panel shall come with standardized software for on-site customization of the system. The unit shall be capable of providing a 600-event historical log with zone or point selectable alarm verification.
 - 2.1.5 Provide a minimum 100 watts of amplification in each FACP with a minimum of 25% spare capacity.
 - 2.1.6 The unit shall support **a minimum of 3000 intelligent addressable points** and one output point, SPST contact per zone. Provide the number of modules necessary to control and supervise fire alarm devices as shown on the Drawings, as well as to provide 25% spare capacity.
 - 2.1.7 The unit shall also provide a minimum of (2) class B strobe circuits with additional circuits as indicated on the drawings.
 - 2.1.8 The fire alarm control panel shall be capable of providing a walk test.
- 2.2 The power feed for the FACP shall be 3-wire, 120volt, AC, single phase (20A circuit) permanently labeled “FIRE ALARM CONTROL POWER”, terminating at the master fire alarm control and supervisory panel. The label shall be red with 1/4” high white lettering. The source circuit breaker must be provided with a lock-on device.
- 2.3 In addition to the AC circuit, the panel shall be equipped with a DC battery to activate an audible alarm and pilot light in case of a power failure on the AC circuit.
- 2.3.1 Provide external battery cabinet to house DC batteries directly below fire alarm panel when fire alarm panel cabinet cannot accommodate the battery size required.
- 2.4 The master fire alarm panel shall be equipped with a manual pull lever type, supervised report station.
- 2.5 With the exception of the manually operated report station required at the master fire alarm panel and large assembly areas, the remainder of the school facility shall be equipped with approved, electronically supervised, automatic fire detection devices, such that every room, space, including concealed spaces, such as the attic spaces above ceilings, etc., is provided with approved coverage.
- 2.6 TRANSPONDER PANELS shall provide voice evacuation/annunciation with a minimum 100 watts of audio amplification to support 70v speaker devices and a minimum of (2) Class B Strobe NAC circuits and be fiber networked to the

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system. Provide for 25% additional capacity for amplification in each Transponder panel.

- 2.7 REMOTE POWER SUPPLIES shall provide a minimum of (4) Class B NAC circuits.

2.7.1 Remote Power Supplies shall be provided adjacent to each Fire Alarm Control Panel that is incapable of supporting NAC strobe circuit(s). Refer to Fire Alarm Riser Diagram for quantity of strobe circuits required at each of these Fire Alarm Control Panels and provide additional Remote Power Supplies as required.

- 2.8 MANUAL FIRE ALARM STATIONS shall be addressable test-reset lock in order that they may be tested, and so designed that after actual emergency operation, they cannot be restored to normal, except by use of a key. An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of 100 feet, front or side. Manual stations shall be constructed of die-formed, satin-finished aluminum, with operating directions provided on the cover in depressed red letters. The word FIRE shall appear on each side of the stations in depressed letters, 1/2-inch in size or larger. Stations shall be suitable for semi-flush mounting on a standard single-gang box or switch plate, and shall be provided with a terminal block for connection of fire alarm system wiring. Manual pull stations must comply with CBC sections 11B-309 and 11B-403.

- 2.9 SPEAKER / STROBE DEVICE shall be of the semi-flush type designed for mounting to a standard 4 11/16" deep electrical back box. Each device shall be provided with a semi-flush accessory plate. Exterior speakers shall be weatherproof. The strobe unit shall have a meantime between failure (MTBF) of 1,000 hours or greater. The strobe section shall have a minimum flash rate of approximately one flash per second, with candela rating as per UL standard 1971. Housing shall be white.

2.9.1 In areas containing two or more audible devices, or three or more visual devices, these devices shall be synchronized, Per NFPA 72, Chapter 18.

2.9.2 Speakers/strobe devices used for Carbon Monoxide alarm must not reflect the word FIRE or have any fire symbol thereon.

- 2.10 SPEAKERS shall operate at 70 VRMS and provide tap setting from 1/8 to 2 watts and provide efficient design for high intelligibility at a minimum wattage across a frequency range of 300 to 8000 HZ and shall be white in color. Speakers shall be ADA, NFPA and ANSI compliant.

2.10.1 Speakers for typical classrooms shall be tapped at 1/4 watt with exterior speakers tapped at 2 watts. Other areas such as Theaters, Auditoriums, Gymnasiums, Team Rooms, Cafeterias, Kitchens and all shop areas shall be tapped at 1/2 watt.

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- 2.10.2 Fire Alarm Speakers used for Carbon Monoxide alarm must not reflect the word FIRE or have any fire symbol thereon.
- 2.11 STROBES. The strobe unit shall have a meantime between failure (MTBF) of 1,000 hours or greater. The strobe section shall have a minimum flash rate of approximately one flash per second, with candela rating as per UL standard 1971. Housing shall be white.
- 2.11.1 In areas containing two or more audible devices, or three or more visual devices, these devices shall be synchronized, per NFPA 72, Chapter 18 California Amendments (2019).
- 2.11.2 Maximum pulse duration to be 0.20 of a second with an ADAAG 4.28.3(3). Visual alarms maximum duty cycle of 40%.
- 2.11.3 Capable of providing minimum candela. Intensity as shown on plans (effective strength measured at the source).
- 2.11.4 The flash rate to be a minimum of 1 Hz and a maximum of 2 Hz per NFPA 18.5.3.1.
- 2.11.5 Fire Alarm Strobes used for Carbon Monoxide alarm must not reflect the word FIRE or have any fire symbol thereon.
- 2.12 HEAT DETECTOR DEVICES shall be analog addressable, fixed temperature x rate of rise, fixed at 200°F and a 15°F/min rate of rise. In janitor rooms equipped with kilns, devices shall be fixed at 200°F.
- 2.13 SMOKE DETECTOR DEVICES shall be analog addressable, photo-electric.
- 2.14 CO – CARBON MONOXIDE detectors shall be provided in all Group E Classrooms and provided with a sounder base to alarm individual classrooms with a 4-pulse temporal pattern as well as transmitting a signal to the staffed remote annunciator.
- 2.15 DUCT TYPE DETECTORS shall be analog addressable, photo-electric type, provide with remote test switch and auxiliary contacts as required for control of A/C units or smoke dampers.
- 2.16 DIGITAL ALARM COMMUNICATOR TRANSMITTER. The control panel shall meet the requirements of UL 864 for central station connections, and shall be UL listed for use with the fire alarm control panel. The communicator shall be connected to supervise two telephone lines, all wiring required for this connection shall be provided by the fire alarm contractor Coordinate interface with District monitoring company as required.
- 2.17 REMOTE ANNUNCIATOR shall be an 80 character backlit, alphanumeric, LCD readout display. The display shall include alarm, supervisory, CO detection and trouble condition LEDs and tone alert. Each condition shall have a dedicated

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acknowledge push button switch to silence the local tone alert but leaves the LED lights on until all conditions have been restored.

PART 3- EXECUTION

- 3.1 All wiring shall be (min) #18 AWG copper or as noted on drawings. All underground conductors shall be UL wet location rated for use in wet locations, West Penn "Aquaseal" or equal. There shall be no splices in underground handholes or vaults. A multi-conductor cable rated for use in wet locations will also be acceptable. It must be labeled "FIRE ALARM" in all pull boxes, using a water-tight labeling system.
- 3.2 Interior, dry location wiring for low voltage initiating circuits shall be #18 AWG copper, twisted shielded pair minimum, signaling circuits shall be No. 14 AWG minimum, and wiring for 120 volt circuits shall be No. 12 AWG minimum. All wiring shall be color coded, solid copper conductor. Use of power limited cable shall be restricted to controls listed for this purpose. Single conductors shall be type THHN/THWN-2 insulated copper.
 - 3.2.1 Relays initiating HVAC unit automatic shutdown and controlling fire/smoke dampers, door holders, fire curtains, fire/smoke vents and other systems that require connection and control from fire alarm system shall be located within three feet of the fire alarm control panel where the relays are connected. The drawings indicate diagrammatic locations for these devices.
- 3.3 Wire markers shall be provided for each wire connected to equipment. The marker shall be of the taped bank type, of permanent material, and shall be suitable and permanently stamped with the proper identification. The markers shall be attached in a manner that will not permit accidental detachment. Changing of wire colors within circuits shall be unacceptable.
- 3.4 A terminal cabinet/fire alarm panel shall be installed in the electric room for the fire alarm systems at each building. All fire alarm wiring shall terminate on UL approved strips in this terminal cabinet. All wiring shall be labeled at each termination strip. Wiring shall be configured such that all end-of-line resistors will be installed at the terminal cabinet.
 - 3.4.1 Provide external battery cabinet to house DC batteries directly below terminal cabinet/fire alarm panel when cabinet cannot accommodate the battery size required.
- 3.5 Fire Sprinkler Activation detecting System(s) shall each be indicated on a separate zone in the fire alarm control panel.
- 3.6 Fire Alarm Control Panel and all other equipment shall be mounted with the center of all operable reset buttons, located a maximum of 48" front approach / 54" side approach above floor level.

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- 3.7 Contractor shall provide complete wiring between all equipment.
- 3.8 The Fire Alarm/Life Safety Installation shall comply fully with all Local, State and National Codes, and the Local Authority Having Jurisdiction (AHJ) DSA.
- 3.9 The Fire Alarm Control Panel and power supply shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the Panelboard as FIRE ALARM CIRCUIT.
- 3.10 The Control Panel Cabinet shall be grounded securely to a power system ground conductor. Provide a 1/2-inch conduit and 1#12 grounding conductor to the building electrical service ground bus.
- 3.11 Conduit shall enter into the Fire Alarm Control Panel back box only at those areas of the back box which have factory conduit knockouts.
- 3.12 All field wiring shall be completely supervised. In the event of a primary power failure, disconnected standby battery, removal of any internal modules, or any open circuits in the field wiring; an audible and visual trouble signal will be activated until the system and its associated field wiring are restored to normal condition.
- 3.13 All cables and wiring shall be listed for Fire Alarm/Life Safety use, and shall be of the type as required by and installed per CEC Article 760.
- 3.14 The Fire Alarm Control Panel shall be programmed to produce both 3-pulse temporal pattern and 4-pulse temporal pattern where Carbon Monoxide audible and visual notification devices are installed as part of the Fire Alarm System.
- 3.15 Final System Acceptance
 - 3.15.1 Provide an NFPA Certificate of Compliance to DSA and the engineer of record. Complete fire alarm system shall comply with Chapter 14 of NFPA for testing and inspection and be sound-tested for audibility in all spaces requiring voice evacuation. This testing shall be performed in the presence of the project electrical engineer. Adjust speaker taps or provide additional speakers as required to provide correct audibility.
 - 3.15.2 Beam detectors shall be tested by two methods:
 - 3.15.2.1 Manual slow cover test to confirm reflector alignment is correct.
 - 3.15.2.2 Software fire test per UL268.5 to demonstrate when signal level is reduced simulating obstruction the detector will go into alarm.
 - 3.15.3 The system will be accepted only after a satisfactory test of the entire system has been accomplished by a Factory-Trained Distributor in the presence of a representative of the authority having jurisdiction and the Owner's representative. This contractor shall provide all personnel,

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ladders and testing equipment to assist the local authority in completing this test. Actuate each device and verify that the system performs as specified.

- 3.15.4 The Contractor will present a complete set of "as-built" Fire Alarm/Life Safety system drawings, and the factory supplied Operator's Manuals as required by the General Provisions section of this specification.

- 3.15.4.1 DOCUMENTATION CABINET shall be provided at the control panel and prominently labeled, "SYSTEM RECORD DOCUMENTS". All record and testing documentation shall be stored in this cabinet. Contents shall be accessible by authorized personnel only.

- 3.15.5 Once the system has been tested and the certificate of compliance completed, the contract shall not be considered complete until after owner training has been completed. The contractor shall notify in writing their intent to provide the training for the system. This notification shall be given to the Division 21 Contractor, Architect and the Project Engineer a minimum of 2 weeks prior to the scheduled training session. The Division 21 Contractor and/or the architect shall be responsible for notifying the owner to confirm that the appropriate District personnel will be made available for this training session. If the Division 21 Contractor does not receive confirmation that the training session can be performed on the proposed date, then another time shall be provided. The training shall consist of the following:

- 3.15.5.1 Provide a minimum of one (1) four-to-six -hour training period located at the project site, to instruct District personnel in proper operation of all systems.

- 3.15.5.2 Provide a minimum of three (3) complete owner operation manuals for the District records.

- 3.15.5.3 Provide a minimum of two (2) complete as built sets of drawings for the District records.

- 3.15.5.4 Provide all spare parts as described in part 1 of these specifications

- 3.15.5.5 Provide written confirmation and proposed scheduled dates for follow up training and 1-year complete system test.

- 3.16 Follow up Training

- 3.16.1 Provide as a part of this contract, the follow up instructional training period within six (6) months after the final acceptance of the systems. This training shall include a minimum of one four-to-six-hour training period to instruct District personnel in proper operation of all systems and

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shall instruct the District technicians how to repair any non-operational parts of the system as required. All defective parts shall be replaced at no cost to the owner.

- 3.16.2 Contractor shall also include (2) additional site visits within the first year to adjust speaker output on a space by space basis as requested by the owner.

END OF SECTION

SPECIFICATIONS

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Protecting existing vegetation to remain.
 - 2. Removing existing vegetation.
 - 3. Clearing and grubbing.
 - 4. Stripping and stockpiling topsoil.
 - 5. Removing above- and below-grade site improvements.
 - 6. Disconnecting, capping or sealing, and removing site utilities or abandoning site utilities in place.
 - 7. Temporary erosion and sedimentation control.
- B. Related Requirements:
 - 1. Section 02 41 19 "Selective Demolition."

1.3 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface and existing in-place surficial organic soil layer; the zone where plant roots grow.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

SITE CLEARING

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1.4 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.

1.5 MATERIAL OWNERSHIP

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain City of La Puente's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.6 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.7 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from City of La Puente and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by City of La Puente or authorities having jurisdiction.
 - 3. Maintain emergency vehicle access traffic ways at all times. If the Work impacts the emergency vehicle access traffic way, coordinate with the local Fire Marshal.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining City of La Puente's property will be obtained by City of La Puente before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by City of La Puente Construction Manager.
- C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store where indicated.
- D. Utility Locator Service: Retain a professional utility locator service and have all existing underground utilities located and surface-identified before site clearing.

SPECIFICATIONS

- E. Do not commence site clearing operations until temporary erosion-control, sedimentation-control and plant-protection measures are in place.
- F. Tree- and Plant-Protection Zones: The following practices are prohibited within plant protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
 - 8. Do not direct vehicle or equipment exhaust toward protection zones.
 - 9. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- G. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.
- H. Burning: Burning is not permitted on the site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 20 00 "Earth Moving."
 - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain. Wrap a 1-inch blue vinyl tie tape flag around each tree trunk at 54 inches above the ground.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to City of La Puente.

