NOTICE TO BIDDERS

CITY OF WESTLAKE VILLAGE

BID SOLICITATION PACKAGE

FOR

CITY HALL BOOK NOOK EXPANSION

Pre-Bid Meeting– October 28, 2019 at 2:00 pm
Bid Opening – November 4, 2019 at 10:00 am

All Questions due by October 30, 2019

Final Addendum issued October 31, 2019

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TABLE OF CONTENTS

Page

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NOTICE INVITING BIDS
FOR

CITY HALL BOOK NOOK EXPANSION
[the "Project"]

NOTICE IS HEREBY GIVEN that the City of Westlake Village ("City") invites sealed bids for the Project. The City will receive such bids at City Hall, 31200 Oak Crest Drive, Westlake Village, California 91361 up to **10:00 a.m.** on **November 4, 2019** at which time they will be publicly opened and read aloud.

All bids must be made on the form furnished by the City. Each bid must be submitted in a sealed envelope addressed to the City Clerk with the project name typed or clearly printed on the lower left corner. Bids must remain valid and shall not be subject to withdrawal for 5 days after the bid opening date.

For any questions regarding the Contract Documents, Specifications, proposal or other bidding documents, please contact Tucker Graczyk at tgraczyk@willdan.com. Only written or emailed questions will be accepted.

The Construction Contract period is Eighty-Four (85) working days from issuance of Notice to Proceed.

INCORPORATION OF STANDARD SPECIFICATIONS. The 2015 edition of "Standard Specifications for Public Works Construction" ("Standard Specifications") is incorporated into the Contract Documents by reference, as amended by the Contract Documents.

SCOPE OF WORK. The Project includes furnishing all necessary labor, materials, equipment and other incidental and appurtenant work necessary to construct building pad, additions to existing building, new free standing storage building, relocation of area drains, area drain pipe installation, and installation of electrical and mechanical facilities , as more specifically described in the Contract Documents. The work will be performed in strict conformance with the Contract Documents, permits from regulatory agencies with jurisdiction, and applicable regulations. The quantity of work to be performed and materials to be furnished are approximations only, being given as a basis for the comparison of bids. Actual quantities of work to be performed may vary at the discretion of the City Engineer.

OBTAINING BID DOCUMENTS. Potential bidders may obtain free copies of the bid solicitation package for the Project online by visiting http://www.wlv.org/bids.aspx. Potential Bidders may also obtain the bid solicitation package for the Project at City Hall for a non-refundable fee of $35 per set, or $50 per set if mailed. The City must receive payment before the bid solicitation package will be provided.

FACSIMILE NUMBER AND E-MAIL ADDRESS. Anyone obtaining the bid solicitation package shall supply the City Engineer with a facsimile number and e-mail address to facilitate transmission of addenda and other information related to this solicitation. Failure to provide such a facsimile number and e-mail address may result in late notification.

PRE-BID MEETING AND SITE VISIT. A pre-bid meeting will be held on October 28, 2019 at 2:00 p.m. at the City of Westlake Village, 31200 Oak Crest Drive, Westlake Village, CA 91361, followed by a project site visit. No allowances for cost adjustments will be made if a bidder fails to adequately examine the project site before submitting a bid.

REGISTRATION WITH THE DEPARTMENT OF INDUSTRIAL RELATIONS. In accordance with Labor Code Sections 1725.5 and 1771.1, no contractor or subcontractor shall be qualified to bid on, be listed in a bid proposal, subject to the requirements of Public Contract Code Section 4104, or engage in the performance of any contract for public work, unless currently registered and qualified to perform public work pursuant to Section 1725.5 [with limited exceptions for bid purposes only under Labor Code Section 1771.1(a)].

PREVAILING WAGES. In accordance with Labor Code Section 1770 et seq., the Project is a "public work." The selected bidder ("Contractor") and any subcontractors shall pay wages in accordance with the determination of the Director of the Department of Industrial Relations ("DIR") regarding the prevailing rate of per diem wages. Copies of those rates are on file with the City Engineer, and are available to any interested party upon request. The Contractor shall post a copy of the DIR's determination of the prevailing rate of per diem wages at each job site. The Project is subject to compliance monitoring and enforcement by the DIR.

BONDS. Each bid must be accompanied by a cash deposit, cashier's check, certified check or bidder's bond issued by a surety insurer, each of which must be made payable to the City and in an amount not less than 10% of the total bid submitted. Personal or company checks are not acceptable. Upon contract award, the Contractor shall provide faithful performance and payment bonds, each in a sum equal to the contract price. Before acceptance of the Project, the Contractor shall submit a warranty/maintenance bond that is valid for 1 year from acceptance, in the amount of 10% of the contract price. In lieu of the warranty/maintenance bond, the Contractor may submit proof from the surety that the performance bond has been extended for the appropriate duration of time. All bonds must be issued by a California admitted surety insurer using the forms set forth in the Contract Documents, or in any other form approved by the City Attorney. Failure to enter into a valid contract, including the submission of all required bonds and insurance coverages, with the City within 15 days after the date of delivery of the Contract Documents to the Contractor, shall subject the bid security to forfeiture to the extent provided by law.

LICENSES. At the time of bid submission, each Bidder shall possess a valid Class A "General Engineering" contractor's license issued by the California State Contractors License Board.

RETENTION SUBSTITUTION. Five percent of any progress payment will be withheld as retention. In accordance with Public Contract Code Section 22300, and at the request and expense of the Contractor, securities equivalent to the amount withheld may be deposited with the City or with a state or federally chartered bank as escrow agent, which shall then pay such moneys to the Contractor. Upon satisfactory completion of the Project, the securities shall be returned to the Contractor. Alternatively, the Contractor may request that the City make payments of earned retentions directly to an escrow agent at the Contractor's expense. No such substitutions shall be accepted until all related documents are approved by the City Attorney.

TRADE NAMES OR EQUALS. Requests to substitute an equivalent item for a brand or trade name item must be made by written request submitted no later than 35 days after the contract award. Requests received after this time shall not be considered. Requests shall clearly describe the product for which approval is requested, including all data necessary to demonstrate acceptability.

CONTRACT DURATION AND LIQUIDATED DAMAGES. All work shall be completed within 84 working days following the date specified in the written Notice to Proceed from the City. There will be a $1500/day liquidated damages assessment for each calendar day that work remains incomplete beyond the project completion deadline specified in the Contract Documents. There are regular public events at the Civic Center, contractor shall continuously maintain the site in a condition that is safe for pedestrians using the adjacent areas, secure, clean, and free of graffiti.

Failure to maintain the site within 24 hours of notice, shall be assessed liquidated damages in the amount of time and materials required for the City to bring the site to adequate levels of safety, security, or cleanliness as well as the City Engineer's hourly rate ($177/hr) for the number of hours required to contract the improvements and inspect the site.

BIDDING PROCESS. The City reserves the right to reject any or all bids, and to waive any irregularities or informalities in any bid or in the bidding, as deemed to be in its best interest.

By: _____ 10/23/19
Jessica Arden, City Engineer Date

INSTRUCTIONS TO BIDDERS

FORM OF BID. Bids shall be made on the bid forms found herein. Bidders shall include all forms and shall fill in all blank spaces, including inserting "N/A" (for not applicable) where necessary. The bid shall be enclosed in a sealed envelope bearing the bidder's name and the project name as described in the Notice Inviting Bids.

For additional information, please contact Tucker Graczyk at Tgraczyk@willdan.com. Only written or emailed questions will be accepted.

DELIVERY OF BIDS. The bid shall be delivered by the time and to the place specified in the Notice Inviting Bids. No oral, faxed, e-mailed, or telephonic bids or alternatives will be considered. The time of delivery shall be conclusively determined by the time-stamping clock located at City Hall. Bidders are solely responsible for ensuring that their bid is received in proper time, and bidders assume all risks arising out of their chosen means of delivery. Any bid received after the bid submission deadline shall be returned unopened. Bidders are invited to be present for bid opening. Accepted bids shall become City property.

AMENDED BIDS. Unauthorized conditions, limitations or provisos attached to a bid may cause the bid to be deemed incomplete and non-responsive.

WITHDRAWAL OF BID. A bid may be withdrawn without prejudice upon written request by the bidder filed with the City Clerk before the bid submission deadline. Bids must remain valid and shall not be subject to withdrawal for 5 days after the bid opening date.

BIDDER'S SECURITY. Each bid shall be accompanied by cash, a certified or cashier's check payable to the City, or a satisfactory bid bond in favor of the City executed by the bidder as principal and an admitted surety insurer as surety, in an amount not less than 10% of the amount set forth in the bid. The cash, check or bid bond shall be given as a guarantee that, if selected, the bidder will execute the contract in conformity with the Contract Documents, and will provide the evidence of insurance and furnish the specified bonds, within 15 days after the date of delivery of the Contract Documents. In case of the bidder's refusal or failure to do so, the City may award the contract to the next lowest responsive and responsible bidder, and the cash, check, or bond (as applicable) shall be forfeited to the City to the extent permitted by law. No bid bond will be accepted unless it conforms substantially to the form provided in this bid solicitation package.

QUANTITIES APPROXIMATE. Any quantities shown in the bid form or elsewhere herein shall be considered as approximations listed to serve as a general indication of the amount of work or materials to be performed or furnished, and as basis for the bid comparison. The City does not guarantee that the actual amounts required will correspond with those shown. As deemed necessary or convenient, the City may increase or decrease the amount of any item or portion of work or material to be performed or furnished or omit any such item or portion, in accordance with the Contract Documents.

ADDENDA. The City Engineer may, from time to time, issue addenda to this bid solicitation. Bidders are responsible for ensuring that they have received any and all addenda. Each bidder is responsible for verifying that it has received all addenda issued, if any. Bidders must acknowledge in their bid receipt of all addenda, if any. Failure to acknowledge receipt of all addenda may cause a bid to be deemed incomplete and non-responsive.

DISCREPANCIES IN BIDS. Each bidder shall set forth as to each item of work, in clearly legible words and figures, a unit or line item bid amount for the item in the respective spaces provided for this purpose.

In case of discrepancy between the unit price and the extended amount set forth for the item, the unit price shall prevail. However, if the amount set forth as a unit price is ambiguous, unintelligible or uncertain for any cause, or is omitted, or if the unit price is the same amount as the entry in the "extended amount" column, then the amount set forth in the "extended amount" column for the item shall prevail in accordance with the following:

(1) As to lump sum items, the amount set forth in the "extended amount" column shall be the unit price.

(2) As to unit price items, the amount set forth in the "extended amount" column shall be divided by the estimated quantity for the item set forth in the bid documents, and the price thus obtained shall be the unit price.

In case of discrepancy between words and figures, the words shall prevail.

COMPETENCY OF BIDDERS. In evaluating bidder responsibility, consideration will be given not only to the financial standing, but also to the general competency of the bidder for the performance of the Project. Each bidder shall set forth in the designated area of the bid form a statement of its experience. No contract will be executed with a bidder that is not licensed and registered with the DIR in accordance with state law, and with any applicable specific licensing requirements specified in this bid solicitation package. The licensing and registration requirements for contractors shall also apply to all subcontractors.

BIDDER'S EXAMINATION OF SITE AND CONTRACT DOCUMENTS. Each bidder must carefully examine the project site and the entirety of the Contract Documents. Upon submission of a bid, it will be conclusively presumed that the bidder has thoroughly investigated the work and is satisfied as to the conditions to be encountered and the character, quality, and quantities of work to be performed and materials to be furnished. Upon bid submission, it also shall be conclusively presumed that the bidder is familiar with and agrees to the requirements of the Contract Documents, including all addenda. No information derived from an inspection of records or investigation will in any way relieve the Contractor from its obligations under the Contract Documents nor entitle the Contractor to any additional compensation. The Contractor shall not make any claim against the City based upon ignorance or misunderstanding of any condition of the project site or of the requirements set forth in the Contract Documents. No claim for additional compensation will be allowed which is based on a lack of knowledge of the above items. Bidders assume all risks in connection with performance of the work in accordance with the Contract Documents, regardless of actual conditions encountered, and waive and release the City with respect to any and all claims and liabilities in connection therewith, to the extent permitted by law.

DISQUALIFICATION OF BIDDERS. No person shall be allowed to make, file or be interested in more than one bid for the Project, unless alternate bids are specifically called for. A person that has submitted a sub-bid to a bidder, or that has quoted prices of materials to a bidder, is not thereby disqualified from submitting a sub-bid or quoting prices to other bidders or from making a prime bid. If there is a reason to believe that collusion exists among the bidders, all affected bids will be rejected.

RETURN OF BID SECURITY. The successful bidder's bid security shall be held until the contract is executed. Bid security shall be returned to the unsuccessful bidders within a reasonable time, which in any case shall not exceed 60 days after the successful bidder has signed the contract.

AWARD OF CONTRACT. The City reserves the right to reject any or all bids or any parts thereof or to waive any irregularities or informalities in any bid or in the bidding. The contract award, if made, will be to the lowest responsive and responsible bidder, and is anticipated to occur within

60 days after the bid opening. The contract award may be made after that period if the selected bidder has not given the City written notice of the withdrawal of its bid.

LISTING SUBCONTRACTORS. Each bidder shall submit a list of the proposed subcontractors on the Project, as required by the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100 et seq.). The Contractor shall self-perform not less than 50 % of the work, as determined by the percentage of work to be performed by listed subcontractors.

EXECUTION OF CONTRACT. The selected bidder shall execute the contract in the form included in this bid solicitation package within 15 days from the date of delivery of the Contract Documents. Additionally, the selected bidder shall also secure all insurance and bonds as herein specified, and provide copies to the City, within 15 days from the date of delivery of the Contract Documents. Failure or refusal to execute the contract or to conform to any of the stipulated requirements shall be just cause for the annulment of the award and forfeiture of the bidder's security. In such event, the City may declare the bidder's security forfeited to the extent permitted by law, and the City may award the contract to the next lowest responsive and responsible bidder or may reject all bids.

SIGNATURES. The bidder shall execute all documents requiring signatures, and shall cause to be notarized all documents that indicate such a requirement. The bidder shall provide evidence satisfactory to the City, such as an authenticated resolution of its board of directors or a power of attorney, indicating the capacity of the person(s) signing the bid to bind the bidder to the bid and any contract arising therefrom.

INSURANCE AND BONDS. The Contractor shall not begin work until it has given the City evidence of all required insurance coverage (including all additional insured endorsements), a bond guaranteeing the Contractor's faithful performance of the contract, and a bond securing the payment of claims for labor and materials.

TELEPHONES. The City will not provide telephones for bidders' use at the time of bid submission.

INTERPRETATION OF CONTRACT DOCUMENTS. Any bidder that is in doubt as to the intended meaning of any part of this bid solicitation package, or that finds discrepancies in or omissions from this bid solicitation package, may submit to the City Engineer a written request for an interpretation or correction not later than 10 days before the bid submission deadline. Requests for clarification received after this date will be disregarded. Telephonic requests will not be taken. Any interpretation or correction of this bid solicitation package will be made only by a written addendum. No oral interpretation of any provision in this bid solicitation package shall be binding.

TAXES. Except as may be otherwise specifically provided herein, all sales and/or use taxes assessed by federal, state or local authorities on materials used or furnished by the Contractor in performing the work shall be paid by the Contractor. Bidders shall calculate payment for all sales, unemployment, pension and other taxes imposed by federal, state, and local law and shall include these payments in their bid.

CHECKLIST FOR BIDDERS

The following information is required of all bidders at the time of bid submission:

_____ Completed and Signed Bid Cover Form

_____ Completed and Signed Bid Sheets

_____ Completed, Signed and Notarized Questionnaire Form

_____ Completed References Form

_____ Resume of General Construction Superintendent/On-Site Construction Manager

_____ Completed Subcontractor Designation Form

_____ Completed and Signed Industrial Safety Record Form

_____ Completed, Signed and Notarized Bid Bond or Other Security Form

_____ Signed and Notarized Noncollusion Declaration Form

_____ Completed and Signed Addenda Acknowledgement Form

_____ Evidence satisfactory to the City indicating the capacity of the person(s) signing the bid to bind the bidder

Failure of the bidder to provide all required information in a complete and accurate manner may cause the bid to be considered non-responsive.

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BID COVER FORM

CITY OF WESTLAKE VILLAGE

CITY HALL BOOK NOOK EXPANSION
[PROJECT]

TO THE HONORABLE MAYOR AND CITY COUNCIL OF THE CITY OF WESTLAKE VILLAGE:

The undersigned, as bidder, declares that: (1) this bid is made without collusion with any other person and that the only persons or parties interested as principals are those named herein; (2) the undersigned has carefully examined the bid solicitation package (including all addenda), the Contract Documents, and the project site; and (3) the undersigned has investigated and is satisfied as to the conditions to be encountered, the character, quality and quantities of work to be performed, and the materials to be furnished. Furthermore, the undersigned agrees that submission of this bid shall be conclusive evidence that such examination and investigation have been made and agrees, in the event the contract be awarded to it, to execute the contract with the City of Westlake Village to perform the Project in accordance with the Contract Documents in the time and manner therein prescribed, and to furnish or provide all materials, labor, tools, equipment, apparatus and other means necessary so to do, except as may otherwise be furnished or provided under the terms of the Contract Documents, for the following stated unit prices or lump-sum price as submitted on the bid herein.

The undersigned submits as part of this bid a completed copy of its Industrial Safety Record. This Safety Record includes all construction work undertaken in California by the undersigned and any partnership, joint venture or corporation that any principal of the undersigned participated in as a principal or owner for the current calendar year and the last five calendar years before the date of bid submittal. Separate information is being submitted for each such partnership, joint venture, or corporate or individual bidder. The undersigned may attach any additional information or explanation of data that it would like to be taken into consideration in evaluating the Safety Record. An explanation of the circumstances surrounding any and all fatalities is attached.

Accompanying this bid is cash, a cashier's check, a certified check or a bid bond in an amount equal to at least 10% of the total aggregate bid price based on the quantities shown and the unit prices quoted. The undersigned further agrees that, should it be awarded the contract and thereafter fail or refuse to execute the contract and provide the required evidence of insurance and bonds within 15 days after delivery of the Contract Documents to the undersigned, then the cash, check or bid bond shall be forfeited to the City to the extent permitted by law.

The undersigned certifies to have a minimum of three consecutive years of current experience in the type of work related to the Project and that this experience is in actual operation of the firm with permanent employees performing a part of the work as distinct from a firm operating entirely by subcontracting all phases of the work. The undersigned also certifies to be properly licensed by the State as a contractor to perform this type of work.

BIDDER SHALL COMPLETE:

Bidder's Name _____
Street Address _____
City _____ State _____ Zip Code _____
Telephone Number_____ Fax Number _____
Email Address_____
State Contractor's License No. _____
Class _____, which expires on _____.

CITY OF WESTLAKE VILLAGE

BID SHEETS FOR

CITY HALL BOOK NOOK EXPANSION
[PROJECT]

Bidder's Name: _____

To the Honorable Mayor and Members of the City Council:

In compliance with the Notice Inviting Bids, the undersigned hereby agrees to execute the construction agreement to furnish all labor, materials, equipment and supplies for the Project in accordance with the Contract Documents to the satisfaction and under the direction of the City Engineer, at the following prices:

BASE AMOUNT:

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICES	EXTENDED AMOUNT
1.	Mobilization (10% maximum of Total Bid Price)	LS	1	$	$
2.	Demolition	LS	1	$	$
3.	Earthwork	LS	1	$	$
4.	Attached Book Nook Building	LS	1	$	$
5.	Electrical	LS	1	$	$
6.	Concrete sidewalk	SF	777	$	$
7.	Mechanical	LS	1	$	$
8.	Fire sprinkler system	LS	1	$	$
	TOTAL BASE AMOUNT				$_____

BID ALTERNATIVE ITEMS:

ITEM	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICES	EXTENDED AMOUNT
1.	Detached storage buildings	LS	1		
	TOTAL BID ALTERNATIVE ITEMS:				$_____

Note: Items may be adjusted or deleted. Any changes to the quantities for these items shall not constitute a substantial change as referenced in Section 3-2.2.1 of the Standard Specifications. Therefore, regardless of total actual volume (percentage) compared to estimated quantities, the unit prices provided above by the bidder shall be applied to the final quantity when payment is calculated for these items. No adjustment in the unit prices will be allowed. The City reserves the right to not use any of the estimated quantities; and if this right is exercised, the Contractor will not be entitled to any additional compensation. Cost of all export of material shall be included in the above unit costs; no additional compensation will be granted for such expenses.

TOTAL BID PRICE = BASE AMOUNT + BID ALTERNATIVE

TOTAL BID PRICE IN DIGITS: $_____

TOTAL BID PRICE IN WORDS: _____

Signature: _____ Title: _____ Date: _____

Signature: _____ Title: _____ Date: _____

TOTAL AMOUNT BID ABOVE IS SUBJECT TO THE FOLLOWING:

1. The award of contract, if made, will be to the lowest responsive and responsible bidder based on the lowest Total Amount Bid which shall be either the lowest Base Bid or the Base Bid and Bid Alternate.

2. The Total Amount Bid shall include all work shown on the plans and requirements contained in the specifications.

3. **Contractor's shall understand that the Job Walk is highly recommended. Qualified personnel from the Contractor's staff shall attend job walk. Qualified staff include:**

Owner, Project Supervisor, Project Manager, Head Estimator.

4. All property, private or public, shall be protected in place. If any property is damaged due to the work of the contractor, the contractor shall replace all property to the condition it was in prior to the start of work or better.

5. Contractor will notify all property owners whose property is adjacent to the construction activities 48 hours in advance of the work starting date.

6. Contractor is expected to independently determine all work to be done and to verify any quantities stated herein and to submit a bid based on Contractor's own independent calculation and review of the contract plans. The City shall not be responsible for nor will it agree to any increase or additional sums for any miscalculation in the quantity of materials by the contractor required to complete all aspects of the construction called for in the plans and specifications.

7. The City retains the sole discretion on choice of which bid items(s) from both Base Bid and Bid Alternate Bid Items to construct. The City makes no guarantee or assurances as to the amount of work this contract will entail.

8. Note: all unit costs/lump sums shall include prevailing wage rates.

9. Contractor shall be required prior to release of retention to provide
    a. final releases from all vendors, suppliers and subcontractors
    b. certified payroll records for all prime and subcontractor employees

MEASUREMENT AND PAYMENT
FOR
CITY HALL BOOK NOOK EXPANSION BASE BID

BID ITEM NO 1: Mobilization shall consist of preparatory work and operations, including, but not limited to: insurance, bonds, required permits and fees, traffic control plans, shop drawings, submittals, the movement of personnel, equipment, supplies, and incidentals to the project site (mobilization), as-built plans, coordination with other contractors, meetings, project management, miscellaneous demolition, any and all clearing and grubbing necessary, moving off the project, clean up, and compliance with all general conditions applicable to the scope of work. Mobilization shall additionally include the establishment of any temporary facilities, the submittal of a detailed construction schedule and the water pollution control program (WPCP). **Measurement and Payment for Mobilization** shall be at the lump sum price bid and shall include, but not be limited to, full compensation for furnishing all labor, materials, equipment, permits, traffic control plans, access and restoration to the site, and incidentals required to complete mobilization in accordance with the Contract Documents, and no additional compensation will be allowed therefor.

Up to fifty (50) percent of the mobilization cost shall be paid to the Contractor as part of the first progress payment. The remainder of the mobilization cost shall be paid in even increments over the remaining construction period, incremental payment amounts will be recalculated based on any contract delays.

The total amount of mobilization shall not exceed 10% of the original Contract Price.

BID ITEM NO 2: Demolition shall be at the lump sum price and shall include, but not limited to, full compensation for furnishing all labor, materials, tools, equipment, and incidentals required to complete the Demolition, Site Clearing and Grubbing of the site under the direction of the City Engineer or her designee of all plant materials and incidentals for preparation of earthwork as shown on the plans, including sawcutting, removal, hauling, and proper disposal of hardscape and unwanted materials at an off-site approved landfill.

BID ITEM NO 3: Earthwork shall be at the lump sum price and shall include, but not limited to, full compensation for furnishing all labor, materials, tools, equipment, and incidentals required to complete all grading work, including fine and finish grading, and any associated hauling and disposal, as shown on the plans, as specified in these special provisions, and as directed by the City's Authorized representative and shall be in accordance with the Contract Documents, and no additional compensation will be allowed therefor.

BID ITEM NO 4: Attached Book Nook Building shall be at the lump sum bid price and shall include, but not limited to, full compensation for furnishing all labor, materials, tools, equipment, and incidentals required to construct the approximately 320 SFbuilding, with all items necessary to be complete in place, as shown on the plans, and as directed by the City's Authorized Representative and no additional compensation will be allowed therefor.

This item shall conform to the plans, and specification sections such as:

1. Section 027510 – Cement Concrete Pavement

2. Section 027640 – Pavement Joint Sealants
3. Section 032000 – Concrete Reinforcing
4. Section 033000 – Cast-In-Place Concrete
5. Section 051200 – Structural Steel Framing
6. Section 061000 – Rough Carpentry
7. Section 061600 - Sheathing

BID ITEM NO 5: Electrical shall be at the lump sum price and shall include, but not limited to, full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in installing light assemblies, hangers and supports, conduit, sleeves, wires, junction boxes, switches and breakers, and electrical services, complete in place, as shown on the plans, and as directed by SCE and the City's Authorized Representative and no additional compensation will be allowed therefor. Contractor shall confirm that all lighting fixtures are consistent with existing fixtures used in the existing Book Nook, no alternatives will be approved. This item shall conform to the plans, and specification sections such as:

1. Section 260500 – Common Work Results for Electrical
2. Section 260510 – Existing Systems
3. Section 260519 – Low-Voltage Electrical Power Conductors and Cables
4. Section 260526 – Grounding and Bonding for Electrical Systems
5. Section 260529 – Hangers and Supports for Electrical Systems
6. Section 260533 – Raceways and Boxes for Electrical Systems
7. Section 260553 – Identification for Electrical Systems
8. Section 260923 – Lighting Control Devices
9. Section 262726 – Wiring Devices
10. Section 262816 – Enclosed Switches and Circuit Breakers
11. Section 265119 – LED Interior Lighting

BID ITEM NO 6: Concrete sidewalk shall be at the square foot price and shall include, but not limited to, full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing integrally colored concrete sidewalk, complete in place, as shown on the plans, color to match exiting concrete at the Civic Center, and as directed by the City's Authorized Representative and no additional compensation will be allowed therefor.

This item shall conform to the plans, and specification sections such as:

1. Section 027510 – Cement Concrete Pavement
2. Section 027640 – Pavement Joint Sealants
3. Section 032000 – Concrete Reinforcing
4. Section 033000 – Cast-In-Place Concrete

BID ITEM NO 7: Mechanical shall be at the lump sum price and shall include, but not limited to, full compensation for furnishing all labor, materials, tools, equipment, and incidentals required to complete the installation of the HVAC System, piping, air conditioners, heat pumps, and all other mechanical requirements, complete in place and operational, as shown on the

plans, and as directed by the City's Authorized Representative and no additional compensation will be allowed therefor. This item shall conform to the plans, and specification sections such as:

1. Section 230500 – Common Work for HVAC Systems
2. Section 232300 – Refrigerant Piping
3. Section 238126 – Split System Air Conditioner and Heat Pumps

BID ITEM NO 8: Fire sprinkler system shall be at the lump sum price and shall include, but not limited to, full compensation for furnishing all labor, materials, tools, equipment, and incidentals required to complete the installation of a fully rated fire suppression system, sprinklers, fire detectors, piping, alarms, and any LACFD requirements that matches the existing Book Nook fire suppression system, complete in place, as shown on the plans, and as directed by LACFD and the City's Authorized Representative and no additional compensation will be allowed therefor.

GENERAL DESCRIPTION OF BID ALTERNATES

ALT BID ITEM NO 1: Detached storage buildings shall be at the lump sum bid price and shall include, but not be limited to, full compensation for furnishing all labor, materials, tools, equipment, and incidentals required to construct the building, with all items necessary to be complete in place and operational, as shown on the plans, and as directed by the City's Authorized Representative and no additional compensation will be allowed therefor.

QUESTIONNAIRE FORM

Fill out all of the following information. Attach additional sheets if necessary.

(1) Bidder's Name: _____

(2) If the bidder's name is a fictitious name, who or what is the full name of the registered owner? If the bidder's name is not a fictitious name, write "N/A" in the response to this question. If you are doing business under a fictitious name, provide a copy of the filed valid Fictitious Business Name Statement.

_____

(3) Business Address: _____

(4) Telephone: _____ Facsimile: _____

(5) Type of bidder – Individual, Partnership, LLC or Corporation: _____

(6) Corporation organized under the laws of the State of: _____

(7) California State Contractor's License Number and Class: _____

Original Date Issued: _____ Expiration Date: _____

(8) DIR Contractor Registration Number: _____

(9) List the name and title of the person(s) who inspected the project site for your firm:

_____

(10) List the name and title of the person(s) who attended the mandatory pre-bid meeting for your firm, including the mandatory site visit (if any): _____

(11) Number of years experience the bidder has as a contractor in construction work: _____

(12) List the names, titles, addresses and telephone numbers of all individuals, firm members, partners, joint venturers, and company or corporate officers having a principal interest in this bid:

_____

_____

_____

(13) List all current and prior D.B.A.'s, aliases, and fictitious business names for any principal having interest in this bid:

_____

_____

_____

(14) List the dates of any voluntary or involuntary bankruptcy judgments against any principal

having an interest in this bid:

_____

_____

_____

(15) For all arbitrations, lawsuits, settlements and the like (in or out of court) that the bidder or any principal having an interest in this bid has been involved with in the past five years:

a. List the names, addresses and telephone numbers of contact persons for the parties:

_____

_____

_____

b. Briefly summarize the parties' claims and defenses:

_____

_____

_____

c. State the tribunal (e.g., Superior Court, American Arbitration Association, etc.), the matter number, and the outcome:

_____

_____

_____

(16) Has the bidder or any principal having an interest in this bid ever had a contract terminated by the owner or agency? If yes, explain.

_____

_____

_____

(17) Has the bidder or any principal having an interest in this bid ever failed to complete a project? If yes, explain.

_____

_____

_____

(18) Has the bidder or any principal having an interest in this bid ever been terminated for cause, even if it was converted to a "termination of convenience"? If yes, explain.

_____

_____

_____

(19) For projects that the bidder or any principal having an interest in this bid has been involved with in the last five years, did you have any claims or actions:

a. By you against the owner? Circle one: Yes No

b. By the owner against you? Circle one: Yes No

c. By any outside agency or individual for labor compliance? Circle one: Yes No

d. By subcontractors? Circle one: Yes No

e. Are any of these claims or actions unresolved or outstanding? Circle one: Yes No

If your answer is "yes" to any part or parts of this question, explain.

_____

_____

_____

(20) List the last three projects you have worked on or are currently working on for the City of Westlake Village:

_____

_____

_____

Upon request of the City, the bidder shall furnish evidence showing a notarized financial statement, financial data, construction experience, or other additional information.