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3.2 TREE AND PLANT PROTECTION

- A. Protect trees remaining on-site.
 - 1. Protect shrubs and other vegetation indicated to remain or be relocated.
 - 2. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by City of La Puente Construction Manager.

3.3 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Coordinate with and follow all the requirements contained in Section 01 57 23 "Temporary Storm Water Pollution Control."
- C. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- D. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- E. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.4 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
 - 1. Arrange with utility companies to shut off indicated utilities.
 - 2. Protect all utilities to remain in place.
 - 3. Cap or seal utilities in accordance with the appropriate code and industry standard.
- B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by City of La Puente or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify City of La Puente Construction Manager not less than five days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without City of La Puente Construction Manager's written permission.
- C. Removal of underground utilities is included in earthwork sections; in applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and

SPECIFICATIONS

security, and utilities sections; and in Section 02 41 16 "Structure Demolition" and Section 02 41 19 "Selective Demolition."

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 - 3. Use only hand methods for grubbing within protection zones.
 - 4. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
 - 1. Limit height of topsoil stockpiles to 72 inches.
 - 2. Do not stockpile topsoil within protection zones.
 - 3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
 - 4. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

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1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off City of La Puente's property.
- B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 31 10 00

SPECIFICATIONS

SECTION 31 20 00

EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses, plants.
3. Excavating and backfilling for buildings and structures.
4. Drainage course for concrete slabs-on-grade.
5. Subbase course for concrete walks and pavements.
6. Subbase course and base course for asphalt paving.
7. Subsurface drainage backfill for walls and trenches.
8. Excavating and backfilling trenches for utilities and pits for buried utility structures.

- B. Geotechnical Report: Geotechnical Report: A Geotechnical Report has been prepared for this project and is available for the Contractor's review. The Geotechnical Report is believed accurate, however, neither the information contained therein, nor conditions indicated to exist at the test hole locations or other site locations is guaranteed to prevail throughout the job site.

1. Geotechnical Report Publication Information:

- a. Title: Geotechnical Investigation Report, Proposed Community Center Expansion, La Puente Park, 501 Glendora Avenue, La Puente, California
- b. Date: 07/01/2022
- c. Author: Willdan Engineering
- d. Document / Project Number: Project No.111159-2010

- C. Related Requirements:

1. Section 31 10 00 "Site Clearing".
2. Section 32 84 00 "Planting Irrigation" for landscape irrigation trenching.
3. Section 32 93 00 "Plants".
4. Section 33 46 00 "Subdrainage".

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1.3 UNIT PRICES

- A. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following. Unit prices for rock excavation include replacement with approved materials.
 - 1. 24 inches outside of concrete forms other than at footings.
 - 2. 12 inches outside of concrete forms at footings.
 - 3. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - 4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - 5. 6 inches beneath bottom of concrete slabs-on-grade.
 - 6. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

1.4 DEFINITIONS

- A. Backfill: Soil, engineered material, or controlled low-strength material used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Pavement Structural Section: An engineered structural element typically composed of distinct thickness and / or density of rigid concrete pavement or flexible asphalt concrete pavement, base course, subbase course, and subgrade, designed to support a specific load.
- C. Base Course: Engineered aggregate material compacted to a specified density and layer thickness between pavement and the subgrade or subbase course, if applicable.
- D. Subbase Course: Engineered aggregate material compacted to a specified density and layer thickness between base course layer and subgrade.
- E. Subgrade: The bottom surface of an excavation which is to support compacted fill, backfill, or structure foundations or the upper 12 inches of compacted fill to support a pavement structural section or surface improvements.
- F. Bedding Course: A clean, granular material placed full width from the bottom of the excavated trench subgrade to above the top of the pipe to support the buried pipe within the trench.
- G. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- H. Drainage Course (Capillary Break): A clean granular material layer supporting the slab-on-grade and also mitigating the upward migration of water due to capillary action forces.

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- I. Excavation: Removal of materials within specified lines and dimensions, to an indicated elevation or depth of competent bearing material, to support compacted fill, structure foundations, or pavement structural sections.
 - 1. Authorized Additional Excavation: Excavation below the indicated elevations or beyond the specified lines and dimensions as directed by District Construction Manager. Authorized additional excavation and compacted fill material will be paid for according to Contract provisions for unit prices.
 - 2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
 - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by District. Unauthorized excavation, as well as remedial work directed by District Construction Manager, shall be without additional compensation.
 - J. Fill: Soil or engineered materials used to raise existing grades and support surface improvements.
 - K. Controlled Low-Strength Material (CLSM): Flowable, self-leveling, self-compacting backfill or fill material consisting of a 3-sack sand / cement slurry
 - L. Formational Materials / Formation: An undisturbed geologic unit of rock strata possessing similar properties and lithology.
 - M. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and gravel, cobbles, or boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
 - 1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.
 - 2. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.
 - N. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
 - O. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.
- 1.5 PRE-INSTALLATION MEETINGS
- A. Pre-installation Conference: Conduct pre-excavation conference at Project site.

SPECIFICATIONS

1. Review methods and procedures related to earthmoving, including:
 - a. Personnel and equipment needed to make progress and avoid delays.
 - b. Coordination of Work with utility locator service.
 - c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
 - d. Extent of trenching by hand or with air spade.
 - e. Field quality control.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 1. Geotextiles.
 2. Warning tapes.
 3. Vapor Barrier.
- B. Samples for Verification: For the following products, in sizes indicated below:
 1. Geotextile: 12-by-12 inches.
 2. Warning Tape: 12 inches long; of each color.
 3. Vapor Barrier: 12-by12 inches

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
 1. Classification according to ASTM D 2487.
 2. Laboratory compaction curve according to ASTM D 1557.
 3. Expansion Index per ASTM D 4829.
 4. Sand Equivalent Value per ASTM D 2419.
 5. R-Value according to California Test Method 301.
- C. Pre-excavation Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.8 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: The District will retain a DSA accepted testing agency according to ASTM E 329 and ASTM D 3740 for testing indicated.

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1.9 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from District and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by District or authorities having jurisdiction.
 - 3. Maintain emergency vehicle access traffic ways at all times. If the Work impacts the emergency vehicle access traffic way, coordinate with the local Fire Marshal.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining District's property will be obtained by the District before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by the District Construction Manager.
- C. Utility Locator Service: Retain a professional utility locator service and have all existing underground utilities located and surface-identified before beginning earth-moving operations.
- D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 01 57 23 "Temporary Storm Water Pollution Control" and Section 31 10 00 "Site Clearing" are in place.
- E. Do not commence earth-moving operations until plant-protection measures are in place.
- F. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- G. Do not direct vehicle or equipment exhaust towards protection zones.
- H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- I. Existing Utilities: Do not interrupt utilities serving facilities occupied by District or others unless permitted in writing by District and then only after arranging to provide temporary utility services according to requirements indicated.

SPECIFICATIONS

1. Notify District not less than five days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without District's written permission.
- J. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, SC and SM according to ASTM D 2487, free of rock or gravel larger than 6 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
1. Expansion Index: Not more than 50 as measured by ASTM D 4829.
 2. Upper 18 inches of subgrade fill under landscaped areas: Soil containing not more than 10% rock or lumps larger than 1-1/2 inches.
- C. Unsatisfactory Soils: Soil Classification Groups OL, CH, MH, OH, and PT according to ASTM D 2487; Soil Classification Groups GC, CL and ML where those soils are classified as medium or highly expansive by ASTM D 4829.
1. Unsatisfactory soils include soft or yielding soil materials exposed at bottom of excavations
 2. Unsatisfactory soils include satisfactory soils possessing a moisture content not within ± 2 percent of the optimum moisture content at time of excavation and compaction.
 3. Unsatisfactory soils include soils possessing more than 30 percent rock material greater than $\frac{3}{4}$ inch in largest dimension.
- D. Backfill and Fill: Satisfactory soil or engineered materials
- E. Subbase Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 2-1/2-inch sieve and not more than 25 percent passing a No. 200 sieve.
1. Conforms to Caltrans Standard Specifications or "Greenbook" Standard Specifications for Public Works for Class II aggregate subbase material.
 2. R-Value of not less than 50 according to California Test Method 301.
 3. Sand Equivalent Value of at least 21 per ASTM D 2419.

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- F. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 294/D 2940M; with not more than 2 percent passing the No. 200 sieve
 - 1. Conforms to Caltrans Standard Specifications or "Greenbook" Standard Specifications for Public Works for Class II aggregate base material.
 - 2. R-Value of not less than 78 according to California Test Method 301.
 - 3. Sand Equivalent Value of at least 25 per ASTM D 2419.
- G. Bedding Course:
 - 1. Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
 - 2. Conforms to bedding material in accordance with "Greenbook" Standard Specifications for Public Works.
 - 3. Sand Equivalent Value of not less than 20 per ASTM D 2419.
- H. Drainage Course (Capillary Break):
 - 1. Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and no more than 2 percent passing the No. 200 sieve.
 - 2. Conforms to Section 200-1.4 of the "Greenbook" Standard Specifications for Public Works No. 4 Concrete Aggregates.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.
- J. Sand: ASTM C 33/C 33M; fine aggregate.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - 1. Survivability: As follows:
 - a. Grab Tensile Strength: 157 lbf; ASTM D 4632.
 - b. Sewn Seam Strength: 142 lbf; ASTM D 4632.
 - c. Tear Strength: 56 lbf; ASTM D 4533.
 - d. Puncture Strength: 65 lbf; ASTM D 4833.
 - 2. Apparent Opening Size: No. 70 sieve, maximum; ASTM D 4751.
 - 3. Permittivity: 1.8 per second, minimum; ASTM D 4491.
 - 4. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

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- B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: As follows:
 - a. Grab Tensile Strength: 247 lbf; ASTM D 4632.
 - b. Sewn Seam Strength: 222 lbf; ASTM D 4632.
 - c. Tear Strength: 90 lbf; ASTM D 4533.
 - d. Puncture Strength: 90 lbf; ASTM D 4833.
2. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
3. Permittivity: 0.02 per second, minimum; ASTM D 4491.
4. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

SPECIFICATIONS

- 2.4 Vapor Barrier: Minimum 15-mil thick plastic membrane which complies with ASTM E 1745 and installed per ASTM E 1643.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain all storm water BMPs, including erosion and sediment controls during earth-moving operations.

3.2 EXPLOSIVES

- A. Explosives: Explosives are not approved for construction operations. Do not use explosives.

3.3 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
- B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Geotechnical Engineer. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.
 - 1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil and other materials not classified as rock or unauthorized excavation.
 - 2. Rock excavation includes:
 - a. Removal and onsite screening, washing, and proper stockpiling of gravel, cobbles, boulders, and other rock material greater than 3 inches in largest dimension. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the dimensions provided elsewhere in the Section.

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- b. Legal offsite disposal of gravel, cobbles, boulders, and other rock material greater than 3 inches in largest dimension.

3.4 EXCAVATION FOR STRUCTURES

- A. Over excavate existing fill material in entirety beneath planned structures to competent material at approximately 3 feet below grade or a minimum of 1 foot below the bottom of the foundation, whichever is deeper.
- B. Extend over excavation 2 feet beyond the planned foundation perimeter, or up to existing structures, whichever is less.
- C. Where excavations extend up to existing improvements less than 2 feet beyond the planned foundation perimeter, the excavation shall be performed with slot cuts or as directed by the geotechnical engineer, to project existing improvements to remain in place.
- D. Extend excavations to a sufficient distance from planned structures for placing and removing concrete formwork, for constructing new services, other construction, and for inspection of work.
- E. Notify Project Inspector when excavations have reached the specified elevation or formational material. The Project Inspector will arrange for the District's Testing Agency to observe the bottom of the excavation and determine if additional excavation is required.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 - 2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
 - 3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.
- F. Excavations at Edges of Tree- and Plant-Protection Zones:
 - 1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

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3.5 EXCAVATION FOR WALKS AND HARDSCAPE

- A. Surfaces to receive fill shall be scarified to a depth of 12 inches, moisture conditioned, and compacted to at least 90% relative compaction. Fill soils shall be placed in 8-inch thick loose layers, moisture conditioned to slightly above optimum content and compacted to at least 90% of dry density.
- B. Exterior Flatwork: Site preparation shall consist of the upper 12 inches to be scarified, moisture conditioned and compacted to a minimum of 95%..
- C. Extend excavation out 2 feet beyond the limits of planned walks and hardscape or up to existing improvements, whichever is less.
- D. Notify Project Inspector when excavations have reached the specified subgrade elevation. The Project Inspector will arrange for the District's Testing Agency to observe the bottom of the excavation and determine if additional excavation is required.
- E. After approved by the District's Testing Agency, the over-excavation shall be replaced with suitable fill material possessing an expansion index of less than 50.

3.6 EXCAVATION FOR BUILDING FOUNDATIONS

- A. Foundations shall extend at least 18 inches below lowest adjacent pad grade and extend at least 18 inches into dense soil of the very old alluvial deposits and / or Torrey Sandstone, whichever is deeper. The geotechnical engineer shall evaluate foundation excavations to determine if additional excavation / deepened foundations are necessary to expose suitable, homogeneous bearing soils. Exterior Flatwork: Site preparation shall consist of the upper 12 inches to be scarified, moisture conditioned and compacted to a minimum of 95%.

3.7 EXCAVATION FOR STRUCTURAL PAVEMENTS

- A. Over-excavate existing material under traffic rated structural pavements to at least 12 inches below planned subgrade elevation, scarify upper 8 inches of subgrade surface, moisture condition, and recompact to a relative compaction of 90 percent.
- B. Extend excavation out 2 feet beyond the limits of planned structural pavement or up to existing improvements, whichever is less.
- C. Notify Project Inspector when excavations have reached the specified subgrade elevation. The Project Inspector will arrange for the District's Testing Agency to observe the bottom of the excavation and determine if additional excavation is required.
- D. After approved by the District's Testing Agency, the over-excavation shall be replaced with suitable fill material possessing an expansion index of less than 50.

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3.8 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. For the excavation of landscape irrigation trenches, see also Section 32 84 00 "Planting Irrigation."
- C. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 - 1. Clearance: 12 inches each side of pipe or conduit unless otherwise indicated.
- D. Trench Bottoms:
 - 1. Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 2. Unless indicated otherwise, excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
 - 3. Unless indicated otherwise, excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
 - 4. Notify Project Inspector when excavations have reached the specified subgrade elevation. The Project Inspector will arrange for the District's Testing Agency to observe the bottom of the excavation and determine if additional excavation is required.
- E. Trenches in Tree- and Plant-Protection Zones:
 - 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3.9 SUBGRADE INSPECTION

- A. Notify Project Inspector when excavations have reached the specified subgrade elevation or formational material. The Project Inspector will arrange for the District's Testing Agency to observe the bottom of the excavation.
- B. If Testing Agency observes that unsatisfactory soil is present, continue excavation and replace with compacted fill, compacted aggregate base, Controlled Low-Strength Material (CLSM), or as directed by the Geotechnical Engineer.

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- C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Excavate soft, unsatisfactory soils, and areas of excessive pumping or rutting, and replace with compacted fill, compacted aggregate base, Controlled Low-Strength Material (CLSM), or as directed by the Geotechnical Engineer
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Testing Agency, without additional compensation.

3.10 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by District Construction Manager.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by District Construction Manager.

3.11 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials, excavated satisfactory soil materials, and processed oversized rock materials, without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
 - 2. Obtain District's acceptance of stockpile locations prior to creation. If stockpile must be moved, obtain District's acceptance.

3.12 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for Record Documents.
 - 3. Testing and inspecting underground utilities.
 - 4. Removing concrete formwork.

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5. Removing trash and debris.
 6. Removing temporary shoring, bracing, and sheeting.
 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Do not place backfill on uncompacted subgrade or surfaces that are muddy, soft, yielding, pumping, rutting, frozen, or contain frost or ice.

3.13 UTILITY TRENCH BACKFILL

- A. Place bedding course on trench bottoms and where indicated, up to 12 inches above utility lines and in accordance with Section 306-6 of the "Greenbook" Standard Specifications for Public Works Construction.
- B. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
1. Unless otherwise indicated, provide pea gravel bedding for sanitary sewer and storm sewer piping.
 2. Clean sand may be used for bedding under piping other than sewer piping.
- C. Moisture condition backfill material to within ± 2 percent of the optimum moisture content, place in layers not more than 8 inches in loose thickness, and compact to not less than 90 percent relative compaction per ASTM D1557, except subgrade beneath structural pavements.
- D. Beneath structural pavement, moisture condition backfill material to within ± 2 percent of the optimum moisture content, place in layers not more than 8 inches in loose thickness, and compact to not less than 95 percent relative compaction per ASTM D1557.
- E. Do not place trench backfill or bedding material on uncompacted subgrade or surfaces that are muddy, soft, yielding, pumping, rutting, frozen, or contain frost or ice.
- F. Trenches under Foundations: Unless otherwise indicated, backfill trenches excavated under foundation footings and within the zone of influence beneath foundations with concrete to elevation of bottom of footings. Concrete is specified in Section 03 30 00 "Cast-in-Place Concrete."
- G. Trenches under Roadways and Driveways: Unless otherwise indicated, provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below finished surface of roadways or driveways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course (or base course if no subbase course is indicated.) Concrete is specified in Section 03 30 00 "Cast-in-Place Concrete."
- H. Backfill voids with satisfactory soil while removing shoring and bracing.
- I. Initial Backfill:

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1. Soil Backfill: Place and compact initial backfill of pea gravel or satisfactory soil, free of particles larger than 1-inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

J. Final Backfill:

1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

K. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

L. Coordinate backfilling with utilities testing.

3.14 SOIL FILL

- A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from subgrade before placing fills.
- B. Plow, scarify, bench, or break up sloped surfaces steeper than 5 horizontal to 1 vertical so fill material will bond with existing material.
- C. Scarify, moisture condition to within ± 2 percent of the optimum moisture content, and recompact the upper 12 inches of subgrade to at least 90 percent relative compaction per ASTM D 1557.
- D. Do not place subbase course or base course on uncompacted subgrade or surfaces that are muddy, soft, yielding, pumping, rutting, frozen, or contain frost or ice.
- E. All imported soil material shall be tested and approved by Geotechnical Engineer prior to hauling on site

3.15 SOIL MOISTURE CONTROL

- A. Uniformly moisture condition or aerate subgrade and each subsequent fill or backfill layer to within ± 2 percent of optimum moisture content prior to compaction.
 1. Do not place fill or backfill material on uncompacted subgrade or surfaces that are muddy, soft, yielding, pumping, rutting, frozen, or contain frost or ice.
 2. Remove and replace, or scarify and aerate, otherwise satisfactory soil material that exceeds the optimum moisture content by 2 percent or is too wet to compact to specified dry unit weight.

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3.16 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose thickness for material compacted by heavy compaction equipment and not more than 4 inches in loose thickness for material compacted by hand-operated tampers up to planned elevations.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following specified percentages of maximum dry unit weight in accordance with ASTM D 1557:
 - 1. Under structures, building slabs, foundations, steps, and hardscape pavement, moisture condition backfill and fill material to within ± 2 percent of the optimum moisture content, place in layers not more than 8 inches in loose thickness, and compact to at least 90 percent relative compaction.
 - 2. Under traffic rated structural pavements, scarify, moisture condition to within ± 2 percent of the optimum moisture content, and recompact the upper 12 inches of subgrade and each layer of fill material to at least 95 percent relative compaction.
 - 3. Under turf or unpaved areas, moisture condition backfill and fill material to within ± 2 percent of the optimum moisture content, place in layers not more than 8 inches in loose thickness, and compact to at least 90 percent relative compaction.
 - 4. For utility trenches, moisture condition backfill material to within ± 2 percent of the optimum moisture content, place in layers not more than 8 inches in loose thickness, and compact to at least 90 percent relative compaction, except for areas beneath traffic rated, structural pavements.

3.17 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1-inch.
 - 2. Walks: Plus or minus 1-inch.
 - 3. Pavements: Plus or minus 1/2-inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2-inch when tested with a 10-foot straightedge.

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3.18 SUBSURFACE DRAINAGE

- A. Subdrainage Pipe: Specified in Section 33 46 00 "Subdrainage."
- B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
- C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. If indicated on drawings, overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

3.19 SUBBASE AND BASE COURSES UNDER STRUCTURAL PAVEMENTS

- A. Do not place subbase course or base course on uncompacted subgrade or surfaces that are muddy, soft, yielding, pumping, rutting, frozen, or contain frost or ice.
- B. On prepared, compacted subgrade, place subbase course and base course under traffic rated structural pavements as follows:
 - 1. If subdrain textile is indicated on drawings, install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 - 2. Moisture condition subbase and base material to within ± 2 percent of the optimum moisture content, place in layers not more than 8 inches in loose thickness, and compact to not less than 95 percent of the maximum dry unit weight according to ASTM D 1557.
 - 3. Place subbase course and base course in layers of equal thickness, with no loose uncompacted layer more than 8 inches thick or less than 3 inches thick, to required grades, lines, cross sections, and thickness.
 - 4. Shape base course to required crown elevations and cross-slope grades.
 - 5. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.20 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

- A. Do not place drainage course on uncompacted subgrade or surfaces that are muddy, soft, yielding, pumping, frozen, or contain frost or ice.
- B. On prepared, compacted subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

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1. If subdrain textile is indicated on drawings, install subdrain geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place subbase course and base course in layers of equal thickness, with no loose uncompacted layer more than 8 inches thick or less than 3 inches thick, to required grades, lines, cross sections, and thickness.
3. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.21 FIELD QUALITY CONTROL

- A. Testing Agency: District will engage a qualified independent geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to observe and test excavation bottoms, subgrades, and each fill and backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At subgrades beneath foundation footings, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Project Inspector.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.
 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length but no fewer than two tests.
 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 100 feet or less of trench length but no fewer than two tests.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.22 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

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- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Geotechnical Engineer; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.23 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off District's property.

END OF SECTION 31 20 00

SPECIFICATIONS

SECTION 32 12 16 ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Reference Standards:
 - 1. Standard Specifications for the State of California, Department of Transportation (CalTrans Standard Specifications), current edition.

1.2 SUMMARY

- A. Section Includes:
 - 1. Cold milling of existing asphalt pavement.
 - 2. Hot-mix asphalt patching.
 - 3. Hot-mix asphalt paving.
 - 4. Hot-mix asphalt overlay.
 - 5. Asphalt curbs.
 - 6. Asphalt traffic-calming devices.
 - 7. Asphalt surface treatments.
 - a. Seal Coats.
 - b. Crack Sealants.
- B. Related Requirements:
 - 1. Section 02 41 19 "Selective Demolition" for demolition and removal of existing asphalt pavement.
 - 2. Section 31 20 00 "Earth Moving" for subgrade preparation, fill material, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
 - 3. Section 32 13 73 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.
 - 4. Section 32 17 23 "Pavement Markings" for striping and signage on the pavement.

1.3 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt pavement according to the materials, workmanship, and other applicable requirements of the standard specifications of the State.

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1. Standard Specification: CalTrans.
2. Manual of Tests: CalTrans.
3. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.4 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 1. Review methods and procedures related to hot-mix asphalt paving, including:
 - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
 - b. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include technical data and tested physical and performance properties.
 2. Job-Mix Designs: For each job mix proposed for the Work.
- B. Samples for Verification: For the following product, in manufacturer's standard sizes unless otherwise indicated:
 1. Paving Fabric: 12-by-12 inches minimum.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For each manufacturer.
- B. Material Certificates: For each paving material. Submit certificate for each paving material, signed by manufacturer certifying that each material complies with requirements. Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.
- C. Material Test Reports: For each paving material, by a qualified testing agency.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by the California Department of Transportation (CalTrans).

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- B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the California Department of Transportation (CalTrans) for asphalt paving work.
 - 1. Comply with requirements of local jurisdictions where more stringent than CalTrans requirements.
 - 2. Measurement and payment provisions and safety program submittals included in CalTrans standard specifications do not apply to this Section.
 - 3. Comply with the applicable standards of the San Diego County Air Pollution Control City of La Puente for quantities of volatile organic compounds (VOC's) used in all materials.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - 1. Tack Coat: Minimum surface temperature of 60 deg F.
 - 2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
 - 3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.
 - 4. Seal coat: At time of placement, minimum ambient temperature 55 deg F, minimum surface temperature 60 deg F.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Base Coarse Aggregate: Class 2 Aggregate Base mineral aggregate, 3/4-inch maximum size, as specified in CalTrans Standard Specifications.

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- C. Asphalt Aggregate: Type B Aggregate, as specified in CalTrans Standard Specifications.

1. 3/4-inch maximum size for base course.
2. 1/2-inch maximum size for surface course.
3. 3/8-inch Fine for surface course for playgrounds and similar areas.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: Steam Refined, material. PG 64-10 conforming to CalTrans Standard Specifications.
- B. Tack Coat: ASTM D 977 emulsified asphalt, or ASTM D 2397 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- C. Seal Coat: Emulsified asphalt with a minimum 2 percent to 3 percent latex or copolymer added with 2 to 4 lbs of grade #30 silica sand added per gallon and mechanically agitated.
- D. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Recycled Materials for Hot-Mix Asphalt Mixes: Reclaimed asphalt pavement from sources and gradations that have performed satisfactorily in previous installations, equal to performance of required hot-mix asphalt paving produced from all new materials.
- B. Herbicide: Commercial chemical for weed control, registered by the Environmental Protection Agency (EPA), and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wettable powder form.
- C. Sand: ASTM D 1073 or AASHTO M 29, Grade No. 2 or No. 3.
- D. Crack Sealer: Rubberized joint sealant complying with Federal Standards ASTM D 5329 Parking Lot Crack Sealer.

2.4 MIXES

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes; designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:
 1. Comply with CalTrans Standard Specifications.
 2. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

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- B. Base Course: Comply with CalTrans Standard Specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Ensure that any air handling system that is likely to ingest fumes is protected and that windows near paving operations are closed.
- B. Verify that subgrade is dry and in suitable condition to begin paving.
- C. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
 - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Geotechnical Testing Agency, and replace with compacted backfill or fill as directed.
- D. Notify City of La Puente Construction Manager in writing of any unsatisfactory conditions. Proceed with paving only after unsatisfactory conditions have been corrected.
- E. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of imprinted asphalt.

3.2 COLD MILLING

- A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
 - 1. Mill to a uniform finished surface free of excessive gouges, grooves, and ridges.
 - 2. Control rate of milling to prevent tearing of existing asphalt course.
 - 3. Repair or replace curbs, manholes, and other construction damaged during cold milling.
 - 4. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
 - 5. Handle milled asphalt material according to approved waste management plan.
 - 6. Keep milled pavement surface free of loose material and dust.
 - 7. Do not allow milled materials to accumulate on-site.

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3.3 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Scarify and recompact the upper 12 inches of subgrade to 95% of maximum density. 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. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseal concrete pieces firmly.
 - 1. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.
- C. 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.
- D. Patching, Single Asphalt Course: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.
- E. Patching, Separate Asphalt Courses: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.4 REPAIRS

- A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1-inch in existing pavements.
 - 1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.
- B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4-inch.
 - 1. Clean cracks and joints in existing hot-mix asphalt pavement.
 - 2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4-inch wide. Fill flush with surface of existing pavement and remove excess.
 - 3. Use hot-applied joint sealant to seal cracks and joints more than 1/4-inch wide. Fill flush with surface of existing pavement and remove excess.

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3.5 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
 - 1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.
- B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
- C. 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.

3.6 PLACING BASE COURSE

- A. Place base course as follows:
 - 1. Compact base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
 - 2. Shape base to required crown elevations and cross-slope grades.
 - 3. When thickness of compacted base course is 6 inches or less, place materials in a single layer.
 - 4. When thickness of compacted base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches or less than 3 inches thick when compacted.

3.7 PLACING HOT-MIX ASPHALT

- 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. When thickness of asphalt course is 4 inches or less, place materials in a single layer.
 - 2. When thickness of asphalt course exceeds 4 inches, place material in equal layers, with no layer more than 4 inches or less than 2 inches thick when compacted.

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3. Spread mix at a minimum temperature of 250 deg F.
 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 5. 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.
1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.
- 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.

3.8 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 paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.9 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. Use a vibratory roller with dynamic force of 93,000 lbs, or weighing 21,000 lbs. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Repair surfaces by loosening displaced material, filling with

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hot-mix asphalt, and rerolling to required elevations. 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 (Marshall Test Method): 96 percent of reference laboratory density according to ASTM D 6927 or AASHTO T 245, but not less than 94 percent or greater than 100 percent.
 - 2. Average Density (Rice Test Method): 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor 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. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.10 ASPHALT CURBS

- A. Construct hot-mix asphalt curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust. Spread mix at a minimum temperature of 250 deg F.
 - 1. Asphalt Mix: Same as pavement surface-course mix.
- B. Place hot-mix asphalt to curb cross section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms after hot-mix asphalt has cooled.

3.11 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

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1. Base 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 a 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. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4-inch.
- C. Asphalt Speed Bumps: Compact and form asphalt to produce the contour indicated and within a tolerance of plus or minus 1/8-inch of height indicated above pavement surface.