Failure to provide truthful answers to the questions above or in the following References Form may result in the bid being deemed non-responsive.

The bidder certifies under penalty of perjury under the laws of the State of California that the information provided above is true and correct.

Notary Public

Subscribed and sworn to me: _____

_____

Signature:_____

This ____ day of _____, 20_____

Title: _____

Signature: _____

(SEAL)

Company

Signature:

_____

Title:

_____

Date:

_____

Signature:

_____

Title:

_____

Date:

_____

REFERENCES FORM

For all public agency projects in excess of $15,000 that you are currently working on or have worked on in the past two years, provide the following information:

Project 1 Name/Number _____

Project Description _____

Approximate Construction Dates From: _____ To: _____

Agency Name: _____

Contact Person: _____ Telephone: _____

Address: _____

Original Contract Amount: $_____ Final Contract Amount: $_____

If final amount is different from original amount, please explain (change orders, extra work, etc.).

_____

_____

Did you or any subcontractor, file any claims against the agency?
Circle one: Yes No

Did the agency file any claims against you? Circle one: Yes No

If you answered yes to either of the above two questions, please explain and indicate outcome of claims.

_____

_____

Project 2 Name/Number _____

Project Description _____

Approximate Construction Date From: _____ To: _____

Agency Name: _____

Contact Person: _____ Telephone: _____

Address: _____

Original Contract Amount: $_____ Final Contract Amount: $_____

If final amount is different from original amount, please explain (change orders, extra work, etc.).

Did you or any subcontractor, file any claims against the agency?
Circle one: Yes No

Did the agency file any claims against you? Circle one: Yes No

If you answered yes to either of the above two questions, please explain and indicate outcome of claims.

Project 3 Name/Number _____

Project Description _____

Approximate Construction Dates From: _____ To: _____

Agency Name: _____

Contact Person: _____ Telephone: _____

Address: _____

Original Contract Amount: $_____ Final Contract Amount: $_____

If final amount is different from original amount, please explain (change orders, extra work, etc.).

Did you or any subcontractor, file any claims against the agency?
Circle one: Yes No

Did the agency file any claims against you? Circle one: Yes No

If you answered yes to either of the above two questions, please explain and indicate outcome of claims.

Project 4 Name/Number _____

Project Description _____

Approximate Construction Dates From: _____ To _____

Agency Name: _____

Contact Person: _____ Telephone: _____

Address: _____

Original Contract Amount: $_____ Final Contract Amount: $_____

If final amount is different from original amount, please explain (change orders, extra work, etc.).

_____

_____

Did you or any subcontractor, file any claims against the agency?
Circle one: Yes No

Did the agency file any claims against you? Circle one: Yes No

If you answered yes to either of the above two questions, please explain and indicate outcome of claims.

_____

_____

Project 5 Name/Number _____

Project Description _____

Approximate Construction Dates From: _____ To: _____

Agency Name: _____

Contact Person: _____ Telephone: _____

Address: _____

Original Contract Amount: $_____ Final Contract Amount: $_____

If final amount is different from original amount, please explain (change orders, extra work, etc.).

_____

_____

Did you or any subcontractor, file any claims against the agency?
Circle one: Yes No

Did the agency file any claims against you? Circle one: Yes No

If you answered yes to either of the above two questions, please explain and indicate outcome of claims.

Project 6 Name/Number _____

Project Description _____

Approximate Construction Dates From: _____ To: _____

Agency Name: _____

Contact Person: _____ Telephone: _____

Address: _____

Original Contract Amount: $_____ Final Contract Amount: $_____

If final amount is different from original amount, please explain (change orders, extra work, etc.).

Did you or any subcontractor, file any claims against the agency?
Circle one: Yes No

Did the agency file any claims against you? Circle one: Yes No

If you answered yes to either of the above two questions, please explain and indicate outcome of claims.

RESUME

Attach to this bid the experience resume of the person who will be designated as General Construction Superintendent or on-site Construction Manager for the Project.

This page intentionally left blank.

SUBCONTRACTOR DESIGNATION FORM
[Public Contract Code Section 4104]

List all subcontractors that will perform work or labor or render service to the bidder in or about the construction of the Project, or that will specially fabricate and install a portion of the Project, in an amount in excess of 0.5% of the bidder's total bid.

In the case of bids or offers for the construction of streets or highways (including bridges), list all subcontractors that will perform work or labor or render service to the bidder in or about the construction of the Project, or that will specially fabricate and install a portion of the Project, in excess of 0.5% of the bidder's total bid or $10,000, whichever is greater. Regardless of the proportion of the total amount bid, include the traffic control subcontractor in the list.

If all subcontractors do not fit on this page, attach another page listing all information for all other subcontractors.

Name under which Subcontractor is Licensed and Registered	CSLB License Number(s) and Class(es)	DIR Registration Number	Address and Phone Number	Type of Work (e.g., Electrical)	Percentage of Total Bid (e.g., 10%)*
				Traffic Control	

TRAFFIC CONTROL SUBCONTRACTOR ACKNOWLEDGEMENT

I, _____ (Bidder), acknowledge and accept the requirement that all traffic control shall be designed and implemented by a subcontractor per the Special Provisions Section 905 Traffic Control. This subcontractor is identified in the preceding list.

* The percentage of the total bid shall represent the "portion of the work" for the purposes of Public Contract Code Section 4104(b).

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INDUSTRIAL SAFETY RECORD FORM

Bidder's Name _____

	Current Year of Record	2018	2017	2016	2015	2014	Total
Number of contracts							
Total dollar amount of contracts (in thousands of dollars)							
Number of fatalities							
Number of lost workday cases							
Number of lost workday cases involving permanent transfer to another job or termination of employment							

The above information was compiled from the records that are available to me at this time and I declare under penalty of perjury under the laws of the State of California that the information is true and accurate within the limitations of those records.

Signature: _____

Title: _____

Date: _____

Signature: _____

Title: _____

Date: _____

This page intentionally left blank.

Bond No. _____

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS that:

WHEREAS the City of Westlake Village ("City"), has issued an invitation for bids for the Work described as follows: _____

WHEREAS _____

(Name and address of Bidder)

("Principal"), desires to submit a bid to City for the Work.

WHEREAS, bidders are required to furnish a form of bidder's security with their bids.

NOW, THEREFORE, we, the undersigned Principal, and _____

_____

(Name and address of Surety)

("Surety"), a duly admitted surety insurer under the laws of the State of California, as Surety, are held and firmly bound unto the City in the penal sum of _____

_____

Dollars ($_____), being not less than ten percent (10%) of the total bid price, in lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT, if the hereby bounded Principal is awarded the contract for the Work by the City and, within the time and in the manner required by the bidding specifications, enters into the written form of contract included with the bidding specifications, furnishes the required bonds (one to guarantee faithful performance and the other to guarantee payment for labor and materials), and furnishes the required insurance coverage, then this obligation shall become null and void; otherwise, it shall be and remain in full force and effect.

In case suit is brought upon this instrument, Surety further agrees to pay all court costs incurred by the City in the suit and reasonable attorneys' fees in an amount fixed by the court. Surety hereby waives the provisions of Civil Code Section 2845.

IN WITNESS WHEREOF, this instrument has been duly executed by Principal and Surety, on the date set forth below, the name of each corporate party being hereto affixed and these presents duly signed by its undersigned representative(s) pursuant to authority of its governing body.

Dated: _____

"Principal"	"Surety"
_____	_____
_____	_____
By: _____	By: _____
Its: _____	Its: _____
By: _____	By: _____
Its: _____	Its: _____

Note: This Bond must be dated, all signatures must be notarized, and evidence of the authority of any person signing as attorney-in-fact must be attached.

NONCOLLUSION DECLARATION FORM
TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID
[Public Contract Code Section 7106]

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____ [date], at _____ [city], _____ [state].

Signature: _____	Signature: _____
Printed Name: _____	Printed Name: _____
Date: _____	Date: _____

This form must be notarized.

This page intentionally left blank.

ADDENDA ACKNOWLEDGMENT FORM

Bidder's Name: _____

The bidder shall signify receipt of all addenda here, if any:

Addendum Number	Date Received	Signature

If there are more addenda than there is room in the chart above, attach another page acknowledging receipt of the addenda.

This page intentionally left blank.

CONSTRUCTION AGREEMENT

CITY OF WESTLAKE VILLAGE CONTRACT FOR CITY HALL BOOK NOOK EXPANSION

THIS CONSTRUCTION AGREEMENT ("Agreement") is made and entered this _____ day of _____, 20___ ("Effective Date"), by and between the City of Westlake Village, a California municipal corporation ("City") and _____, a _____ [Legal Form of Entity and state of formation, e.g., California corporation, limited partnership, limited liability company] ("Contractor"). Contractor's CSLB license number is _____. Contractor's DIR registration number is _____.

In consideration of the mutual covenants hereinafter set forth, the parties agree as follows:

1. Contract Documents. The Contract Documents consist of this Agreement, the Notice Inviting Bids, the Instructions to Bidders, the Bid (including documentation accompanying the Bid and any post-Bid documentation submitted before the Notice of Award), the Bonds, permits from regulatory agencies with jurisdiction, General Provisions, Special Provisions, Plans, Standard Plans, Standard Specifications, Reference Specifications, Addenda, Change Orders, and Supplemental Agreements to the extent attached to this Agreement. Such attachments are incorporated herein by reference.

2. Scope of Services. Contractor shall perform the Work in a good and workmanlike manner for the project identified as clearing and grubbing, installation of irrigation and landscaping ("Project"), as described in this Agreement and in the Contract Documents.

3. Compensation. In consideration of the services rendered hereunder, City shall pay Contractor a not to exceed amount of _____ dollars ($_____) in accordance with the prices as submitted in the Bid.

4. Incorporation by Reference. All of the following documents are attached hereto and incorporated herein by this reference: Workers' Compensation Certificate of Insurance, Additional Insured Endorsement (Comprehensive General Liability), Additional Insured Endorsement (Automobile Liability), and Additional Insured Endorsement (Excess Liability).

5. Antitrust Claims. In entering into this Agreement, Contractor offers and agrees to assign to City all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Business and Professions Code Section 16700 et seq.) arising from purchases of goods, services, or materials pursuant to this Agreement. This assignment shall be made and become effective at the time City tenders final payment to Contractor without further acknowledgment by the parties.

6. Prevailing Wages. City and Contractor acknowledge that the Project is a public work to which prevailing wages apply.

7. Workers' Compensation. Labor Code Sections 1860 and 3700 provide that every contractor will be required to secure the payment of compensation to its employees. In accordance with the provisions of Labor Code Section 1861, by signing this Agreement, Contractor certifies as follows:

> "I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers'

compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract."

8. Authority. Any person executing this Agreement on behalf of Contractor warrants and represents that he or she has the authority to execute this Agreement on behalf of Contractor and has the authority to bind Contractor to the performance of its obligations hereunder.

9. Entire Agreement. This Agreement, including the Contract Documents and any other documents incorporated herein by specific reference, represents the entire and integrated agreement between City and Contractor. This Agreement supersedes all prior oral or written negotiations, representations or agreements related to the Project. This Agreement may not be modified or amended, nor any provision or breach waived, except in a writing signed by both parties that expressly refers to this Agreement.

10. Counterparts. This Agreement may be executed in counterpart originals, duplicate originals, or both, each of which is deemed to be an original for all purposes.

IN WITNESS WHEREOF, the parties have executed this Agreement the day and year first above written.

CITY OF WESTLAKE VILLAGE

By: _____
Mayor

ATTEST:

By: _____
City Clerk

APPROVED AS TO FORM:

By: _____
City Attorney

CONTRACTOR

By: _____
□ Chairman □ President □ Vice President

By: _____
□ Secretary □ Asst. Secretary
□ Chief Finance Officer □ Asst. Treasurer

[Pursuant to California Corporations Code Section 313, both signature lines must be executed unless the signatory holds at least one of the offices designated on each line.]

Bond No. _____

PAYMENT BOND
(LABOR AND MATERIALS)

KNOW ALL PERSONS BY THESE PRESENTS that:

WHEREAS the City of Westlake Village ("City"), State of California, has awarded to _____

_____ ("Principal")

(Name and address of Contractor)

a contract (the "Contract") for the Work described as follows:

_____

(Project name)

WHEREAS, under the terms of the Contract, Principal is required before entering upon the performance of the Work, to file a good and sufficient payment bond with City to secure the claims to which reference is made in Title 3 (commencing with Section 9000) of Part 6 of Division 4 of the Civil Code.

NOW, THEREFORE, we, the undersigned Principal, and _____

_____

(Name and address of Surety)

("Surety") a duly admitted surety insurer under the laws of the State of California, as Surety, are held and firmly bound unto City and all contractors, subcontractors, laborers, material suppliers, and other persons employed in the performance of the Contract and referred to in Title 3 (commencing with Section 9000) of Part 6 of Division 4 of the Civil Code in the penal sum of ___

_____

Dollars ($_____), for materials furnished or labor thereon of any kind, or for amounts due under the Unemployment Insurance Act with respect to this Work or labor, that Surety will pay the same in an amount not exceeding the amount hereinabove set forth, and also in case suit is brought upon this bond, will pay, in addition to the face amount thereof, costs and reasonable expenses and fees, including reasonable attorneys' fees, incurred by City in successfully enforcing this obligation, to be awarded and fixed by the court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims under Title 3 (commencing with Section 9000) of Part 6 of Division 4 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Upon expiration of the time within which the California Labor Commissioner may serve a civil wage and penalty assessment against Principal, any of its subcontractors, or both Principal and its subcontractors pursuant to Labor Code Section 1741, and upon expiration of the time within which a joint labor management committee may commence an action against Principal, any of its subcontractors, or both Principal and its subcontractors pursuant to Labor Code Section 1771.2, if the condition of this bond be fully performed, then this obligation shall become null and void; otherwise, it shall be and remain in full force and effect.

Surety hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract or the Specifications accompanying the same shall in any manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension, alteration, or addition.

IN WITNESS WHEREOF, two identical counterparts of this instrument, each of which shall for all purposes be deemed an original hereof, have been duly executed by Principal and Surety, on the date set forth below, the name of each corporate party being hereto affixed and these presents duly signed by its undersigned representative(s) pursuant to authority of its governing body.

Dated: _____

"Principal"	"Surety"
_____	_____
_____	_____
By: _____	By: _____
Its	Its
By: _____	By: _____
Its	Its
(Seal)	*(Seal)*

Note: This Bond must be executed in duplicate and dated, all signatures must be notarized, and evidence of the authority of any person signing as attorney-in-fact must be attached. DATE OF BOND MUST NOT BE BEFORE DATE OF CONTRACT. Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located.

Bond No. _____

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS that:

WHEREAS the City of Westlake Village ("City"), has awarded to _____

_____

_____ ("Principal")

(Name and address of Contractor)

a contract (the "Contract") for the Work described as follows:

_____

(Project name)

WHEREAS, Principal is required under the terms of the Contract to furnish a bond for the faithful performance of the Contract.

NOW, THEREFORE, we, the undersigned Principal, and _____

_____

_____,

(Name and address of Surety)

("Surety") a duly admitted surety insurer under the laws of the State of California, as Surety, are held and firmly bound unto the City in the penal sum of _____

_____

Dollars ($_____), this amount being not less than the total Contract Price, in lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, successors executors and administrators, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT, if the hereby bounded Principal, his, her or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and provisions in the Contract and any alteration thereof made as therein provided, on Principal's part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless City, its officers, agents and employees, as therein stipulated, then this obligation shall become null and void; otherwise, it shall be and remain in full force and effect.

As a part of the obligation secured hereby and in addition to the face amount specified therefor, there shall be included costs and reasonable expenses and fees, including reasonable attorneys' fees, incurred by City in successfully enforcing such obligation, all to be taxed as costs and included in any judgment rendered. Surety hereby waives any statute of limitations as it applies to an action on this bond.

Surety hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or of the Work to be performed thereunder or the specifications accompanying the same shall in anywise affect its obligations under this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the Work or to the specifications. Surety hereby waives the provisions of California

Civil Code Sections 2845 and 2849. City is the principal beneficiary of this bond and has all rights of a party hereto.

IN WITNESS WHEREOF, two identical counterparts of this instrument, each of which shall for all purposes be deemed an original hereof, have been duly executed by Principal and Surety, on the date set forth below, the name of each corporate party being hereto affixed and these presents duly signed by its undersigned representative(s) pursuant to authority of its governing body.

Dated: _____

"Principal"	"Surety"
_____	_____
_____	_____
By: _____	By: _____
Its	Its
By: _____	By: _____
Its	Its
(Seal)	*(Seal)*

Note: This Bond must be executed in duplicate and dated, all signatures must be notarized, and evidence of the authority of any person signing as attorney-in-fact must be attached. DATE OF BOND MUST NOT BE BEFORE DATE OF CONTRACT. Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located.

WORKERS' COMPENSATION
CERTIFICATE OF INSURANCE

WHEREAS, the City of Westlake Village ("City") has required certain insurance to be provided by:

_____

NOW THEREFORE, the undersigned insurance company does hereby certify that it has issued the policy or policies described below to the following named insureds and that the same are in force at this time:

1. This certificate is issued to:

   City of Westlake Village
   31200 Oak Crest Drive
   Westlake Village, California 91361

   The insureds under such policy or policies are:

   _____

2. Workers' Compensation Policy or Policies in a form approved by the Insurance Commissioner of California covering all operations of the named insureds as follows:

Policy Number	Effective Date	Expiration Date

_____

_____

_____

By: _____
Its Authorized Representative

ADDITIONAL INSURED ENDORSEMENT
COMPREHENSIVE GENERAL LIABILITY

Name and address of named insured ("Named Insured"):

Name and address of insurance company ("Company"):

General description of agreement(s), permit(s), license(s), and/or activity(ies) insured:

Notwithstanding any inconsistent statement in the policy to which this endorsement is attached (the "Policy") or in any endorsement now or hereafter attached thereto, it is agreed as follows:

1. The City of Westlake Village ("City"), its elected officials, officers, attorneys, agents, employees, and volunteers are additional insureds (the above named additional insureds are hereafter referred to as the "Additional Insureds") under the Policy in relation to those activities described generally above with regard to operations performed by or on behalf of the Named Insured. The Additional Insureds have no liability for the payment of any premiums or assessments under the Policy.

2. The insurance coverages afforded the Additional Insureds under the Policy shall be primary insurance, and no other insurance maintained by the Additional Insureds shall be called upon to contribute with the insurance coverages provided by the Policy.

3. Each insurance coverage under the Policy shall apply separately to each Additional Insured against whom claim is made or suit is brought except with respect to the limits of the Company's liability.

4. Nothing in this contract of insurance shall be construed to preclude coverage of a claim by one insured under the policy against another insured under the policy. All such claims shall be covered as third-party claims, i.e., in the same manner as if separate policies had been issued to each insured. Nothing contained in this provision shall operate to increase or replicate the Company's limits of liability as provided under the policy.

5. The insurance afforded by the Policy for contractual liability insurance (subject to the terms, conditions and exclusions applicable to such insurance) includes liability assumed by the Named Insured under the indemnification and/or hold harmless provision(s) contained in or executed in conjunction with the written agreement(s) or permit(s) designated above, between the Named Insured and the Additional Insureds.

6. The policy to which this endorsement is attached shall not be subject to cancellation, change in coverage, reduction of limits (except as the result of the payment of claims), or non-renewal except after written notice to City, by certified mail, return receipt requested, not less than thirty (30) Days before the effective date thereof; provided, however, that such notice shall be not less than ten (10) Days before the effective date thereof if cancellation is due to non-payment of premium. In the event of Company's failure to comply with this notice provision, the policy as initially drafted will continue in full force and effect until compliance with this notice requirement.

7. Company hereby waives all rights of subrogation and contribution against the Additional Insureds, while acting within the scope of their duties, from all claims, losses and liabilities arising out of or incident to the perils insured against in relation to those activities described generally above with regard to operations performed by or on behalf of the Named Insured regardless of any prior, concurrent, or subsequent active or passive negligence by the Additional Insureds.

8. It is hereby agreed that the laws of the State of California shall apply to and govern the validity, construction, interpretation, and enforcement of this contract of insurance.

9. This endorsement and all notices given hereunder shall be sent to City at:

City Manager
City of Westlake Village
31200 Oak Crest Drive
Westlake Village, California 91361

10. Except as stated above and not in conflict with this endorsement, nothing contained herein shall be held to waive, alter or extend any of the limits, agreements, or exclusions of the policy to which this endorsement is attached.

TYPE OF COVERAGES TO WHICH THIS ENDORSEMENT ATTACHES	POLICY PERIOD FROM/TO	LIMITS OF LIABILITY

11. Scheduled items or locations are to be identified on an attached sheet. The following inclusions relate to the above coverages. Includes:

□ Contractual Liability
□ Owners/Landlords/Tenants
□ Manufacturers/Contractors
□ Products/Completed Operations
□ Broad Form Property Damage
□ Extended Bodily Injury
□ Broad Form Comprehensive General Liability Endorsement
□ Explosion Hazard
□ Collapse Hazard
□ Underground Property Damage
□ Pollution Liability
□ Liquor Liability
□ _____
□ _____
□ _____

12. A □ deductible or □ self-insured retention *(check one)* of $_____ applies to all coverage(s) except: _____ *if none, so state)*. The deductible is applicable □ per claim or □ per occurrence *(check one)*.

13. This is an □ occurrence or □ claims made policy *(check one)*.

14. This endorsement is effective on _____ at 12:01 a.m. and forms a part of Policy Number _____.

I, _____ *(print name)*, hereby declare under penalty of perjury under the laws of the State of California, that I have the authority to bind the Company to this endorsement and that by my execution hereof, I do so bind the Company.

Executed _____, 20___

Signature of Authorized Representative
(Original signature only; no facsimile signature or initialed signature accepted)

Telephone No.: (____) _____

ADDITIONAL INSURED ENDORSEMENT
AUTOMOBILE LIABILITY

Name and address of named insured ("Named Insured"):

Name and address of insurance company ("Company"):

General description of agreement(s), permit(s), license(s), and/or activity(ies) insured:

Notwithstanding any inconsistent statement in the policy to which this endorsement is attached (the "Policy") or in any endorsement now or hereafter attached thereto, it is agreed as follows:

1. The City of Westlake Village ("City"), its elected officials, officers, attorneys, agents, employees, and volunteers are additional insureds (the above named additional insureds are hereafter referred to as the "Additional Insureds") under the Policy in relation to those activities described generally above with regard to operations performed by or on behalf of the Named Insured. The Additional Insureds have no liability for the payment of any premiums or assessments under the Policy.

2. The insurance coverages afforded the Additional Insureds under the Policy shall be primary insurance, and no other insurance maintained by the Additional Insureds shall be called upon to contribute with the insurance coverages provided by the Policy.

3. Each insurance coverage under the Policy shall apply separately to each Additional Insured against whom claim is made or suit is brought except with respect to the limits of the Company's liability.

4. Nothing in this contract of insurance shall be construed to preclude coverage of a claim by one insured under the policy against another insured under the policy. All such claims shall be covered as third-party claims, i.e., in the same manner as if separate policies had been issued to each insured. Nothing contained in this provision shall operate to increase or replicate the Company's limits of liability as provided under the policy.

5. The insurance afforded by the Policy for contractual liability insurance (subject to the terms, conditions and exclusions applicable to such insurance) includes liability assumed by the Named Insured under the indemnification and/or hold harmless provision(s) contained or executed in conjunction with the written agreement(s) or permit(s) designated above, between the Named Insured and the Additional Insureds.

6. The policy to which this endorsement is attached shall not be subject to cancellation, change in coverage, reduction of limits (except as the result of the payment of claims), or non-renewal except after written notice to City, by certified mail, return receipt requested, not less than thirty (30) Days before the effective date thereof; provided, however, that such notice shall be not less than ten (10) Days before the effective date thereof if cancellation is due to non-payment of premium. In the event of Company's failure to comply with this notice provision, the policy as initially drafted will continue in full force and effect until compliance with this notice requirement.

7. Company hereby waives all rights of subrogation and contribution against the Additional Insureds, while acting within the scope of their duties, from all claims, losses and liabilities arising out of or incident to the perils insured against in relation to those activities described generally above with regard to operations performed by or on behalf of the Named Insured regardless of any prior, concurrent, or subsequent active or passive negligence by the Additional Insureds.

8. It is hereby agreed that the laws of the State of California shall apply to and govern the validity, construction, interpretation, and enforcement of this contract of insurance.

9. This endorsement and all notices given hereunder shall be sent to City at:

City Manager
City of Westlake Village
31200 Oak Crest Drive
Westlake Village, California 91361

10. Except as stated above and not in conflict with this endorsement, nothing contained herein shall be held to waive, alter or extend any of the limits, agreements, or exclusions of the policy to which this endorsement is attached.

TYPE OF COVERAGES TO WHICH THIS ENDORSEMENT ATTACHES	POLICY PERIOD FROM/TO	LIMITS OF LIABILITY

11. Scheduled items or locations are to be identified on an attached sheet. The following inclusions relate to the above coverages. Includes:

□ Any Automobiles
□ All Owned Automobiles
□ Non-owned Automobiles
□ Hired Automobiles
□ Scheduled Automobiles
□ Garage Coverage
□ Truckers Coverage
□ Motor Carrier Act
□ Bus Regulatory Reform Act
□ Public Livery Coverage
□ _____
□ _____

12. A □ deductible or □ self-insured retention *(check one)* of $_____ applies to all coverage(s) except: _____ *(if none, so state)*. The deductible is applicable □ per claim or □ per occurrence *(check one)*.

13. This is an □ occurrence or □ claims made policy *(check one)*.

14. This endorsement is effective on _____ at 12:01 a.m. and forms a part of Policy Number _____.

I, _____ *(print name)*, hereby declare under penalty of perjury under the laws of the State of California, that I have the authority to bind the Company to this endorsement and that by my execution hereof, I do so bind the Company.

Executed _____, 20___

Signature of Authorized Representative
(Original signature only; no facsimile signature

Telephone No.: (____) _____ *or initialed signature accepted)*

ADDITIONAL INSURED ENDORSEMENT
EXCESS LIABILITY

Name and address of named insured ("Named Insured"):

Name and address of insurance company ("Company"):

General description of agreement(s), permit(s), license(s), and/or activity(ies) insured:

Notwithstanding any inconsistent statement in the policy to which this endorsement is attached (the "Policy") or in any endorsement now or hereafter attached thereto, it is agreed as follows:

1. The City of Westlake Village ("City"), its elected officials, officers, attorneys, agents, employees, and volunteers are additional insureds (the above named additional insureds are hereafter referred to as the "Additional Insureds") under the Policy in relation to those activities described generally above with regard to operations performed by or on behalf of the Named Insured. The Additional Insureds have no liability for the payment of any premiums or assessments under the Policy.

2. The insurance coverages afforded the Additional Insureds under the Policy shall be primary insurance, and no other insurance maintained by the Additional Insureds shall be called upon to contribute with the insurance coverages provided by the Policy.

3. Each insurance coverage under the Policy shall apply separately to each Additional Insured against whom claim is made or suit is brought, except with respect to the limits of the Company's liability.

4. Nothing in this contract of insurance shall be construed to preclude coverage of a claim by one insured under the policy against another insured under the policy. All such claims shall be covered as third-party claims, i.e., in the same manner as if separate policies had been issued to each insured. Nothing contained in this provision shall operate to increase or replicate the Company's limits of liability as provided under the policy.

5. The insurance afforded by the Policy for contractual liability insurance (subject to the terms, conditions and exclusions applicable to such insurance) includes liability assumed by the Named Insured under the indemnification and/or hold harmless provision(s) contained in or executed in conjunction with the written agreement(s) or permit(s) designated above, between the Named Insured and the Additional Insureds.

6. The policy to which this endorsement is attached shall not be subject to cancellation, change in coverage, reduction of limits (except as the result of the payment of claims), or non-renewal except after written notice to City, by certified mail, return receipt requested, not less than thirty (30) Days before the effective date thereof; provided, however, that such notice shall be not less than ten (10) Days before the effective date thereof if cancellation is due to non-payment of premium. In the event of Company's failure to comply with this notice

provision, the policy as initially drafted will continue in full force and effect until compliance with this notice requirement.

7. Company hereby waives all rights of subrogation and contribution against the Additional Insureds, while acting within the scope of their duties, from all claims, losses and liabilities arising out of or incident to the perils insured against in relation to those activities described generally above with regard to operations performed by or on behalf of the Named Insured regardless of any prior, concurrent, or subsequent active or passive negligence by the Additional Insureds.

8. It is hereby agreed that the laws of the State of California shall apply to and govern the validity, construction, interpretation, and enforcement of this contract of insurance.

9. This endorsement and all notices given hereunder shall be sent to City at:

City Manager
City of Westlake Village
31200 Oak Crest Drive
Westlake Village, California 91361

10. Except as stated above and not in conflict with this endorsement, nothing contained herein shall be held to waive, alter or extend any of the limits, agreements, or exclusions of the policy to which this endorsement is attached.

TYPE OF COVERAGES TO WHICH THIS ENDORSEMENT ATTACHES	POLICY PERIOD FROM/TO	LIMITS OF LIABILITY

□ Following Form
□ Umbrella Liability
□ _____

11. Applicable underlying coverages:

INSURANCE COMPANY	POLICY NUMBER	AMOUNT

12. The following inclusions, exclusions, extensions or specific provisions relate to the above coverages:

13. A □ deductible or □ self-insured retention *(check one)* of $_____ _____ applies to all coverage(s) except: _____ _____ *(if none, so state)*. The deductible is applicable □ per claim or □ per occurrence *(check one)*.

14. This is an □ occurrence or □ claims made policy *(check one)*.

15. This endorsement is effective on _____ at 12:01 a.m. and forms a part of Policy Number _____.

I, _____ *(print name)*, hereby declare under penalty of perjury under the laws of the State of California, that I have the authority to bind the Company to this endorsement and that by my execution hereof, I do so bind the Company.

Executed _____, 20___

_____
Signature of Authorized Representative
(Original signature only; no facsimile signature
Telephone No.: (____) _____ *or initialed signature accepted)*

CONTRACT EXECUTION CHECKLIST

TO BE SUBMITTED BY SUCCESSFUL BIDDER:

_____ Two executed and notarized copies of the Construction Agreement

_____ Payment Bond in amount of the Construction Agreement

_____ Performance Bond in amount of the Construction Agreement

_____ Workers' Compensation Certificate

_____ Liability insurance certificate in the amount of $2,000,000 naming the City as a co-insured

_____ Automobile insurance certificate in the amount of $1,000,000 naming the City as a co-insured

_____ General aggregate insurance certificate in the amount of $1,000,000, naming the City as a co-insured

_____ Additional insured endorsement – comprehensive general liability

_____ Additional insured endorsement – automobile liability

_____ Additional insured endorsement – excess liability

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GENERAL PROVISIONS

SECTION 0. GENERAL PROVISIONS DEFINED

0-1 *STANDARD SPECIFICATIONS*

The Work described herein shall be done in accordance with the provisions of the 2015 edition of the Standard Specifications (defined in the Notice Inviting Bids), except for those provisions that are expressly not incorporated by a provision in the Contract Documents.