3.12 CRACK REPAIR

- A. Remove vegetation and treat with herbicide.
- B. Rout cracks in accordance with SHRP H348 and H349.
- C. Fill cracks with hot-applied joint sealant. Apply with a wand from a double jacketed melter.
 1. Over-fill cracks and squeegee level with pavement

3.13 SURFACE TREATMENTS

- A. Seal Coat: Apply first coat at rate of 0.125 to 0.185 gal./sq. yd. After first coat has dried, apply second coat at rate of 0.100 to 0.185 gal./sq. yd.
 1. Seal coating new pavements should be delayed 30 days after installation or as recommended by manufacturer.
 2. Preparation: All area shall be power-swept, vacuumed and cleared of loose material.
 3. Standing water shall be spread out and allowed to dry. Do not apply seal coat to wet or damp surfaces.
 4. Oil spots shall be manually scraped and cleaned with a mild detergent. Apply primer over highly saturated petroleum areas.
 5. Cover and protect items within paved area that are not to be coated, such as valve boxes, manholes and concrete.

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3.14 FIELD QUALITY CONTROL

- A. Testing Agency: City of La Puente will engage a qualified testing agency to perform tests and inspections and to prepare test reports.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. Asphalt Speed Bumps: Finished height of traffic-calming devices above pavement will be measured for compliance with tolerances.
- E. Replace and compact hot-mix asphalt where core tests were taken.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.15 WASTE HANDLING

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow milled materials to accumulate on-site.

END OF SECTION 32 12 16

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SECTION 32 13 13 CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes Concrete Paving including the following:
 - 1. Driveways.
 - 2. Roadways.
 - 3. Parking lots.
 - 4. Curbs and gutters.
 - 5. Walks.
- B. Related Requirements:
 - 1. Section 03 30 00 "Cast-in-Place Concrete" for general building applications of concrete.
 - 2. Section 32 13 73 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.
 - 3. Section 32 17 23 "Pavement Markings."
 - 4. Section 32 17 26 "Tactile Warning Surfacing" for detectable warning mats.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to concrete paving, including:

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- a. Concrete mixture design.
 - b. Quality control of concrete materials and concrete paving construction practices.
2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete paving Subcontractor.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.
- C. Samples for Verification: For each type of product or exposed finish, prepared as Samples of size indicated below:
 1. Colored Concrete: 3" x 3" samples. Provide two samples of each color.
- D. Design Mixes: For each concrete paving mix. Include alternate design mixes when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 1. Mix designs are subject to approval of the City of La Puente's testing laboratory of record for compliance with requirements.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Certificates: For the following, from manufacturer:
 1. Cementitious materials.
 2. Steel reinforcement and reinforcement accessories.
 3. Fiber reinforcement.
 4. Admixtures.
 5. Curing compounds.
 6. Applied finish materials.
 7. Bonding agent or epoxy adhesive.
 8. Joint fillers.

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1.7 QUALITY ASSURANCE

- A. Codes and Standards: Comply with local governing regulations if more stringent than herein specified.
- B. Comply with applicable provisions of the following, except as otherwise indicated:
 - 1. Applicable portions of the CBC.
 - 2. The U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities.
 - 3. Conform to applicable City codes for paving work on public property.
- C. Continuous surfaces, including walks and sidewalks, shall have a continuous common surface, not interrupted by abrupt changes in level exceeding 1/2-inch
- D. All concrete paving with a slope less than 5 percent shall have a medium broom finish, and all concrete paving with a slope equal to or greater than 5 percent shall have a slip resistant heavy broom finish.
- E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.
- F. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.
- G. Concrete Testing Service: Engage a qualified independent testing agency to design concrete mixes.
 - 1. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- H. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.
 - 1. Build mockup panels not less than 3'x3' for each different integrally colored concrete paving and finish. Locate on site as directed by City of La Puente Construction Manager.
 - 2. Notify City of La Puente Construction Manager seven days in advance of dates and times when mockups will be constructed.
 - 3. Obtain Construction Manager's approval of mockups before starting construction.
 - 4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
 - 5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless City of La Puente Construction Manager specifically approves such deviations in writing.
 - 6. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - 7. Demolish and remove non-approved mockups from the site.

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1.8 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

- A. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, fabricated from as-drawn steel wire into flat sheets.
- B. Epoxy-Coated Welded-Wire Reinforcement: ASTM A 884/A 884M, Class A, plain steel.
- C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- D. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class II zinc coated, hot-dip galvanized after fabrication and bending; with ASTM A 615/A 615M, Grade 60 deformed bars.

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- E. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 deformed bars.
- F. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60 deformed bars; assembled with clips.
- G. Plain-Steel Wire: ASTM A 1064/A 1064M, as drawn.
- H. Deformed-Steel Wire: ASTM A 1064/A 1064M.
- I. Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A; coated, plain.
- J. Epoxy-Coated, Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 plain-steel bars.
- K. Tie Bars: ASTM A 615/A 615M, Grade 60; deformed.
- L. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- M. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, precast concrete, or fiber-reinforced concrete of greater compressive strength than concrete specified, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
- N. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.
- O. Zinc Repair Material: ASTM A 780/A 780M.

2.4 CONCRETE MATERIALS

- A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150/C 150M, gray Portland cement Type II, low alkali.
 - 2. Fly Ash: ASTM C 618, Class N or Class F.
- B. Aggregate: ASTM C 33/C 33M, uniformly graded, from a single source.
 - 1. Fine Aggregate: Minimum sand equivalent (ASTM D 2419) is 80.
 - 2. Coarse Aggregate: Minimum cleanness value (CalTrans Test cv 227) is 80.

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- C. Exposed Aggregate: Selected, hard, and durable; washed; free of materials with deleterious reactivity to cement or that cause staining; from a single source, with gap-graded coarse aggregate as follows:
 - 1. Aggregate Sizes: 3/8- to 5/8-inch nominal.
 - 2. Aggregate Source, Shape, and Color: Shall be Stadium Conglomerate from Santee Batch plants.
- D. Water: Potable and complying with ASTM C 94/C 94M.

2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260/C 260M.
- B. 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.
- C. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
- D. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
- E. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
- F. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
- G. Color Pigment: ASTM C 979/C 979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Davis Colors.
 - b. Scofield, L. M. Company.
 - c. SureCrete Design Products.
 - d. Or Equal.
 - 2. Color: As selected by Architect from manufacturer's full range.

2.6 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

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- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ChemMasters, Inc.
 - b. Euclid Chemical Company (The); an RPM company.
 - c. L&M Construction Chemicals, Inc.
 - d. Or Equal.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ChemMasters, Inc.
 - b. Dayton Superior.
 - c. L&M Construction Chemicals, Inc.
 - d. Or Equal.

2.7 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.
- 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 25 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy-Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8- to 1/4-inch.

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ChemMasters, Inc.
 - b. Scofield, L. M. Company.
 - c. Sika Corporation.
 - d. Or Equal.

2.8 CONCRETE MIXES

- A. Prepare design mixtures, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience. Mix designs are subject to approval of the City of La Puente's testing laboratory.
 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method. Do not use City of La Puente's field quality control testing agency for this purpose.
 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
 1. Fly Ash or Pozzolan: 15 percent.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content of 2.0 to 4.0 percent.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
- F. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved sample.
- G. Concrete Mixtures: Normal-weight concrete.
 1. Compressive Strength (28 Days): 3000 psi.
 2. Minimum cementitious content: 564 lbs Portland cement per Cu. Yd.
 3. Maximum W/C Ratio at Point of Placement: 0.50.
 4. Slump Limit: 4 inches.

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- a. Slump Limit for Concrete Containing High-Range Water-Reducing Admixture: Not more than 8 inches after adding admixture to plant- or site-verified 2- to 3-inch slump.

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

3.2 PREPARATION

- A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Remove loose material from compacted subbase surface immediately before placing concrete.

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3.3 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.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.
- F. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 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.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints 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.

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1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 2. Provide tie bars at sides of paving strips where indicated.
 3. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- 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.
1. Locate expansion joints at maximum intervals of 50 feet unless otherwise indicated.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler not less than 1/2-inch or more than 1-inch below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Control Joints: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of control joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
- 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 finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

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- C. 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.
- D. Comply with requirements and with recommendations of ACI 301 for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. 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.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies 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.
- J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing. If results are not approved, remove and replace with formed concrete.

3.7 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. 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.

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2. 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.

3.8 SPECIAL FINISHES

- A. Monolithic Exposed-Aggregate Finish: Expose coarse aggregate in paving surface as follows:
 1. Immediately after float finishing, spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
 2. Cover paving surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
 3. Without dislodging aggregate, remove mortar concealing the aggregate by lightly brushing surface with a stiff, nylon-bristle broom. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half of the diameter of the smallest aggregate.
 4. Fine-spray surface with water and brush. Repeat cycle of water flushing and brushing until cement film is removed from aggregate surfaces to depth required.
- B. Seeded Exposed-Aggregate Finish: Immediately after initial floating, spread a single layer of aggregate uniformly on paving surface. Tamp aggregate into plastic concrete and float finish to entirely embed aggregate with mortar cover of 1/16 inch.
 1. Spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
 2. Cover paving surface with plastic sheeting, sealing laps with tape, and remove sheeting when ready to continue finishing operations.
 3. Without dislodging aggregate, remove mortar concealing the aggregate by lightly brushing surface with a stiff, nylon-bristle broom. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half of the diameter of the smallest aggregate.
 4. Fine-spray surface with water and brush. Repeat cycle of water flushing and brushing until cement film is removed from aggregate surfaces to depth required.
- C. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on paving surface according to manufacturer's written instructions and as follows:
 1. Uniformly spread 25 lb/100 sq. ft. of dampened, slip-resistive aggregate over paving surface in two applications. Tamp aggregate flush with surface using a steel trowel, but do not force below surface.
 2. Uniformly distribute approximately two-thirds of slip-resistive aggregate over paving surface with mechanical spreader, allow to absorb moisture, and embed by power floating. Follow power floating with a second slip-resistive aggregate application, uniformly distributing remainder of material at right angles to first application to ensure uniform coverage, and embed by power floating.
 3. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.

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4. After curing, lightly work surface with a steel-wire brush or abrasive stone and water to expose nonslip aggregate.

3.9 DETECTABLE WARNING INSTALLATION

- A. Blockouts: Form blockouts in concrete for installation of detectable paving units specified in Section 32 17 26 "Tactile Warning Surfacing."
 1. Tolerance for Opening Size: Plus 1/4-inch, no minus.
- B. Cast-in-Place Detectable Warning Tiles: Form blockouts in concrete for installation of tiles specified in Section 32 17 26 "Tactile Warning Surfacing." Screed surface of concrete where tiles are to be installed to elevation, so that edges of installed tiles will be flush with surrounding concrete paving. Embed tiles in fresh concrete to comply with Section 32 17 26 "Tactile Warning Surfacing" immediately after screeding concrete surface.

3.10 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive hot temperatures.
- B. 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 float finishing.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound where allowed, or a combination of these, as follows:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.

SPECIFICATIONS

3. Curing Compound (Allowed only where other materials will not be applied over concrete): Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.11 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 1. Elevation: 1/4-inch.
 2. Thickness: Plus 3/8-inch, minus 1/4-inch.
 3. Surface: Gap below 10 feet-long; unleveled straightedge not to exceed 1/4-inch.
 4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2-inch per 12 inches of tie bar.
 5. Lateral Alignment and Spacing of Dowels: 1-inch.
 6. Vertical Alignment of Dowels: 1/4-inch.
 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4-inch per 12 inches of dowel.
 8. Joint Spacing: 3 inches.
 9. Contraction Joint Depth: Plus 1/4-inch, no minus.
 10. Joint Width: Plus 1/8-inch, no minus.

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: City of La Puente will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.
- B. Testing Services: Testing will be performed according to the following requirements:
 1. Sampling Fresh Concrete: Representative samples of fresh concrete will be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
 2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
 3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive-strength specimens.
 5. Compression Test Specimens: ASTM C 31/C 31M; one set of three standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders will be molded and stored for laboratory-cured test specimens.

SPECIFICATIONS

- 6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. One specimen will be tested at 7 days and two specimens at 28 days.
- C. Test results will be reported in writing to Architect, Project Inspector, City of La Puente Construction Manager, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests will contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- D. Additional Tests: Testing and inspecting agency will make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by the City of La Puente Construction Manager.
- E. Concrete paving will be considered defective if it does not pass tests and inspections.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.13 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 City of La Puente Construction Manager.
- B. Drill test cores where directed by City of La Puente Construction Manager, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with Portland cement concrete bonded to paving with epoxy adhesive.
- C. 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.
- D. 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 32 13 13

SPECIFICATIONS

SECTION 32 13 73 CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Expansion and contraction joints within Portland cement concrete pavement.
 - 2. Cold-applied joint sealants.
 - 3. Joint-sealant backer materials.
 - 4. Primers.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of joint sealant and accessory.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.

SPECIFICATIONS

2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

2.2 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Nonsag, Low-Modulus, Neutral-Curing, Silicone Joint Sealant for Concrete: ASTM D 5893/D 5893M, Type NS.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Roadsaver Silicone-SL; Crafcro Inc.
 - b. 888; Dow Corning Corporation.
 - c. Pecora Corporation.
 - d. Or Equal.
- B. Multicomponent, Pourable, Urethane, Chemically Curing Elastomeric Formulation Jet-Fuel-Resistant Joint Sealant for Concrete: ASTM C 920; Type M; Grade P; Class 12-1/2; for Uses T, M, and, as applicable to joint substrates indicated, O.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Vulkem 202; Mameco International.
 - b. Urexpam NR-300; Pecora Corporation.
 - c. Sealtight Gardox; W. R. Meadows, Inc.
 - d. Or Equal.

SPECIFICATIONS

2.3 JOINT-SEALANT BACKER MATERIALS

- A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.
- B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.4 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from pre-installation joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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 all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on pre-installation 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.

SPECIFICATIONS

3.3 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.
- C. Install joint-sealant backings to support joint 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 joint-sealant backings.
 - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
 - 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:
 - 1. Place joint sealants so they fully contact 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.
- E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements 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 joint sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

- A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.
- B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

SPECIFICATIONS

END OF SECTION 32 13 73

SPECIFICATIONS

SECTION 32 17 23 PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes painted markings applied to asphalt and concrete pavement.
- B. Related Requirements:
 - 1. Section 09 91 13 "Exterior Painting" for painting exterior concrete surfaces other than pavement.

1.3 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to marking pavement, including:
 - a. Pavement aging period before application of pavement markings.
 - b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include technical data and tested physical and performance properties.
- B. Shop Drawings: For playground markings.
 - 1. Indicate playground markings, colors, and dimensions.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of CBC Title 24 for pavement-marking work.

SPECIFICATIONS

1.6 PLAYGROUND MARKINGS

- A. Where existing playground markings will be disrupted by the Work of this project, survey, photograph and record all existing markings, and replace them in their original configuration, location and color.
- B. Where new playground markings are to be provided, locate and configure as shown in the Drawings.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by the manufacturer. Protect stored materials from direct sunlight.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for alkyd materials 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Dunn-Edwards Corporation.
 - 2. Frazee Paint; Comex Group.
 - 3. Sherwin-Williams Company (The).
 - 4. Or Equal.