The Standard Specifications set forth above will control the general provisions, construction materials, and construction methods for this contract, except as amended by the Plans, Special Provisions, or other contract documents. The following provisions are supplementary and in addition to the provisions of the Standard Specifications unless otherwise noted. Only those sections requiring elaboration, amendments, specifying of options or additions called out.

0-2 *NUMBERING OF* SECTIONS

The number of sections and subsections in these General Provisions are compatible with the numbering in the Standard Specifications. The Special Provisions will be numbered as Sections 700 through 799. Subsections of architectural and/or other work may be numbered according to the Construction Specifications Institute (CSI) format.

0-3 *SUPPLEMENTATION OF STANDARD SPECIFICATIONS*

The Sections that follow supplement, but do not replace, the Standard Specifications, except as otherwise indicated herein. In the event of any conflict between the Standard Specifications and these General Provisions, these General Provisions shall control.

SECTION 1. TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS

The provisions below shall supplement, but not replace, those provisions in Section 1 of the Standard Specifications.

1-2 *TERMS AND DEFINITIONS*

Whenever in the Standard Specifications or in the Contract Documents the following terms are used, they shall be understood to mean the following:

Agency – The City of Westlake Village.

Board – The City Council of the City of Westlake Village.

Contract Documents – As defined in Standard Specifications Section 1-2, but also including the General Provisions.

County – County of Los Angeles, California

Engineer – The City Engineer, acting either directly or through properly authorized agents. Such agents shall act within the scope of the particular duties entrusted to them.

Inspector – An authorized representative of the City, assigned by the City to make inspections of Work performed by or materials supplied by the Contractor.

Laboratory – A laboratory authorized by the City to test materials and Work involved in the Contract.

Project – See Work.

Submittal – Any drawing, calculation, specification, product data, samples, manuals, requests for substitutes, spare parts, photographs, survey data, traffic control plans, record drawings, Bonds or similar items required to be submitted to the City under the terms of the Contract.

1-3.3 Institutions

The institutions listed in Section 1-3.3 of the Standard Specifications shall be supplemented by the list below:

Abbreviation	**Word or Words**
AAN	American Association of Nurserymen
ACI	American Concrete Institute
AGCA	Associated General Contractors of America
APWA	American Public Works Association
ASME	American Society of Mechanical Engineers
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
IEEE	Institute of Electric and Electronic Engineers
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
SSS	State of California Standard Specifications, Latest edition, Department of Transportation
SSP	State of California Standard Plans, Latest edition, Department of Transportation

SECTION 2. SCOPE AND CONTROL OF THE WORK

The provisions below shall supplement, but not replace, those provisions in Section 2 of the Standard Specifications.

2-2 ASSIGNMENT

Any purported assignment without written consent of the City shall be null, void, and of no effect, and the Contractor shall hold harmless, defend and indemnify the City and its officers, officials, employees, agents and representatives with respect to any claim, demand or action arising from or relating to any unauthorized assignment.

If the City opts to consent to assignment, the City's consent shall be contingent upon: (1) a letter from the Surety agreeing to the assignment and assigning all of the Bonds to the assignee without any reduction, or the assignee supplying all new Bonds in the amounts originally required under the Contract Documents; and (2) the assignee supplying all of the required insurance in the amounts required in the Contract Documents. Until the Surety assigns all of the Bonds or the assignee supplies all of the new Bonds, and until the assignee supplies all of the required

insurance, an assignment otherwise consented to in writing by the City shall not be effective. Even if the City consents to assignment, no assignment shall relieve the Contractor of liability under the Contract.

2-4 CONTRACT BONDS

The Performance Bond shall remain in force until the date of recordation of the Notice of Completion. The Labor and Materials Bond shall remain in force until expiration of the time within which the California Labor Commissioner may serve a civil wage and penalty assessment against the principal, any of its subcontractors, or both the principal and its subcontractors pursuant to Labor Code Section 1741, and until the expiration of the time within which a joint labor management committee may commence an action against the principal, any of its subcontractors, or both the principal and its subcontractors pursuant to Labor Code Section 1771.2.

Before acceptance of the Project, the Contractor shall submit a Warranty/Maintenance Bond that is valid for 1 year from date of recordation of Notice of Completion by the County Recorder, in the amount of 10% of the Contract Price. In lieu of the Warranty/Maintenance Bond, Contractor may submit proof from the Surety that the Performance Bond has been extended for the appropriate duration of time. Other than the details listed herein, the Warranty/Maintenance Bond shall adhere to the requirements for Bonds in Section 2-4 of the Standard Specifications. Nothing herein shall abridge or amend Section 6-8.3 of the Standard Specifications or the related provisions in these Contract Documents.

All Bonds must be submitted using the required forms, which are in the Contract Documents, or on any other form approved by the City Attorney.

2-5 PLANS AND SPECIFICATIONS

2-5.1 General

In addition to the requirements under Section 2-5.1 in the Standard Specifications, the Contractor shall maintain a control set of Plans and Specifications on the project site at all times. All final locations determined in the field, and any deviations from the Plans and Specifications, shall be marked in red on the control set to show the as-built conditions. This control set of Plans shall also be edited for all Addenda, Requests for Information, Change Orders, field changes not involving cost, and any other variation that occurred during construction. Upon completion of all Work, the Contractor shall return the control set to the City Engineer. Final payment will not be made until this requirement is met.

Where a work feature is shown on the drawings or identified in the Specifications but is not specifically indicated as an item in the Bid Sheets, and there is no ambiguity regarding the requirement to construct, install, or construct and install that work feature, the Contractor is required to complete the work feature. All costs to the Contractor for constructing, installing, or both constructing and installing such a work feature shall conclusively be deemed to be included in the Bid.

2-5.2 Precedence of the Contract Documents

With regard to Section 2-5.2 in the Standard Specifications, the General Provisions shall control over the Special Provisions, and the Notice Inviting Bids and Instructions to Bidders (in that order) shall control over the Bid, such that the order of precedence shall be as follows:

1. Permits issued by regulatory agencies with jurisdiction.

2. Change Orders and Supplemental Agreements, whichever occurs last.
3. Construction Agreement.
4. Addenda.
5. Notice Inviting Bids.
6. Instructions to Bidders.
7. Bid.
8. General Provisions.
9. Special Provisions.
10. Plans.
11. Standard Plans.
12. Standard Specifications.
13. Reference Specifications.

2-5.3 Submittals

Contractor to provide submittals, including physical material samples, for approval by the City Engineer or her designee for all materials, schedule, and emergency contacts set forth in the plans and specifications.

2-7 SUBSURFACE DATA

If the City or its consultants have made investigations of subsurface conditions in areas where the Work is to be performed, such investigations shall be deemed made only for the purpose of study and design. If a geotechnical or other report has been prepared for the Project, the Contractor may inspect the records pertaining to such investigations subject to and upon the conditions hereinafter set forth. The inspection of the records shall be made in the office of the City Engineer. It is the Contractor's sole responsibility to determine whether such investigations exist, and the City makes no affirmative or negative representation concerning the existence of such investigations.

The records of any such investigations are made available solely for the convenience of the Contractor. It is expressly understood and agreed that the City, the City Engineer, their agents, consultants or employees assume no responsibility whatsoever with respect to the sufficiency or accuracy of any investigations, the records thereof, and the interpretations set forth therein. No warranty or guarantee is expressed or implied that the conditions indicated by any such investigations or records are representative of those existing in the Project area. The Contractor agrees to make such independent investigations and examination as necessary to be satisfied of the conditions to be encountered in the performance of the Work.

The Contractor represents that it has studied the Plans, Specifications and other Contract Documents, and all surveys and investigation reports of subsurface and latent physical conditions, has made such additional surveys and investigations as necessary for the performance of the Work at the Contract Price in accordance with the requirements of the Contract Documents, and that it has correlated the results of all such data with the requirements of the Contract Documents. No claim of any kind shall be made or allowed for any error, omission or claimed error or omission, in whole or in part, of any geotechnical exploration or any other report or data furnished or not furnished by the City.

2-9 SURVEYING

The Contractor shall verify all dimensions on the drawings and shall report to the City any discrepancies before proceeding with related Work. The Contractor shall perform all survey and layout Work per the benchmark information on the Project Plans. All surveying Work must

conform to the Professional Land Surveyors' Act (Business and Professions Code Section 8700 et seq.). All Project surveying notes and "cut-sheets" are to be provided to the City after the completion of each surveying activity and all final surveying notes shall be provided before final payment to the Contractor.

Construction stakes shall be set and stationed by the Contractor at its expense. Unless otherwise indicated in the Special Provisions, surveying costs shall conclusively be deemed to be included in the price of items bid. No separate payment will be made. Re-staking and replacement of construction survey markers damaged as a result of the Work, vandalism, or accident shall be at the Contractor's expense.

2-10 INSPECTION

The Contractor shall arrange and pay for all off-site inspection of the Work required by any ordinance or governing authorities. The Contractor shall also arrange and pay for other inspections, including tests in connection therewith, as may be assigned or required.

2-13 REMOVALOF REJECTED AND UNAUTHORIZED WORK

The Contractor and all subcontractors, suppliers, and vendors shall guarantee that the entire work will meet all requirements of this contract as to the quality of materials, equipment, and workmanship. The Contractor, at no cost to the AGENCY, shall make any repairs or replacements made necessary by defects in materials, equipment, or workmanship that become evident within 1 year after the date of recordation of the Notice of Completion. Within this 1-year period, the Contractor shall also restore to full compliance with the requirements of this contract any portion of the work which is found to not meet those requirements. The Contractor shall hold the AGENCY harmless and defend and indemnify the AGENCY from claims of any kind arising from damages due to said defects or non-compliance. The Contractor shall make all repairs, replacements, and restorations within 30 days after the date of the Engineer's written notice.

SECTION 3. CHANGES IN WORK

The provisions below shall supplement, but not replace, those provisions in Section 3 of the Standard Specifications.

3-2 CHANGES INITIATED BY THE AGENCY

The City reserves the right, without notice to the Surety, to increase or decrease the quantity of any item or portion of the Work described in the Contract Documents or to alter or omit portions of the Work so described, as may be deemed necessary or expedient by the City Engineer, without in any way making the Contract void. Such increases, alterations or decreases of Work shall be considered and treated as though originally contracted for, and shall be subject to all the terms, conditions and provisions of the original Contract. The Contractor shall not claim or bring suit for damages, whether for loss of profits or otherwise, on account of any decrease, alteration or omission of any kind of Work to be done.

3-3 EXTRA WORK

New and unforeseen work will be classified as Extra Work only when the Work is not covered and cannot be paid for under any of the various items or combination of items for which a bid price appears on the Bid. The Contractor shall not do any Extra Work except upon written order from the City Engineer.

3-3.2.3 MARKUP

Add the following:

Contractor shall only apply the following markup: Pursuant to sub part a) and b) the contractor's markup is not to exceed 12%.

SECTION 4. CONTROL OF MATERIALS

4-1 MATERIALS AND WORKMANSHIP

The provisions below shall supplement, but not replace, those provisions in Section 4-1 of the Standard Specifications.

The Contractor and all Subcontractors, suppliers, and vendors shall guarantee that the Work will meet all requirements of this Contract as to the quality of materials, equipment, and workmanship.

4-1.1 Test of Materials

Except as elsewhere specified, the City shall bear the cost of testing materials and workmanship that meet or exceed the requirements indicated in the Standard Specifications and the Special Provisions. The cost of all other tests, including the retesting of material or workmanship that fails to pass the first test, shall be borne by the Contractor.

If the Contractor requests to substitute an equivalent item for a brand or trade name item, the burden of proof as to the comparative quality and suitability of alternative equipment or articles or materials shall be upon the Contractor, and the Contractor shall furnish, at its own expense, all information necessary or related thereto as required by the City Engineer. All requests for substitution shall be submitted, together with all documentation necessary for the City Engineer to determine equivalence, no later than thirty-five (35) Days after the contract award, unless a different deadline is listed in the Special Provisions.

SECTION 5 UTILITIES

The provisions below shall supplement, but not replace, those provisions in Section 5 of the Standard Specifications.

5-1 LOCATION

The location and existence of any underground Utility or substructure has not been obtained. The methods used and costs involved to locate existing elements, points of connection and all construction methods are the Contractor's sole responsibility. Accuracy of information furnished, as to existing conditions, is not guaranteed by the City. The Contractor, at its sole expense, must make all investigations necessary to determine locations of existing elements, which may include contacting Underground Service Alert and other private underground locating firm(s), utilizing specialized locating equipment, hand trenching, or both. For every Dig Alert Identification Number issued by Underground Service Alert during the course of the Project, the Contractor must submit to the City the following form. The Contractor shall be responsible for preserving the integrity of the existing underground utilities at the site.

UNDERGROUND SERVICE ALERT IDENTIFICATION NUMBER FORM

No excavation will be permitted until this form is completed and returned to the City.

Government Code Section 4216 et seq. requires a Dig Alert Identification Number to be issued before a permit to excavate will be valid.

To obtain a Dig Alert Identification Number, call Underground Service Alert at **811** a minimum of three (3) Working Days before scheduled excavation. For best response, provide as much notice as possible up to ten (10) Working Days.

Dig Alert Identification Number: _____

Dated: _____ _____
("CONTRACTOR")

By: _____

Printed Name: _____

Title: _____

By: _____

Printed Name: _____

Title: _____

Note: This form is required for every Dig Alert Identification Number issued by Underground Service during the course of the Work. Additional forms may be obtained from the City upon request.

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5-1.3 Entry by Utility Owners

The right is reserved to the owners of public utilities or franchises to enter the project site for the purpose of making repairs or changes in their property that may be necessary as a result of the Work as well as any other reason authorized by the City. When the Contract Documents provide for the utility owners to alter, relocate or reconstruct a Utility, or when the Contract Documents are silent in this regard and it is determined by the City Engineer that the utility owners must alter, relocate or reconstruct a Utility, the Contractor shall schedule and allow adequate time for those alterations, relocations or reconstructions by the respective utility owners. City employees and agents shall likewise have the right to enter upon the project site at any time and for any reason or no reason at all.

5-2 PROTECTION

If the Contractor damages or breaks the Utilities, it will be the Contractor's responsibility to repair the Utility at no cost to the utility owner or the City.

5-3 REMOVAL

Facilities encountered during the prosecution of the Work that are determined to be abandoned shall be removed by the Contractor as required for the Work, unless directed otherwise by the City Engineer. The remaining portion of the existing Utility which is left in place shall be accurately recorded, in elevation and plan, on the control set of Contract Drawings.

5-4 RELOCATION

The Contractor shall cooperate fully with all forces of the City or other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities that interfere with the progress of the Work. The Contractor shall schedule the Work so as to minimize interference with the relocation, altering, or other rearranging of facilities.

5-6 COOPERATION

The Contractor's attention is directed to the fact that Work may be conducted at or adjacent to the site by other contractors during the performance of the Work under this Contract. The Contractor shall conduct its operations so as to cause a minimum of interference with the work of such other contractors, and shall cooperate fully with such contractors to provide continued safe access to their respective portions of the site, as required to perform work under their respective contracts. Compensation for compliance shall be included in the various items of the Work, and no additional compensation shall be allowed therefor.

5-7 NOTIFICATION

The Contractor shall notify the City Engineer and the owners of all Utilities and substructures not less than forty-eight (48) hours before starting construction. The following list of names and telephone numbers is intended for the convenience of the Contractor and is not guaranteed to be complete or accurate:

CITY OF WESTLAKE VILLAGE
Attention: Mrs. Jessica Arden (818) 706-1613

AT&T (TRANSMISSION)
Attention: Mr. Walter Werstiuk (Transmission) (714) 963-7964

Ms. Rosemary Burnett (Local)	(626) 817-4273
Repair Center	611
THE GAS COMPANY	
Attention: Mr. Charles Lee (Distribution)	(818) 701-4504
Mr. Sam Sifuentes (Transmission)	(818) 701-3448
SOUTHERN CALIFORNIA EDISON	
Attention: Mr. Kim Gurule	(818) 796-9932
LAS VIRGENES MUNICIPAL WATER DISTRICT	
Attention: Mr. Doug Barrow	(818) 251-2100
TIME WARNER	
Attention: Mrs. Patricia Robertson	(805) 732-8260
LA COUNTY DEPT. OF PUBLIC WORKS	
Attention: Daryll Chenoweth	(626) 458-3109
LA COUNTY DEPT. FLOOD CONTROL	
Attention: Rosanna Dantolo	(626) 458-3168
UNDERGROUND SERVICE ALERT	(800) 227-2600

SECTION 6. PROSECUTION, PROGRESS AND ACCEPTANCE OF THE WORK

The provisions below shall supplement, but not replace, those provisions in Section 6 of the Standard Specifications.

6-1 CONSTRUCTION SCHEDULE AND COMMENCEMENT OF THE WORK

6-1.1 Construction Schedule

In addition to the construction schedule required pursuant to Section 6-1.1 of the Standard Specifications after notification of the contract award and before any start of the Project, as well as the revised construction schedule in advance of beginning revised operations, the Contractor shall submit an updated construction schedule with its monthly invoice every month. Progress payments shall be contingent upon the receipt of monthly updated construction schedules.

One (1) week before the scheduled pre-construction meeting, the Contractor must submit a construction schedule to the City Engineer for review and approval. The Contractor shall make revisions as required by the City Engineer. The schedule must account for all subcontract work, as well as the work of the Contractor, submittals, coordination with the other contractors performing concurrent work and the Traffic Control Plan. The Contractor shall update this Construction Schedule when directed by the City Engineer, or when:

a. A Change Order significantly affects the contract completion date or the sequence of construction approach or activities; or

b. The actual sequence of the Work, or the planned sequence of the Work, is changed and does not conform to the Contractor's current accepted Project construction schedule; or

c. The City identifies a Community Event at least 5 working days prior to the Event taking place, that requires the Contractor delay work, during which time additional contract days shall be let to the Contractor, and no additional compensation shall be let.

6-1.1.1 Pre-Construction Conference

Prior to the commencement of Work at the site, a pre-construction conference will be held at the City and shall be attended by the Contractor's project manager, its on-site field superintendent, and any Subcontractors that the Contractor deems appropriate. Attendance by the Contractor and any Subcontractors designated is mandatory.

Contractor shall submit its twenty-four (24) hour emergency telephone numbers to the City Engineer for approval a minimum of two (2) Working Days before the pre-construction conference. Unless previously submitted to the City Engineer, the Contractor shall bring to the pre-construction conference copies of each of the following:

1) Construction Schedule.
2) Procurement schedule of major equipment and materials and items requiring long lead time.
3) Shop drawing/sample submittal schedule.
4) Preliminary schedule of values (lump sum price breakdown) for progress payment purposes.
5) Written designation of the on-site field superintendent and the project manager. Both daytime and emergency telephone numbers shall be included in the written designation.

The purpose of the conference is to designate responsible personnel and establish a working relationship. The parties will discuss matters requiring coordination and establish procedures for handling such matters. The complete agenda will be furnished to the Contractor before the meeting date. The Contractor shall be prepared to discuss all of the items listed below.

1) The Contractor's construction schedule.
2) Notification of local residents before starting any Work and keeping them informed throughout the Project.
3) Procedures for transmittal, review, and distribution of the Contractor's submittals.
4) Processing applications for payment.
5) Maintaining record documents.
6) Critical Work sequencing.
7) Maintaining sewage service during construction, including proposed by-passes.
8) NPDES requirements, if any.
9) Field decisions and Change Orders.
10) Use of project site, office and storage areas, security, housekeeping, and the City's needs.
11) Major equipment deliveries and priorities.
12) Traffic control.
13) Any other item that the City representative states is relevant to the meeting.

6-1.1.2 Weekly Progress Meetings

Progress meetings will be held each week during the course of the Project. The meeting location, day of the week and time of day will be mutually agreed to by the City and the Contractor. The Contractor shall provide a two (2) week "look ahead" schedule for each meeting. The construction manager will preside at these meetings and will prepare the meeting agenda, meeting minutes

and will distribute minutes to all persons in attendance. As the Work progresses, if it is determined by agreement of the attendees, that weekly meetings are not necessary, the weekly progress meetings may be changed to bi-weekly progress meetings.

6-5 TERMINATION OF THE CONTRACT FOR CONVENIENCE

In addition to the reasons for termination listed in Section 6-5 of the Standard Specifications, which allow termination upon any written notice, the City may cancel the Contract for any other reason or for no reason upon thirty (30) Days' written notice. The rest of the procedure outlined in Section 6-5 shall apply to such situation, including the Contractor's required immediate notification of Subcontractors and suppliers and the payment. In no event (including termination for impossibility or impracticability, due to conditions or events beyond the control of the City, for any other reason or for no reason) shall the total amount of money to Contractor exceed the amount which would have been paid to Contractor for the full performance of the services described in the Contract.

Furthermore, some of the City's projects are funded in whole or in part by funds other than the City's General Fund. If this Project is funded by such external funds in whole or in part, or if those external funds are terminated or reduced at any time and for any reason or for no reason at all, and the City determines at its discretion that no other funding is available for continuation of this Project, the City will not be obligated to continue funding for the services contained in these Contract Documents and may terminate the Project immediately. The City shall reimburse the Contractor for its work satisfactorily completed until the termination date. In no event shall the total amount of money to the Contractor exceed the amount which the City has received in funding from its external source. The Special Provisions may include further details in this regard.

6-6 DELAYS AND EXTENSIONS OF TIME

Unless otherwise agreed in writing, an adjustment to the Contract Time by reason of a Change Order shall be agreed to at the time the Change Order is issued and accepted by Contractor. If the Change Order does not reserve the right of the parties, or either of them, to seek an adjustment to the Contract Time, then the parties forever relinquish and waive such right and there shall be no further adjustments to the Contract Time.

6-6.1 Extensions of Time

In the event it is deemed appropriate by the City to extend the time for completion of the Work, any such extension shall not release any guarantee for the Work required by the Contract Documents, nor shall any such extension of time relieve or release the Sureties on the Bonds executed. In executing such Bonds, the Sureties shall be deemed to have expressly agreed to any such extensions of time. The amount of time allowed by an extension of time shall be limited to the period of the delay giving rise to the same as determined by the City. Notwithstanding any dispute which may arise in connection with a claim for adjustment of the Contract time, the Contractor shall promptly proceed with the Work.

6-6.2 Payment for Delays

Notwithstanding any other terms and conditions of the Contract Documents, the City shall have no obligation whatsoever to increase the Contract Price or extend the time for delays.

Unless compensation and/or mark up is agreed upon by the City, the Contractor agrees that no payment of compensation of any kind shall be made to the Contractor for damages or increased overhead costs caused by any delays in the progress of the Contract, whether such delays are

avoidable or unavoidable or caused by any act or omission of the City or its agents. Any accepted delay claim shall be fully compensated for by an extension of time to complete the performance of the Work.

This Section shall not apply to compensable delays caused solely by the City. If a compensable delay is caused solely by the City, the Contractor shall be entitled to a Change Order that: (1) extends the time for completion of the Contract by the amount of delay caused by the City; and (2) provides equitable adjustment, as determined by the City, to the Contractor.

6-8 COMPLETION, ACCEPTANCE AND WARRANTY

The Contractor shall complete all Work under the Contract within Twenty-Five (25) Working Days from the Notice to Proceed. The Contractor shall not be allowed to begin any construction activity at the site before the issuance of the Notice to Proceed. Between the period of the Notice of Award and Notice to Proceed, the Contractor shall process Shop Drawings and begin procuring equipment and materials.

6-8.2 Acceptance

The Project will not be considered complete and ready for City Council direction to staff regarding recordation of the Notice of Completion until all required Work is completed, the Work site is cleaned up in accordance with Section 7-8 of the Standard Specifications, the General Provisions, and the Special Provisions, and all of the following items have been received by the City Engineer:

1. A form of Notice of Completion, with all information required by the California Civil Code;

2. All written guarantees and warranties;

3. All “as-builts”;

4. The Warranty/Maintenance Bond or proof from the Surety of the extension of the Performance Bond, as more specifically detailed in Section 2-4 of these General Provisions; and

5. Duplicate copies of all operating instructions and manufacturer’s operating catalogs and data, together with such field instructions as necessary to fully instruct City personnel in correct operation and maintenance procedures for all equipment installed listed under the electrical, air conditioning, heating, ventilating and other trades. This data and instructions shall be furnished for all equipment requiring periodic adjustments, maintenance or other operation procedures.

The Contractor shall allow at least seven (7) Working Days notice for final inspection. Such notice shall be submitted to the City Engineer in writing.

6-8.3 Warranty

For the purposes of the calculation of the start of the warranty period, the Work shall be deemed to be completed upon the date of recordation of the Notice of Completion. If that direction is contingent on the completion of any items remaining on a punchlist, the Work shall be deemed to be completed upon the date of the City Engineer’s acceptance of the final item(s) on that punchlist.

The Contractor shall repair or replace defective materials and workmanship as required in Section 6-8.3 of the Standard Specification at its own expense. Additionally, the Contractor agrees to

defend, indemnify and hold the City harmless from claims of any kind arising from damage, injury or death due to such defects.

The parties agree that no certificate given shall be conclusive evidence of the faithful performance of the Contract, either in whole or in part, and that no payment shall be construed to be in acceptance of any defective Work or improper materials. Further, the certificate or final payment shall not terminate the Contractor's obligations under the warranty herein. The Contractor agrees that payment of the amount due under the Contract and the adjustments and payments due for any Work done in accordance with any alterations of the same, shall release the City, the City Council and its officers and employees from any and all claims or liability on account of Work performed under the Contract or any alteration thereof.

6-9 LIQUIDATED DAMAGES AND FORFEIT DUE TO DELAYS

For the purposes of the calculation of the start of the liquidated damages, the Work shall be deemed to be completed when the same has been completed in accordance with the Plans and Specifications therefor and to the satisfaction of the City Engineer, and the City Engineer has certified such completion in accordance with Section 6-8.1 of the Standard Specifications.

6-11 *DISPUTES AND CLAIMS*

6-11.1 GENERAL

Any and all decisions made on appeal pursuant to this Subsection 6-11 shall be in writing. Any "decision" purportedly made pursuant to this Subsection 6-11 which is not in writing shall not be binding upon the Agency and should not be relied upon by the Contractor.

Nothing in this subsection shall be considered as relieving the Contractor from his/her duty to file the notice required under Subsection 6-12 or other duties required by the Contract Documents.

6-11.2 ADMINISTRATIVE REVIEW

Request for review made to the Construction Inspector or Project Engineer may be either oral or written. Request for review made to the Deputy City Engineer and City Engineer shall be made in writing with supporting evidence attached.

Each request for review shall be submitted by the Contractor within twenty-one (21) calendar days of receipt of the decision which he/she wishes.

Prior to demand for arbitration, the Contractor shall exhaust his/her administrative remedies by attempting to resolve his/her dispute or claim with Agency`s staff in the following sequence:

1. Project Engineer
2. Deputy City Engineer
3. City Engineer

Should the Project Engineer or the Deputy City Engineer fail to address a request by the Contractor for review of a disputed decision within fourteen (14) calendar days after receiving such request, the Contractor may proceed directly to the City Engineer. At the option of the Agency, the person to whom the request for review is directed may elect to take such request to a higher level and the Contractor's request shall be deemed to be properly submitted to such higher level.

The City Engineer shall address disputes or claims within twenty eight (28) calendar days after receiving such request and all necessary supporting data. The City Engineer's decision on the dispute or claim shall be the Agency's final decision.

6-11.3 ARBITRATION

Claims and disputes arising under or related to the performance of the contract, except for claims which have been released by execution of the "Release on Contract" as provided in Subsection 9-4, shall be resolved in arbitration unless the Agency and the Contractor agree in writing, after the claim or dispute has arisen, to waive arbitration and to have the claim or dispute litigated in court of competent jurisdiction. Arbitration shall be conducted, to the extent feasible, pursuant to Chapter 3 (Sections 301-393, inclusive) of Division 2 of Title 1 of the California Code of Regulations except that references therein to the "State Contract Act" shall be construed to mean "applicable law" and "Public Agency", or "Department" shall be construed to mean "Agency" as defined in Subsection 1.2. The arbitration decision shall be decided under and in accordance with California law, supported by substantial evidence, and in writing, contain the basis for the decision, findings of fact, and conclusions of law.

Arbitration shall be initiated by a Demand for Arbitration. A Demand for Arbitration by the Contractor shall be made not later than one hundred eighty (180) calendar days after the date of the final written decision of the Agency on the claim or dispute.

All contracts valued at more than $15,000 between the Contractor and his/her Subcontractors and Suppliers shall include a provision that the Subcontractors and Suppliers shall be bound to the Contractor to the same extent that the Contractor is bound to the Agency by all terms and provisions of the Contract, including these arbitration provisions.

6-12 *NOTICE OF POTENTIAL CLAIM*

The Contractor shall not be entitled to the payment of any additional compensation for any cause, including any act, or failure to act, by the Engineer, or the happening of any event, thing or occurrence, unless the Contractor shall have given the Engineer due notice in writing within ten (10) calendar days of the event, of the potential claim as hereinafter specified, provided, however, that compliance with this Subsection 6-12 shall not be a prerequisite as to any claim which is based on differences in measurements or errors of computation as to the Contract quantities.

Additionally, this Subsection 6-12 shall not supersede the specific notice and protest requirements of Subsection 3-4 "Changed Conditions" and Subsection 6-7.3 "Contract Time Accounting" respectively.

A written notice of potential claim shall set forth the reasons for which the Contractor believes additional compensation will or may be due, the nature of the costs involved, and, insofar as possible, the amount of the potential claim. A notice as above required must have been given to the Engineer prior to the time that the Contractor shall have performed
the Work giving rise to the potential claim for additional compensation, if based on an act or failure to act by the Engineer, or in all other cases within fifteen (15) days after the happening of the event, thing or occurrence giving rise to the potential claim.

It is the intention of this Subsection 6-12 that differences between the parties arising under and by the virtue of the Contract be brought to the attention of the Engineer at the earliest possible time in order that such matters may be settled, if possible, or other appropriate action promptly taken. The Contractor hereby agrees that he/she shall have no right to additional compensation

for any claim that may be based on any such act, failure to act, event, thing or occurrence for which no written notice of potential claim as herein required was filed.

SECTION 7. RESPONSIBILITIES OF THE CONTRACTOR

The first paragraph of Section 7-3.1 of the Standard Specifications shall not be incorporated and shall instead be replaced with the following:

> The Contractor shall provide and maintain insurance naming the City, its elected and appointed officials, officers, employees, attorneys, agents, designated volunteers, and independent contractors in the role of City officials as insureds or additional insureds regardless of any inconsistent statement in the policy or any subsequent endorsement whether liability is attributable to the Contractor or the City. The insurance provisions shall not be construed to limit the Contractor's indemnity obligations contained in the Contract. The City will not be liable for any accident, loss, or damage to the Work before completion, except as otherwise specified in Section 6-10.