2.2 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint: Alkyd traffic-marking paint.
 - 1. Color: As indicated.
- B. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952E, Type II, with drying time of less than three minutes.

SPECIFICATIONS

1. Color: As indicated.
- C. Pavement-Marking Paint: Latex traffic-marking paint.
 1. Color: As indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with the City of La Puente Project Manager and City of La Puente Construction Manager.
- B. Allow paving to age for a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.

3.3 PROTECTING AND CLEANING

- A. Protect pavement markings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 32 17 23

SPECIFICATIONS

SECTION 32 17 26 TACTILE WARNING SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Cast-in-place detectable warning tiles.
 - 2. Detectable warning unit pavers.
- B. Related Requirements:
 - 1. Section 32 13 13 "Concrete Paving" for concrete walkways serving as substrates for tactile warning tiles or pavers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each type of tactile warning surface, in manufacturer's standard sizes unless otherwise indicated, showing edge condition, truncated-dome pattern, texture, color, and cross section; with fasteners and anchors.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For tactile warning surfacing, to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Surface-applied detectable warning tiles or mats are not permitted.
- B. Tactile Warning Surfacing shall have a coefficient of friction of 0.6 minimum when tested in accordance with ASTM C 1028.

SPECIFICATIONS

1.6 PROJECT CONDITIONS

- A. Weather Limitations for Mortar and Grout:
 - 1. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and windbreaks, and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and higher.
 - a. When ambient temperature exceeds 100 deg F, or when wind velocity exceeds 8 mph and ambient temperature exceeds 90 deg F, set unit pavers within 1 minute of spreading setting-bed mortar.

1.7 WARRANTY

- A. Manufacturer's certification that indicates compliance with the architectural access standards as published in the current edition of the CBC.
- B. Special Warranty: Manufacturer agrees to repair or replace components of tactile warning surfaces that fail in materials or workmanship within specified warranty period.
 - 1. Failures include:
 - a. Deterioration of finishes beyond normal weathering and wear.
 - b. Deterioration of durability criteria as listed below.
 - c. Separation or delamination of materials and components.
 - 2. Warranty Period: Provide a minimum five year warranty from date of Substantial Completion of durability criteria, including shape, color fastness, confirmation, sound-on-cane acoustic quality, resilience and attachment, per DSA Bulletin 10/31/02 revised 4/9/08.

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

- A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities, and the CBC for tactile warning surfaces.
 - 1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.
- B. Source Limitations: Obtain each type of tactile warning surfacing, joint material, setting material, anchor, and fasteners from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

SPECIFICATIONS

2.2 DETECTABLE WARNING TILES

- A. Cast-in-Place Detectable Warning Tiles: Accessible truncated-dome detectable warning tiles configured for setting flush in new concrete walkway surfaces, with slip-resistant surface treatment on domes and field of tile.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armorcast Products Company.
 - b. Detectable Warning Systems, Inc.
 - c. StrongGo Industries, LLC.
 - d. Or Equal.
 2. Material: Cast-fiber-reinforced polymer concrete tile.
 3. Color: Safety yellow.
 - a. Color No. 33538 per Federal Standard 595B.
 - b. Color must be integral throughout the tile and not surface applied.
 4. Sizes:
 - a. Rectangular panel, 36-by-width shown on plans.
 5. Dome Spacing and Configuration:
 - a. 2.35-inch center-to-center spacing in all directions and across adjacent tiles.
 - b. Round truncated dome configuration, 0.9" (22 mm) diameter at base and 0.45" (11 mm) diameter at top.
 - c. Truncated dome height: 0.2" (5 mm).
 - d. Layout: Square layout within the tile and square to the direction of travel.
 6. Mounting:
 - a. Permanently embedded detectable warning tile wet-set into freshly poured concrete.
 - b. Detectable warning tile set into formed recess in concrete and adhered with mortar.
 - c. Replaceable detectable warning tile wet-set into freshly poured concrete and surface-fastened to permanently embedded anchors.

2.3 DETECTABLE WARNING UNIT PAVERS

- A. Detectable Warning Concrete Unit Pavers: Solid paving units, made from normal-weight concrete with a compressive strength of not less than 5000 psi, water absorption of not more than 5 percent according to ASTM C 140, and no breakage and not more than 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67, with accessible detectable warning truncated domes on exposed surface of units.

SPECIFICATIONS

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hanover Architectural Products.
 - b. Stepstone, Inc.
 - c. Tile-Tech Pavers.
 - d. Or Equal.
2. Sizes:
 - a. Thickness: 2 inches at field of tile.
 - b. Face Size: Nominal 12-by-12 inches.
3. Dome Spacing and Configuration:
 - a. 2.35-inch center-to-center spacing in all directions and across adjacent tiles.
 - b. Round truncated dome configuration, 0.9" (22 mm) diameter at base and 0.45" (11 mm) diameter at top.
 - c. Truncated dome height: 0.2" (5 mm).
 - d. Layout: Square layout within the tile and square to the direction of travel.
4. Color: Safety Yellow:
 - a. Color No. 33538 per Federal Standard 595B.
 - b. Color must be integral throughout the paver and not surface applied.

B. Mortar Setting Bed:

1. Portland Cement: ASTM C 150/C 150M, Type I or Type II.
2. Sand: ASTM C 33/C 33M.
3. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed Portland cement and aggregate mortar bed, and not containing a retarder.
4. Thinset Mortar: Latex-modified Portland cement mortar complying with ANSI A118.4.
5. Water: Potable.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:
1. Furnish Type 304 stainless-steel fasteners for exterior use.
 2. Fastener Heads: For nonstructural connections, use only flush, oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.

SPECIFICATIONS

- B. Adhesive: As recommended by manufacturer for adhering tactile warning surfacing unit to pavement.
- C. Sealant: As recommended by manufacturer for sealing perimeter of tactile warning surfacing unit.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF TACTILE WARNING SURFACING

- A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.
- B. Place tactile warning surfacing units in dimensions and orientation indicated.
- C. Provide expansion joints around perimeter of precast concrete tiles and at 8' on center maximum in both directions.
- D. Installation must comply with the architectural access standards as published in the current edition of the CBC.

3.3 INSTALLATION OF DETECTABLE WARNING TILES

- A. Cast-in-Place Detectable Warning Tiles:
 - 1. Concrete Paving Installation: Comply with installation requirements in Section 32 13 13 "Concrete Paving." Mix, place, and finish concrete to conditions complying with detectable warning tile manufacturer's written requirements for satisfactory embedment of tile.
 - 2. Set each detectable warning tile accurately and firmly in place and completely seat tile back and embedments in wet concrete by tamping or vibrating. If necessary, temporarily apply weight to tiles to ensure full contact with concrete.
 - 3. Set surface of tile flush with surrounding concrete and adjacent tiles, with variations between tiles and between concrete and tiles not exceeding plus or minus 1/8-inch from flush.
 - 4. Protect exposed surfaces of installed tiles from contact with wet concrete. Complete finishing of concrete paving surrounding tiles. Remove concrete from tile surfaces.
 - 5. Clean tiles using methods recommended in writing by manufacturer.

SPECIFICATIONS

B. Removable Cast-in-Place Detectable Warning Tiles:

1. Concrete Paving Installation: Comply with installation requirements in Section 32 13 13 "Concrete Paving." Mix, place, and finish concrete to conditions complying with detectable warning tile manufacturer's written requirements for satisfactory embedment of removable tile.
2. Set each detectable warning tile accurately and firmly in place with embedding anchors and fasteners attached, and firmly seat tile back in wet concrete by tamping or vibrating. If necessary, temporarily apply weight to tiles to ensure full contact with concrete.
3. Set surface of tile flush with surrounding concrete and adjacent tiles, with variations between tiles and between concrete and tiles not exceeding plus or minus 1/8-inch from flush.
4. Protect exposed surfaces of installed tiles from contact with wet concrete. Complete finishing of concrete paving surrounding tiles. Remove concrete from tile surfaces.
5. Clean tiles using methods recommended in writing by manufacturer.

3.4 INSTALLATION OF DETECTABLE WARNING UNIT PAVERS

A. Unit Paver Installation, General:

1. Setting-Bed and Unit Paver Installation: Comply with installation requirements in Section 32 14 00 "Unit Paving."
2. Use full units without cutting.
3. Tolerances: Do not exceed indicated slope in direction of travel, or 2% cross-slope for finished surface of paving.

B. Mortar Setting-Bed Applications:

1. Saturate concrete subbase with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.
2. Apply mortar-bed bond coat over surface of concrete subbase about 15 minutes before placing mortar bed. Limit area of bond coat to avoid its drying out before placing setting bed. Do not exceed 1/16-inch thickness for bond coat.
3. Apply mortar bed over bond coat; spread and screed mortar bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.
4. Mix and place only that amount of mortar bed that can be covered with pavers before initial set. Before placing pavers, cut back, bevel edge, and remove and discard setting-bed material that has reached initial set.
5. Place pavers before initial set of cement occurs. Immediately before placing pavers on mortar bed, apply uniform 1/16-inch-thick bond coat to mortar bed or to back of each paver with a flat trowel.
6. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.

TACTILE WARNING SURFACING

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7. Spaced Joint Widths: Provide 3/8-inch nominal joint width with variations not exceeding plus or minus 1/16-inch.
8. Grouted Joints: Grout paver joints complying with ANSI A108.10. Grout joints as soon as possible after initial set of setting bed.
 - a. Force grout into joints, taking care not to smear grout on adjoining surfaces.
 - b. Tool exposed joints slightly concave when thumbprint hard.
 - c. Cure grout by maintaining in a damp condition for seven days unless otherwise recommended by grout or liquid-latex manufacturer.
 - d. Grout color must match adjacent tactile warning surfacing color. Safety yellow, Color No. 33538 per Federal Standard 595B.
9. Remove excess grout from exposed paver surfaces; wash and scrub clean.
10. Protect installation from traffic until grout has set.

3.5 CLEANING AND PROTECTION

- A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint. Replace using tactile warning surfacing installation methods acceptable to City of La Puente Construction Manager.
- B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION 32 17 26

SPECIFICATIONS

SECTION 32 84 00 PLANTING IRRIGATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product data and Shop Drawings showing sprinkler layout and flow characteristics. Include wiring diagrams.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Design 100 percent water-coverage irrigation system for lawn and exterior plants indicated.
- B. Minimum System Pressure Rating: 150 psig (1035 kPa)
- 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.

2.2 PIPES AND FITTINGS

- A. Pipe Materials: PE, ASTM F 771; PE 3408 compound; SDR 15.
 - 1. Insert Fittings: ASTM D 2609, nylon or propylene plastic.
- B. Pipe Materials: PVC pipe, ASTM D 2241, PVC 1120, SDR 26.
 - 1. Fittings: PVC plastic pipe fittings, ASTM D 2467, Schedule 80, socket type with ASTM F 656 primer and ASTM D 2564 solvent cement.

2.3 VALVES

- A. Curb Valves:
 - 1. Description: Bronze body, ground-key plug or ball with wide tee head.
 - 2. Curb-Valve Casing: Similar to AWWA M44 for cast-iron valve casings.
- B. Plastic Ball Valves:
 - 1. Description: MSS SP-122, Full Port with socket or threaded ends.

SPECIFICATIONS

C. Bronze Gate Valves:

- D. Description: MSS SP-80, Type 2, solid bronze wedge; nonrising bronze stem; Class 125 with integral seat, screw-in bonnet, and malleable-iron, bronze, or aluminum handwheel.

E. Water Control Valves:

1. Description: Cast- or ductile-iron body globe valve, AWWA C550 or FDA-approved interior epoxy coating; or stainless-steel body.

F. Bronze Automatic Control Valves:

1. Description: Cast-bronze body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.

G. Plastic Automatic Control Valves:

1. Description: Molded-plastic body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.

H. Antisiphon, Pressure-Type Vacuum Breakers: Spring-loaded check valve.

- I. Pressure Regulators: Single-seated, direct-operated type with integral Y-pattern strainer.

2.4 QUICK COUPLERS

- A. Two-piece assembly, with coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.

2.5 SPRINKLERS

A. Metal, Surface Spray Sprinklers:

1. Sprinklers: Brass housing; flush, surface, fixed pattern, with screw-type flow adjustment.

B. Plastic, Surface Spray Sprinklers:

1. Sprinklers: Plastic housing; flush, surface, fixed pattern, with screw-type flow adjustment.

C. Plastic, Pop-up, Gear-Drive Rotary Sprinklers:

1. Gear drive, full-circle and adjustable part-circle type.

D. Plastic, Surface, Pop-up Spray Sprinklers:

SPECIFICATIONS

1. Fixed pattern, with screw-type flow adjustment and stainless-steel spring.

E. Plastic Shrub Sprinklers:

1. Fixed pattern, with screw-type flow adjustment.

2.6 DRIP IRRIGATION SPECIALTIES

- A. Emitters: Plastic body with single outlet, to deliver flow at approximately 30 psig (138 kPa) of 0.6 gph.
- B. Drip Tubes: Flexible PVC, NPS 1/2

2.7 CONTROLLERS

- A. Description: Automatic low-voltage control system made for control of irrigation-system automatic control valves. Controller operates on 120-V ac; provides 24-V ac power to control valves.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install components having pressure rating equal to or greater than system operating pressure.
- B. Confirm distribution uniformity and ensure head-to-head spacing. If appropriate irrigation uniformity and head-to-head spacing is not accomplished, adjust head spray or location to insure adequate water distribution uniformity.
- C. Lay piping on solid subbase, uniformly sloped without humps or depressions. Slope circuit piping down toward drain valve a minimum of 0.4 percent.
- D. Minimum Cover: Provide the following minimum cover over top of buried piping:
 1. Pressure Piping: 18 inches below frost depth, whichever is greater.
 2. Circuit Piping: 12 inches
 3. Drain Piping: 12 inches
 4. Sleeves: 24 inches
- E. Install water meters in meter boxes, with shutoff valve on meter inlet. Include valve on meter outlet and valved bypass around meter.
- F. Install pressure regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Install shutoff valve on outlet and valved bypass.
- G. Sprinklers: Flush circuit piping with full head of water and install sprinklers after hydrostatic test is completed.

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SPECIFICATIONS

END OF SECTION 32 84 00

**PLANTING IRRIGATION
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SPECIFICATIONS

SECTION 32 91 13

SOIL PREPARATION

1.1 SECTION REQUIREMENTS

- A. Section includes the composition and mixing of planting soils cited in other Sections.
- B. Definitions:
 - 1. Planting Soil: Existing soil modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
 - 2. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- C. Submittals: Product data and bulk Samples for each type of product.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED BY COMPOSITION

- A. Planting-Soil Type: Existing, on-site surface soil stockpiled on-site; modified by blending with the following soil amendments and fertilizers (unless soils test recommendations differ):
 - 1. Ratio of Loose Compost to Soil: 1:4 by volume.
 - 2. Ratio of Loose Peat to Soil: by volume.
 - 3. Weight of Lime: 40 lbs. per 1000 sq. ft. (100 sq. m) 6 inches (150 mm) of soil depth.
 - 4. Weight of Sulfur: 25lbs. per 1000 sq. ft. (100 sq. m) per 6 inches (150 mm) of soil depth.
 - 5. Weight of Agricultural Gypsum: 20lbs. per 1000 sq. ft. (100 sq. m) per 6 inches (150 mm) of soil depth.
 - 6. Weight of Commercial fertilizer 6-24-24XB: 24lbs. per 1000 sq. ft. (100 sq. m) per 6 inches (150 mm) of soil depth.

2.2 MATERIALS

- A. Lime: ASTM C 602, Class T, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent; in the form of ground dolomitic limestone.
- B. Sulfur: Containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing a No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through a No. 40 (0.425-mm) sieve.
- C. Agricultural Gypsum: Minimum 90 percent calcium sulfate, ground with 90 percent passing a No. 50 (0.30-mm) sieve.

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- D. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M .
- E. Compost: Well-composted, stable, and weed-free organic matter produced by composting plant materials, and bearing U.S. Composting Council's "Seal of Testing Assurance."
- F. Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture with 100 percent passing a 1/2-inch (13-mm) sieve, a pH of 3.4 to 4.8, and a soluble-salt content measured by electrical conductivity of maximum 5 dS/m.
- G. Wood Derivatives: Shredded and composted, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.
- H. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of [20] [33] [50] percent available phosphoric acid.
- I. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen; composition resulting in 6 percent of actual nitrogen, 24 percent phosphate, and 24 percent potash:

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Place planting soil and fertilizers according to requirements in other Specification Sections.
- B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth. Clean soil to contain a maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.

3.2 PLACING AND MIXING PLANTING SOIL

- A. Mixing: Blend unamended soil with amendments to produce full depth of required planting soil with uniform texture. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698 unless otherwise indicated.
- C. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

SPECIFICATIONS

- D. Protect areas of in-place soil from additional compaction, disturbance, and contamination.
- E. Remove surplus soil and waste material off Owner's property unless otherwise indicated.

PART 4 - SOILS TESTING

4.1 TESTING REQUIREMENTS

- F. General: Perform tests on soil samples according to requirements in this article.
 - 1. Conduct soil tests for on-site soil a minimum of two (2) times.
 - a. First soil test: Test in place on-site or stockpiled on-site soil to determine the condition of on-site soils. If on-site soils cannot meet the requirements of topsoil as defined herein, provide import topsoil as specified below.
 - b. If the on-site soils can be amended to meet the requirements of topsoil as specified herein, complete a second series of soil testing after the soil has been amended per the recommendation of the first soil test. Amend the soil a second time if the test results indicate additional soil amendments are necessary. Complete and verify all additional soil amendment recommendations prior to planting. Additional testing may be required as directed by the District Construction Manager in collaboration with the Landscape Architect.
 - 2. Conduct soil tests for imported topsoil a minimum of three (3) times.
 - a. First Time Soil Tests: Test stockpiled soil at the providers supply yard to determine necessary treatment to meet imported soil requirements. Conduct a minimum of three separate soil tests to provide the most accurate analysis of stockpiled soils. A representative sample shall consist of a composite of multiple sub-samples taken from the area under investigation, combined and then submitted.
 - b. Second Time Soil Tests: Complete a second series of three (3) soil tests after the soil has been amended per the recommendation of the first soil tests. Perform these tests prior to delivery of imported soil. If the test results indicate additional soil amendments are necessary, continue to amend the soil and retest until the soil meets the specification requirements.
 - c. Third Time Soil Tests: Complete a third series of three (3) soil tests after the imported topsoil is placed on-site. Complete and verify all additional soil amendment recommendations prior to planting. Additional testing may be required as directed by the District Construction Manager in collaboration with the Landscape Architect.

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G. Physical Testing:

1. Soil Texture: Soil-particle, size-distribution analysis by the following method according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
 - a. Hydrometer Method: Report percentages of sand, silt, and clay. Report percentage of gravel, if present.
2. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
3. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
4. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85% compaction according to ASTM D 698 (Standard Proctor).

H. Chemical Testing:

1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1- Physical and Mineralogical Methods."
3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.

I. Fertility Testing: Soil-fertility analysis according to standard laboratory protocol of SSSA, including the following:

1. Percentage of water in saturation extract.
2. Electrical conductivity (ECe).
3. Soil reaction (acidity/alkalinity pH value).
4. Buffered acidity or alkalinity.
5. Nitrogen ppm.
6. Phosphorous ppm.
7. Potassium ppm.
8. Manganese ppm.
9. Manganese-availability ppm.
10. Molybdenum ppm.
11. Iron ppm.
12. Sulfur ppm.
13. Boron ppm.
14. Zinc ppm.
15. Zinc availability ppm.

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16. Copper ppm.
 17. Chloride ppm.
 18. Sodium ppm and sodium absorption ratio (SAR).
 19. Soluble-salts ppm.
 20. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
 21. Other deleterious materials, including their characteristics and content of each.
- J. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
- K. Recommendations: Based on the test results, testing agency shall provide interpretation of data and written recommendations for soil treatments, soil amendments to be incorporated, and required leaching, to produce satisfactory planting soil suitable for healthy, viable plants as indicated on Drawings. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients. Include results of the soil texture and percent by dry weight of soil organic matter. Include recommendations for remediation of phytotoxicity elements and deleterious materials. Include amount and length of time to perform leaching operations, if required.
1. Fertilizers and Soil Amendment Rates: State recommendations in weight or volume per 1000 sq. ft. for 6-inch depth of soil and in weight or volume per cu. yd. of backfill mix.
 2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight or volume per 1000 sq. ft. for 6-inch depth of soil and in weight or volume per cu. yd. of backfill mix.

END OF SECTION 32 91 13

SPECIFICATIONS

SECTION 32 92 00

TURF AND GRASSES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: product certificates.
- B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding."

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

- A. Sod Quality: Certified, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding."
- B. Species: To match existing turfgrass on site.

2.2 FERTILIZERS AND MULCHES

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen; 1 lb/1000 sq. ft. (0.5 kg/100 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
- B. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium; 20 percent nitrogen; 10 percent phosphorous; and 10 percent potassium; by weight.
- C. Straw Mulch: Clean, mildew- and seed-free salt hay or threshed straw of wheat, rye, oats, or barley.
- D. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- E. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 2 to 5 dS/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and with organic matter content of 50 to 60 range percent of dry weight.

TURF AND GRASSES

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PART 3 - EXECUTION

3.1 PREPARATION

- A. Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Moisten before planting.

3.2 PLANTING

- A. Sodding: Lay sod within 24 hours of harvesting. Lay sod with tightly fitted joints, offsetting joints in adjacent courses; do not stretch or overlap. Tamp and roll lightly. Fill minor cracks between pieces of sod with soil or sand. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples. Saturate sod with fine water spray within two hours of planting. During first week, water daily to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.3 MAINTENANCE SERVICE

- A. Maintain and establish plantings by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and mulch to produce a uniformly smooth installation. Provide materials and installation the same as those used in the original installation.
- B. Maintain plantings until established, but for not less than 120 days.
- C. Mow turf as soon as top growth is tall enough to cut. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.
 - 1. Mow grass to maintain height of 2 to 3 inches (50 to 75 mm).

END OF SECTION 32 92 00

SPECIFICATIONS

SECTION 32 93 00

PLANTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product data and product certificates.
- B. Installer Qualifications: Landscape Industry Certified Technician
- C. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting. Remove rejected plants immediately from Project site. Notify Architect of sources of planting materials seven days in advance of delivery to site.

PART 2 - PRODUCTS

2.1 PLANTING MATERIALS

- A. Standard: Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- B. Tree and Shrub Material: Nursery grown, with healthy root systems, well shaped, and fully branched; healthy, vigorous stock, free of insects, eggs, and larvae; and free of defects and disfigurement.
- C. Annuals and Biennials: Healthy, disease-free plants of species and variety indicated, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

2.2 FERTILIZERS AND MULCHES

- A. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
 - 1. Size: 21-gram tablets.
 - 2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.
- B. Organic Mulch: Ground or shredded bark.

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1. Size Range: 1 inches maximum, 1/2 inch minimum.

2.3 MISCELLANEOUS

- A. Weed-Control Barrier: Polypropylene or polyester nonwoven fabric.
- B. Slow-Release Watering Device: Standard product manufactured for drip irrigation of plants and emptying its water contents over an extended time period.

PART 3 - EXECUTION

3.1 PLANTING

- A. Placing Planting Soil: Blend planting soil in place.
- B. Trees and Shrubs: Excavate pits with sides sloped inward at a 45-degree angle. Trim perimeter of bottom, leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Excavate approximately 3 times as wide as ball or container diameter. Scarify sides of plant pit smeared or smoothed during excavation.
 1. Backfill: Planting soil with existing site soil and 1/4 (by volume) nitrified top soil MIX. For trees, use excavated soil for backfill.
 2. Set each plant plumb and in center of planting pit or trench with root flare 2 inches (50 mm) above adjacent finish grades.
 3. Remove burlap and wire baskets from tops and sides of balls. For containers, remove root balls without damaging root ball or plant. For bare-root stock, spread roots without tangling, plumb before backfilling, and maintain plumb while working.
 4. Backfill around ball in layers, tamping to settle soil and eliminate voids and air pockets. When one-half backfilled, water thoroughly before placing remainder of backfill. Water again after placing and tamping final layer of soil.
 5. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Do not place tablets in bottom of the hole or touching the roots.
 6. Remove only dead, dying, or broken branches. Do not prune for shape.
 7. Stabilize trees by upright staking and tying. Allow enough slack to avoid rigid restraint of tree.
- C. Plant ground cover and plants as indicated on plans. Dig holes large enough to allow spreading roots. Work soil around roots and leave a slight saucer around plants to hold water. Water after planting. Do not cover plant crowns with wet soil.
- D. Mulching: Before mulching, install weed-control barriers.] Apply [organic mulch, 3 inches (75 mm) thick, and finish level with adjacent finish grades. Do not place mulch within 3 inches (75 mm) of tree trunks or stems.
- E. Edgings: Install edgings and anchor with stakes.

PLANTS

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- F. Slow-Release Watering Devices: Install one device at each tree.

3.2 MAINTENANCE

- A. Tree and Shrub Maintenance: Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, adjusting and repairing tree-stabilization devices, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.
- B. Maintain trees and shrubs until established, but not less than 120 days.
- C. Ground Cover and Plant Maintenance: Maintain and establish plantings by watering, weeding, fertilizing, mulching, and other operations as required to establish healthy, viable plantings.
- D. Maintain ground covers and plants until established, but not less than 120 days.

END OF SECTION 32 93 00

SPECIFICATIONS

SECTION 33 05 00 COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Piping joining materials.
 - 2. Transition fittings.
 - 3. Dielectric fittings.
 - 4. Sleeves.
 - 5. Identification devices.
 - 6. Grout.
 - 7. Flowable fill.
 - 8. Piped utility demolition.
 - 9. Piping system common requirements.
 - 10. Equipment installation common requirements.
 - 11. Painting.
 - 12. Concrete bases.
 - 13. Metal supports and anchorages.

1.3 DEFINITIONS

- A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
- B. Concealed 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.
- C. ABS: Acrylonitrile-butadiene-styrene plastic.
- D. CPVC: Chlorinated polyvinyl chloride plastic.
- E. PE: Polyethylene plastic.
- F. PVC: Polyvinyl chloride plastic.

SPECIFICATIONS

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Dielectric fittings.
 - 2. Identification devices.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Steel Piping Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.8 COORDINATION

- A. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- B. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces.
- C. Coordinate size and location of concrete bases. Formwork, reinforcement, and concrete requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."

SPECIFICATIONS

PART 2 - PRODUCTS

2.1 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness, unless otherwise indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8-inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- G. Solvent Cements for Joining Plastic Piping:
 - 1. ABS Piping: ASTM D 2235.
 - 2. CPVC Piping: ASTM F 493.
 - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - 4. PVC to ABS Piping Transition: ASTM D 3138.
- H. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.2 TRANSITION FITTINGS

- A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
- B. Transition Couplings NPS 1-1/2 and Smaller:
 - 1. Underground Piping: Manufactured piping coupling or specified piping system fitting.
 - 2. Aboveground Piping: Specified piping system fitting.

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C. AWWA Transition Couplings NPS 2 and Larger:

1. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.

D. Plastic-to-Metal Transition Fittings:

1. Description: CPVC and PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

E. Plastic-to-Metal Transition Unions:

1. Description: MSS SP-107, CPVC and PVC four-part union. Include brass threaded end, solvent-cement-joint plastic end, rubber O-ring, and union nut.

F. Flexible Transition Couplings for Underground Nonpressure Drainage Piping:

1. Description: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

2.3 DIELECTRIC FITTINGS

A. Dielectric Fittings, General: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.

B. Dielectric Unions:

1. Description: Factory fabricated, union, NPS 2 and smaller.
 - a. Pressure Rating: 150 psig minimum at 180 deg F.
 - b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.

C. Dielectric Flanges:

1. Description: Factory-fabricated, bolted, companion-flange assembly, NPS 2-1/2 to NPS 4 and larger.
 - a. Pressure Rating: 150 psig minimum.
 - b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Kits:

1. Description: Nonconducting materials for field assembly of companion flanges, NPS 2-1/2 and larger.
 - a. Pressure Rating: 150 psig minimum.
 - b. Gasket: Neoprene or phenolic.

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- c. Bolt Sleeves: Phenolic or polyethylene.
- d. Washers: Phenolic with steel backing washers.

E. Dielectric Couplings:

- 1. Description: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining, NPS 3 and smaller.
 - a. Pressure Rating: 300 psig at 225 deg F.
 - b. End Connections: Threaded.

F. Dielectric Nipples:

- 1. Description: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining.
 - a. Pressure Rating: 300 psig at 225 deg F.
 - b. End Connections: Threaded or grooved.

2.4 SLEEVES

- A. Mechanical sleeve seals for pipe penetrations are specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
- B. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.
- D. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- E. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.
- F. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.5 IDENTIFICATION DEVICES

- A. General: Products specified are for applications referenced in other utilities Sections. If more than single type is specified for listed applications, selection is Installer's option.
- B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.
 - 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
 - 2. Location: Accessible and visible.