The first sentence of Section 7-8.4.2 shall not be incorporated, and shall instead be replaced with the following:

> Construction materials and equipment shall not be stored in Streets, roads, or highways unless otherwise specified in the Special Provisions or approved by the City Engineer.

The first sentence of the second paragraph of Section 7-9 of the Standard Specifications shall not be incorporated, and shall instead be replaced with the following:

> The Contractor shall relocate, repair, replace, or reestablish all existing improvements within the project limits which are not designated for removal (e.g., curbs, sidewalks, driveways, signal loops, fences, walls, sprinkler systems, signs, Utility installations, pavements, structures, etc.) which are damaged or removed as a result of the Contractor's or the Subcontractors' operations or as required by the Plans and Specifications.

The last paragraph of Subsection 7-9 of the Standard Specifications shall not be incorporated, and shall instead be replaced with the following:

> All costs to the Contractor for protecting, removing, restoring, relocating, repairing, replacing, or reestablishing existing improvements shall be included in the Bid.

Section 7-12 of the Standard Specifications shall not be incorporated, and shall instead be replaced with the following:

> The names, addresses and specialties of the Contractor, Subcontractors, architects or engineers may <u>not</u> be displayed on any signage within the public right-of-way. This signage prohibition includes advertising banners hung from truck beds or other equipment.

Otherwise, the provisions below shall supplement, but not replace, those provisions in Section 7 of the Standard Specifications.

7-1 THE CONTRACTOR'S EQUIPMENT AND FACILITIES

A noise level limit of 85 dbA at a distance of fifty (50) feet shall apply to all construction equipment on or related to the job whether owned by the Contractor or not. The use of excessively loud warning signals shall be avoided, except in those cases required for the protection of personnel.

The Contractor shall maintain a secure site without possibility of public access or use. All materials, equipment, and facilities shall remain out of public access. Any security fencing used shall remain locked during non-work hours, and any locking of the site shall remain accessible to the City and Contractor.

7-2 LABOR

7-2.2.1 Public Work

The Contractor acknowledges that the Project is a "public work" as defined in Labor Code Section 1720 *et seq*. ("Chapter 1"), and that this Project is subject to (a) Chapter 1, including without limitation Labor Code Section 1771 and (b) the rules and regulations established by the Director of Industrial Relations ("DIR") implementing such statutes. The Contractor shall perform all Work on the Project as a public work. The Contractor shall comply with and be bound by all the terms, rules and regulations described in (a) and (b) as though set forth in full herein.

7-2.2.2 Copies of Wage Rates

Pursuant to Labor Code Section 1773.2, copies of the prevailing rate of per diem wages for each craft, classification, or type of worker needed to perform the Project are on file at City Hall and will be made available to any interested party on request. By initiating any Work on this Project, the Contractor acknowledges receipt of a copy of the DIR determination of such prevailing rate of per diem wages, and the Contractor shall post such rates at each job site covered by these Contract Documents.

7-2.2.3 Job Site Notices

The Contractor is required to post job site notices, as prescribed by regulation.

7-2.2.4 Failure to Pay Prevailing Rates

The Contractor shall comply with and be bound by the provisions of Labor Code Sections 1774 and 1775 concerning the payment of prevailing rates of wages to workers and the penalties for failure to pay prevailing wages. The Contractor shall, as a penalty paid to the City, forfeit two hundred dollars ($200) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates as determined by the DIR for the work or craft in which the worker is employed for any public work done pursuant to these Contract Documents by the Contractor or by any Subcontractor.

7-2.2.5 Apprentices

The Contractor shall comply with and be bound by the provisions of Labor Code Sections 1777.5, 1777.6 and 1777.7 and California Code of Regulations Title 8, Section 200 et seq. concerning the employment of apprentices on public works projects. The Contractor shall be responsible for

compliance with these Sections for all apprenticeable occupations. Before commencing Work on this Project, the Contractor shall provide the City with a copy of the information submitted to any applicable apprenticeship program. Within sixty (60) Days after concluding Work, Contractor and each of its Subcontractors shall submit to the City a verified statement of the journeyman and apprentice hours performed under this Contract.

7-2.2.6 Debarment or Suspension

The Contractor shall not perform Work with any Subcontractor that has been debarred or suspended pursuant to California Labor Code Section 1777.1 or any other federal or State law providing for the debarment of contractors from public works. The Contractor and Subcontractors shall not be debarred or suspended throughout the duration of this Contract pursuant to Labor Code Section 1777.1 or any other federal or State law providing for the debarment of contractors from public works. If the Contractor or any Subcontractor becomes debarred or suspended during the duration of the Project, the Contractor shall immediately notify the City.

7-2.3 Payroll Records

The Contractor shall comply with and be bound by the provisions of Labor Code Section 1776, which requires the Contractor and each Subcontractor to (1) keep accurate payroll records and verify such records in writing under penalty of perjury, as specified in Section 1776, (2) certify and make such payroll records available for inspection as provided by Section 1776, and (3) inform the City of the location of the records. The Contractor has ten (10) days in which to comply subsequent to receipt of a written notice requesting these records, or as a penalty to the City, the Contractor shall forfeit one hundred dollars ($100) for each Day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due.

7-2.4 Hours of Labor

The Contractor acknowledges that eight (8) hours labor constitutes a legal day's work. The Contractor shall comply with and be bound by Labor Code Section 1810. The Contractor shall comply with and be bound by the provisions of Labor Code Section 1813 concerning penalties for workers who work excess hours. The Contractor shall, as a penalty paid to the City, forfeit twenty-five dollars ($25) for each worker employed in the performance of this Project by the Contractor or by any Subcontractor for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any one (1) calendar day and forty (40) hours in any one calendar week in violation of the provisions of Division 2, Part 7, Chapter 1, Article 3 of the Labor Code. Pursuant to Labor Code Section 1815, work performed by employees of the Contractor in excess of eight (8) hours per day, and forty (40) hours during any one week shall be permitted upon public work upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half (1-1/2) times the basic rate of pay.

7-2.5 Registration with the DIR

In accordance with Labor Code Sections 1725.5 and 1771.1, no contractor or subcontractor shall be qualified to bid on, be listed in a bid proposal, subject to the requirements of Public Contract Code Section 4104, or engage in the performance of any contract for public work, unless currently registered and qualified to perform public work pursuant to Section 1725.5.

7-2.6 Compliance Monitoring and Posting Job Sites

This Project is subject to compliance monitoring and enforcement by the DIR. The Contractor shall post job site notices, as prescribed by regulation.

7-2.7 Subcontractors

For every Subcontractor who will perform Work on the Project, the Contractor shall be responsible for such Subcontractor's compliance with Chapter 1 and Labor Code Sections 1860 and 3700, and the Contractor shall include in the written contract between it and each Subcontractor a copy of the provisions in this Section 7-2 of the General Provisions and a requirement that each Subcontractor shall comply with those provisions. The Contractor shall be required to take all actions necessary to enforce such contractual provisions and ensure Subcontractor's compliance, including without limitation, conducting a periodic review of the certified payroll records of the Subcontractor and upon becoming aware of the failure of the Subcontractor to pay its workers the specified prevailing rate of wages. The Contractor shall diligently take corrective action to halt or rectify any failure.

7-2.9 Prevailing Wage Indemnity

To the maximum extent permitted by law, the Contractor shall indemnify, hold harmless and defend (at the Contractor's expense with counsel reasonably acceptable to the City) the City, its officials, officers, employees, agents and independent contractors serving in the role of City officials, and volunteers from and against any demand or claim for damages, compensation, fines, penalties or other amounts arising out of or incidental to any acts or omissions listed in Section 7-2 of the General Provisions by any Person (including the Contractor, its Subcontractors, and each of their officials, officers, employees and agents) in connection with any Work undertaken or in connection with the Contract Documents, including without limitation the payment of all consequential damages, attorneys' fees, and other related costs and expenses. All duties of the Contractor under this Section 7-2.9 shall survive expiration or termination of the Contract.

7-3 LIABILITY INSURANCE

The Contractor shall at all times during the term of the Contract carry, maintain, and keep in full force and effect the insurance referenced in Section 7-3 of the Standard Specifications, as modified below.

7-3.1.1 Additional Insureds

The City, its elected and appointed officials, officers, employees, attorneys, agents, designated volunteers, and independent contractors in the role of City officials, shall be the insured or named as additional insureds covering the Work, regardless of any inconsistent statement in the policy or any subsequent endorsement, whether liability is attributable to the Contractor or the City.

7-3.1.2 No Limitation on Indemnity

The insurance provisions shall not be construed to limit the Contractor's indemnity obligations contained in these Contract Documents.

7-3.1.3 Replacement Insurance

The Contractor agrees that it will not cancel, reduce or otherwise modify the insurance coverage. The Contractor agrees that if it does not keep the required insurance in full force and effect, and

such insurance is available at a reasonable cost, the City may take out the necessary insurance and pay the premium thereon, and the repayment thereof shall be deemed an obligation of the Contractor and the cost of such insurance may be deducted, at the option of the City, from payments due the Contractor. This shall be in addition to all other legal options available to the City to enforce the insurance requirements.

7-3.1.4 Certificates of Insurance with Original Endorsements

The Contractor shall submit to the City certificates of insurance with the original endorsements, both of which reference the same policy number, for each of the insurance policies that meet the insurance requirements, not less than one (1) day before beginning of performance under the Contract. The endorsements are to be signed by a person authorized by that insurer to bind coverage on its behalf. Endorsements may be executed on the City's standard forms titled "Additional Insured Endorsement," copies of which are provided in the Contract Documents, or on any other form that contains substantially the same terms and is approved by the City's Risk Manager. In any case, the endorsements must specifically name the City of Westlake Village and its elected and appointed officials, officers, employees, attorneys, agents, designated volunteers, and independent contractors in the role of City officials as insureds or additional insureds. Current insurance certificates and endorsements shall be kept on file with the City at all times during the term of this Contract. The City reserves the right to require complete, certified copies of all required insurance policies at any time.

7-3.1.5 Subcontractors

The Contractor shall ensure all Subcontractors and their employees are listed as additional insureds on all of the Contractor's insurance.

7-3.2 General Liability Insurance

Instead of the minimum limits listed in Section 7-3.2 of the Standard Specifications, the coverage shall provide the following minimum limits:

Insurance Coverage Requirements	**Limits of Liability**
Comprehensive General Liability Aggregate Limit	$ 2,000,000
Products/Completed Operations Hazard Aggregate Limit	$ 1,000,000
Bodily Injury Limit	$ 2,000,000
Property Damage Limit	$ 2,000,000
Each Occurrence	$ 1,000,000

7-3.3 Workers' Compensation Insurance

The Workers' Compensation insurance shall have a minimum limit of one million dollars ($1,000,000) or the amount required by law, whichever is greater.

7-3.4 Automobile Insurance

Instead of the minimum limits listed in Section 7-3.4 of the Standard Specifications, the automobile insurance shall have a minimum limit of one million dollars ($1,000,000) per claim and occurrence and one million dollars ($1,000,000) in the aggregate for bodily injuries or death of one person and one million dollars ($1,000,000) for property damage arising from one incident.

7-3.5 If required by the City, Contractor shall also provide the following policy(ies) of insurance:

–

Name the City of Westlake Village as additionally insured.

INDEMNIFICATION

The following indemnity provisions shall supersede the indemnity in Section 7-3.1 of the Standard Specifications.

7-3.6 Contractor's Duty

To the maximum extent permitted by law, the Contractor hereby agrees, at its sole cost and expense, to defend with competent defense counsel approved by the City Attorney, protect, indemnify, and hold harmless the City, its elected and appointed officials, officers, employees, volunteers, attorneys, agents (including those City agents serving as independent contractors in the role of City representatives), successors, and assigns (collectively "Indemnitees") from and against any and all claims (including, without limitation, claims for bodily injury, death or damage to property), demands, charges, obligations, damages, causes of action, proceedings, suits, losses, stop payment notices, judgments, fines, liens, penalties, liabilities, costs and expenses of every kind and nature whatsoever, in any manner arising out of, incident to, related to, in connection with or resulting from any act, failure to act, error or omission of the Contractor or any of its officers, agents, attorneys, servants, employees, Subcontractors, material suppliers or any of their officers, agents, servants or employees, and/or arising out of, incident to, related to, in connection with or resulting from any term, provision, image, plan, covenant, or condition in the Contract Documents; including, without limitation, the payment of all consequential damages, attorneys' fees, experts' fees, and other related costs and expenses (individually, a "Claim," or collectively, "Claims"). The Contractor shall promptly pay and satisfy any judgment, award or decree that may be rendered against any of the Indemnitees as to any such Claim. The Contractor shall reimburse Indemnitees for any and all legal expenses and costs incurred by each of them in connection therewith or in enforcing the indemnity herein provided. The Contractor's obligation to indemnify shall not be restricted to insurance proceeds, if any, received by the Contractor or Indemnitees. This indemnity shall apply to all Claims regardless of whether any insurance policies are applicable or whether the Claim was caused in part or contributed to by an Indemnitees.

7-3.7 Civil Code Exception

Nothing in this Section 7-4 shall be construed to encompass Indemnitees' sole negligence or willful misconduct to the limited extent that the underlying Contract is subject to Civil Code Section 2782(a) or the City's active negligence to the limited extent that the underlying Contract Documents are subject to Civil Code Section 2782(b), provided such sole negligence, willful misconduct or active negligence is determined by agreement between the parties or by the findings of a court of competent jurisdiction.

7-3.8 Nonwaiver of Rights

Indemnitees do not and shall not waive any rights that they may possess against the Contractor because the acceptance by the City, or the deposit with the City, of any insurance policy or certificate required pursuant to these Contract Documents. This indemnity provision is effective regardless of any prior, concurrent, or subsequent active or passive negligence by Indemnitees and shall operate to fully indemnify Indemnitees against any such negligence.

7-3.9 Waiver of Right of Subrogation.

The Contractor, on behalf of itself and all parties claiming under or through it, hereby waives all rights of subrogation and contribution against the Indemnitees, while acting within the scope of their duties, from all Claims arising out of or incident to the activities or operations performed by or on behalf of the Contractor regardless of any prior, concurrent or subsequent active or passive negligence by Indemnitees.

7-3.10 Survival.

The provisions of this Section 7-4 shall survive the expiration or termination of the Contract, are intended to be as broad and inclusive as is permitted by the law of the State, and are in addition to any other rights or remedies that Indemnitees may have under the law. Payment is not required as a condition precedent to an Indemnitee's right to recover under this indemnity provision, and an entry of judgment against the Contractor shall be conclusive in favor of the Indemnitee's right to recover under this indemnity provision.

7-4 *PERMITS*

Before starting any construction work, the Contractor will be required to obtain all necessary permits from the City, which may include obtaining a no fee encroachment permit for Work within the public right-of-way, as well as all other permits required from all other agencies. Should this Project require construction of trenches or excavations which are five (5) feet or deeper and into which a person is required to descend, the Contractor shall obtain a Cal/OSHA permit and furnish the City with a copy before Work can commence on this Project. Contractor shall bear all cost for fees for all agencies except for the City's permit fees.

7-7 COOPERATION AND COLLATERAL WORK

The Contractor shall be responsible for coordinating all Work with the City's street sweeping, trash pick-up, and street maintenance contractors, emergency services departments, utility companies' crews, and others when necessary. Payment for conforming to these requirements shall be included in other items of Work, and no additional payment shall be made thereof.

7-8 WORKSITE MAINTENANCE

Clean-up shall be done as Work progresses at the end of each day and thoroughly before weekends. The Contractor shall not allow the Work site to become littered with trash and waste material, but shall maintain the same in a neat and orderly condition throughout the construction operation. Materials which need to be disposed shall not be stored at the project site, but shall be removed by the end of each Working Day. If the job site is not cleaned to the satisfaction of the City Engineer, the cleaning will be done or contracted by the City and shall be back-charged to the Contractor and deducted from the Contract Price.

The Contractor shall make arrangements for storing its equipment and materials. The Contractor shall make its own arrangements for any necessary off-site storage or shop areas necessary for the proper execution of the Work. Approved areas within project site may be used for temporary storage; however, the Contractor shall be responsible for obtaining any necessary permits from the City. In any case, the Contractor's equipment and personal vehicles of the Contractor's employees shall not be parked on the traveled way or on any section where traffic is restricted at any time.

The Contractor shall deliver, handle, and store products in accordance with the manufacturer's written recommendations and by methods and means that will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at the project site and overcrowding of construction spaces. In particular, the Contractor shall provide delivery and installation coordination to ensure minimum holding or storage times for products recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss.

Storage shall be arranged to provide access for inspection. The Contractor shall periodically inspect to assure products are undamaged and are maintained under required conditions.

The Contractor shall promptly remove from the vicinity of the completed Work, all rubbish, debris, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. Final acceptance of the Work by the City will be withheld until the Contractor has satisfactorily complied with the foregoing requirements for final clean-up of the Project site.

All costs associated with the clean-up and storage required to complete the Project shall be the sole responsibility of the Contractor.

7-10 PUBLIC CONVENIENCE AND SAFETY

7-10.1 TRAFFIC AND ACCESS

Add the following:

Vehicular and pedestrian access to street intersections, public and private parking lots, commercial businesses, residences, and other public and private properties must be maintained at all times except at locations where the Engineer determines that certain items of work cannot be accomplished without access restriction. At those locations, access restriction shall be limited to the time period required to accomplish the particular item of work. At least 72 hours in advance of starting any work that may affect the access to private properties, the Contractor shall provide written notice to such property owners.

Unless otherwise approved, the Contractor shall maintain at least one lane of traffic in each direction through the project area at all times in a manner satisfactory to the Engineer.

7-10.2.5 DUMPSTERS AND STORAGE TRAILERS

Dumpsters, storage trailers, and/or roll-off storage boxes shall be allowed to be stored in public right of way only when and where specifically authorized by the Engineer.

7-15 *RECYCLING OF MATERIALS*

Subsection 7-15 is hereby added to the Standard Specifications as follows:

7-15.1 Recycling of Asphalt Concrete, Portland Cement Concrete, Aggregate Base, and Green Waste are Required

The records of disposal, including scale tonnages, shall be furnished to the City on a monthly basis. Failure to comply with the requirements of this Section will result in delay of progress payment.

7-15.2 Contractor's Obligation

The City is committed to a recycling program. If available, it is the obligation of the Contractor, under this Contract, to recycle the waste material through an approved recycling plant. Records and reports of waste recycle will be submitted to the City on a regular monthly basis.

SECTION 8. FACILITIES FOR AGENCY PERSONNEL

The provisions of Section 8 of the Standard Specifications shall apply except as modified herein. No field offices for City personnel shall be required; however, City personnel shall have the right to enter upon the Project at all times and shall be admitted to the offices of the Contractor to use the telephone, desk and sanitary facilities provided by the Contractor for its own personnel.

SECTION 9. MEASUREMENT AND PAYMENT

The provisions below shall supplement, but not replace, those provisions in Section 9 of the Standard Specifications.

9-1.2 Methods of Measurement

The Contract Price shall constitute full compensation for all labor, equipment, materials, tools and incidentals required to complete the Project as outlined in these Contract Documents and as directed by the City Engineer.

9-3 PAYMENT

9-3.1 General

In accordance with Public Contract Code Section 7107, if no claims have been filed and are still pending, the amount deducted from the final estimate and retained by the City will be paid to the Contractor except such amounts as are required by law to be withheld by properly executed and filed notices to stop payment, or as may be withheld for any other lawful purposes.

9-3.2 Partial and Final Payment

9-3.2.1 Monthly Closure Date and Invoice Date

In accordance with Section 9-3.2 of the Standard Specifications, the monthly closure date shall be the last Day of each month. A measurement of Work performed and a progress estimate of the value thereof based on the Contract and of the monthly payment shall be prepared by the Contractor and submitted to the City Engineer before the tenth (10th) Day of the following month for verification and payment consideration.

9-3.2.2 Payments

The City shall make payments within thirty (30) Days after receipt of the Contractor's undisputed and properly submitted payment request, including an updated construction schedule pursuant to Section 6-1.1 of the General Provisions. The City shall return to the Contractor any payment request determined not to be a proper payment request as soon as practicable, but not later than seven (7) Days after receipt, and shall explain in writing the reasons why the payment request is not proper.

9-3.2.3 Retention

The City shall withhold five percent (5%) from each progress payment. However, at any time after fifty percent (50%) of the Work has been completed, if the City Council finds that satisfactory progress is being made, it may, at its discretion, make any of the remaining progress payments in full for actual Work completed. The City shall withhold not less than five percent (5%) of the Contract Price from the Final Payment Amount (defined in Section 9-3.2.4) until at least thirty-five (35) days after recordation of the Notice of Completion, or recordation of a notice of completion or cessation, but not longer then the period permitted by Public Contract Code Section 7107.

9-3.2.4 Final Invoice and Payment

Whenever the Contractor shall have completely performed the Contract in the opinion of the City Engineer, the City Engineer shall notify the City Clerk that the Contract has been completed in its entirety. The Contractor shall then submit to the City Engineer a written statement of the final quantities of Contract items for inclusion in the final invoice. Upon receipt of such statement, the City Engineer shall check the quantities included therein and shall authorize a payment amount, which in the City Engineer's opinion shall be just and fair, covering the value of the total amount of Work done by the Contractor, less all previous payments and all amounts to be retained under the provisions of the Contract Documents ("Final Payment Amount"). The City Engineer shall then request that the City accept the Work and that the City Clerk be authorized to file, on behalf of the City in the office of the County Recorder, a Notice of Completion of the Work herein agreed to be done by the Contractor. In addition, the final payment will not be released until the Contractor returns the control set of Plans and Specifications showing the redlined as-built conditions.

9-3.2.5 Substitute Security

In accordance with Public Contract Code Section 22300, the Contractor may request that it be permitted to substitute securities in lieu of having retention withheld by the City from progress payments when such payments become due or, in the alternative, the Contractor may request that the City make payments of earned retentions directly to an agreed upon designated escrow agent at the Contractor's expense. If the Contractor selects either one of these alternatives, the following shall control.

9-3.2.5.1 Substitution of Securities for Performance Retention

At some reasonable time before any progress payment would otherwise be due and payable to the Contractor in the performance of Work under these Contract Documents, the Contractor may submit a request to the City in writing to permit the substitution of retentions with securities equivalent to the amount estimated by the City ("estimated amount of retention") to be withheld. The Contractor shall deposit such securities with the City or may, in the alternative, deposit such securities in escrow with a State or federally chartered bank in California, as the escrow agent, at the Contractor's expense. Such securities will be the equivalent or greater in value of the estimated amount of retention. If the Contract is modified by written Modifications or Change Orders or the Contractor otherwise becomes entitled to receive an amount more than the Contract Price at the time the securities are deposited, the Contractor shall, at the request of the City, deposit with the City or escrow agent, whichever is applicable, additional securities within a reasonable time so that the amount of securities on deposit with the City or escrow agent is equivalent or greater in value than the amount of retention the City would otherwise be entitled to withhold from progress payments due or to become due to the Contractor as the Work progresses. The City shall withhold any retention amount that exceeds the security amount until the additional securities are deposited and, if the deposit is with an escrow agent, the City has confirmation from

that escrow agent of the new total value of securities. Upon satisfactory completion of the Contract, which shall mean, among other things, that the City is not otherwise entitled to retain proceeds from progress payments as elsewhere provided in the Contract or under applicable law, the securities shall be returned to the Contractor. The City shall, within its sole discretion, determine whether the amount of the securities on deposit with the City or escrow agent is equal to or greater than the amount of estimated retention of progress payments that could otherwise be held by the City if the Contractor had not elected to substitute same with securities.

9-3.2.5.2 Deposit of Retention Proceeds with an Escrow Agent

As an alternative to the substitution of securities, as provided above, or the City otherwise retaining and holding retention proceeds from progress payments, the Contractor may request the City to make payments of retentions earned directly to an escrow agent with the same qualifications as required in Section 9-3.2.5.1 above and at the expense of the Contractor. At its sole expense, the Contractor may direct the investment of such retention payments into only such securities as mentioned in Section 9-3.2.5.3 below and shall be entitled to interest earned on such investments on the same terms provided for securities deposited by the Contractor. Upon satisfactory completion of the Contract, which shall mean when the City would not otherwise be entitled to withhold retention proceeds from progress payments had the Contractor not elected to have such proceeds deposited into escrow, the Contractor shall be allowed to receive from the escrow agent all securities, interest and payments deposited into escrow pursuant to the terms of this Section. The Contractor shall pay to each Subcontractor, not later than ten (10) Days of receipt of payment, the respective amount of interest earned, net of costs attributed to retention withheld from each Subcontractor, on the amount withheld to ensure performance of the Contractor.

9-3.2.5.3 Subcontractor Entitlement to Interest

If the Contractor elects to receive interest on any moneys withheld in retention by the City, then the Subcontractor shall receive the identical rate of interest received by the Contractor on any retention moneys withheld from the Subcontractor by the Contractor, less any actual pro rata costs associated with administering and calculating that interest. In the event that the interest rate is a fluctuating rate, the rate for the Subcontractor shall be determined by calculating the interest rate paid during the time that retentions were withheld from the Subcontractor. If the Contractor elects to substitute securities in lieu of retention, then, by mutual consent of the Contractor and the Subcontractor, the Subcontractor may substitute securities in exchange for the release of moneys held in retention by the Contractor. The Contractor shall pay each Subcontractor, not later than ten (10) Days after receipt of escrow moneys, the amount owed to each Subcontractor from the moneys plus the respective amount of interest earned, net of costs attributed to the retention held from each Subcontractor, on the amount of retention withheld to ensure performance of the Subcontractor.

9-3.2.5.4 Securities Eligible for Investment

Securities eligible for investment shall include those listed in Government Code Section 16430, bank or savings and loan certificates of deposit, interest-bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed upon between the Contractor and the City. The Contractor shall be the beneficial owner of any securities substituted for any monies withheld and shall receive any interest thereon.

9-3.2.5.5 Escrow Agreement for Security Deposits in Lieu of Retention

The escrow agreement that shall be used for the deposit of securities in lieu of retention shall substantially conform to the form prescribed in Public Contract Code Section 22300(f).

9-3.2.5.6 Inconsistencies with Prevailing Statutory Requirements

If there is any inconsistency between or differences in Public Contract Code Section 22300 and the terms of this provision, or any future amendments thereto, Section 22300 shall control.

9-4 AUDIT

The City or its representative shall have the option of inspecting and/or auditing all records and other written materials used by the Contractor in preparing its billings to the City as a condition precedent to any payment to the Contractor or in response to a construction claim or a Public Records Act (Government Code Section 6250 et seq.) request. The Contractor will promptly furnish documents requested by the City at no cost. Additionally, the Contractor shall be subject to State Auditor examination and audit at the request of the City or as part of any audit of the City, for a period of three (3) years after final payment under the Contract. The Contractor shall include a copy of this Section 9-4 in all contracts with its Subcontractors, and the Contractor shall be responsible for immediately obtaining those records or other written material from its Subcontractors upon a request by the State Auditor or the City. If the Project includes other auditing requirements, those additional requirements will be listed in the Special Provisions.

SECTION 10. ADDITIONAL TERMS

10-1 NONDISCRIMINATORY EMPLOYMENT

The Contractor shall not unlawfully discriminate against any individual based on race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, genetic information, marital status, sex, gender, gender identity, gender expression, age, sexual orientation or military and veteran status. The Contractor understands and agrees that it is bound by and will comply with the nondiscrimination mandates of all statutes and local ordinances and regulations.

10-2 NOTICE TO PROCEED

Upon award of this Contract and signing the Contract Documents, the City shall issue the Contractor a Notice to Proceed. The City will not authorize any Work to be done under these Contract Documents before the Contract has been fully executed. Any Work that is done by the Contractor in advance of such time shall be considered as being done at the Contractor's own risk and responsibility, and as a consequence will be subject to rejection.

10-3 CONTRACTOR'S RESPONSIBILITY FOR WORK

Until the final acceptance of the Work by the City as defined in Section 6-8.2 of the General Provisions, by written action of the City Engineer, the Contractor shall have the charge and care thereof and shall bear the risk of injury or damage to any part of the Work by the action of the elements, criminal acts, or any other cause. The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the Work occasioned by any cause before its completion and acceptance and shall bear the expense thereof, except for such injuries or damages arising from the sole negligence or willful misconduct of the City, its officers, agents or employees. In the case of suspension of Work from any cause whatever, the Contractor shall be

responsible for all materials and the protection of Work already completed, shall properly store and protect them if necessary, and shall provide suitable drainage and erect temporary structures where necessary.

10-4 PROCEDURE IN CASE OF DAMAGE TO PUBLIC PROPERTY

Any portions of curb, gutter, sidewalk or any other City improvement damaged by the Contractor during the course of construction shall be replaced by the Contractor at its own cost. The cost of additional replacement of curb, gutter or sidewalk in excess of the estimated quantities shown in the Bid form and Specifications, and found necessary during the process of construction (but not due to damage resulting from carelessness on the part of the Contractor during its operation), shall be paid to the Contractor at the unit prices submitted in the Bid.

10-5 REMOVAL OF INTERFERING OBSTRUCTIONS

The Contractor shall remove and dispose of all debris, abandoned structures, tree roots and obstructions of any character encountered during the process of excavation. It is understood that the cost of any such removals are made a part of the unit price bid by the Contractor under the item for excavation or removal of existing Work.

10-6 SOILS ENGINEERING AND TESTING

A certified materials testing firm may be retained by the City to perform materials tests during the Contractor's entire operation to ascertain compliance with the contract requirements. The City shall be responsible for the first series of tests. If the initial tests do not meet the contract requirements, the Contractor shall bear the cost of all subsequent tests.

If the City requires other tests or more specific requirements for testing regarding this Project, those details will be included in the Special Provisions.

10-7 ACCESS TO PRIVATE PROPERTY

Unless otherwise stated in the Special Provisions, the Contractor shall be responsible for all fees and costs associated with securing permission to access private property for any portion of the Project.

10-8 WORKING DAYS AND HOURS

The Contractor shall do all Work between the hours of 7:30 a.m. to 4:00 p.m., Monday through Friday. No Work will be allowed on weekends, or City holidays, which are as follows:

> City of Westlake Village: New Year's Day, Birthday of Martin Luther King, Jr., President's Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day, Day after Thanksgiving, Christmas Day.

In addition, no Work will be allowed on any special election Day that may be declared. Should a special election Day be declared, a time extension of one (1) Working Day will be granted for each such Day.

No work will be allowed during any City events being held at the Westlake Village Civic Center. Should such an event occur, a time extension of one (1) Working Day will be granted for each

event day that falls on a normal Working Day, and a time extension of one (1) Working Day will granted for any days leading up to any such event where preparation of the Civic Center is needed. Notice of an City Event will be given to the Contractor at the earliest possible date, and no later than one week prior.

A permit may have other hours or Days for the Contractor to do the Work, and those hours and Days shall supersede any hours and Days written in this Section.

Whenever the Contractor is permitted or directed to perform night Work or to vary the period during which Work is performed during the Working Day, the Contractor shall give twelve (12) hours' notice to the City Engineer so that inspection may be provided. Also, a charge may be made to the Contractor for approved overtime or weekend inspections requested by the Contractor.