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- C. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.
- D. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive-vinyl type with permanent adhesive.
- E. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers, extending 360 degrees around pipe at each location.
- F. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.
- G. Lettering: Manufacturer's standard preprinted captions as selected by Architect.
- H. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils thick.
 - 1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.
 - 2. Color: Comply with ASME A13.1, unless otherwise indicated.
- I. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.
 - 1. Material: 0.032-inch-thick, polished brass.
 - 2. Material: 0.0375-inch-thick stainless steel.
 - 3. Material: 3/32-inch-thick plastic laminate with 2 black surfaces and a white inner layer.
 - 4. Material: Valve manufacturer's standard solid plastic.
 - 5. Size: 1-1/2 inches in diameter, unless otherwise indicated.
 - 6. Shape: As indicated for each piping system.
- J. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.
- K. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
 - 1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
 - 2. Thickness: 1/16-inch, for units up to 20 sq. in. or 8 inches in length, and 1/8-inch for larger units.
 - 3. Fasteners: Self-tapping, stainless-steel screws or contact-type permanent adhesive.
- L. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:
 - 1. Green: Cooling equipment and components.
 - 2. Yellow: Heating equipment and components.

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3. Brown: Energy reclamation equipment and components.
4. Blue: Equipment and components that do not meet criteria above.
5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
6. Terminology: Match schedules as closely as possible. Include the following:
 - a. Name and plan number.
 - b. Equipment service.
 - c. Design capacity.
 - d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
7. Size: 2-1/2-by-4 inches for control devices, dampers, and valves; 4-1/2-by-6 inches for equipment.

M. Plasticized Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with mat finish suitable for writing.

1. Size: 3-1/4-by-5-5/8 inches.
2. Fasteners: Brass grommets and wire.
3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.

N. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in piped utility identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of piped utility systems and equipment.

1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

2.6 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.7 FLOWABLE FILL

A. Description: Low-strength-concrete, flowable-slurry mix.

1. Cement: ASTM C 150, Type I, Portland.
2. Density: 115- to 145-lb/cu. ft.
3. Aggregates: ASTM C 33, natural sand, fine.
4. Admixture: ASTM C 618, fly-ash mineral.
5. Water: Comply with ASTM C 94/C 94M.

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6. Strength: 100 to 200 psig at 28 days.

PART 3 - EXECUTION

3.1 PIPED UTILITY DEMOLITION

- A. Refer to Section 02 41 19 "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.
 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 2. Piping to Be Abandoned in Place: Drain piping. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.
 3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make operational.
 5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to the City of La Puente.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 DIELECTRIC FITTING APPLICATIONS

- A. Dry Piping Systems: Connect piping of dissimilar metals with the following:
 1. NPS 2 and Smaller: Dielectric unions.
 2. NPS 2-1/2 to NPS 12: Dielectric flanges or dielectric flange kits.
- B. Wet Piping Systems: Connect piping of dissimilar metals with the following:
 1. NPS 2 and Smaller: Dielectric couplings or dielectric nipples.
 2. NPS 2-1/2 to NPS 8: Dielectric nipples or dielectric flange kits.
 3. NPS 10 and NPS 12: Dielectric flange kits.

3.3 PIPING INSTALLATION

- A. Install piping according to the following requirements and utilities Sections specifying piping systems.

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- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping to permit valve servicing.
- E. Install piping at indicated slopes.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of equipment areas or other wet areas 2 inches above finished floor level.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - a. PVC Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
- J. Verify final equipment locations for roughing-in.
- K. Refer to equipment specifications in other Sections for roughing-in requirements.

3.4 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and utilities Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

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- D. 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 unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- G. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- H. Soldered Joints: Apply ASTM B 813 water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.
- I. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- J. Pressure-Sealed Joints: Assemble joints for plain-end copper tube and mechanical pressure seal fitting with proprietary crimping tool to according to fitting manufacturer's written instructions.
- K. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
 - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
 - 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
- L. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- M. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

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- N. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - 1. Plain-End PE Pipe and Fittings: Use butt fusion.
 - 2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.
- O. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.5 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - 3. Install dielectric fittings at connections of dissimilar metal pipes.

3.6 EQUIPMENT INSTALLATION

- A. Install equipment level and plumb, unless otherwise indicated.
- B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.
- C. Install equipment to allow right of way to piping systems installed at required slope.

3.7 PAINTING

- A. Painting of piped utility systems, equipment, and components is specified in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.8 IDENTIFICATION

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
 - 1. Stenciled Markers: According to ASME A13.1.
 - 2. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.
 - 3. Locate pipe markers on exposed piping according to the following:
 - a. Near each valve and control device.

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- b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
 - c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
 - d. At manholes and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.
- B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.
 - 1. Lettering Size: Minimum 1/4-inch high for name of unit if viewing distance is less than 24 inches, 1/2-inch high for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
 - 2. Text of Signs: Provide name of identified unit. Include text to distinguish among multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

3.9 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
 - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of base.
 - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 - 7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Section 03 30 00 "Cast-in-Place Concrete."

3.10 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Section 05 50 00 "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor piped utility materials and equipment.

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- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.11 GROUTING

- A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 33 05 00

SPECIFICATIONS

SECTION 33 42 00 STORMWATER CONVEYANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Reference Standards:
 - 1. Standard Specifications for Public Works, current edition, including Regional and City of San Diego Supplemental Amendments.
 - 2. City of San Diego Standard Specifications for Public Works Construction (Whitebook), current edition.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings.
 - 2. Nonpressure transition couplings.
 - 3. Cleanouts.
 - 4. Drains.
 - 5. Encasement for piping.
 - 6. Cleanouts.
 - 7. Channel drainage systems.
 - 8. Catch basins.
 - 9. Stormwater inlets.
 - 10. Pipe outlets.
 - 11. Stormwater disposal systems.
- B. Related Requirements:
 - 1. Section 31 20 00 "Earth Moving" for excavating, trenching, and backfilling, and underground warning tapes.
 - 2. Section 33 46 00 "Subdrainage" for filter fabric.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Drop inlets.
 - 2. Cleanouts and drains.

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3. Pipe and fittings.

B. Shop Drawings:

1. Cleanouts: Include plans, elevations, sections, details, frames, and covers.
2. Catch basins and stormwater inlets. Include plans, elevations, sections, details, frames, covers, and grates.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.
- B. Field quality-control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic cleanouts, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle cleanouts according to manufacturer's written rigging instructions.
- D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by City of La Puente or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 1. Notify City of La Puente Construction Manager no fewer than three days in advance of proposed interruption of service.
 2. Do not proceed with interruption of service without City of La Puente Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service and Extra-Heavy classes.
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

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2.2 PVC PIPE AND FITTINGS

A. PVC Gravity Sewer Piping:

1. Pipe and Fittings: ASTM F 679, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

B. PVC Pressure Piping:

1. Pipe: Pipe: ASTM D 1785, Schedule 40 and Schedule 80 PVC, with plain ends for solvent-cemented joints.
2. Fittings: ASTM D 2467, Schedule 80 PVC, socket type.

2.3 NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Concrete Pipes: ASTM C 443, rubber.
2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
3. For Fiberglass Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
4. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
5. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fernco Inc.
 - b. Mission Rubber Company.
 - c. NDS Inc.
 - d. Or Equal.
2. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Ring-Type, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fernco Inc.
 - b. Logan Clay Pipe.

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- c. Mission Rubber Company.
 - d. Or Equal.
- 2. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.4 CLEANOUTS

A. Concrete Cleanouts:

- 1. Materials and dimensions according to City of San Diego standards. Cleanout types and additional dimensions as indicated on Drawings. Provide heavy duty frames and grates.

B. Plastic Cleanouts:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. NDS Inc.
 - b. Sioux Chief Manufacturing Company, Inc.
 - c. Zurn Industries, LLC.
 - d. Or Equal.
- 2. Description: PVC body with PVC threaded plug. Include PVC drain pipe fitting and riser to cleanout of same material as drain piping.

2.5 DRAINS

A. Cast-Iron Area Drains:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Smith, Jay R. Mfg. Co.
 - b. Watts; a Watts Water Technologies company.
 - c. Zurn Industries, LLC.
 - d. Or Equal.
- 2. Description: ASME A112.6.3 gray-iron round body with anchor flange and round secured grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated.
- 3. Top-Loading Classification(s): Medium and Heavy Duty.

B. Cast-Iron Trench Drains:

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

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- a. Smith, Jay R. Mfg. Co.
 - b. Watts; a Watts Water Technologies company.
 - c. Zurn Industries, LLC.
 - d. Or Equal.
 2. Description: ASME A112.6.3, 6-inch-wide top surface, rectangular body with anchor flange or other anchoring device, and rectangular secured grate. Include units of total length indicated and quantity of bottom outlets with inside calk or spigot connections, of sizes indicated.
 3. Top-Loading Classification(s): Medium, Heavy, and Extra-Heavy Duty.
- C. Steel Trench Drains:
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Rockford Sanitary Systems, Inc.
 - b. Or Equal.
 2. Description: Factory fabricated from ASTM A 242/A 242M, welded steel plate, to form rectangular body with uniform bottom downward slope of 2 percent toward outlet, anchor flange, and grate. Include units of total length indicated, bottom outlet of size indicated, outlet strainer, acid-resistant enamel coating on inside and outside surfaces, and grate with openings of total free area at least two times cross-sectional area of outlet.
 3. Plate Thicknesses: 1/8-inch and 1/4-inch.
 4. Overall Widths: 7-1/2 inches and 12-1/3 inches.
 - a. Grate Openings: 3/8-inch circular or 3/8-by-3-inch slots.
- 2.6 POLYMER-CONCRETE, CHANNEL DRAINAGE SYSTEMS
- A. General Requirements for Polymer-Concrete, Channel Drainage Systems: Modular system of precast, polymer-concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include quantity of units required to form total lengths indicated.
 - B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. ACO USA.
 2. Innovative Plastic, Inc.
 3. Polycast: Hubbell Power Systems, Inc.
 4. Or Equal.
 - C. Sloped-Invert, Polymer-Concrete Systems:
 1. Channel Sections:

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- a. Interlocking-joint, precast, modular units with end caps.
 - b. 4-inch inside width and deep, rounded bottom, with built-in invert slope of 0.6 percent and with outlets in quantities, sizes, and locations indicated.
 - c. Extension sections necessary for required depth.
 - d. Frame: Include gray-iron or steel frame for grate.
 2. Grates:
 - a. Manufacturer's designation "Medium Duty," with slots or perforations that fit recesses in channels.
 - b. Material: Gray iron.
 3. Covers: Solid gray iron if indicated.
 4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- D. Narrow-Width, Level-Invert, Polymer-Concrete Systems:
1. Channel Sections:
 - a. Interlocking-joint, precast, modular units with end caps.
 - b. 5-inch inside width and 9-3/4-inch-deep, rounded bottom, with level invert and with NPS 4 outlets in quantities, sizes, and locations indicated.
 2. Grates:
 - a. Slots or perforations that fit recesses in channels.
 - b. Material: Gray iron.
 3. Covers: Solid gray iron if indicated.
 4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- E. Wide-Width, Level-Invert, Polymer-Concrete Systems:
1. Channel Sections:
 - a. Interlocking-joint, precast, modular units with end caps.
 - b. 8-inch inside width and 13-3/4-inch-deep, rounded bottom, with level invert and with outlets in quantities, sizes, and locations indicated.
 2. Grates:
 - a. Slots or other openings that fit recesses in channels.
 - b. Material: Gray iron.
 3. Covers: Solid gray iron if indicated.
 4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.

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F. Drainage Specialties: Precast, polymer-concrete units.

1. Large Catch Basins:

- a. 24-by-12-inch polymer-concrete body, with outlets in quantities and sizes indicated.
- b. Gray-iron slotted grate.
- c. Frame: Include gray-iron or steel frame for grate.

2. Small Catch Basins:

- a. 19- to 24-inch by approximately 6-inch polymer-concrete body, with outlets in quantities and sizes indicated.
- b. Gray-iron slotted grate.
- c. Frame: Include gray-iron or steel frame for grate.

3. Oil Interceptors:

- a. Polymer-concrete body with interior baffle and four steel support channels and two 1/4-inch-thick, steel-plate covers.
- b. Steel-plate covers.
- c. Capacity: As indicated on drawings.
- d. Inlet and Outlet: As indicated on drawings.

4. Sediment Interceptors:

- a. 27-inch-square, polymer-concrete body, with outlets in quantities and sizes indicated.
- b. 24-inch-square, gray-iron frame and slotted grate.

G. Supports, Anchors, and Setting Devices: Manufacturer's standard unless otherwise indicated.

H. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.

2.7 PLASTIC, CHANNEL DRAINAGE SYSTEMS

A. General Requirements for Plastic, Channel Drainage Systems:

1. Modular system of plastic channel sections, grates, and appurtenances.
2. Designed so grates fit into frames without rocking or rattling.
3. Number of units required to form total lengths indicated.

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

1. ACO USA.
2. NDS Inc.

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3. Zurn Industries, LLC.
4. Or Equal.

C. Fiberglass Systems:

1. Channel Sections:
 - a. Interlocking-joint, fiberglass modular units, with built-in invert slope of approximately 1 percent and with end caps.
 - b. Rounded or inclined inside bottom surface, with outlets in quantities, sizes, and locations indicated.
 - c. Width: 6 or 8 inches.
2. Factory- or field-attached frames that fit channel sections and grates.
 - a. Material: Manufacturer's standard metal.
3. Grates with slots or perforations that fit frames.
 - a. Material: Gray iron.
4. Covers: Solid gray iron if indicated.
5. Drainage Specialties:
 - a. Large Catch Basins: 24-inch-square plastic body, with outlets in quantities and sizes indicated. Include gray-iron frame and slotted grate.
 - b. Small Catch Basins: 12-by-24-inch plastic body, with outlets in quantities and sizes indicated. Include gray-iron frame and slotted grate.

D. PE Systems:

1. Channel Sections: Interlocking-joint, PE modular units, 4 inches wide, with end caps. Include rounded bottom, with level invert and with outlets in quantities, sizes, and locations indicated.
2. Grates: PE, ladder shaped; with stainless-steel screws.
3. Color: Gray unless otherwise indicated.
4. Drainage Specialties: Include the following PE components:
 - a. Drains: 4-inch-diameter, round, slotted top; with NPS 4 bottom outlet.
 - b. Drains: 8-inch-diameter, round, slotted top; with NPS 6 bottom outlet.
 - c. Drains: 4-inch-square, slotted top; with NPS 3 bottom outlet.
 - d. Drains: 8-inch-square, slotted top; with NPS 6 bottom outlet.
 - e. Catch Basins: 12-inch-square plastic body, with outlets in quantities and sizes indicated. Include PE slotted grate 11-3/4 inches square by 1-1/8 inches thick.

- E. Supports, Anchors, and Setting Devices: Manufacturer's standard unless otherwise indicated.

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- F. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.

2.8 CATCH BASINS

- A. Standard Precast Concrete Catch Basins:
 - 1. Materials and dimensions per City of San Diego standards.
 - 2. Type of catch basin and additional dimensions as indicated on Drawings.

2.9 STORMWATER INLETS

- A. Curb Inlets: Made with vertical curb opening, of materials and dimensions according to City of San Diego standards.
- B. Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions according to City of San Diego standards. Include heavy-duty frames and grates.
- C. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to City of San Diego standards. Include heavy-duty frames and grates.
- D. Frames and Grates: Heavy duty, according to City of San Diego standards.

2.10 PIPE OUTLETS

- A. Riprap Basins: Broken, irregularly sized and shaped, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."
 - 1. Average Size: As indicated on drawings.
- B. Filter Stone: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size graded stone.

2.11 STORMWATER DISPOSAL SYSTEMS

- A. Chamber Systems:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advanced Drainage Systems, Inc.
 - b. CULTEC, Inc.
 - c. Hancor Inc.
 - d. Or Equal.

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2. Storage and Leaching Chambers: Molded PE with perforated sides and open bottom. Include number of chambers, distribution piping, end plates, and other standard components as required for system total capacity.
 3. Filtering Material: ASTM D 448, Size No. 24, 3/4- to 2-1/2-inch washed, crushed stone or gravel unless shown otherwise.
 4. Filter Mat: Geotextile woven or spun filter fabric, in one or more layers, for minimum total unit weight of 4 oz./sq. yd..
- B. Pipe Systems: Perforated manifold, header, and lateral piping complying with AASHTO M 252M for NPS 10 and smaller, AASHTO M 294M for NPS 12 to NPS 60. Include proprietary fittings, couplings, seals, and filter fabric.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advanced Drainage Systems, Inc.
 - b. Hancor Inc.
 - c. Or Equal.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install cleanouts for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing drain is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
 1. Install piping pitched down in direction of flow.
 2. Install piping with 36-inch minimum cover unless drawings indicate otherwise.

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3. Install PVC drain piping according to ASTM D 2321 and ASTM F 1668.

G. Install force-main pressure piping according to the following:

1. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
2. Install piping with 36-inch minimum cover unless drawings indicate otherwise.
3. Install PVC pressure piping according to AWWA M23, or ASTM D 2774 and ASTM F 1668.

H. Install corrosion-protection as indicated on drawings.

3.2 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join hub-and-spigot, cast-iron soil piping with gasketed joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
2. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
3. Join corrugated steel drain piping according to ASTM A 798/A 798M.
4. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
5. Join PVC profile gravity drain piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
6. Join concrete drain piping according to ASTM C 14 and ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
7. Join dissimilar pipe materials with nonpressure-type flexible couplings.

B. Join force-main pressure piping according to the following:

1. Join PVC pressure piping according to ASTM D 2855 for solvent-cemented joints.
2. Join dissimilar pipe materials with pressure-type couplings.

3.3 CLEANOUT INSTALLATION

A. Concrete Cleanouts: Construct concrete cleanouts according to City of San Diego standards. Set cleanout frames and covers flush with finished surface.

B. Plastic Cleanouts: Use cast-iron soil pipe fittings in drain pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in drain pipe.

1. Install cleanouts and riser extensions from drain pipes to cleanouts at grade.
2. Use commercially manufactured 45 degree wye and 45 degree bend fittings in storm drain pipes and risers for cleanouts.
3. Install piping so cleanouts open in direction of flow in storm drain pipe.

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4. Unpaved Areas: Set cleanout tops 1-inch above surrounding earth grade.
5. Paved Areas (Walkways, Roadways, etc.): Set cleanout tops flush with pavement surface.

3.4 DRAIN INSTALLATION

- A. Install type of drains in locations indicated.
 1. Use Light-Duty, top-loading classification drains in earth or unpaved foot-traffic areas.
 2. Use Medium-Duty, top-loading classification drains in paved foot-traffic areas.
 3. Use Heavy-Duty, top-loading classification drains in vehicle-traffic service and parking areas.
 4. Use Extra-Heavy-Duty, top-loading classification drains in roads.
- B. Embed drains in 4-inch minimum concrete around bottom and sides.
- C. Fasten grates to drains if indicated.
- D. Set drain frames and covers with tops flush with pavement surface.
- E. Assemble trench sections with flanged joints.
- F. Embed trench sections in 4-inch minimum concrete around bottom and sides.

3.5 CATCH BASIN INSTALLATION

- A. Construct in accordance with City of San Diego standards.
- B. Construct to sizes and shapes indicated on Drawings
- C. Set frames and grates to elevations indicated.

3.6 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct riprap of broken stone, as indicated.
- C. Install outlets that spill onto grade, anchored with concrete, where indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- E. Construct energy dissipaters at outlets, as indicated.

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3.7 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.8 CHANNEL DRAINAGE SYSTEM INSTALLATION

- A. Install with top surfaces of components, except piping, flush with finished surface.
- B. Assemble channel sections to form slope down toward drain outlets. Use sealants, adhesives, fasteners, and other materials recommended by system manufacturer.
- C. Embed channel sections and drainage specialties in 4-inch minimum concrete around bottom and sides.
- D. Fasten grates to channel sections if indicated.
- E. Assemble channel sections with flanged or interlocking joints.
- F. Embed channel sections in 4-inch minimum concrete around bottom and sides.

3.9 STORMWATER DISPOSAL SYSTEM INSTALLATION

- A. Chamber Systems: Excavate trenches of width and depth, and install system and backfill according to chamber manufacturer's written instructions. Include storage and leaching chambers, filtering material, and filter mat.
- B. Piping Systems: Excavate trenches of width and depth, and install piping system, filter fabric, and backfill, according to piping manufacturer's written instructions.

3.10 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains.
- B. Connect force-main piping to building's storm drainage force mains.
- C. Make connections to existing piping and underground manholes or cleanouts.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes, cleanouts, and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed

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around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, cleanout, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

- a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
 4. Protect existing piping, manholes, cleanouts, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- D. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure drain piping unless otherwise indicated.
 - a. Shielded flexible couplings for same or minor difference OD pipes.
 - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
 - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
 2. Use pressure-type pipe couplings for force-main joints.

3.11 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 1. Close open ends of piping with at least 8-inch-thick, brick masonry bulkheads.
 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes, Cleanouts, and Structures: Excavate around manholes, cleanouts, and structures as required and use one procedure below:
 1. Remove manhole, cleanout, or structure and close open ends of remaining piping.

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2. Remove top of manhole, cleanout, or structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.

C. Backfill to grade.

3.12 IDENTIFICATION

A. Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.13 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

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- a. Exception: Piping with soil-tight joints unless required by authorities having jurisdiction.
 - b. Option: Test plastic piping according to ASTM F 1417.
 - c. Option: Test concrete piping according to ASTM C 924.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.14 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION 33 42 00

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SECTION 33 46 00

SUBDRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Perforated-wall pipe and fittings.
 - 2. Drainage panels.
 - 3. Geotextile filter fabrics.

1.3 ACTION SUBMITTALS

- A. Product Data:
 - 1. Drainage conduits, including rated capacities.
 - 2. Drainage panels, including rated capacities.
 - 3. Geotextile filter fabrics.

1.4 COORDINATION

- A. Coordinate foundation drainage system installation with excavating, trenching, and backfilling.
- B. Coordinate drainage panel installation with waterproofing of walls below grade.
- C. Coordinate piping termination with storm drainage system.

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

- A. General: Include pipes, fittings, couplings, and joint materials.
- B. Perforated PVC Sewer Pipe and Fittings: ASTM D 2729, bell-and-spigot ends, for loose joints.

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2.2 MOLDED-SHEET DRAINAGE PANELS

- A. Description: Prefabricated composite drainage panels, made with drainage core and faced with filter fabric, for use as part of foundation drainage system.
1. : Subject to compliance with requirements, provide products by the following:
 - a. Carlisle Coatings & Waterproofing, Inc..
 - b. Grace Construction Products; W.R. Grace & Co.
 - c. Polyguard Products, Inc.
 - d. Or Equal.
 2. Drainage Core: Three-dimensional, non-biodegradable, molded-plastic-sheet material designed to effectively conduct water to foundation drainage system under maximum soil pressures.
 - a. Flow Rate: 9 to 15 gpm/ft. at hydraulic gradient of 1.0 and 3600 psf normal pressure when tested according to ASTM D 4716.
 - b. Minimum Compressive Strength: 18,000 lbf/sq.ft.
 3. Filter Fabric: Nonwoven needle-punched geotextile, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with the following properties determined according to AASHTO M 288:
 - a. Survivability: Class 2.
 - b. Apparent Opening Size: No. 60 sieve, maximum.
 - c. Permittivity: 0.2 per second, minimum.

2.3 SOIL MATERIALS

- A. Soil materials are specified in Section 31 20 00 "Earth Moving."

2.4 WATERPROOFING FELTS

- A. Material: Comply with ASTM D 226, Type I, asphalt-saturated organic felt.

2.5 GEOTEXTILE FILTER FABRICS

- A. Description: Fabric of polypropylene (PP) or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D 4491.
- B. Structure Type: Nonwoven, needle-punched continuous filament.
1. Survivability: AASHTO M 288 Class 2.
 2. Styles: Flat and sock.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
- B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.
- C. Verify that drainage panels installed as part of foundation wall waterproofing is properly positioned to drain into subdrainage system.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving."

3.3 FOUNDATION DRAINAGE INSTALLATION

- A. Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches deep and 12 inches wide.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
- D. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.
- E. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
- F. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.
- G. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.
- H. Place layer of geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.
- I. Install drainage panels on foundation walls as follows:
 - 1. Coordinate placement with other drainage materials.

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2. Comply with manufacturer's written instructions for securing drainage panels to substrate. Use adhesives and mechanical fasteners recommended by manufacturer. Lap edges of fabric and extend fabric around foundation drainage pipe according to manufacturer's recommendations. Do not penetrate waterproofing. Protect installed panels during backfilling
 3. Lay perforated drainage pipe at base of footing. Install as indicated in Part 3 "Piping Installation" Article.
 4. Separate 4 inches of fabric at beginning of roll and cut away 4 inches of core. Wrap fabric around end of remaining core.
 5. Attach panels to wall beginning at subdrainage pipe. Place and secure molded-sheet drainage panels, with geotextile facing away from wall.
- J. Place backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

3.4 UNDERSLAB DRAINAGE INSTALLATION

- A. Excavate for underslab drainage system after subgrade material has been compacted but before drainage course has been placed. Include horizontal distance of at least 6 inches between drainage pipe and trench walls. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
- D. Install drainage piping as indicated in Part 3 "Piping Installation" Article for underslab subdrainage.
- E. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
- F. After satisfactory testing, cover drainage piping with drainage course to elevation of bottom of slab, and compact and wrap top of drainage course with flat-style geotextile filter fabric.
- G. Install horizontal drainage panels as follows:
 1. Coordinate placement with other drainage materials.
 2. Lay perforated drainage pipe at inside edge of footing.
 3. Place drainage panel over drainage pipe with core side up. Peel back fabric and wrap fabric around pipe. Locate top of core at bottom elevation of floor slab.
 4. Butt additional panels against other installed panels. If panels have plastic flanges, overlap installed panel with flange.

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3.5 RETAINING-WALL DRAINAGE INSTALLATION

- A. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- B. Place supporting layer of drainage course over compacted subgrade to compacted depth of not less than 4 inches.
- C. Install drainage piping as indicated in Part 3 "Piping Installation" Article for retaining-wall subdrainage.
- D. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
- E. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.
- F. Place drainage course in layers not exceeding 3 inches in loose depth; compact each layer placed and wrap top of drainage course with flat-style geotextile filter fabric.
- G. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.
- H. Install drainage panels on wall as follows:
 - 1. Coordinate placement with other drainage materials.
 - 2. Comply with manufacturer's written instructions for securing drainage panels to substrate. Use adhesives and mechanical fasteners recommended by manufacturer. Lap edges of fabric and extend fabric around foundation drainage pipe according to manufacturer's recommendations. Do not penetrate waterproofing. Protect installed panels during backfilling.
 - 3. Lay perforated drainage pipe at base of footing as described elsewhere in this Specification. Do not install aggregate.
 - 4. If weep holes are indicated instead of drainage pipe, cut 1/2-inch-diameter holes on core side at weep-hole locations. Do not cut fabric.
 - 5. Cut panel as necessary to keep top 12 inches below finish grade.
 - 6. For inside corners, bend panel. For outside corners, cut core to provide 3 inches for overlap.
- I. Fill to Grade: Place satisfactory soil fill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Fill to finish grade.

3.6 LANDSCAPING DRAINAGE INSTALLATION

- A. Provide trench width to allow installation of drainage conduit. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

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- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
- D. Install drainage conduits as indicated in Part 3 "Piping Installation" Article for landscaping subdrainage with horizontal distance of at least 6 inches between conduit and trench walls. Wrap drainage conduits without integral geotextile filter fabric with flat-style geotextile filter fabric before installation. Connect fabric sections with adhesive or tape.
- E. Add drainage course to top of drainage conduits.
- F. After satisfactory testing, cover drainage conduit to within 12 inches of finish grade.
- G. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.
- H. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.
- I. Fill to Grade: Place satisfactory soil fill material over drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Fill to finish grade.

3.7 PIPING INSTALLATION

- A. Drawings indicate general location and arrangement of foundation drainage system piping.
- B. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
 - 1. Foundation and Retaining Wall Subdrainage: Install piping pitched down, at a minimum of 1 percent unless otherwise indicated.
 - 2. Underslab Subdrainage: Install piping level.
 - 3. Plaza Deck Subdrainage: Install piping level.
 - 4. Landscaping Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent unless otherwise indicated.
 - 5. Lay perforated pipe with perforations down.
 - 6. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.
- C. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.
- D. Extend piping and connect to storm drainage system or daylight as indicated.

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3.8 PIPE JOINT CONSTRUCTION

- A. Join perforated PVC sewer pipe and fittings according to ASTM D 3212 with loose bell-and-spigot, push-on joints.
- B. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.9 CLEANOUT INSTALLATION

- A. Comply with requirements for cleanouts specified in Section 33 42 00 "Stormwater Conveyance."
- B. Cleanouts for Subdrainage:
 - 1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
 - 2. In vehicular-traffic areas, unless indicated otherwise, use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 18-by-18-by-12 inches deep. Set top of cleanout flush with grade.
 - 3. In nonvehicular-traffic areas, use NPS 4 PVC pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12-by-12-by-4 inches deep. Set top of cleanout 1 inch above grade.
 - 4. Comply with requirements for concrete specified in Section 03 30 00 "Cast-in-Place Concrete."
- C. Cleanouts for Underslab Subdrainage:
 - 1. Install cleanouts and riser extensions from piping to top of slab. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
 - 2. Use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of slab.

3.10 CONNECTIONS

- A. Comply with requirements for piping specified in Section 33 42 00 "Stormwater Conveyance." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Unless otherwise indicated, connect low elevations of subdrainage system to building's solid-wall-piping storm drainage system.

SPECIFICATIONS

3.11 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

B. Drain piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.12 CLEANING

- #### **A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.**

END OF SECTION 33 46 00