10-9 COMPLIANCE WITH LAWS

The Contractor shall comply with all applicable federal, state and local laws, ordinances, codes and regulations in force at the time the Contractor performs pursuant to the Contract Documents.

10-10 CONTRACTOR'S REPRESENTATIONS

By signing the Contract, the Contractor represents, covenants, agrees, and declares under penalty of perjury under the laws of the State of California that: (a) the Contractor is licensed, qualified, and capable of furnishing the labor, materials, and expertise necessary to perform the services in accordance with the terms and conditions set forth in the Contract Documents; (b) there are no obligations, commitments, or impediments of any kind that will limit or prevent its full performance under the Contract Documents; (c) there is no litigation pending against the Contractor that could adversely affect its performance of the Contract, and the Contractor is not the subject of any criminal investigation or proceeding; and (d) to the Contractor's actual knowledge, neither the Contractor nor its personnel have been convicted of a felony.

10-11 CONFLICTS OF INTEREST

The Contractor agrees not to accept any employment or representation during the term of the Contract or within twelve (12) months after acceptance as defined in Section 6-8.2 of the General Provisions that is or may likely make the Contractor "financially interested," as provided in Government Code Sections 1090 and 87100, in any decisions made by the City on any matter in connection with which the Contractor has been retained pursuant to the Contract Documents.

10-12 APPLICABLE LAW

The validity, interpretation, and performance of these Contract Documents shall be controlled by and construed under the laws of the State of California, excluding California's choice of law rules. Venue for any such action relating to the Contract shall be in the Los Angeles County Superior Court.

10-13 TIME

Time is of the essence in these Contract Documents.

10-14 INDEPENDENT CONTRACTOR

The Contractor and Subcontractors shall at all times remain, as to the City, wholly independent contractors. Neither the City nor any of its officials, officers, employees or agents shall have control over the conduct of the Contractor, Subcontractors, or any of their officers, employees, or agents, except as herein set forth, and the Contractor and Subcontractors are free to dispose of all portions of their time and activities that they are not obligated to devote to the City in such a manner and to such Persons that the Contractor or Subcontractors wish except as expressly provided in these Contract Documents. The Contractor and Subcontractors shall have no power to incur any debt, obligation, or liability on behalf of the City, bind the City in any manner, or otherwise act on behalf of the City as agents. The Contractor and Subcontractors shall not, at any time or in any manner, represent that they or any of their agents, servants or employees, are in any manner agents, servants or employees of the City. The Contractor and Subcontractors agree to pay all required taxes on amounts paid to them under the Contract, and to indemnify and hold the City harmless from any and all taxes, assessments, penalties, and interest asserted against the City by reason of the independent contractor relationship created by the Contract Documents. The Contractor shall include this provision in all contracts with all Subcontractors.

10-15 CONSTRUCTION

In the event of any asserted ambiguity in, or dispute regarding the interpretation of any matter herein, the interpretation of these Contract Documents shall not be resolved by any rules of interpretation providing for interpretation against the party who causes the uncertainty to exist or against the party who drafted the Contract Documents or who drafted that portion of the Contract Documents.

10-16 NON-WAIVER OF TERMS, RIGHTS AND REMEDIES

Waiver by either party of any one (1) or more of the conditions of performance under these Contract Documents shall not be a waiver of any other condition of performance under these Contract Documents. In no event shall the making by the City of any payment to the Contractor constitute or be construed as a waiver by the City of any breach of covenant, or any default that may then exist on the part of the Contractor, and the making of any such payment by the City shall in no way impair or prejudice any right or remedy available to the City with regard to such breach or default.

10-17 TERM

The Contract is effective as of the Effective Date listed, and shall remain in full force and effect until the Contractor has fully rendered the services required by the Contract Documents or the Contract has been otherwise terminated by the City. However, some provisions may survive the term listed within this Section, as stated in those provisions.

10-18 NOTICE

Except as otherwise required by law, any notice or other communication authorized or required by these Contract Documents shall be in writing and shall be deemed received on (a) the day of delivery if delivered by hand or overnight courier service during the City's regular business hours or (b) on the third (3rd) business day following deposit in the United States mail, postage prepaid,

to the addresses listed on the Contractor's Bid and City Hall, or at such other address as one party may notify the other.

10-19 SEVERABILITY

If any term or portion of these Contract Documents is held to be invalid, illegal, or otherwise unenforceable by a court of competent jurisdiction, the remaining provisions of these Contract Documents shall continue in full force and effect.

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SPECIAL PROVISIONS

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SECTION 02 75 10 CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete sidewalks, curbs, gutters, utility slabs, parking areas, driveways, driveway aprons and approaches.

B. Finishing concrete pavements.

C. Steel reinforcement.

1.2 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ADAAG - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

C. ASTM A82 - Specification for Steel Wire, Plain, for Concrete Reinforcement.

D. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

E. ASTM A184 - Specification for Fabricated Deformed Steel Bar Mats for Concrete.

F. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

G. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.

H. ASTM C33 - Concrete Aggregates.

I. ASTM C94 - Ready Mixed Concrete.

J. ASTM C150 - Portland Cement.

K. ASTM C260 - Air-Entraining Admixtures for Concrete.

L. ASTM C289 - Potential Reactivity of Aggregates.

M. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.

N. ASTM C494 - Chemical Admixtures for Concrete.

O. ASTM C618- Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture for Concrete.

P. ASTM C979 - Pigments for Integrally Colored Concrete.

Q. ASTM C1116 - Specification for Fiber-Reinforced Concrete and Shotcrete.

R. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California

State Accessibility Standards.

S. DSA/AC - Division of State Architect/Access Compliance.

T. National Ready Mix Concrete Association - Plant Certification Program.

U. Southern California Chapter, American Public Works Association – Standard Specifications for Public Works Construction.

V. Storm-water Best Management Practice Handbook (BMP Handbook), Construction Edition, as published by the California Storm Water Quality Association.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Obtain materials from same source throughout.

1.4 QUALIFICATIONS

A. Manufacturer: Manufacturer of ready-mix concrete products complying with ASTM C94 requirements for production facilities and equipment. Certified according to National Ready Mix Concrete Association's Plant Certification Program.

B. Installer: Company who has completed pavement work similar in material, design, and extent to that indicated for this project.

1.5 REGULATORY REQUIREMENTS

A. Conform to (CBC) California Building Code, (CCR) Title 24, Part 2, and 2010 ADA standard for access requirements for individuals with disabilities.

B. Portland Cement concrete surface finish paving shall be stable, firm, and slip resistant and shall comply with **CBC Sections 11B-302.**

C. Detectable Warning Surfaces

1. Detectable warning surfaces shall not be used on the project.

1.6 ENVIROMENTAL REQUIREMENTS

A. Provide concrete curing, finishing, and waste management techniques as defined in Section 4 of the Storm Water Best Management Practice Handbook, (BMP Handbook) Construction Edition.

1.7 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Include data on curing compounds.

C. Submit proposed mix design to testing laboratory and to Architect for review prior to commencement of work.

D. Submit manufacturer's instructions under provisions of Section 013300.

1.8 MOCKUP

A. Provide mockup of each pavement finish under provisions of Section 014500.

B. Construct mockup area under conditions similar to those which will exist during actual placement, with coatings applied.

C. Locate where directed.

D. Mockup may not remain as part of the work.

1.9 WARRANTY

A. Provide five-year warranty under the provisions of Section 017400 for detectable warning pavement.

B. Warranty: Shall indicate compliance with standards required by CBC, California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, 11B-705.3. Warranty coverage shall include durability criteria which indicates that the shape, color fastness, sound-on-cane acoustic quality, resilience, and attachment will not degrade significantly for at least five years after original installation. As used in this Article, “not degrade significantly” means that the product maintains at least 90 percent of its approved design characteristics, as determined by the Division of The State Architect.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement: ASTM C150 Normal-Type I Portland type, gray color, from single source throughout project.

B. Fine and Coarse Aggregates: ASTM C33, non-reactive when tested in accordance with ASTM C289 and Appendix X-1 of ASTM C33.

C. Water: Clean and not detrimental to concrete.

2.2 BASE MATERIALS

A. Aggregate Base: Crushed rock conforming to Section 200-2.2 of the Standard

Specifications for Public Works Construction.

2.3 FORM MATERIALS

A. Conform to ACI 301.

2.4 REINFORCEMENT

A. Reinforcing Steel: ASTM A615; 60 ksi yield grade; deformed billet steel bars, uncoated finish.

B. Welded Steel Wire Fabric: Plain type, ASTM A185; in coiled rolls or flat sheets; uncoated finish.

C. Fabricated Bar Mats: ASTM A184; welded or clip-assembled steel bar mats of ASTM A615, Grade 60 steel bars.

D. Tie Wire: ASTM A82, annealed steel, minimum 16 gage size.

E. Dowels: ASTM A615; 40 ksi yield grade, plain steel, uncoated finish.

F. Supports: Chairs, spacers, dowel bar supports and other devices for spacing, supporting and fastening reinforcing bars, welded wire fabric, and dowels in place.

G. Secondary Fibrous Reinforcement:

1. Collated, fibrillated, polypropylene fibers for secondary reinforcement of concrete slabs with length varying from 1-1/2 to 2 inches or nylon filamentized fibers of 3/4 inch length meeting requirements of ASTM C1116, Type III.

2. Manufacturers:

a. Forta Mono or Forta, Forta Corp., www.fortacorp.com.

b. Fibermix or Fibermesh, SI Concrete Corp., www.fibermesh.com.

c. Nycon, Nycon, Inc., www.nycon.com.

d. Grace Fibers or Micro Fibers, W.R. Grace and Co., www.graceconstruction.com.

3. Substitutions: Under provisions of Section 016300.

2.5 ACCESSORIES

A. Curing Compound: ASTM C309, Type 1-D, Class B.

B. Preformed Joint: ASTM D1751, 1/2 inch thick.

C. Joint Sealers: As specified in Section 027640.

2.6 ADMIXTURES

A. Air Entrainment: ASTM C260.

B. Surface Retarder: ASTM C494, Type B or D.

C. Fly Ash: ASTM C618, Class F.

D. Water Reducing Admixture: ASTM C494, Type A.

E. Integral Color Mix shall be "Coachella Sand" C-15 Scofield Chromix Admixtures

2.7 CONCRETE MIX

A. Mix concrete in accordance with ASTM C94, Alternative No. 3.

B. Provide concrete of the following characteristics:

1. Driveways, aprons and approaches: Compressive strength of 3,500 psi at 28 days. Integrally Colored, color to be shown in mock up and approved by City Representative.

2. Sidewalks, curbs, gutters and utility slabs: Compressive Strength of 2,500 psi at 28 days. Integrally Colored, color to be shown in mock up and approved by City Representative.

3. Slump: 4 to 6 inches.

4. Maximum aggregate size: 3/4 inch.

5. Cement Content: Minimum 5.5 sacks/cu. yd.

6. Fly Ash: Maximum 25 percent by weight.

7. Air Entrainment: 2 to 4 percent.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify compacted subgrade is ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

C. Beginning of installation means acceptance of existing conditions.

3.2 BASE

A. Prepare and compact base materials in accordance with provisions of Section **023160**.

3.3 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of adjacent manholes, catch basins, inlets, and other fixed objects with oil to form isolation joint and prevent bond with paving.

C. Notify Architect minimum 24 hours prior to commencement of concreting operations.

3.4 FORMING

A. Place and secure forms to correct location, dimension, and profile.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint fillers vertical in position, in straight lines. Secure to formwork during concrete placement.

3.5 REINFORCEMENT

A. Place reinforcement at mid-height of slabs-on-grade.

B. Lap adjoining pieces of welded wire fabric one full mesh and lace splice with wire. Offset laps of adjoining sheets.

C. Place fabricated bar mats in lengths as long as practical. Overlap adjacent mat 2 inches.

D. Interrupt reinforcement at expansion joints.

E. Place secondary fiber reinforcement in concrete mix in quantities as specified for concrete pavements.

F. Place reinforcement to achieve slab and curb alignment as detailed.

G. Provide doweled joints at interruption of concrete with one end of dowel set in capped sleeve to allow longitudinal movement.

3.6 PLACING CONCRETE

A. Place concrete in accordance with ACI 301.

B. Hot and Cold Weather Placement: ACI 301.

C. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.

D. Place concrete continuously between predetermined construction joints and control

joints.

E. Do not push or drag concrete into place or use vibrators to move concrete into place.

F. Place concrete to pattern indicated in strip sequence.

3.7 JOINTS

A. Review locations of joints when indicated and make recommendations for any additional joints or suggestions for new locations. Lack of joints or misplacement of joints will not constitute justification of pavement cracking.

B. Place expansion joints as indicated on civil drawings to correct elevation and profile. Align curb, gutter, and sidewalk joints.

C. Place joint filler between paving components and building or other appurtenances. Recess top of filler for sealant placement by Section 027640.

D. Provide control joints at not to exceed 5 FOOT intervals.

E. Hand tool control joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

F. Provide keyed joints as indicated.

G. Finish each edge of joint with radiused jointer tool

H. Form isolation joints where paving abuts curbs, catch basins, manholes, inlets, structures, and other fixed objects.

3.8 FINISHING

A. Uniformly spread, screed and consolidate concrete. Do not spread concrete by vibration.

B. Smooth Form Finish:

1. Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with number of seams kept to a practical minimum and in a uniform, orderly pattern.

2. Patch tie holes and defects.

3. Trowel to smooth even finish.

4. Use for curbs, gutters, and mowstrips.

C. Medium Broom Finish:

1. Float surface and trowel to smooth even finish.

2. While surface is still plastic draw a soft fiber bristle broom uniformly over surface in perpendicular direction to traffic.

3.9 CURING

A. Cure concrete surfaces in accordance with ACI 301.

B. Apply curing compound on finished slab surfaces in accordance with manufacturer's instructions.

3.10 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 014580.

B. Owner's Inspector will take cylinders and perform slump tests in accordance with ACI 301 and will arrange for pick-up of cylinders by Testing Laboratory.

C. Three concrete test cylinders will be taken for every 50 or less cu yds of each class of concrete placed each day.

D. One slump test will be taken for each set of test cylinders taken.

E. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.11 TOLERANCES

A. Provide tolerances under provisions of Section 014500.

B. Maximum Variation of Surface Flatness: 1/4 inch in 10 feet.

C. Maximum Variation from True Position: 1/4 inch.

D. Variation of Pavement Thickness: Plus 3/8 inch, minus 1/4 inch.

E. Maximum Variation of Pavement Joints: 1/8 inch vertical alignment.

3.12 PROTECTION

A. Immediately after placement, protect concrete under provisions of Section 016000 from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit traffic over pavement for 7 days after finishing.

END OF SECTION 02 75 10

SECTION 02 76 40 PAVEMENT JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Expansion and contraction joints within cement concrete pavement.
2. Joints between cement concrete and walls.

1.2 SUBMITTALS

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

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

C. Product certificates and test reports.

D. Compatibility and Adhesion Test Reports: From sealant manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 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.

1. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 COLD-APPLIED JOINT SEALANTS

A. Single-Component Urethane Sealant for Concrete: Single-component, pourable, coal-tar- modified, urethane formulation complying with ASTM C 920 for Type S; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.

02 76 40-1 PAVEMENT JOINT

1. Available Products:

   a. Sonneborn, Div. of ChemRex, Inc.; Sonomeric 1.

   b. Craftco Inc.

   c. Dow Corning

B. Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3406.

1. Available Products:

   a. Crafco Inc.; Superseal 444/777.
   b. Meadows, W. R., Inc.; Poly-Jet 3406.

2.4 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

PART 3 - EXECUTION

3.1 INSTALLATION

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

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint- sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience.

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

D. Install backer materials to support sealants during application and at position required to produce optimum sealant movement capability. Do not leave gaps between ends of backer materials. Do not stretch, twist, puncture, or tear backer materials. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

E. Install sealants at the same time backings are installed to completely fill recesses provided for each joint configuration and to produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Immediately after sealant application and before skinning or curing begins, apply fine grade (60) silica sand to joint surface.

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

H. After curing, remove excess silica sand.

END OF SECTION
027640

SECTION 032000 – CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Reinforcing steel bars, and welded steel wire fabric for cast-in-place concrete.
   2. Support chairs, bar supports, and spacers for reinforcing.

B. Related Sections:
   1. 012300 - Alternates: Descriptions of alternates involving work of this Section.
   2. 031000 - Concrete Forming and Accessories: Coordination.
   3. 042200 - Concrete Unit Masonry: Requirements for steel bar reinforcing.
   4. 312000 - Earth Moving: Coordination; vapor barrier.
   5. 316329 - Drilled Concrete Piers and Shafts: Requirements for steel bar reinforcing.
   6. 321313 - Concrete Paving: Requirements for steel bar reinforcing.

C. The Drawings, provisions of the Agreement, the General Conditions, and Division 01 specification sections apply to all work of this Section.

D. Substitutions will be considered only under the terms and conditions of Section 016000.

1.2 REFERENCES

A. American Concrete Institute (ACI):
   1. 301 - Specifications for Structural Concrete for Buildings.
   2. 315 - Details and Detailing of Concrete Reinforcement.
   3. 318 - Building Code Requirements for Reinforced Concrete.

B. American Society for Testing and Materials (ASTM):
   1. A82 - Specifications for Steel Wire, Plain, for Concrete Reinforcement.
   2. A184 - Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
   3. A185 - Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
   4. A615 - Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
   5. A706 - Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.

C. American Welding Society (AWS): D1.4 Structural Welding Code - Reinforcing Steel.

D. Concrete Reinforcing Steel Institute (CRSI):
   1. MSP-1 - Manual of Standard Practice.
   2. 63 - Recommended Practice for Placing Reinforcing Bars.

1.3 SUBMITTALS

A. Make submittals in accordance with Section 013300.

B. Shop Drawings:
   1. Indicate sizes, spacing and dimensions for fabrication and placing of reinforcing steel, including bar supports and stirrup spacing.
   2. Indicate bar schedules, and diagrams of bent bars.
   3. Indicate welds, ties, and details.
   4. Structural Drawings shall not be used as a data base for submittal of reinforcing steel placement drawings.

1.4 QUALITY ASSURANCE

A. Regulatory Agencies: Conform to requirements of the jurisdictional Code authorities.

B. Installer Qualifications: Three years experience in installation of steel bar and welded wire fabric reinforcing.

C. Welders Qualifications: AWS certified for types of welds required.

D. Inspections and Tests: As specified in Sections 003153 and 014500.

E. Refer to Structural Drawing S-001 for additional requirements.

1.5 PRODUCT HANDLING

A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.

B. Handle and store materials to prevent contamination.

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

1.6 SUBCONTRACTOR GUARANTEE

A. Furnish Subcontractor Guarantees in accordance with Section 017700.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing Bars: As specified on Structural Drawings. [ASTM A615, Grade 60; ASTM A706, Grade 60, for welded assemblies].

B. Welded Wire Fabric: As specified on Structural Drawings; mesh and wire sizes as noted. [ASTM A185, 6 x 6 - Wx Wwire, unless otherwise noted.]

C. Tie Wire: Double annealed steel; black; 16 gage minimum; galvanized for exterior exposed concrete.

D. Bar Supports: Conform to CRSI MSP-1; bright basic finish, except use plastic coated devices where surfaces are exposed to weather.

E. Welding Electrodes: As specified on Structural Drawings. [Conform to AWS D1.4 for type and grade of materials being welded.]

2.2 FABRICATION

A. Steel Bar Reinforcement:
   1. Fabricate in accordance with ACI 315 to shapes and dimensions indicated on the Structural Drawings.
   2. Bending and Straightening: In accordance with ACI 318.
   3. Splices: In accordance with ACI 318, unless indicated otherwise; obtain approval of splices not indicated on Structural Drawings or approved on shop drawings.
   4. Shop Welding: Provide welding only as indicated on Structural Drawings, unless approved otherwise; comply with requirements of ACI 318 and AWS D1.4.

B. Reinforcing Steel Bar Mats: Fabricate in accordance with ASTM A184.

C. Welded Wire Fabric: Fabricate in flat sheets, not rolls, of ASTM A82 plain cold-drawn steel wire, in accordance with the CRSI MSP-1; standard finish unless noted otherwise.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to starting work, carefully examine installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.

B. Do not begin installation until all unsatisfactory conditions are resolved. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 INSTALLATION

A. Clean reinforcing steel free from loose rust, millscale, mud, oil, and other foreign matter which would affect bond.

B. Place supports and steel reinforcing in accordance with ACI 318 and CRSI 63.

C. Unless approved otherwise, bars may be moved a maximum of 1 bar diameter to avoid interference with other reinforcing steel, conduit, or other embedded items. Maintain required coverage.

D. Obtain written approval by the Architect prior to heating, bending, welding, or cutting bar in locations other than those indicated or specified.

E. Field welding shall be in accordance with AWS D1.4.

F. Splices:
   1. Lap Splices: Class B unless indicated otherwise. Tie securely with wire to prevent displacement of splices during placement of concrete.
   2. Locations: Only where indicated on Structural Drawings or approved shop drawings; do not splice bars at other locations without approval by Architect.

G. Bends: Bars shall not be field bent unless field bending is indicated on Structural Drawings, and only bent once.

H. Welded Wire Fabric:
   1. Install in accordance with ACI 301 and ACI 315.
   2. Install in longest practicable sections.
   3. Lap adjoining pieces such that the overlap between outermost cross wires of each sheet is not less than 2 full meshes or 12 inches at structural slabs, one full mesh or 6 inches at slabs-on-grade. Lay splices with 16 gauge wire.
   4. Offset end laps in adjacent widths to prevent continuous laps.

I. Prevent displacement in accordance with ACI 301.

J. Placement Tolerances: ACI 301.

K. Do not displace or damage vapor barrier under slabs during work of this Section.

END OF SECTION 032000

SECTION 03 3000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Requirements:

1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

1.4 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.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, **acceptable to authorities having jurisdiction,** qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.6 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1.

1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M).

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117 (ACI 117M).

2.2 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.

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.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

D. 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."

2.4 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type per Plans
2. Fly Ash: ASTM C 618, **Class F**

3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.

1. Maximum Coarse-Aggregate Size: **3/4 inch (25 mm)** nominal for slab on grade and 1½ inches for footings.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures 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.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

D. Water: ASTM C 94/C 94M **and potable**.

2.5 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: **ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork**.

2.7 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 (ACI 301M).

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use **water-reducing or plasticizing** 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 0.50.

2.8 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Normal-Weight Concrete:

1. Minimum Compressive Strength: **Per plans**.
2. Maximum W/C Ratio: Per plans.
3. Slump Limit: Per plans.

2.9 FABRICATING REINFORCEMENT

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

2.10 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 (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), 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 (ACI 117M).

C. **Do not chamfer** exterior corners and edges of permanently exposed concrete.

3.2 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.

3.3 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 (150 mm) and seal with manufacturer's recommended tape.

3.4 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.

3.5 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 Architect.

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. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) 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.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. 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. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces **not exposed to public view**.

B. 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**.

C. 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.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

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.

3.8 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, 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 (6 mm) in one direction.

1. Apply scratch finish to surfaces **indicated in architectural**.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces **indicated in architectural.**

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten 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 **indicated in architectural**.
2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed **3/16 inch (4.8 mm)**.

E. Broom Finish: Apply a broom finish to exterior concrete **indicated in architectural**.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 (ACI 301M) 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 (1 kg/sq. m 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. 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.
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 (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or

tears during curing period, using cover material and waterproof tape.

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.

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.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.11 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a **special inspector** to perform field tests and inspections and prepare test reports.

END OF SECTION 03 3000

SECTION 051200 – STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Structural steel frame and related elements.
   2. Steel frames for steel canopy framing, steel lintels, and other miscellaneous steel elements indicated on the Structural Drawings.
   3. Baseplate grouting.

B. Related Sections:
   1. 002215 - Bidder Requirements: Special bidding requirements.
   2. 031000 - Concrete Forming and Accessories: Placement of anchor bolts and accessories to be embedded in concrete.
   3. 055000 - Metal Fabrications: Miscellaneous steel fabrications not indicated on the Structural Drawings.
   4. 055016 - Metal Fabrications - General Bid: Miscellaneous steel fabrications not indicated on the Structural Drawings.
   5. 076126 - Metal Canopy Roofing: Coordination.
   6. 099000 - Painting: Field painting of exposed structural steel surfaces; special coating.

C. Drawings, the provisions of the Agreement, the General Conditions, and Division 1 specification sections apply to all work of this Section.

D. Substitutions: Substitute products will be considered only under the terms and conditions of Section 016000.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. A36 - Structural Steel.
   2. A53 - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
   3. A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.
   4. A123 - Zinc (Hot Dipped Galvanized Coatings on Iron and Steel Products.
   5. A153 - Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
   6. A307 - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
   7. A325 - High Strength Bolts for Structural Steel Joints.
   8. A449 - Quenched and Tempered Steel Bolts and Studs.
   9. A490 - Heat-Treated Steel Structural Bolts, 150ksi Minimum Tensile Strength.
   10. A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
   11. A572 - High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality.
   12. A992 - Specification for Steel for Structural Shapes Used in Building Framing.
   13. C1107 - Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

B. American Institute of Steel Construction, Inc. (AISC):
   1. Code of Standard Practice for Steel Buildings and Bridges:
      a. Paragraph 4.2.1 of the above Code is hereby modified by changing the second sentence to read as follows: If a fabricator wishes to change a connection that is fully detailed in the contract documents, the fabricator shall submit the change with all relevant and substantiating calculations and data

for review by the Owner's authorized representative in a manner that clearly indicates that a change is being requested.

b. Paragraph 4.2.2 is deleted in its entirety.

c. Paragraph 7.9.3 of the above Code is hereby modified by deletion of the following words: “The contract documents specify the sequence and schedule of placement of such elements and the effects of the loads imposed by these partial or completely installed interacting elements of the bare steel frame.”

2. Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, including the Commentary of the AISC Specification.

OR THE
FOLLOWING:

C. American Welding Society (AWS): D1.1- Structural Welding Code - Steel.

D. Steel Structures Painting Council (SSPC): Steel Structures Painting Manual, Volume 2, Systems and Specifications.

1.3 SUBMITTALS

A. Make submittals in accordance with Section 013300.

B. Shop Drawings: Indicate the following.
1. Profiles, sizes, spacing, and locations of structural members, connections, attachments, fasteners, cambers, loads.
2. Welded connections using standard AWS welding symbols.
3. Net weld lengths.
4. Components to be shop primed; including type of primer.
5. Components to be galvanized.

1.4 QUALITY ASSURANCE

A. Standards: Comply with applicable referenced AISC and AWS Standards.

B. Welders Qualifications: AWS certified for types of welds required.

C. Pre-Award Meeting:
1. Prior to structural steel subcontract award, administer a meeting to address proposed bidder’s experience in work of similar type and scope, source quality control programs, field conditions, exceptions to the specifications, related work, sequencing and coordination, and inspections; include procedures and requirements for submittals, testing under the subcontract, coordination with Owner testing, and requirements for scheduling and delivery.
2. Attendance: General Contractor, Architect, Structural Engineer, Owner, and each prospective subcontractor.
3. Subcontract award will be conditional upon installer's demonstration of intent to provide all materials necessary for in accordance with scheduling requirements, and in compliance with all provisions of the Contract Documents.

D. Inspection and Tests: Work is subject to testing and inspection as specified in Sections 003153 and 014500.

E. Structural Drawings shall not be used as a data base for submittal of steel erection drawings.

1.5 SUBCONTRACTOR GUARANTEE

A. Furnish Subcontractor Guarantees in accordance with Section 017700.

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL

A. Structural Steel: Types as indicated in "Notes" on Structural Drawings.

B. Structural Steel Wide Flange Shapes: ASTM A992.

C. Structural Steel Plates and Other Shapes (angles, channels and others): ASTM A36, except ASTM A572 at locations indicated on the Structural Drawings.

D. Structural Pipe: ASTM A53, Type E or S, Grade B.

E. Structural Tubing: ASTM A500, Grade B.

2.2 ACCESSORIES

A. Headed Steel Stud Connectors: Type as indicated in "Notes" on Structural Drawings. ASTM A108, Grade 1015 or 1020, cold-finished carbon steel, with dimensions complying with AISC Specifications.

B. Connection Bolts:
   1. ASTM A325, except ASTM A490 at locations indicated on Structural Drawings.
   2. Bolts may have load indicator washers; break off tightening devices, or other bolt tension indicators as approved by the Architect.
   3. Galvanized in accordance with ASTM A153 where exposed to the weather.

C. Anchor Bolts:
   1. Type as indicated in "Notes" on Structural Drawings, ASTM A36, ASTM A307 or ASTM A449.
   2. Galvanized in accordance with ASTM A153 where exposed to the weather.

D. Non-Shrink Base Plate Grout: Type as indicated in "Notes" on Structural Drawings. ASTM C1107, Grade C, non-shrink, non-metallic, minimum 7,000 psi at 28 days; Master Flow 713 by Master Builders, Inc., Cleveland, OH (800/628-9990), Sonogrout 10K by Sonneborn, Shakopee, MN (800/433-9517), or approved.

E. Standard Primer: Modified alkyd; Azeron Series FD-88 by Tnemec Company Inc. (816/483- 3400), GP 818 by Carboline (914/644-1000); or approved.

F. Shop Primers:
   1. Standard Primer: Modified alkyd; Azeron Series FD-88 by Tnemec Company Inc. (816/483-3400), GP 818 by Carboline (914/644-1000); or approved.
   2. Zinc Primer: Tnemec Series "394 PerimePrime;" single component moisture cured primer; minimum 62 percent solids by volume. Primer must be compatible with the special coating specified in Section 099000.

G. Welding Electrodes: E-70 series, low hydrogen, appropriate for use.

2.3 FABRICATION

A. Fabricate structural steel items in accordance with approved shop drawings. Properly mark and match-mark all materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling.

B. Shop fabricate in parts or sections as large as practicable.

C. Welds to be Exposed to View in Finished Work: Grind welds smooth with adjacent surfaces. Grind butt welds flat and perpendicular to the weld direction.

D. Beam Cutouts:
   1. Include in the Contract shop fabricated beam cutouts at locations indicated on the Structural Drawings and fabricated in accordance with details.
   2. Provide additional shop fabricated beam cutouts and field fabricated beam cutouts at locations to be determined at a later date; refer to Section 012200 - Unit Prices.

E. Galvanizing:
   1. For items indicated to be galvanized, comply with ASTM A123.
   2. Galvanize items after fabrication to the greatest practical extent. Treat all bare steel exposed by fabrication operations with cold galvanizing compound.
   3. Galvanize following components:
      a. Exposed to weather: exterior structural steel elements.
      b. Structural framing members at locations indicated on Structural Drawings.

F. Shop Primers:
   1. Preparation: Solvent clean in accordance with SSPC-SP1. Remove rust and scale by wire brushing, scraping, and sanding down to bare metal in accordance with SSPC-SP2 and SP3. Where SP2 and SP3 measures are insufficient, provide commercial blast cleaning in accordance with SSPC-SP6. Immediately apply specified prime coat.
   2. Application: Spray apply primer in accordance with manufacturer's recommendations, minimum 2.5 mil dry film thickness.
   3. Standard Primer - Apply to all steel except:
      a. Steel encased in concrete.
      b. Surfaces to be field welded.
      c. Contact surfaces at high-strength bolts.
      d. Members which will be concealed by interior finishes.
      e. Surfaces to receive sprayed fireproofing.
      f. Members which are galvanized.
      g. Members to receive zinc-rich primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to starting work, carefully examine installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.

B. Do not begin installation until all unsatisfactory conditions are resolved. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 PREPARATION

A. Embedded Items:
   1. Prior to the pouring of concrete, furnish anchor bolts and other embedded items to the concrete subcontractor for placement. Furnish setting templates to ensure proper alignment of embedded elements.
   2. Perform early verification that anchor bolts have been properly placed through review of as-built embedded element placement drawings specified in Section 011000. Notify the Architect in writing of errors in the placement of embedded elements which would affect installation of the structural steel.

3.3 ERECTION

A. Erect structural steel in accordance with approved shop drawings and AISC Code of Standard Practice, Section 7.

B. Temporary Shoring and Bracing: Provide as required with connections of sufficient strength to bear imposed loads. Remove temporary members when permanent members are in place and final connections are made.

C. Bolted Connections: Bolts in connections not specifically identified as slip-critical, subject to tension loads, or required to be fully tensioned bearing type connections shall be tightened to snug-tight condition as defined in RCSC Specification for Structural Joints.

D. Base Plate Grouting: Set on leveling nuts to accurate elevations and grout solid with non- shrink grout.

E. Touch-up of Primed Surfaces: Immediately after erection, clean field welds, bolted connections and abraded areas, and touch-up with same primer as applied in the shop.
   1. Tolerances: Maximum deviation from plumb, level, and alignment shall not exceed 1 in 500.

3.4 FIELD QUALITY CONTROL

A. Lower Flange Elevation Survey: To verify that proper camber has been built into beams and girders to support concrete fill, the bottom of lower flange elevations at end and mid points will be recorded, prior to placement of the fill, by the General Contractor's surveyor as specified in Section 011000.

END OF SECTION 051200

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Shear wall panels.
4. Rooftop equipment bases and support curbs.
5. Wood blocking**, cants,** and nailers.
6. Wood furring **and grounds**.
7. Wood sleepers.
8. Plywood backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. 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.

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, **omit grade stamp and provide certificates of grade compliance issued by grading agency**.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: **19 percent** unless otherwise indicated.

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

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.

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.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat **items indicated on Drawings, and the following:**

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, [**furring,**] [**stripping,**] 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 (460 mm) above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

1. Species and Grade shall be as noted on plan for all members.

2.4 ENGINEERED WOOD PRODUCTS

A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.

1. Versalam or Paralam
2. Extreme Fiber Stress in Bending, Edgewise: **2900 psi (20.0 MPa)** minimum.
3. Modulus of Elasticity, Edgewise: **2,000,000 psi (13 700 MPa) minimum**.

2.5 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. Cants.
5. Furring.
6. Grounds.

B. Species and Grade: Per plans.

2.6 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**.

B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on plans and referenced ESR.

2.7 METAL FRAMING ANCHORS

A. 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.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM

A 653/A 653M, G60 (Z180) coating designation.

1. Use for interior locations unless otherwise indicated.

C. 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 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.

1. Use for wood-preservative-treated lumber and where indicated.

2.8 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.

B. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.

C. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, [**butyl rubber**] [**or**] [**rubberized-asphalt**] 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 (0.6 mm).

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, and similar supports to comply with requirements for attaching other construction.

D. Install shear wall panels to comply with manufacturer's written instructions.

E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Do not splice structural members between supports unless otherwise indicated.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

I. 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 ICC's International Building Code (IBC).
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather.

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Parapet sheathing.
4. Composite nail base insulated roof sheathing.
5. Subflooring.
6. Underlayment.
7. Sheathing joint and penetration treatment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

A. Emissions: Products shall meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 WALL SHEATHING

A. Plywood Sheathing: **Exterior, Structural I** sheathing.

B. Oriented-Strand-Board Sheathing: **Exposure 1, Structural I** sheathing.

2.3 ROOF SHEATHING

A. Plywood Sheathing: **Exterior, Structural I** sheathing.

B. Oriented-Strand-Board Sheathing: **Exposure 1, Structural I** sheathing.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For **roof parapet and wall** sheathing, provide fasteners **with hot-dip zinc coating complying with ASTM A 153/A 153M.**

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

D. Coordinate **wall parapet and roof** sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:

a. **Nail** to wood framing.
b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch (3 mm) apart at edges and ends.

END OF SECTION 061600

SECTION 230500 – COMMON WORK FOR HVAC SYSTEMS

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. Requirements under this section includes required work that is common to multiple sections in Division 23 and shall be complied with by all suppliers and subcontractors.

B. This Section includes the following:

1. Mechanical sleeve seals.
2. Escutcheons.
3. Equipment Labels.
4. Supports.
5. Grout.
6. Motors.
7. Identification.
8. Vibration and Seismic Control.

1.3 DEFINITIONS

A. A/E: Prime design consultant responsible for preparation of these specifications.

B. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

C. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

D. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

E. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

F. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

G. The following are industry abbreviations for plastic materials:

1. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

A. Provide submittals per Section 013300, “Submittal Procedures.”

B. Product Data: Submit product data for each type of product indicated herein. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

C. Provide for the following:

1. Mechanical sleeve seals.
2. Escutcheons.
3. Equipment Labels.
4. Supports.
5. Motors.
6. Identification.
7. Wiring Diagrams: For power, signal, and control wiring.

D. Operation and Maintenance Data:

1. All equipment that includes an electrical connection or has recommended maintenance, along with all related accessories.
2. All controls.

1.5 PROJECT CONDITIONS

A. Do not install products or materials that are wet, moisture damaged, or mold damaged.

B. Field Measurements: Verify actual dimensions of site conditions by field measurements before fabrication.

1.6 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.

1.7 COORDINATION

A. Arrange for duct and pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08.

D. Coordinate work with other trades including venting, electrical connections, equipment connections, controls, etc.

E. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit.
4. Ambient and environmental conditions of installation location.

F. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

G. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

1. Basis of Design: Unistrut Corp.; Tyco International, Ltd.
2. Manufacturers:
   a. B-Line Systems, Inc.; a division of Cooper Industries.
   b. ERICO/Michigan Hanger Co.; ERISTRUT Div.
   c. Hubbard Enterprises/HOLDRITE®
   d. PHD Manufacturing, Inc.
   e. Unistrut Corp.; Tyco International, Ltd.

B. Coatings: Manufacturer's standard finish unless bare metal surfaces are indicated.

C. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.2 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated or stainless steel, for

use in hardened Portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:
    a. Basis of Design: Hilti, Inc.
    b. Hilti, Inc.
    c. Hubbard Enterprises/HOLDRITE®
    d. ITW Ramset/Red Head.
    e. Powers Fasteners.

2.3 MISCELLANEOUS MATERIALS

A. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
    1. Properties: Nonstaining, noncorrosive, and nongaseous.
    2. Design Mix: 5000-psi, 28-day compressive strength.
    3. All grout applied within project interior must comply with the California Department of Public Health (CDPH) Standard Method v1.1–2010, using the applicable exposure scenario, and contain no more than 50 g/L VOCs.

B. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, and tension and shear capacities appropriate for application.
    1. Stud: Threaded, zinc-coated carbon steel.
    2. Expansion Plug: Zinc-coated steel.
    3. Washer and Nut: Zinc-coated steel.

C. Concrete: Portland cement mix, 3000 psi minimum. Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for formwork, reinforcement, and concrete.

D. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink, nonmetallic grout; suitable for interior and exterior applications.
    1. Properties: Non-staining, noncorrosive, and nongaseous.
    2. Design Mix: 5,000-psi, 28-day compressive strength.

2.4 IDENTIFICATION FOR PIPING AND EQUIPMENT

A. Plastic Labels for Equipment:
    1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
    2. Letter Color: White.
    3. Background Color: Black.

4. Maximum Temperature: Able to withstand temperatures up to 160 degree F.

5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

7. Fasteners: Stainless-steel rivets or self-tapping screws.

8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number.

C. Do not use pipe labels or plastic tapes for bare pipes conveying fluids at temperatures of 125 degree F or higher.

D. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

E. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

F. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

G. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.

2. Lettering Size: At least 1-1/2 inches high.

2.5 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

2. Pressure Plates: Carbon steel. Include two for each sealing element.

3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

4. Basis of Design: Pipeline Seal and Insulator, Inc. "Thunderline Link Seal."

5. Manufacturers:
   a. Calpico
   b. Metraflex Co. Metraseal.

2.6 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.7 ESCUTCHEONS

A. General: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw or spring clips, and chrome-plated finish.

2.8 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 (34.5-MPa), 28-day compressive strength.
   3. Packaging: Premixed and factory packaged.

2.9 MOTORS

A. GENERAL MOTOR REQUIREMENTS
   1. Comply with NEMA MG 1 unless otherwise indicated.

B. MOTOR CHARACTERISTICS
   1. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
   2. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

C. SINGLE-PHASE MOTORS
   1. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

a. Permanent-split capacitor.

b. Split phase.

c. Capacitor start, inductor run.

d. Capacitor start, capacitor run.

2. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

3. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

4. Motors 1/20 HP and Smaller: Shaded-pole type.

5. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION

3.1 DEMOLITION

Refer to Section 017329, "Cutting and Patching" and Section 024119, "Selective Structure Demolition" for general demolition requirements and procedures.

A. Disconnect, demolish, and remove HVAC 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. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

B. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and provide new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.

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 or, if conflicts exist, as indicated on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. 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.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping at indicated or code-required slopes.

G. Install piping free of sags and bends.

H. Install piping to allow application of insulation.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Install escutcheons for penetrations of walls, ceilings, and floors where exposed to view from any location in a finished space and in stairways**,** according to the following:

1. New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: two-piece, deep-pattern type.

b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.

K. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, 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 mechanical equipment areas or other potentially-wet areas two inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

a. Steel Pipe Sleeves: For pipes smaller than NPS 6.

b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.

c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to two inches above finished floor level. Refer to Section 076200, "Sheet Metal Flashing and Trim" for flashing.

3. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 for materials and installation.

L. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves.

Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for one inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

M. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07.

N. Verify final equipment locations for roughing-in.

O. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING CONNECTIONS

A. See Section 232300, Refrigerant Piping:

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.5 HANGER AND SUPPORT APPLICATIONS

A. Comply with MSS SP-69 and 89 for pipe hanger selections and applications that are not specified otherwise in piping system Sections.

B. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

C. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

D. Use padded hangers for piping that is subject to scratching.

E. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as

specified in piping system Sections, install the following types:

1. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
2. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 and above, with steel pipe base stanchion support and cast-iron floor flange.
3. Single Pipe Rolls (MSS Type 41): For suspension of pipes, from 2 rods if longitudinal movement caused by expansion and contraction might occur.
4. Complete Pipe Rolls (MSS Type 44): For support of pipes, if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

F. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers if longer ends are required for riser clamps.

G. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

H. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

I. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
2. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
3. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.

J. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

K. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

L. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

M. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

N. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

O. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

P. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.

3.6 PAINTING

A. Systems, equipment, and components is specified in Sections 099123, "Interior Painting" and 099113, "Exterior Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

C. Supply City with drawdowns of each paint color used, for future matching.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.

3.8 GROUTING

A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.

3.9 COMMISSIONING

A. Notify the Commissioning Agent one week prior to start up of equipment.

B. Submit to the Commissioning Agent a Verification of Completion form with the pre-functional check off sheet for each component when it is ready for functional testing.

C. Assist the Commissioning Agent as required to perform the functional testing on the system components and the system as a whole.

END OF SECTION 230500

SECTION 232300 – REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Sections 230500 and are directly related to work included in this section. Other sections are indirectly related and shall be reviewed.

1.2 WORK INCLUDED

A. Work under this section shall include furnishing all labor, materials, tools, and equipment necessary for the complete installation of the field refrigerant piping.

B. Products installed but not furnished under this Section include pre-charged tubing, refrigerant specialties, and refrigerant accessories furnished as an integral part of or separately with packaged air conditioning, cooler, and freezer equipment.

1.3 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air-Conditioning Applications: 300 psig.
2. Suction Lines for Heat-Pump Applications: 535 psig.
3. Hot-Gas and Liquid Lines: 535 psig.

1.4 SUBMITTALS

A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:

1. Pre-insulated refrigerant line sets.

B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.

1. Shop Drawing Scale: 1/4 inch equals 1 foot

C. Welding certificates.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

PART 2 - PRODUCTS

2.1 PIPING AND FITTINGS

A. Refrigerant Piping: Copper refrigerant tube, ASTM B280, cleaned, dehydrated and sealed, marked ACR on hard temper straight lengths. Coils shall be tagged ASTM B280 by the manufacturer.

B. Water and Drain Piping: Copper water tube, ASTM B88, Type L, or refrigerant tube ASTM B280.

C. Fittings, Valves and Accessories:

1. Solder joints: Wrought copper fittings, ANSI B16.22.

a. Solder, refrigerant tubing: Cadmium free, AWS A5.8, 45 percent silver brazing alloy, Class BAg-5.

b. Solder, water and drain: 95-5 tin-antimony, ASTM B32 (95TA).

2. Flanges and flanged fittings: ANSI/ASME B16.24.

2.2 PIPE SUPPORTS

A. Refer to specification Section 230500.

2.3 REFRIGERANTS AND OIL

A. Provide required refrigerant and oil for proper system operation.

B. Refrigerant R410a, in accordance with ANSI/ASHRAE Standard 34.

2.4 PIPE INSULATION FOR DX HVAC SYSTEMS

A. General

1. All refrigerant copper lines shall be free of extraneous chemicals such as corrosive cleaners or building materials dust prior to the installation of the insulation.

2. Refrigerant pipe shall be sealed while slipping on insulation to prevent foreign matter from entering tube.

3. Insulation shall be slid onto pipe, longitudinal slitting of the insulation is not

allowed except on mitered sections. Insulation shall be pushed on pipe, not pulled.

4. Insulation shall be mitered, pre-adhered and longitudinally slit to fit over all P-traps, tees and elbows or bends over 90□.
5. All butt joints and mitered seams shall be adhered with full coverage of adhesive on both surfaces. Insulation shall not be stretched while adhering.
6. At the beginning and ends of piping runs, the insulation shall be adhered directly to the copper pipe using a 2-inch strip of adhesive. Insulation should not be adhered to the pipe at the extreme low points in any piping run.
7. Saddles or piping shields shall be installed under all insulated lines at clamps, clevis hangers, or locations where insulation may be compressed. Wood dowels or blocks, of a thickness equal to the insulation, shall be inserted and completely sealed into the insulation if the excessive compression of the insulation remains at the saddle locations.
8. Hangers clamped directly over the pipe shall be insulated over the hanger, insulation shall be fully adhered to the hanger. In addition, hangers with double rods shall be insulated between the rods. All seams of the insulation shall be sealed with adhesive.
9. All flexible elastomeric insulation exposed to sunlight or installed outdoors shall be protected with 2 coats of an approved UV-resistant finish after the adhesive is dry.

B. Flexible Elastomeric Closed-Cell Pipe Insulation: ASTM C534, flexible, molded or sheet. Materials shall have a minimum thermal conductivity of 0.27 Btu-in. per sq.ft. per °F per hour at a mean temperature of 75°F when tested in accordance with ASTM C177 or ASTM C518, latest revisions. Maximum service temperature, 180 °F. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E84, latest revision. Materials shall have a minimum water vapor transmission of 0.08 per-inches when tested in accordance with ASTM E96, Procedure A, latest revision. Provide waterproof vapor retarder adhesive. Insulation exposed to outdoors shall be provided with UV protection.

1. Manufacturer: Armacell "AP Armaflex" with Armacell No. 520 joint adhesive or Aeroflex "Aerocel" with Aeroseal joint adhesive.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install refrigerant piping and refrigerant containing parts in accordance with ANSI/ASHRAE Standard 15 and ANSI/ASME B31.5. Refrigerant piping shall be brazed with 15 percent silver solder in accordance with ANSI/AWS A5.8.

1. The equipment manufacturer establishes maximum piping length between components of the cooling/heating system. It is the contractor responsibility to verify that these piping lengths are not exceeded during installation.
2. Install piping as short as possible, with a minimum number of joints, elbow and fittings.

3. Install piping with adequate clearance between pipe and adjacent walls and hangers to allow for service and inspection. Space piping, including insulation, to provide one inch minimum clearance between adjacent piping or other surface.

   Use pipe sleeves through walls, floors, and ceilings, sized to permit installation of pipes with full thickness insulation.

4. Swab fittings and valves with manufacturer's recommended cleaning fluid to remove oil and other compounds prior to installation.

5. Install hangers and supports per ANSI/ASME B31.5 and the refrigerant piping manufacturer's recommendations.

B. Protect refrigerant system during construction against entrance of foreign matter, dirt and moisture; have open ends of piping and connections to compressors, condensers, evaporators and other equipment tightly capped until assembly.

C. Pass nitrogen gas through the pipe or tubing to prevent oxidation as each joint is brazed. Cap the system with a reusable plug after each brazing operation to retain the nitrogen and prevent entrance of air and moisture.

D. Pipe relief valve discharge to outdoors for systems containing more than 100 pounds of refrigerant.

E. Firestopping: Fill openings around uninsulated piping penetrating floors or fire walls, with firestop material. For firestopping insulated piping refer to Section 230500, Common Work for HVAC Systems.

F. Seismic Bracing: Refer to specification Section 230548, BASIC Materials and Methods, for bracing of piping in seismic areas.

3.2 PIPE AND TUBING INSULATION

A. Apply flexible cellular insulation and fabricate fittings in accordance with the manufacturer's written instructions.

B. Use proper size material. Do not stretch or strain insulation.

C. To avoid undue compression of insulation, provide cork stoppers or wood inserts at supports as recommended by the insulation manufacturer. Insulation shields are specified under specification Section 230500, Common Work for HVAC Systems.

D. Where possible, slip insulation over the pipe or tubing prior to connection, and seal the butt joints with adhesive. Where the slip-on technique is not possible, slit the insulation and apply it to the pipe sealing the seam and joints with contact adhesive. Optional tape sealing, as recommended by the manufacturer, may be employed.

E. Apply two coats of weather-resistant finish as recommended by the manufacturer to insulation exposed to outdoor weather.

3.3 SIGNS AND IDENTIFICATION

A. Each refrigerating system erected on the premises shall be provided with an easily legible permanent sign securely attached and easily accessible, indicating thereon the name and address of the installer, the kind and total number of pounds of refrigerant required in the system for normal operations, and the field test pressure applied.

B. Systems containing more than 110 lb of refrigerant shall be provided with durable signs, in accordance with ANSI A13.1 and ANSI Z53.1, having letters not less than 0.5 inch in height designating:

1. Valves and switches for controlling refrigerant flow, the ventilation and the refrigerant compressor(s).

2. Signs on all exposed high pressure and low pressure piping installed outside the machinery room, with name of the refrigerant and the letters "HP" or "LP."

3.4 FIELD QUALITY CONTROL

A. Prior to initial operation examine and inspect piping system for conformance to plans and specifications and ANSI/ASME 31.5. Equipment, material, or work rejected because of defects or nonconformance with plans and specifications, and the Contractor shall correct ANSI codes for pressure piping.

3.5 FIELD TESTS

A. After completion of piping installation and prior to initial operation, conduct test on piping system according to ANSI/ASME B31.5. Furnish materials and equipment required for tests. Perform tests in the presence of A/E. If the test fails, correct defects and perform the test again until it is satisfactorily done and all joints are proved tight.

1. Every refrigerant-containing parts of the system that is erected on the premises, except compressors, condensers, evaporators, safety devices, pressure gages, control mechanisms and systems that are factory tested, shall be tested and proved tight after complete installation, and before operation.

2. The high and low side of each system shall be tested and proved tight at not less than the lower of the design pressure or the setting of the pressure-relief device protecting the high or low side of the system, respectively, except systems erected on the premises using non-toxic and non-flammable Group A1 refrigerants with copper tubing not exceeding 0.62 in O.D. This may be tested by means of the refrigerant charged into the system at the saturated vapor pressure of the refrigerant at 68 degrees F minimum.

B. Test Medium: A suitable dry gas such as nitrogen or shall be used for pressure testing. The means used to build up test pressure shall have either a pressure-limiting device or pressure-reducing device with a pressure-relief device and a gage on the outlet side. The pressure relief device shall be set above the test pressure but low enough to prevent permanent deformation of the system components.

3.6 SYSTEM TEST AND CHARGING

A. System Test and Charging: As recommended by the equipment manufacturer or as

follows:

1. Connect a drum of refrigerant to charging connection and introduce enough refrigerant into system to raise the pressure to 10-psi gage. Close valves and disconnect refrigerant drum. Test system for leaks with halide test torch or other approved method suitable for the test gas used. Repair all leaking joints and retest.

2. Connect a drum of dry nitrogen to charging valve and bring test pressure to design pressure for low side and for high side. Refer to Part 1, Quality Assurance. Test entire system again for leaks.

3. Evacuate the entire refrigerant system by the triplicate evacuation method with a vacuum pump equipped with an electronic gage reading in microns. Pull the system down to 500 microns and hold for four hours then break the vacuum with dry nitrogen (or refrigerant). Repeat the evacuation two more times breaking the third vacuum with the refrigeration to be charged and charge with the proper volume of refrigerant.

3.7 OWNER TRAINING

A. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance of refrigerant piping valves and refrigerant piping specialties.

B. Provide Owner with all Operating and Maintenance Manuals. Refer to Section 230500.

END OF SECTION 232300

SECTION 238126 - SPLIT-SYSTEM AIR-CONDITIONERS AND HEAT PUMPS

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 split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. 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.

B. ASHRAE Compliance:

1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."

2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," Section 6 - " Procedures," and Section 7 -

"Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. LG, Mitsubishi or Sanyo

2.2 INDOOR UNITS (5 TONS OR LESS)

A. Concealed Evaporator-Fan Components:

1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
2. Insulation: Faced, glass-fiber duct liner.
3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
4. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
5. Fan Motors:

a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230500 "Common Work for HVAC Systems."

b. Multi-tapped, multispeed with internal thermal protection and permanent lubrication.

c. Wiring Terminations: Connect motor to chassis wiring with plug connection.

6. Filters: Permanent, cleanable.

7. Condensate Drain Pans:

    a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

        1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.

        2) Depth: A minimum of 2 inches deep.

    b. Double-wall stainless-steel sheet with space between walls filled with foam insulation and moisture-tight seal.

    c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.

B. Ceiling-Mounted, Evaporator-Fan Components:

1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
3. Fan: Direct drive, centrifugal.
4. Fan Motors:

    a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

    b. Multi-tapped, multispeed with internal thermal protection and permanent lubrication.

    c. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.

    d. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.

    e. Mount unit-mounted disconnect switches on interior of unit.

5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

    a. Disposable Panel Filters:

        1) Factory-fabricated, viscous-coated, flat-panel type.

        2) Thickness: 1 inch.

        3) Arrestance according to ASHRAE 52.1: **80**

        4) Merv according to ASHRAE 52.2:

        5) Media: Interlaced glass fibers sprayed with nonflammable adhesive.

6) Frame: Galvanized steel,

2.3 OUTDOOR UNITS (5 TONS OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
    a. Compressor Type: Scroll.
    b. Refrigerant Charge: R-410A.
    c. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.
3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.
4. Fan: Aluminum-propeller type, directly connected to motor.
5. Motor: Permanently lubricated, with integral thermal-overload protection.
6. Low Ambient Kit: Permits operation down to 45 deg F (7 deg C).
7. Mounting Base: Polyethylene.

2.4 ACCESSORIES

A. Thermostat: Low voltage with subbase to control compressor and evaporator fan.

B. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:

1. Compressor time delay.
2. 24-hour time programmable.
3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
4. Fan-speed selection including auto setting.

C. Automatic-reset timer to prevent rapid cycling of compressor.

D. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

E. Drain Hose: For condensate.

2.5 CAPACITIES AND CHARACTERISTICS

A. See schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install roof-mounted, compressor-condenser components on equipment supports specified in Section 077200 "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.

D. Equipment Mounting:

1. Install ground-mounted, compressor-condenser components on cast-in-place concrete equipment base. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete.
2. Comply with requirements for vibration isolation and seismic control devices specified in Section 230500 "Common Work for HVAC."

E. Install and connect pre-charged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

END OF SECTION 238126

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes general electrical requirements for all Division 26 work and is supplemental and in addition to the requirements of Division 1. See Division 01 for sequence of work.

B. It is the intention of this Division of the Specifications and the Contract Drawings to describe and provide for the furnishing, installing, testing and placing in satisfactory and fully operational condition all equipment, materials, devices and necessary appurtenances to provide a complete electrical system. Provide all materials, appliances and apparatus not specifically mentioned herein or shown on the drawings, but which are necessary to make a complete, fully operational installation of all electrical systems shown on the contract drawings or described herein. Connect equipment and devices furnished and installed under other Divisions of this specification (or the Owner) under this Division.

C. Workmanship shall be of the best quality and competent and experienced electricians shall be employed and shall be under the supervision of a competent and experienced foreman.

D. The drawings and specifications are complimentary and what is called for (or shown) in either is required to be provided as if called for in both. Where conflicting information occurs within the drawings and specifications or between the drawings and specifications, the more expensive alternative shall be used as a basis for bidding and construction.

E. Branch Circuit Wiring: Where the drawings identify circuit numbers for items requiring electrical power, but do not indicate the manner of the wiring between the item and its source, the manner of the wiring shall be devised by the contractor utilizing the following provisions:
   1. Wire sizes:
      a. Derate wiring for thermal restrictions imposed by the National Electrical Code.
      b. If wire sizes are not otherwise indicated, wire sizes shall limit the voltage drop for circuits serving general purpose receptacles (180VA per strap) to less than 3%, based on the receptacle in the circuit that is farthest from the source being utilized with a load of 14 amps at 80% power factor.

         The following wire sizes and circuit lengths comply with this requirement:
         1) #12 up to 90 feet

2) #10 up to 125 feet
3) #8 up to 190 feet

c. Wire sizes for other loads shall limit the voltage drop to less than 3% based on the load indicated on the panel schedule.

2. Multiwire circuits: Multiwire circuits shall not be used unless specifically indicated or noted on the drawings. Provide a dedicated neutral conductor for each single pole circuit breaker or approved handle tie.
3. Do not combine wiring of different source panels in the same raceway system, unless the panels are interconnected with sub feed or through feed lugs with no intervening disconnecting means.
4. Outlet and junction boxes: Arrange wiring extensions from junction boxes to outlet boxes to restrict the number of wires in an outlet box as required by NEC Article 314.
5. Single tubular raceways extending into panels or switchboards shall not contain more than 20 wires.

1.3 WORK IN OTHER DIVISIONS

A. Refer to Division 27 for Communications and Division 28 for Electronic Safety and Security. System elements of those Divisions require conformance and integration with the work of Division 26.

B. See all other specifications for other work which includes but is not limited to: Conveying Systems

Cutting and

Patching Door

Hardware

Fire Protection

Mechanical Systems and Control

Wiring Painting, Refinishing and

Finishes

1.4 CODES, PERMITS, INSPECTION FEES

A. The following codes and standards are referenced in the Division 26 specifications. Perform all work and provide materials and equipment in accordance with the latest referenced codes and standards of the following organizations:
1. American National Standards Institute (ANSI)
2. National Electrical Manufacturer's Association (NEMA)
3. National Fire Protection Association (NFPA)
4. Underwriter's Laboratories (UL)
5. National Electrical Contractors Association (NECA)

B. Install the electrical systems based on the following:

NFPA 70	National Electrical Code as adopted and amended by the Local Jurisdiction.
IBC	International Building Code as adopted and amended by the Local Jurisdiction.

C. The referenced codes establish a minimum level of requirements. Where provision of the various codes conflict with each other, the more stringent provision shall govern. If any conflict occurs between referenced codes and this specification, the codes are to govern. Compliance with code requirements shall not be construed as relieving the Contractor from complying with any requirements of the drawings or specifications which may be in excess of requirements of the governing codes and rules and not contrary to same.

D. Obtain and pay for all licenses, permits and inspections required by laws, ordinances and rules governing work specified herein. Arrange for inspection of work by the inspectors and give the inspectors all necessary assistance in their work of inspection.

1.5 COORDINATION

A. Coordination during the bidding and pricing aspects of the contract includes determining where the work of other Divisions relies on the work of this Division for electricity and including the electrical system to match the requirements.

B. Coordinate work with that of the other Contractors and/or other trades doing work on the project. Examine all drawings and specifications of other trades for construction details and coordination. Make every reasonable effort to provide timely notice of work affecting other trades to prevent conflicts or interference as to space requirements, dimensions, openings, block-outs, sleeving or other matters which will cause delays or necessitate work-around methods.

C. Obtain submittals and shop drawings of all equipment with electrical connections furnished under other divisions of the specification and by the Owner. Provide all wiring in accordance with specific equipment requirements. Immediately advise the Architect of any changes which may affect the contract price.

D. Special attention is called to the following items. Coordinate all conflicts prior to installation:
   1. Door swings such that switches will be located on the "strike" side of the door.
   2. Location of grilles, pipes, sprinkler heads, ducts and other mechanical equipment so that all electrical outlets, lighting fixtures and other electrical outlets and equipment are clear from and in proper relation to these items.
   3. Location of cabinets, counters and doors so that electrical outlets, lighting fixtures and equipment are clear from and in proper relation to these items.
   4. Recessing and concealing electrical materials in CMU walls, concrete construction and precast construction.
   5. At each switchboard, panelboard and motor control center location the Contractor shall monitor the work of all trades to assure that the space and clearance requirements of code are met.

6. Review specifications for other Divisions of the work to determine where other Divisions are requiring electrical connections. Verify electrical provisions shown on contract drawings by examining shop drawing submittals of other Divisions prior to submission to the owner. Do not proceed with ordering of supporting electrical equipment, such as circuit breakers, until electrical characteristics are verified. Proceed with rough-in only after verification of shop drawings.

E. Augment bid documents with additional information to ensure coordination between trades. Provide digital format electrical systems drawings showing all ceiling devices, fixtures, raceways and cable tray locations and routing to mechanical contractor to be used for coordination drawings provided by mechanical contractor. Include dimensions and elevations of devices, fixtures, raceway and cable tray.

F. Furnish, install and place in satisfactory condition all raceways, boxes, conductors and connections and all other materials required for the electrical systems shown or noted in the contract documents to be complete, fully operational and fully tested upon completion of the project. Raceways, boxes and ground connections are shown diagrammatically only and indicate the general character and approximate location. The layout does not necessarily show the total number of raceways or boxes for the circuits required, nor are the locations of indicated runs intended to show the actual routing of the raceways.

Where routings of major raceways and telecommunication pathways are indicated on plan sheets, the routing information supplements the information on diagrams. If no routing information is shown, route the systems in a manner that will coordinate with new and existing infrastructure and the work of other trades.

G. The horsepower of motors and apparatus wattage's shown on the drawings are estimated requirements of equipment furnished under other Divisions of this contract. Provide overload elements to suit actual equipment nameplate current. Advise Architect of any equipment changes or substitutions affecting electrical systems.

H. Consult the architectural drawings for the exact height and location of all electrical equipment not specified herein or shown on the drawings. Make any minor changes (less than 6'-6" horizontal) in the location of the raceways, outlets, boxes, devices, wiring, etc., from those shown on the drawings without extra charge, where coordination requires or if so directed by the Architect before rough-in.

I. Provide inserts or sleeves for outlet boxes, conductors, cables and/or raceways as required. Coordinate the installation thereof with other trades.

J. The Contractor will not be paid for relocation of work, cuttings, patching and finishing required for work requiring reinstallation due to lack of coordination prior to installation.

1.6 WARRANTY

A. Refer to General Conditions of the Contract.

1.7 CORRECTION OF WORK

A. Within one year after the date of Substantial Completion of the work, the Contractor

shall correct any work found to be not in conformance with the Contract Documents promptly after written notice from the owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. This obligation shall survive acceptance of the work under this Contract and termination of the Contract. The Owner shall give such notice promptly after discovery of the condition.

1.8 CHANGE ORDERS

A. Comply with the requirements of Division 1.

B. Material pricing shall be based on competitive market conditions and include contractor net discounting. "List" or "book" pricing of material will not be accepted. Upon request, demonstrate that pricing is competitive by furnishing quotes from competing vendors or distributors.

C. Labor units shall be based on standard publications such as NECA or RS Means, using standard (not "change order") construction production. Where the change order requires additional work that is not normally part of the construction process, separately itemize the work and identify specific inefficiencies.

D. Labor pricing shall include an average of the journeyman and apprentice labor classification rates used to perform the work.

1.9 SUBMITTALS AND SHOP DRAWINGS

A. Submittals and Shop Drawings: Schedule so as not to delay construction schedule and no later than 60 days after award of contract, submit common brochure(s) with index and divider tabs by specification section, containing all required catalog cuts. Allow two weeks for review for each submittal and resubmittal. Incomplete submittals and shop drawings which do not comply with these requirements will be returned for correction, revision and resubmittal. Provide submittals for each product proposed for the project. See General Conditions for format, quantity, etc.

B. Submit electronically. Submittals shall show:
   1. Indicate listing by UL or other approved testing agency.
   2. Highlight with yellow or blue marker adequate information to demonstrate materials being submitted fully comply with contract documents.
   3. Review and check all material prior to submittal and stamp "Reviewed and Approved".

C. Shop drawings shall show:
   1. Ratings of items and systems.
   2. How the components of an item or system are assembled, interconnected, function together and how they will be installed on the project.
   3. System layout floor plans with complete device layout, point-to-point wiring connection between all components of the system, wire sizes and color coding.
   4. Riser diagrams showing vertical wiring between components.
   5. Line diagrams and or logical/control schematics including interface to other systems as applicable. Provide point to point wiring diagrams, indicate terminal identification at item of equipment. Typical diagrams may be used when accompanied by wire schedules that are specific to each product.

6. Coordinate with other division shop drawings and submittals. Identify interface points and indicate method of connection.
7. Electrical rooms: Submit 1/2" = 1'0" detail plans and wall elevations of each room showing actual size of equipment in place. Identify coordinating elements such as structural beams or mechanical systems. Submittals shall show coordination among all suppliers of equipment, including power components, fire alarm, racks, nurse call, public address, security, etc. Submit room layouts at same time as material submittals, and prior to installation of any equipment.
8. List of all Division 23 equipment noting actual rating of equipment that will be installed. For discrepancies between the requirements of the proposed equipment and the equipment provisions indicated on the drawings, indicate the contractor's proposed no cost change to the electrical system to accommodate the submitted equipment.

D. Release of Drawing Data files
1. Contractor may request to utilize the project drawing data files for assistance in producing shop drawings. Request shall be made by signing owner/design team's requested documentation for release of the data files.

E. The Contractor agrees:
1. Submittals and shop drawings processed by the Architect are not change orders.
2. The purpose of submittals and shop drawings by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept.
3. Submittals demonstrate equipment and material Contractor intends to furnish and install and indicate detailing fabrication and installation methods Contractor intends to use.
4. To accept all responsibility for assuring that all materials furnished under this Division of the specifications meet, in full, all requirements of the contract documents.
5. To pay for Engineers review cost of submittal review beyond one resubmittal.

F. The Engineer's review is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Corrections or comments made during this review do not relieve contractor from compliance with the requirements of the drawings and specifications. Contractor is responsible for: Dimensions which shall be confirmed and correlated at the job site; fabrication process and techniques of construction; coordination of his work with that of all other trades; performing his work in a safe and satisfactory manner.

G. Submittals and shop drawings are required per the submittals schedule at the end of this Section.

1.10 PROJECT CLOSE-OUT

A. Coordinate with close-out provisions in Division 01 - General Requirements.

B. Request For Final Punchlist
1. To request a final electrical punch list, forward a letter to the Architect. stating; "The electrical work on this project is complete, all punch list items to date are complete, items a. - n. in the Punchlist Procure paragraph in Section 260500 -

Common Work Results For Electrical are complete and the project is ready for final punch list observation."

2. Project Punchlist Procedure: Perform the following procedures for project closeout of electrical portions of work.
   a. Perform testing, tests and documentation.
   b. Provide engraved nameplates on electrical equipment.
   c. Refinish electrical equipment finishes which are damaged.
   d. Clean light fixtures per Section 260500 - Common Work Results For Electrical.
   e. Color code junction boxes per Section 260533 - Raceways and Boxes For Electrical Systems.
   f. Insert word processed (typed) Panel Schedules in all new and existing panelboards with actual "as-built" circuit descriptions.
   g. Number all circuit breakers.
   h. Obtain final electrical permit inspection. Include copies in O & M manual.
   i. Provide written warranty in O & M per the General Conditions of the Contract.
   j. Furnish Record Drawings per this section. Obtain signature on Job Completion Form.
   k. Furnish O & M Manuals per this section. Obtain signature on Job Completion Form.
   l. Give instruction periods to owner's personnel per this section. Obtain signature on Job Completion Form.
   m. To request final acceptance of project, fill out Job Completion Form in this section and forward to Architect. Note: If inspectors have not signed form, a copy of signed-off permits will suffice.
   n. Include with Job Completion Form, a copy of the final punch list with the word "DONE", and the date and Contractor's initials after each item on the list.

1.11 ELECTRICAL EQUIPMENT OPERATION AND MAINTENANCE (O&M) MANUALS

A. Provide O&M manuals required in Division 01 - General Requirements for all equipment furnished under Division 26 - Electrical of the specifications. Submit a preliminary copy, complete except for the bound cover, 60 days prior to completion of the project for checking and review. Deliver final bound corrected copies as noted in Division 1 - General Requirements 20 days prior to scheduled instruction periods. Obtain a receipt for the manuals and forward a copy of the receipt to the Engineer with the Job Completion Form.

B. The information included must be the exact equipment installed. Where sheets show the equipment installed and other equipment, the installed equipment shall be neatly and clearly identified on such sheets.

C. These O&M manuals shall contain all the information needed to operate and maintain all systems and equipment provided in the project. Present and arrange information in a logical manner for efficient use by the Owner's operating personnel. The information provided shall include but not be limited to the following:
   1. Equipment manufacturer, make, model number, size, nameplate data, etc.
   2. Description of system configuration and operation including component identification and interrelations. A master control schematic drawing(s) may be

required for this purpose.

3. Dimensional and performance data for specific unit provided as appropriate.
4. Manufacturer's recommended operation instructions.
5. Manufacturer's recommended lubrication and servicing data including frequency.
6. Complete parts list including reordering information, recommended spares and anticipated useful life (if appropriate). Parts lists shall give full ordering information assigned by the original parts manufacturer. Relabeled and/or renumbered parts information as reassigned by equipment supplier not acceptable. Include the parts list and part diagram that was included with the product's packaging, note that a "catalog cut" will not meet this criterion.
7. Shop drawings.
8. Wiring diagrams.
9. Signal equipment submittals shall contain step-by-step circuit description information designed to acquaint maintenance personnel with equipment operation in each mode of operation.
10. A complete list of local (nearest) manufacturer representative and distributor contacts for each type of equipment and manufacturer. Include name, company, address, phone, fax, e-mail address, and web site.

D. Furnish complete wiring diagrams for each system for the specific system installed under the contract. "Typical" line diagrams will not be acceptable unless revised to indicate the exact field installation.

E. Group the information contained in the manuals in an orderly arrangement by specification index. Provide a typewritten index and divider sheets between categories with identifying tabs. Bind the completed manuals with hard board covers not exceeding 5" thick. (Provide two or more volumes if required.) Signal and communication systems shall be in separate volumes. Imprint the covers with the name of the job, Owner, Architect, Electrical Engineer, Contractor and year of completion. Imprint the back edge with the name of the job, Owner and year of completion. Hard board covers and literature contained may be held together with screw post binding.

1.12 INSTRUCTION PERIODS

A. After substantial completion of the work and 20 days after the O&M manuals have been delivered to the owner and after all tests and final inspection of the work by the Authority(s) Having Jurisdiction; demonstrate the electrical systems and instruct the Owner's designated operating and maintenance personnel in the operation and maintenance of the various electrical systems. The Contractor shall arrange scheduled instruction periods with the Owner. The Contractor's representatives shall be superintendents or foremen knowledgeable in each system and suppliers representatives when so specified. When more than one training session is specified, the second session shall be 30 to 90 days after the first as agreed to by the Owner.

B. Include in each instruction session an overview of the system, presentation of information in maintenance manuals with appropriate references to drawings. Conduct tours of the building areas with explanations of maintenance requirements, access methods, servicing and maintenance procedures, equipment cleaning procedures and adjustment locations.

C. Include the following scheduled instruction periods:

		1st Session	2nd Session
2.	Lighting Control & Dimming System	2 hours	1 hours

D. Factory trained suppliers representatives shall provide instruction for lighting control/dimming, power generation & transfer switches, paralleling low voltage switchgear, static uninterruptible power supply and transient voltage suppression system(s).

1.13 RECORD DRAWINGS

A. Record drawings shall be kept on: the contract drawings, shop drawings indicating field wiring, vendor diagrams indicating field wiring, and similar documents.

B. Continually record the actual electrical system(s) installation on a set of prints kept readily available at the project during construction. These prints shall be used for this purpose alone.
1. Mark record prints with red erasable pencil. Mark the set to show the actual installation where the installation varies substantially from the work as originally shown.
2. Accurately locate with exact dimensions all underground and underslab raceways and stub-outs.
3. Note changes of directions and locations, by dimensions and elevations, as utilities are actually installed.
4. Include addenda items and revisions made during construction.
5. Erase conditions not constructed or "X-out" and annotate "not constructed" to clearly convey the actual "as constructed" condition.
6. Organize record drawings sheets in manageable sets, bind and print suitable titles, dates and other identification on the cover of each set.
7. Where “typical” wiring diagrams were used during submittals the record drawings shall indicate exact point to point wiring with exact terminal number designations.

C. Transfer the changes marked up on the record prints into AutoCAD drawing files at the completion of the work. The version of AutoCAD shall not be earlier than the most recent version available at the date the project bids were received. AutoCAD files shall not include the stamp of the engineer of record. Provide two (2) sets of prints, one set of fixed line reproducible drawings and one set of AutoCAD drawing files on CD Rom. Transmit drawings, AutoCAD drawing files and the record drawing mark-ups to the Architect. Final payment to the contractor will not be authorized until these documents have been submitted to and accepted by the Architect.

1.14 FINAL ACCEPTANCE REQUEST

A. Submit to the Architect, a Division 26 Job Completion Form (form attached in this section) properly filled out prior to the time final acceptance of the electrical work is requested.

1.15 ABBREVIATIONS AND DEFINITIONS

A. When the following abbreviations and definitions are used in relation to the work for Division 26 they shall have the following meanings:

Item	Meaning
AHJ	Authority Having Jurisdiction.
Boxes	Outlet, Junction or Pull Boxes.
Code	All applicable codes currently enforced at project location.
Compression	Compressed using a leveraged powered (hydraulic or equivalent) crimping tool.
Connection	All materials and labor required for equipment to be fully operational.
Exterior Location	Outside of or penetrating the outer surfaces of the building weather protective membrane.
Fully Operational	Tested, approved, and operating to the satisfaction of the AHJ, manufacturer and contract documents.
Furnish	Deliver to the jobsite
Install	To enter permanently into the project and make fully operational.
Kcml	Thousand circular mils (formerly MCM).
Mfr.	Manufacturer.
NEC	National Electrical Code, National Fire Protection Association, Publication #70.
NIC	Not in Contract.
Noted	Shown or specified in the contract documents.
Provide	Furnish and install.
Required	As required by code, AHJ, contract documents, or manufacturer for the particular installation to be fully operational.
Shown	As indicated on the drawings or details.
Wiring	Raceway, conductors and connections.

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials and equipment installed shall have been tested and listed by Underwriters Laboratories or other approved testing organization and shall be so labeled unless otherwise permitted by the Authority Having Jurisdiction (Inspector).

B. All materials to be new, free from defects and not less than quality herein specified. Materials shall be designated to insure satisfactory operation and operational life in the environmental conditions which will prevail where they are being installed.

C. Each type of materials furnished shall be of the same make, be standard products of manufacturers regularly engaged in production of such materials and be the manufacturer's latest standard design.

D. All materials, equipment and systems furnished that include provisions for storing, displaying, reporting, interfacing, inputting, or functioning using date specific information shall perform properly in all respects regardless of the century. Any interface to other new or existing materials, equipment or systems shall function properly and shall be century compliant, both in regards to information sent and received.

2.2 SUBSTITUTION OF MATERIALS

A. No Substitute:

Where a specified product is indicated "no substitute", it is the intent of this specification to require new materials to be compatible with the existing installation or as specifically requested by the owner. To this end certain materials and systems no substitution will be allowed.

B. Prior to Bid Opening:

Acceptance of products other than those specified will be issued by addendum to the bid documents only after the following requirements are met and the proposed listed material is determined to meet or exceed the requirements:

1. Requests for listing to be original material, clearly indicating the product fully complies with contract documents and be neatly marked with yellow felt tip marker to clearly define and describe the product for which listing is requested.
2. Include certified laboratory test report for lighting fixtures.
3. Samples shall be submitted if requested.
4. Requests shall be received 5 days prior to bid opening.
5. Requests containing insufficient information to confirm compliance with contract documents will not be considered.

C. After Award of Contract:

Substitution of products will be considered after award of contract only under the following conditions:

1. The Contractor shall have placed orders for specified materials promptly after contract is awarded and the specified products cannot be delivered to the project to meet the Owner's construction schedule.
2. The reason for the unavailability is beyond the Contractor's control, i.e., due to strikes, bankruptcy, discontinuance of manufacturer, acts of God.
3. The specified product is no longer manufactured.
4. There is compelling economic advantage to the Owner.

D. In all cases, should a substituted material result in requiring electrical system or

building modifications; the Contractor alone shall pay all costs to provide these modifications including all costs to the Engineer and Architect for redesign, and updating of record drawings required to accommodate the required modifications.

2.3 NAMEPLATES

A. Provide nameplates per Section 260553 - Identification for Electrical Systems.

PART 3 - EXECUTION

3.1 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft. Handle all equipment carefully to prevent damage, breakage, denting, and scoring of finishes. Do not install damaged equipment.

B. Store products subject to damage by the elements above ground, undercover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instruction.

3.2 CUTTING BUILDING CONSTRUCTION

A. Obtain permission from the Architect and coordinate with other trades prior to cutting. Locate cuttings so they will not weaken structural components. Cut carefully and only the minimum amount necessary. Cut concrete with diamond core drills or concrete saws except where space limitations prevent the use of such tools.

B. All construction materials damaged or cut into during the installation of this work must be repaired or replaced with materials of like kind and quality as original materials by skilled labor experienced in that particular building trade.

3.3 PENETRATION OF BUILDING ELEMENTS

A. General:

1. Penetrations of building elements by electrical systems shall not compromise the performance and integrity of the building element (structural, fire, smoke, waterproof, etc.)

B. Fire and smoke rated elements:

1. Electrical penetrations of fire and smoke rated floor and wall assemblies shall maintain fire-resistance or smoke barrier rating of the assembly. Firestopping materials and installation requirements are specified in Division 7 section "Firestopping".

3.4 PAINTING

A. Items furnished under this Division that are scratched or marred in shipment or

installation shall be refinished with touchup paint selected to match installed equipment finish.

3.5 EQUIPMENT CONNECTION

A. For equipment furnished under this or other Divisions of the specifications, or by owner, provide all electrical connections necessary to serve such equipment and provide required control connections to all equipment so that the equipment is fully operational upon completion of the project. Investigate existing equipment to be relocated and provide new connections as required.

B. Contract Coordination: Investigate vendor equipment proposed for installation and address and integrate the following into the construction process:
   1. Special equipment requirements identified in shop drawings or submittals.
   2. Equipment requirements for distribution system performance, for example, an external disconnect switch or fused disconnect switch to provide compliance with a governing code, a short circuit current rating, or a listing.

C. Obtain rough-in requirements for equipment furnished under other divisions of this specification prior to roughing-in.

3.6 HOUSEKEEPING PADS

A. Provide steel reinforced concrete housekeeping pad under each floor mounted switchboard, transformer, motor control center, generator and/or other free standing electrical equipment. Size 4" greater (horizontal minimum) than base of equipment mounted thereon. Minimum height 3-1/2". Use 3000-psi (20.7-Mpa), 28 day compressive strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete". Chamfer edges and finish smooth with all blockouts square and plumb.

B. When housekeeping pad is poured on previously poured concrete or is for engine or motor driven equipment, the pad shall be reinforced (4# rebar, 12" o.c., both ways) and the rebar shall be tied to the existing floor via #4 rebar epoxy grouted into the existing concrete on 18" centers or other acceptable means. The existing slab shall be thoroughly cleaned and prepared for the pad just before the pour.

3.7 CLEAN UP

A. Contractor shall continually remove debris, cuttings, crates, cartons, etc., created by his work. Such clean up shall be done daily and at sufficient frequency to eliminate hazard to the public, other workmen, the building or the Owner's employees. Before acceptance of the installation, Contractor shall carefully clean cabinets, panels, lighting fixtures, wiring devices, cover plates, etc., to remove dirt, cuttings, paint, plaster, mortar, concrete, etc. Blemishes to finished surfaces of apparatus shall be removed and new finish equal to the original applied.
   1. Wipe surfaces of electrical equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   2. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent, high pressure sodium, metal halide,

and mercury vapor fixtures to comply with requirements for new fixtures.

3.8 TESTING AND DEMONSTRATION

A. Demonstrate that all electrical equipment operates as specified and in accordance with manufacturer's instructions. Perform tests in the presence of the Architect, Owner or Engineer. Provide all instruments, manufacturer's operating instructions and personnel required to conduct the tests. Repair or replace any electrical equipment that fails to operate as specified and or in accordance with manufacturer's requirements.

DIVISION 26 ELECTRICAL JOB COMPLETION FORM

PROJECT NAME: _____
PROJECT

LOCATION: _____
DATE: _____

A. Electrical Inspectors Final Acceptance (Copy of certificate attached.)

_____
Name Agency Date

B. Fire Marshal's Final Acceptance of Fire Alarm System (Copy of certificate attached.)

_____
Name Agency Date

C. The following systems have been demonstrated to Owner's representative.

1. Power Distribution System _____
Owner's Rep. Date

2. Lighting Control & Dimming System _____
Owner's Rep Date

D. Record Drawings
Attached Transmitted previously
to _____ Date

E. O & M Manuals
Attached Transmitted previously
to _____

F. Test Reports
Attached Transmitted previously
to _____ Date

G. The work is complete in accordance with contract documents and authorized changes except for

_____
and the architect/engineer's representative is requested to meet with

at o
_____ _____ n _____
Supervisor of Electrical Work Time Date

_____ _____

Contractors Rep. Signature

Date

DIVISION 26 SUBMITTAL LIST

SECTION	DESCRIPTION	SUBMIT RECEIVE DATE	STATUS
260519	LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES		
260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS		
260533	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS		
260553 SYSTEMS	IDENTIFICATION FOR ELECTRICAL		
260923	LIGHTING CONTROL DEVICES		
262726	WIRING DEVICES		
262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS		
265119	LED INTERIOR LIGHTING		

END OF SECTION 260500

SECTION 260510 – EXISTING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 and Division 02 Specification Sections, apply to this Section.

1.2 RELATED WORK

A. Same as in Section 260500 - Common Work Results For Electrical.

1.3 REFERENCE DOCUMENTS

A. Reference documents including record drawings and "as builts" of existing systems are included with the construction documents. The contractor shall asses the accuracy of these documents during pre-bid walk through and adjust his bid to accommodate discrepancies between the documents and actual conditions.

1.4 INDICATED EXISTING SYSTEMS

A. The electrical drawings show portions of the existing electrical systems which are to remain, be removed or be modified as a part of the Contractor's work. The indicated information is derived from record drawings and other data obtained from or with the permission of the owner. Where indicated, concealed systems are also derived from record drawings and the Engineer's best judgment of the configuration.

B. The Contractor shall inspect the existing installation prior to bidding and shall judge the work required. Inspection shall include areas within and adjacent to the work of any discipline or trade performing work for the contract.

C. The complete extent of the existing systems could not be verified during creation of the construction documents. Unless the contractor's inspection of the existing system determines a greater amount, the contractor shall assume there is 20% more existing electrical systems than what is indicated on the contract drawings.

1.5 POWER OUTAGES

A. The facility will continue its normal operation during construction; the Contractor shall schedule electrical system(s) outages with the Owner's Representative. Electrical system(s) outages to Owner occupied areas shall not be permitted from 7:00 a.m. to 6:00 p.m. on any day of the week.

A. Cutovers must be accomplished in a minimum of 4 hours or as directed by Owner’s representative.

B. Submit a written request for a power outage at least one week in advance identifying the areas and systems that will be affected, time and duration of the power outage. The Contractor shall receive written authorization to proceed with the outage and shall re- notify the Owner verbally at least one hour prior to the outage and also notify the Owner when the outage is completed.

C. Unscheduled Outages: In the event that the Contractor's work causes or contributes to an electrical system(s) outage (or other system fault), the Contractor is responsible for immediately correcting the problem. Included (as examples) shall be any premium time required to stay on the job site until problem is corrected and air freight for parts not locally available. Any damage resulting from performance of work under this contract shall be repaired to assure continuing facility operation and integrity, at no increase in contract cost.

1.6 PREMIUM TIME

A. Premium time shall be included in the Base Bid for electrical system(s) outages and for other work as required by the schedule, as shown on the drawings and as noted in other Divisions of the Specifications.

1.7 EXISTING STRUCTURAL CONDITIONS

A. Existing floor slabs are post tensioned concrete slabs. Contractor shall penetrate floors by core drilling only. Extreme caution is required to avoid cutting post tensioned cables. X-ray of floor shall be performed prior to selecting location of cores and anchors for electrical equipment. Cores and anchors shall be kept 2" minimum away from the post tensioning cables.

PART 2 - PRODUCTS

2.1 EXISTING MATERIALS

A. All materials which are a part of the building shall remain the property of the Owner.

2.2 EXISTING MATERIALS TO BE REINSTALLED

A. Existing materials and equipment (except interior, undamaged raceways) that are removed as a part of the work or stored in surplus shall not be reinstalled as a part of the new systems unless specifically noted or authorized in writing by the Owner's Representative. Forward a copy of the authorization to the Engineer. The requirements of the specifications (i.e., condition, installation, testing, etc.) shall apply as if the materials were new, furnished by the Contractor.

2.3 EXISTING MATERIALS NOT TO BE REINSTALLED

A. In coordination with the Architect, these materials shall be made available for his inspection and decision as to whether the Owner will retain possession. Items selected for retention shall be turned over to the Owner. These items shall be delivered to a location on the premises selected by the Owner. Take reasonable care to avoid damage to this material. If the Contractor fails to conform to this

requirement, he shall purchase and turn over to the Owner replacement material of like kind and quantity.

B. All material not selected for retention by the Owner and debris shall be legally disposed of by the Contractor.

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS

A. Examine the structure, building, and conditions under which electrical work is to be installed for conditions detrimental to proper and timely completion of electrical work. Do not proceed with work until deficiencies or detrimental conditions have been corrected. Report deficiencies or detrimental conditions of existing electrical work which might be unsuitable to connect with or receive other work. Failure to so report shall constitute acceptance of other work as being fit and proper for the reception of electrical work.

B. Field trace all existing circuitry affected by the project to determine:
1. Source of supply or information collection point within the project area
2. Load or termination within the project area
3. Load or termination outside the project area, but supplied from or connected to equipment within the project area
4. Loads supplied from and located outside of the project area but have circuitry within the project area.

3.2 REMOVAL

A. All removal work required under this contract is not shown on the electrical drawings. Refer to work of other divisions for contract work that may affect existing electrical systems. Coordinate work between trades prior to bid.

B. Switchboards, panelboards, signaling and communication systems, other electrical equipment free standing or surface mounted, raceway (exposed) and conductors; which are not presently in service or will not be in service as a result of this contract shall be removed.

C. Contractor shall remove all floor, wall or ceiling mounted outlet devices in the "Removal" or "Demolition Area" indicated on the drawing, even if the equipment/or device is not individually shown on the project drawings. Unused flush mounted devices, outlet and other boxes in finished areas shall be removed from wall and the remaining hole patched to match adjacent wall surfaces.

D. Unused raceways and wire shall be removed back to source if accessible, otherwise cut flush at ceiling, floor or wall and fill with grout.

E. If Contractor questions whether a particular device is to be removed notify the Architect noting type and location of device. If so directed, the Contractor shall maintain the existing device in service without any change in contract price.

F. Contractor shall divert all electrical demolition materials including, but not limited to copper and aluminum cabling, fixture ballasts and lamps, enclosures, raceways and bus ducts, to either a local recycling station or to the on-site recycling station as provided by the General Contractor or Owner.

3.3 EXISTING SYSTEMS MAINTAINED

A. Maintain existing systems not identified for demolition. Maintaining existing systems includes relocating the systems to coordinate with work of this contract, when work of this contract cannot be done while the existing system is in its present location.

B. Any existing wiring serving devices to remain in service and which may be affected by work performed under this contract shall be rerouted to maintain circuit continuity. Contractor shall assume the risk of maintaining existing systems, except relocation of wiring of #2 AWG and above shall be considered an additional cost if not shown to be relocated. If such wiring is found the Contractor shall notify Architect Owner's Representative of wiring location, reason it must be removed and cost of relocation and receive the Owner's approval before proceeding with the work.

C. Examine drawings of all disciplines to determine where work of other trades will or is likely to require relocation of existing systems. Remove and relocate electrical equipment in the way of work of other trades. Exact relocation requirement of existing systems to remain to be based on detailed coordination with other trades. Contractor to provide proposed locations of relocated devices to Owner's Representative for approval prior to commencement of work.

D. Relocation of any system shall be permanent.

E. Re-route existing circuits that are affected as a result of this contract that serve devices to remain in service.
   1. Power Circuits (Including removal or relocation of existing panelboards).
      a. Prior to demolition work trace out and identify each branch circuit and feeder circuit that serves loads in occupied areas.
      b. Provide temporary wiring, schedule outage and reconnect loads to temporary wiring.
      c. Provide new wiring in new location.
      d. Schedule outage, disconnect temporary wiring, and connect loads to new wiring. Remove temporary wiring.
      e. Outage for each circuit shall not be more than 20 minutes.

   2. Signal and Communication Systems
      a. Prior to demolition trace out and identify device and systems being served.
      b. Provide temporary wiring to maintain operation of system throughout facility.
      c. Schedule outage and connect to temporary wiring and test system.
      d. Provide new wiring on new location.
      e. Schedule outage, disconnect temporary wiring, and reconnect to new wiring. Remove temporary wiring.
      f. Outage for each system shall not be more than 20 minutes.

3.4 TEMPORARY ELECTRICAL SYSTEMS

A. Provide temporary lighting, exit lighting, and fire notification in areas of construction that will have ongoing or intermittent public access. Temporary lighting shall comply with IES standards and other provisions of these specifications. Selected light fixtures must have battery backup to allow for egress at all times. Indicate path to nearest exit with exit signs. All temporary systems shall be removed after they are no longer in operation.

B. Removing, temporary installation, and reinstalling in ceilings of light fixtures, speakers, detectors, exit signs and other electrical equipment is not shown on the drawings. The Contractor shall investigate the ceiling demolition work and include appropriate temporary work in the bid. The sequence of work shall be (1) Remove and store fixtures, detectors and speakers along with removal of ceiling, (2) Provide temporary support for wired fixtures and devices to be reinstalled in new ceiling at approximately the same location. Use chains for lighting fixture support. (3) Clean and reinstall in the new or replaced ceilings. Provide new lamps when so noted. Provide temporary relocation of exit signs to original location when exit is reactivated.

3.5 WORK OUTSIDE OF REMODEL AREAS

A. Provide new wiring systems in concealed ceiling spaces, unless the structure is open to the floor below.

B. For work outside of the project area assume that removal and replacement of ceiling tiles is required in all finished areas. Spaces above existing ceilings are highly congested.

C. Route wiring around obstructions and provide pull boxes per code. Carefully remove, store or temporarily hang and re-install in undamaged condition all electrical equipment, lighting fixtures and ceiling tiles where access to perform work is required. Clean prior to re-installation. Provide new lamps when so noted.

3.6 NEW DEVICES IN REMODEL AREAS

A. Provide flush mounting for devices in existing walls. Fish conduit in wall. Where existing boxes are indicated to be reused, extend box as necessary and provide new devices and plates.

B. Contractor is cautioned that the existing building contains clay tile and concrete walls. New devices may require cutting and patching, and it shall be the responsibility of the contractor to provide all cutting and patching required for the installation of the Division 26 work. Contractor shall investigate existing areas prior to bid and shall include all costs of such work in the bid.

C. This facility has wiring embedded in raceways in concrete slabs. Provide new concealed wiring to last outlet or pull box before homerun to panel.

END OF SECTION 260510

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Metal-clad cable, Type MC, rated 600 V or less.
3. Armored cable, Type AC, rated 600 V or less.
4. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

A. RoHS: Restriction of Hazardous Substances.

B. VFC: Variable-frequency controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or

less.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Alpha Wire Company
   2. American Bare Conductor
   3. Belden Inc.
   4. Okonite Company (The)
   5. Southwire Company

C. Standards:

   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
   2. RoHS compliant.
   3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.

E. Conductor Insulation:

   1. Type NM: Comply with UL 83 and UL 719.
   2. Type RHH: Comply with UL 44.
   3. Type THHN: Comply with UL 83.
   4. Type THW: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
   5. Type XHHW-2: Comply with UL 44.

2.2 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Alpha Wire Company
   2. American Bare Conductor
   3. Belden Inc.
   4. Okonite Company (The)
   5. Southwire Company

C. Standards:

   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
   2. Comply with UL 1569.
   3. RoHS compliant.
   4. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Circuits:

1. Single circuit and multicircuit with color-coded conductors.
2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.

E. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.

F. Ground Conductor: Insulated.

G. Conductor Insulation:

1. Type TFN/THHN/THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.

H. Armor: Steel or Aluminum, interlocked.

I. Jacket: PVC applied over armor.

2.3 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. 3M Electrical Products
2. AFC Cable Systems; a part of Atkore International
3. Hubbell Power Systems, Inc.
4. O-Z/Gedney; a brand of Emerson
5. Thomas & Betts Corporation; a member of the ABB Group

C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper.
2. Type: One hole with standard barrels.
3. Termination: Crimp.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

C. VFC Output Circuits Cable: Extra-flexible stranded for all sizes.

D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN- 2, single conductors in raceway.

B. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

C. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

D. VFC Output Circuits: Type XHHW-2 in metal conduit.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

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

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

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

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

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.

2. Perform each of the following visual and electrical tests:

a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
b. Test bolted connections for high resistance using one of the following:

1) A low-resistance ohmmeter.
2) Calibrated torque wrench.
3) Thermographic survey.

c. Inspect compression-applied connectors for correct cable match and indentation.
d. Inspect for correct identification.
e. Inspect cable jacket and condition.
f. Insulation-resistance test on each conductor for ground and adjacent

conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.

g. Continuity test on each conductor and cable.

h. Uniform resistance of parallel conductors.

B. Cables will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

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 grounding and bonding systems and equipment.

B. Section includes grounding and bonding systems and equipment, plus the following special applications:

1. Underground distribution grounding.
2. Ground bonding common with lightning protection system.
3. Foundation steel electrodes.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
1. Grounding arrangements and connections for separately derived systems.

B. Qualification Data: For testing agency and testing agency's field supervisor.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Plans showing as-built, dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
1) Grounding arrangements and connections for separately derived systems.

b. Instructions for periodic testing and inspection of grounding features at grounding connections for separately derived systems based on NFPA

70B.

1) Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
2) Include recommended testing intervals.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Certified by

NETA. PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. 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.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:
1. Burndy; part of Hubbell Electrical Systems
2. ERICO International Corporation
3. O-Z/Gedney; a brandy of Emerson Industrial Automation
4. SIEMENS Industry, Inc,

2.3 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
6. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in

switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

F. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.

G. Conduit Hubs: Mechanical type, terminal with threaded hub.

H. Straps: Solid copper, cast-bronze clamp. Rated for 600 A.

I. Tower Ground Clamps: Mechanical type, copper or copper alloy, terminal two-piece clamp.

J. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

K. Water Pipe Clamps:

1. Mechanical type, two pieces with zinc-plated bolts.

a. Material: Tin-plated aluminum.
b. Listed for direct burial.

2. U-bolt type with malleable-iron clamp and copper ground connector.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three

bands of green and two bands of yellow.

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

1. Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

D. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

D. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

E. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with

a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

3.5 INSTALLATION

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

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor and install in conduit.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install [**tinned**] bonding jumper to bond across flexible duct connections to achieve continuity.

F. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.

G. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal.

a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and, include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5

ohms.

3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).

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

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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. Steel slotted support systems.
2. Aluminum slotted support systems.
3. Nonmetallic slotted support systems.
4. Conduit and cable support devices.
5. Support for conductors in vertical conduit.
6. Structural steel for fabricated supports and restraints.
7. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
8. Fabricated metal equipment support assemblies.

B. Related Requirements:

1. Section 260548.16 "Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

a. Slotted support systems, hardware, and accessories.
b. Clamps.
c. Hangers.
d. Sockets.
e. Eye nuts.
f. Fasteners.
g. Anchors.
h. Saddles.
i. Brackets.
j. Light fixtures
k. Concrete finishes

l. Exterior finishes

2. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.
4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Delegated-Design Submittal: For hangers and supports for electrical systems.

1. Include design calculations and details of hangers.
2. Include design calculations for seismic restraints.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Ductwork, piping, fittings, and supports.
3. Structural members to which hangers and supports will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Items penetrating finished ceiling, including the following:

a. Luminaires.
b. Air outlets and inlets.
c. Speakers.
d. Sprinklers.
e. Access panels.
f. Projectors.

B. Seismic Qualification Data: Certificates, for hangers and supports for electrical equipment and systems, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegate Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design hanger and support system.

B. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the supported equipment and systems will remain in place without separation of any parts when subjected to the seismic forces specified."
2. Component Importance Factor: 1.0.

C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame Rating: Class 1.
2. Self-extinguishing according to ASTM D 635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch- (10-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c. in at least one surface.

1. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
   a. Allied Tube & Conduit, a part of Atkore International
   b. Or, approved equal.
2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Material for Channel, Fittings, and Accessories: Galvanized steel.
4. Channel Width: 1-1/4 inches (31.75 mm).
5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.

B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical

conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   a. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
      1) Hilti, Inc.
      2) Or, approved equal.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   a. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
      1) B-line, an Eaton business
      2) Or, approved equal.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: Stainless-steel springhead type.
7. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1. NECA 1.
2. NECA 101
3. NECA 105.

B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps] [single-bolt conduit clamps.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount

cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Comply with requirements in Section 099123 "Interior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

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. Metal conduits and fittings.
   2. Nonmetallic conduits and fittings.
   3. Metal wireways and auxiliary gutters.
   4. Surface raceways.
   5. Boxes, enclosures, and cabinets.

B. Related Requirements:
   1. Section 078413 "Penetration Firestopping" for firestopping at conduit and box entrances.

1.3 DEFINITIONS

A. GRC: Galvanized rigid steel conduit.

B. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

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

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

   1. Structural members in paths of conduit groups with common supports.
   2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Seismic Qualification Data: Certificates, for enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from

manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.

C. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Alflex Inc.
2. Allied Tube & Conduit; a Tyco International Ltd. Co.
3. Maverick Tube Corporation.
4. O-Z/Gedney; a brand of EGS Electrical Group.

B. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. IMC: Comply with ANSI C80.6 and UL 1242.

E. EMT: Comply with ANSI C80.3 and UL 797.

F. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

G. Fittings for Metal Conduit:
1. Comply with NEMA FB 1 and UL 514B.
2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Fittings, General: Listed and labeled for type of conduit, location, and use.
4. Fittings for EMT:
   a. Material: Steel.
   b. Type: compression.
5. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
6. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

H. Joint Compound for IMC, or GRC: Approved, as defined in NFPA 70, by authorities

having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Manufactures: Subject to compliance with requirements, provide products by one of the following:
   1. CANTEX Inc.
   2. ElecSYS, Inc
   3. RACO; a Hubbell company
   4. Thomas & Betts Corporation

B. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. ENT: Comply with NEMA TC 13 and UL 1653.

D. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

E. LFNC: Comply with UL 1660

F. RTRC: Comply with UL 2515A and NEMA TC 14.

G. Nonmetallic Fittings:
   1. Fittings, General: Listed and labeled for type of conduit, location, and use.
   2. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

   3. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Cooper B-Line, Inc.
   2. Hoffman, a Pentair company.
   3. SquareD; a brand of Schneider Electric.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
   1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

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

D. Wireway Covers: Hinged type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.4 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Thomas & Betts Corporation.
      b. Walker Systems, Inc; Wiremold Company (The)
      c. Wiremold Company (The); Electric Sales Division

2.5 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
   2. Hoffman.
   3. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
   4. O-Z/Gedney; a unit of General Signal.
   5. RACO; a Hubbell Company.
   6. Thomas & Betts Corporation.
   7. Walker Systems, Inc.; Wiremold Company (The)

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

E. Metal Floor Boxes:
   1. Material: Cast metal or sheet metal.
   2. Type: Fully adjustable.
   3. Shape: Rectangular.
   4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.

G. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb (32 kg).
   1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

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

I. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

J. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

K. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).

L. Gangable boxes are allowed.

M. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous- hinge cover with flush latch unless otherwise indicated.
   1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
   2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

N. Cabinets:
   1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
   2. Hinged door in front cover with flush latch and concealed hinge.
   3. Key latch to match panelboards.
   4. Metal barriers to separate wiring of different systems and voltage.
   5. Accessory feet where required for freestanding equipment.
   6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Indoors: Apply raceway products as specified below unless otherwise indicated:
   1. Exposed, Not Subject to Physical Damage: EMT.
   2. Exposed, Not Subject to Severe Physical Damage: EMT.
   3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
      a. Loading dock.
      b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
      c. Mechanical rooms.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: IMC.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

B. Minimum Raceway Size: 3/4-inch (21-mm) trade size.

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

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

D. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

E. Install surface raceways only where indicated on Drawings.

F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.

D. Do not fasten conduits onto the bottom side of a metal deck roof.

E. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

F. Complete raceway installation before starting conductor installation.

G. Arrange stub-ups so curved portions of bends are not visible above finished slab.

H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.

I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.

J. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

K. Support conduit within 12 inches (300 mm) of enclosures to which attached.

L. Stub-ups to Above Recessed Ceilings:
   1. Use EMT, IMC, or RMC for raceways.
   2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

M. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

N. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

O. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

P. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

Q. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

R. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

S. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

T. Surface Raceways:
   1. Install surface raceway with a minimum 2-inch (50-mm) radius control at bend points.
   2. Secure surface raceway with screws or other anchor-type devices at intervals

not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

U. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

V. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Conduit extending from interior to exterior of building.
4. Conduit extending into pressurized duct and equipment.
5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
6. Where otherwise required by NFPA 70.

W. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

X. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 36 inches (915 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

Y. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

Z. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

AA. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

BB. Locate boxes so that cover or plate will not span different building finishes.

CC. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

DD. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

EE. Set metal floor boxes level and flush with finished floor surface.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install 0sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

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

END OF SECTION 260533

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

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. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

B. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

C. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

D. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

E. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

    a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
    b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non- fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.3 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry- Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

    a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with

requirements in Section 079200 "Joint Sealants."

b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall, so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

F. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

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. Color and legend requirements for raceways, conductors, and warning labels and signs.
2. Labels.
3. Bands and tubes.
4. Tapes and stencils.
5. Tags.
6. Signs.
7. Cable ties.
8. Paint for identification.
9. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

B. Delegated-Design Submittal: For arc-flash hazard study.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Comply with NFPA 70E requirements for arc-flash warning labels.

F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
   1. Temperature Change: 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:
   1. Legend: Indicate voltage and system or service type.

B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.
   1. Color shall be factory applied.
   2. Colors for 208/120-V Circuits:
      a. Phase A: Black.
      b. Phase B: Red.
      c. Phase C: Blue.
   3. Colors for 240-V Circuits:
      a. Phase A: Black.
      b. Phase B: Red.
   4. Colors for 480/277-V Circuits:
      a. Phase A: Brown.
      b. Phase B: Orange.
      c. Phase C: Yellow.
   5. Color for Neutral: White.
   6. Color for Equipment Grounds: Green.
   7. Colors for Isolated Grounds: Green with white stripe.

C. Warning Label Colors:
   1. Identify system voltage with black letters on an orange background.

D. Warning labels and signs shall include, but are not limited to, the following legends:
   1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
   2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

E. Equipment Identification Labels:
   1. Black letters on a white field.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil- (0.08-mm-) thick, vinyl flexible label with acrylic pressure-sensitive adhesive.
   1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
   2. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

D. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil- (0.08-mm-) thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
   1. Minimum Nominal Size:
      a. 1-1/2 by 6 inches (37 by 150 mm) for raceway and conductors.
      b. 3-1/2 by 5 inches (76 by 127 mm) for equipment.
      c. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

A. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameters sized to suit diameters and that stay in place by gripping action.

B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F (93 deg C). Comply with UL 224.

2.5 TAPES AND STENCILS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide; compounded for outdoor use.

C. Tape and Stencil: 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers placed diagonally over orange background and is 12 inches (300 mm) wide. Stop stripes at legends.

D. Floor Marking Tape: 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm).

2.6 TAGS

A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.

B. Nonmetallic Preprinted Tags: Polyethylene tags, [**0.015 inch (0.38 mm)**] [**0.023 inch (0.58 mm)**] thick, color-coded for phase and voltage level, with factoryprinted permanent designations; punched for use with self-locking cable tie fastener.

C. Write-on Tags:
1. Polyester Tags: 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.7 SIGNS

A. Baked-Enamel Signs:
1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal Size: 7 by 10 inches (180 by 250 mm).

B. Metal-Backed Butyrate Signs:
1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch (1-mm) galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal Size: 10 by 14 inches (250 by 360 mm).

C. Laminated Acrylic or Melamine Plastic Signs:
1. Engraved legend.
2. Thickness:
   a. For signs up to 20 sq. in. (129 sq. cm), minimum 1/16 inch (1.6 mm) thick.
   b. For signs larger than 20 sq. in. (129 sq. cm), 1/8 inch (3.2 mm) thick.
   c. Engraved legend with black letters on white face.
   d. Punched or drilled for mechanical fasteners with 1/4-inch (6.4-mm) grommets in corners for mounting.
   e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.8 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black, except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
1. Minimum Width: 3/16 inch (5 mm).

2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D 638: 7000 psi (48.2 MPa).
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
5. Color: Black.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
   1. Secure tight to surface of conductor, cable, or raceway.

H. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.
   1. Secure tight to surface of conductor, cable, or raceway.

I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.

K. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

L. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
   1. "EMERGENCY POWER."
   2. "POWER."
   3. "UPS."

M. Vinyl Wraparound Labels:

   1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
   2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

N. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.

O. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.

P. Self-Adhesive Labels:
   1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
   2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.

Q. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

R. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.

S. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.

T. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
   1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

U. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

V. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.

W. Metal Tags:
   1. Place in a location with high visibility and accessibility.
   2. Secure using general-purpose cable ties.

X. Nonmetallic Preprinted Tags:
   1. Place in a location with high visibility and accessibility.
   2. Secure using general-purpose cable ties.

Y. Write-on Tags:
   1. Place in a location with high visibility and accessibility.
   2. Secure using general-purpose cable ties.

Z. Baked-Enamel Signs:
   1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
   2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on minimum 1-1/2-inch- (38-mm-) high sign; where two lines of text are required, use signs minimum 2 inches (50 mm) high.

AA. Metal-Backed Butyrate Signs:
   1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
   2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high sign; where two lines of text are required, use labels 2 inches (50 mm) high.

BB. Laminated Acrylic or Melamine Plastic Signs:
   1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
   2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high sign; where two lines of text are

required, use labels 2 inches (50 mm) high.

CC. Cable Ties: General purpose, for attaching tags, except as listed below:

1. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Snap-around labels.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

D. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

E. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."

F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.

G. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with the conductor designation.

H. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

I. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

J. Workspace Indication: Apply floor marking tape or tape and stencil to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush- mounted panelboards and similar equipment in finished spaces.

K. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.

L. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.
   1. Apply to exterior of door, cover, or other access.
   2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
      a. Power-transfer switches.
      b. Controls with external control power connections.

M. Arc Flash Warning Labeling: Self-adhesive labels.

N. Operating Instruction Signs: Baked-enamel warning signs.

O. Emergency Operating Instruction Signs: Baked-enamel warning signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.

P. Equipment Identification Labels:

   1. Indoor Equipment: Baked-enamel signs.
   2. Equipment to Be Labeled:
      a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a engraved, laminated acrylic or melamine label.
      b. Enclosures and electrical cabinets.
      c. Access doors and panels for concealed electrical items.
      d. Emergency system boxes and enclosures.
      e. Enclosed switches.
      f. Variable-speed controllers.

END OF SECTION 260553

SECTION 260923 - LIGHTING CONTROL DEVICES

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. Indoor occupancy and vacancy sensors.
2. Switchbox-mounted occupancy sensors.
3. Lighting contactors.
4. Emergency shunt relays.

B. Related Requirements:

1. Section 262726 "Wiring Devices" for wall-box dimmers, non-networkable wall-switch occupancy sensors, and manual light switches.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Show installation details for the following:

a. Occupancy sensors.
b. Vacancy sensors.

2. Interconnection diagrams showing field-installed wiring.
3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and elevations, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which equipment will be attached.
3. Items penetrating finished ceiling, including the following:

a. Luminaires.
b. Air outlets and inlets.

c. Speakers.
d. Sprinklers.
e. Access panels.
f. Control modules.

B. Field quality-control reports.

C. Sample Warranty: For manufacturer's warranties.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in operation and maintenance manuals.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On manufacturer's website. Provide names, versions, and website addresses for locations of installed software.
3. Device address list.
4. Printout of software application and graphic screens.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Faulty operation of lighting control software.
b. Faulty operation of lighting control devices.

2. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 INDOOR OCCUPANCY AND VACANCY SENSORS

A. Subject to compliance with the contract documents, provide products from one of the following manufacturers:
1. Acuity Lighting Group, Inc
2. Bryant Electric, a Hubbell company
3. Hubbell Building Automation
4. Leviton Mfg Company, Inc.
5. Lutron Electronics Co, Inc.
6. Sensor Switch Inc
7. Wattstopper

B. General Requirements for Sensors:

1. Ceiling mounted, solid-state indoor occupancy and vacancy sensors.
2. Dual technology.
3. Integrated or Separate power pack.
4. Hardwired connection to switch; and BAS and lighting control system.
5. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
6. Operation:
   a. Combination Sensor: Unless otherwise indicated, sensor shall be programmed to turn lights on when coverage area is occupied and turn them off when unoccupied, or to turn off lights that have been manually turned on; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.

7. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A.
8. Power: Line voltage or low-voltage power pack designed to work in conjunction with sensor.
9. Mounting:
   a. Sensor: Suitable for mounting in any position on a standard outlet box.
   b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
   c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

10. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
11. Bypass Switch: Override the "on" function in case of sensor failure.
12. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lux); turn lights off when selected lighting level is present.

C. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of 1000 square feet (110 square meters) when mounted 48 inches (1200 mm) above finished floor.
5. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. (186 sq. m) when mounted on a 96-inch- (2440-mm-) high

ceiling.

6. Detection Coverage (Corridor): Detect occupancy anywhere within 90 feet (27.4m) when mounted on a 10-foot (3-m) high ceiling in a corridor not wither than 14-feet (4.3-m).

2.2 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

A. Subject to compliance with the contract documents, provide products from one of the following manufacturers:
   1. Acuity Lighting Group, Inc
   2. Bryant Electric, a Hubbell company
   3. Hubbell Building Automation
   4. Leviton Mfg Company, Inc.
   5. Lutron Electronics Co, Inc.
   6. Sensor Switch Inc
   7. Wattstopper

B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox, with provisions for connection to BAS using hardwired connection.

   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
   3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F (0 to 49 deg C).

   4. Switch Rating: Not less than 800-VA LED load at 120 V, and 800-W incandescent.

C. Wall-Switch Sensor:

   1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft. (84 sq. m).
   2. Sensing Technology: Dual technology - PIR and ultrasonic.
   3. Switch Type: SP, field-selectable automatic "on," or manual "on," automatic "off."
   4. Capable of controlling load in three-way application.
   5. Voltage: Match the circuit voltage.
   6. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc (108 to 1600 lux). The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
   7. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
   8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
   9. Color: White.
   10. Faceplate: Color matched to switch.

2.3 EMERGENCY SHUNT RELAY

A. Description: NC, electrically held relay, arranged for wiring in parallel with manual or automatic switching contacts; complying with UL 924.

1. Coil Rating: 120 V.

2.4 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.

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

3.2 SENSOR INSTALLATION

A. Comply with NECA 1.

B. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

C. Install and aim sensors in locations to achieve not less than 90-percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.3 CONTACTOR INSTALLATION

A. Comply with NECA 1.

3.4 WIRING INSTALLATION

A. Comply with NECA 1.

B. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 3/4 inch (19 mm).

C. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower- limited conductors according to conductor manufacturer's written instructions.

D. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.5 IDENTIFICATION

A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate lighting control devices and perform tests and inspections.

B. Perform the following tests and inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Lighting control devices will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.7 ADJUSTING

A. Occupancy Adjustments: When requested within 6 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 260923

SECTION 262726 - WIRING DEVICES

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. Straight-blade convenience.
2. GFCI receptacles.
3. Cord and plug sets.
4. Decorator-style convenience.
5. Wall-box dimmers.
6. Wall plates.

1.3 DEFINITIONS

A. Abbreviations of Manufacturers' Names:

1. Cooper: Cooper Wiring Devices; Division of Cooper Industries, Inc.
2. Hubbell: Hubbell Incorporated: Wiring Devices-Kellems.
3. Leviton: Leviton Mfg. Company, Inc.
4. Pass & Seymour: Pass& Seymour/Legrand.

B. BAS: Building automation system.

C. EMI: Electromagnetic interference.

D. GFCI: Ground-fault circuit interrupter.

E. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

F. RFI: Radio-frequency interference.

G. SPD: Surge protective device.

H. UTP: Unshielded twisted pair.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Floor Service-Outlet Assemblies: One for every 10, but no fewer than one.
   2. Poke-Through, Fire-Rated Closure Plugs: One for every five floor service outlets installed, but no fewer than two.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

   1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
   2. Devices shall comply with the requirements in this Section.

D. Devices for Owner-Furnished Equipment:

   1. Receptacles: Match plug configurations.

   2. Cord and Plug Sets: Match equipment requirements.

E. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STRAIGHT-BLADE RECEPTACLES

A. Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Subject to compliance with requirements, provide products by one of the following:
   a. Cooper; 5351 (single), CR5362 (duplex)
   b. Hubbell; HBL5351 (single), HBL5352 (duplex).
   c. Leviton; 5891 (single), 5352 (duplex).
   d. Pass & Seymour; 5361 (single), 5362 (duplex)

2.3 GFCI RECEPTACLES

A. General Description:

1. 125 V, 20 A, straight blade, non-feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles:

1. Subject to compliance with requirements, provide products by one of the following:
   a. Cooper;VGF20
   b. Hubbell; GFR5352L
   c. Leviton;7899.
   d. Pass & Seymour; 2095

2.4 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.5 DECORATOR-STYLE DEVICES

A. Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, and UL 498.

1. Subject to compliance with requirements, provide products by one of the following manufacturers:
   a. Cooper 6252
   b. Hubbell, DR15
   c. Leviton, 16252

d. Pass & Seymour, 26252

B. GFCI, Non-Feed-Through Type, Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, UL 498, and UL 943 Class A.

1. Subject to compliance with requirements, provide products by one of the following manufacturers:
   a. Cooper VGF15
   b. Hubbell, GF15LA
   c. Leviton, 8599
   d. Pass & Seymour, 1594

2.6 WALL-BOX DIMMERS

A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.

B. Control: Continuously adjustable slider; with single-pole or three-way switching. Comply with UL 1472.

C. LED Lamp Dimmer Switches: Modular; compatible with LED lamps; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.7 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, thermoplastic with lockable cover.

2.8 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Emergency Power System: Red.
3. SPD Devices: Blue.

B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

    a. Cut back and pigtail, or replace all damaged conductors.
    b. Straighten conductors that remain and remove corrosion and foreign matter.
    c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.

7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan-speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on bottom. Group adjacent switches under single, multigang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 FIELD QUALITY CONTROL

A. Test Instruments: Use instruments that comply with UL 1436.

B. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

C. Perform the following tests and inspections:

1. In healthcare facilities, prepare reports that comply with recommendations in NFPA 99.
2. Test Instruments: Use instruments that comply with UL 1436.
3. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

D. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

E. Test straight-blade for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).

F. Wiring device will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Enclosures.

1.3 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
5. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
b. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
2. Fuse Pullers: Two for each size and type.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).

2. Altitude: Not exceeding 6600 feet (2010 m).

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

2.2 GENERAL REQUIREMENTS

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

D. Comply with NFPA 70.

2.3 FUSIBLE SWITCHES

A. Subject to compliance with requirements, provide products by one of the following manufacturers:
1. ABB Inc
2. Eaton
3. General Electric Company
4. Siemens Industry, Inc; Energy
5. Square-D; by Schneider Electric

B. Type HD, Heavy Duty:

1. Single throw.
2. Three pole.
3. 600-V ac.

4. 1200 A and smaller.
5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses.
6. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
5. Lugs: Compression] type, suitable for number, size, and conductor material.
6. Service-Rated Switches: Labeled for use as service equipment.

2.4 NONFUSIBLE SWITCHES

A. Subject to compliance with requirements, provide products by one of the following manufacturers:
1. Eaton
2. General Electric Company
3. Siemens Industry, Inc; Energy
4. Square-D; by Schneider Electric

B. Type GD, General Duty, Three Pole, Single Throw, 240-V ac, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Three Pole, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and =aluminum neutral conductors.
4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
5. Lugs: Compression type, suitable for number, size, and conductor material.
6. Service-Rated Switches: Labeled for use as service equipment.

2.5 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure Finish: The enclosure shall be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1).

C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both endwalls.

D. Operating Mechanism: The circuit-breaker operating handle shall be or directly operable through the dead front trim of the enclosure (NEMA 250 Type 3R). The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

E. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

F. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

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

1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

3.2 PREPARATION

A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of electric service.
2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without Owner's written

permission.
4. Comply with NFPA 70E.

3.3 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

3.4 INSTALLATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

C. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

D. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

E. Install fuses in fusible devices.

F. Comply with NFPA 70 and NECA 1.

3.5 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:

a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, grounding, and clearances.
c. Verify that the unit is clean.
d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
e. Verify that fuse sizes and types match the Specifications and Drawings.
f. Verify that each fuse has adequate mechanical support and contact integrity.
g. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
i. Verify correct phase barrier installation.
j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published

data.

d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
e. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."

D. Tests and Inspections for Molded Case Circuit Breakers:

1. Visual and Mechanical Inspection:

a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
b. Inspect physical and mechanical condition.
c. Inspect anchorage, alignment, grounding, and clearances.
d. Verify that the unit is clean.
e. Operate the circuit breaker to ensure smooth operation.
f. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

g. Inspect operating mechanism, contacts, and chutes in unsealed units.
h. Perform adjustments for final protective device settings in accordance with the coordination study.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than

those published in Table 100.1 or as recommended in manufacturer's published data.

c. Perform a contact/pole resistance test. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.

d. Perform insulation resistance tests on all control wiring with respect to ground. Applied potential shall be 500-V dc for 300-V rated cable and 1000- V dc for 600-V rated cable. Test duration shall be one minute. For units with solid state components, follow manufacturer's recommendation. Insulation resistance values shall be no less than two megohms.

e. Determine the following by primary current injection:

1) Long-time pickup and delay. Pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.

2) Short-time pickup and delay. Short-time pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.

3) Ground-fault pickup and time delay. Ground-fault pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.

4) Instantaneous pickup. Instantaneous pickup values shall be as specified and within manufacturer's published tolerances.

f. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data. Minimum pickup voltage of the shunt trip and close coils shall be as indicated by manufacturer.

g. Verify correct operation of auxiliary features such as trip and pickup indicators; zone interlocking; electrical close and trip operation; trip-free, anti- pump function; and trip unit battery condition. Reset all trip logs and indicators. Investigate units that do not function as designed.

h. Verify operation of charging mechanism. Investigate units that do not function as designed.

3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

E. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

1. Test procedures used.
2. Include identification of each enclosed switch and circuit breaker tested and

describe test results.

3. List deficiencies detected, remedial action taken, and observations after remedial action.

3.7 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262816

SECTION 265119 - LED INTERIOR LIGHTING

PART 1 - 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 the following types of LED luminaires:
   1. Recessed linear.
   2. Strip light.
   3. Surface mount, linear.
   4. Suspended, linear.
   5. Materials.
   6. Finishes.
   7. Luminaire support.

B. Related Requirements:

   1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting unit, including lamp, reflector, and housing to match aestheticially the existing luminaires used currently on the site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Arrange in order of luminaire designation.

2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
6. Photometric data and adjustment factors based on laboratory tests, complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project.

    a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Luminaires.
2. Suspended ceiling components.
3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches (300 mm) of the plane of the luminaires.
4. Structural members to which luminaires will be attached.
5. Initial access modules for acoustical tile, including size and locations.
6. Items penetrating finished ceiling, including the following:

    a. Other luminaires.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.
    f. Ceiling-mounted projectors.

7. Moldings.

B. Seismic Qualification Certificates: For luminaires, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

C. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Product Certificates: For each type of luminaire.

E. Product Test Reports: For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.

F. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
2. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
3. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. Provide luminaires from a single manufacturer for each luminaire type.

C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective

covering before shipping.

1.10 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.

1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

2.2 LUMINAIRE REQUIREMENTS

A. 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.

B. Standards:

1. ENERGY STAR certified.
2. UL Listing: Listed for damp location.
3. Recessed luminaires shall comply with NEMA LE 4.
4. User Replaceable Lamps:

a. Bulb shape complying with ANSI C78.79.
b. Lamp base complying with ANSI C81.61.

C. CRI of 90. CCT of as indicated in luminaire schedule.

D. Rated lamp life of 50,000 hours to L70.

E. Lamps dimmable from 100 percent to 0 percent of maximum light output.

F. Internal driver.

G. Nominal Operating Voltage: 120Vac as indicated on Drawings.

1. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

H. Housings: as indicated in Luminaire Schedule on Drawings.

2.3 RECESSED LINEAR

A. Manufacturer: as indicated in luminaire schedule.

B. Minimum 3800 lumens. Minimum allowable efficacy of 85 lumens per watt.

C. Integral junction box with conduit fittings.

2.4 STRIP LIGHT

A. Minimum 750 lumens. Minimum allowable efficacy of 80 lumens per watt.

B. Integral junction box with conduit fittings.

2.5 SURFACE MOUNT, LINEAR

1. Manufacturer: as indicated in luminaire schedule.
2. Or, approved equal.

B. Minimum 4000 lumens. Minimum allowable efficacy of 85 lumens per watt.

C. Integral junction box with conduit fittings.

2.6 SUSPENDED, LINEAR

A. Manufacturer: as indicated in luminaire schedule.

B. Minimum 4000 lumens. Minimum allowable efficacy of 85 lumens per watt.

2.7 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Diffusers and Globes:

1. As indicated in Luminaire Schedule on Drawings.
2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise

indicated.

D. Housings: as indicated in Luminaire Schedule on Drawings.

E. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. "USE ONLY" and include specific lamp type.
b. Lamp diameter, shape, size, wattage, and coating.
c. CCT and CRI for all luminaires.

2.8 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.9 LUMINAIRE SUPPORT

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

D. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

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 the Work.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire mounting devices shall be capable of supporting a horizontal force of
   100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaire Support:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls.
2. Do not attach luminaires directly to gypsum board.

G. Ceiling-Mounted Luminaire Support:

1. Ceiling mount with two 5/32-inch- (4-mm-) diameter aircraft cable supports adjustable to 120 inches (6 m) in length.

H. Suspended Luminaire Support:

1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
3. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

I. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

J. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 265119