CITY OF HERMOSA BEACH CONTRACT DOCUMENTS AND SPECIFICATIONS FOR

CIP No. 619
Kelly Courts Renovations

July 2025

City of Hermosa Beach

NOTICE INVITING BIDS

Notice is hereby given that the City of Hermosa Beach will receive electronic bids until **2:00 PM on Thursday, August 28, 2025,** at which time the electronic bids will be publicly opened at the City Council Chambers at 1315 Valley Drive, Hermosa Beach, CA 90254 and posted on Planet Bids for **CIP No. 619 Kelly Courts Renovations.**

A pre-bid meeting will be held at **11:00 AM on Tuesday, August 12, 2025; at the Kelly Courts at 861 Valley Drive, Hermosa Beach, CA 90254**. The City will respond to questions from prospective Bidders at that time.

The project includes, but is not limited to, renovating the existing pickleball, tennis and basketball courts, collectively identified as Kelly Courts. The project involves demolishing and replacing existing structures such as perimeter walls, fencing, lighting, court surfaces, and play equipment. New construction will include curb walls, concrete slabs, sidewalks, asphalt pavement, court resurfacing, and the installation of modern fencing, lighting, electrical systems, and play equipment; and other related work to complete the work per project's plans and specifications at the Kelly Courts, located at 861 Valley Drive, Hermosa Beach, CA 90254.

The engineer's cost estimate for the project is **$795,155**. License requirement is a valid **State of California Contractors License Class "A" license.**

The duration of the project is **40 working days.** All bids must be submitted electronically on Planet Bids Portal, accessible through the City's webpage at https://www.hermosabeach.gov/our-government/city-clerk/bids-and-proposals where you must first register as a vendor through our Planet Bids Portal. Contract Documents, plans, and specifications will be available for review on Planet Bids. All relevant materials shall be obtained from the link above.

Each proposal must be accompanied by a cash deposit, a certified or cashier's check, or a Bidder's bond, made payable to the City of Hermosa Beach, in an amount not less than 10 percent of the total bid submitted.

The successful Bidder will be required to furnish a faithful performance bond in the amount of 100 percent of the Contract price, a payment bond in the amount of 100 percent of the Contract price, and a warranty bond all in the attached form satisfactory to the City Attorney. The successful Bidder will also be required to pay the State of California prevailing wage scale as determined by the Department of Industrial Relations, available at http://www.dir.ca.gov/dlse/dlsePublicWorks.html.

The Contractor must be registered with the Department of Industrial Relations at the time of bid. Contractor's registration information is available at:
https://www.dir.ca.gov/Public-Works/Contractor-Registration.html

The City reserves the right to reject any or all bids and to waive any informality or irregularity in any bid received and to be the sole judge of the merits of the respective bids received. The award, if made, will be made to the lowest responsive and responsible Bidder.

Please submit any questions related to this bid on Planet Bids portal no later than **2:00PM on Friday, August 15, 2025.**

TABLE OF CONTENTS

CIP NO. 619 Kelly Courts Renovations

I. PROJECT DESCRIPTION AND UNDERSTANDING 5

II. NOTICE TO BIDDERS 6

III. INSTRUCTION TO BIDDERS 8

IV. BID DOCUMENTS 17

- A. PROPOSAL 17
- B. BID PROPOSAL 18
- C. BID BOND 22
- D. BIDDER'S ASSURANCE 25
- E. BIDDER'S DECLARATION 26
- F. CERTIFICATE OF NON-DISCRIMINATION BY CONTRACTORS 28
- G. CERTIFICATION OF PRINCIPAL 29
- H. DECLARATION OF ELIGIBILITY TO CONTRACT 30
- I. NON-COLLUSION DECLARATION 31
- J. REFERENCES OF WORK 32
- K. SUBCONTRACTORS LIST 34
- L. IRAN CONTRACTING ACT CERTIFICATION 37
- M. PUBLIC WORKS CONTRACTOR REGISTRATION CERTIFICATION 38
- N. FLEET COMPLIANCE CERTIFICATION 39

V. CONTRACT DOCUMENTS 41

- A. CONTRACT AGREEMENT 42
- B. AGREEMENT OF INDEMNIFICATION 60
- C. EQUALS 61
- D. FAITHFUL PERFORMANCE BOND 62
- E. PAYMENT BOND (LABOR AND MATERIALS) 67
- F. GUARANTEE TO THE CITY OF HERMOSA BEACH 71
- G. GENERAL COMPREHENSIVE LIABLITY ADDITONAL INSURED ENDORSMENT 72
- H. AUTOMOBILE LIABILITY ADDITIONAL INSURED ENDORSEMENT 74
- I. INSTRUCTIONS FOR COMPLETING, EXECUTING, AND SUBMITTING EVIDENCE OF INSURANCE TO THE OWNER 76
- J. WORKER'S COMPENSATION INSURANCE CERTIFICATE 78
- K. SUPPLEMENTAL INFORMATION TO BE COMPLETED BY PRINCIPAL 79
- L. W9 FORM 80

VI. TECHNICAL PROVISIONS TP-1

VII. SPECIAL PROVISIONS SP-1

EXHIBIT "A" – SHEDULE OF PERFORMSNCE SP-33

EXHIBIT "B"- SOLID WASTE REPORTING SP-34

EXHIBIT "C"- CONSTRUCTION NOTICE TEMPLATE SP-36

EXHIBIT "D"- HAUL ROUTES SP-37

City of Hermosa Beach

CIP NO. 619 KELLY COURTS RENOVATIONS

I. PROJECT DESCRIPTION AND UNDERSTANDING

The City of Hermosa Beach is seeking proposals to renovate the existing pickleball, tennis and basketball courts, collectively identified as Kelly Courts. Work generally consists of demolishing existing perimeter curb wall and foundation, removal of existing fence posts, fabric and windscreen material and gates, demolishing existing concrete improvements, removal of existing light poles and fixtures, removal of existing play fields posts, backboards, hoops and nets, removal of existing court surface material, construction of new curb wall with fence, installing new fence posts, vinyl-coated fabric, windscreen and gates, construction of new concrete slab, construction of new sidewalk and other concrete improvements, reconstruction of asphalt concrete pavement, installation of pavement striping, markings and new signs, installation of new light poles and fixtures, installation of new electrical conduits and conductors, resurfacing of courts and installation of new play courts' posts, nets, backboards and hoops, and completion of other related and necessary work to complete the work per project's plans and specifications. The project is scheduled to have a time frame of **forty (40) working days** for completion of work.

II. NOTICE TO BIDDERS

Prospective Bidder: To be considered as a responsive Bidder you must register on Planet Bids portal through the city's website at https://www.hermosabeach.gov/our-government/city-clerk/bids-and-proposals .

Pre-bid Meeting: A pre-bid meeting will be held at **11:00 AM on Tuesday , August 12, 2025; at the Kelly Courts at 861 Valley Drive, Hermosa Beach, CA 90254**. The City will respond to questions from prospective Bidders at that time.

Bid Documents: Bid Documents, including but not limited to specifications and proposal forms, will be available for download on Planet Bids Portal, accessible through the webpage at:
https://pbsystem.planetbids.com/portal/51313/bo/bo-search.

To the extent required by Section 20103.7 of the Public Contract Code, upon request from a Contractor plan room service, the City shall provide an electronic copy of the Contract Documents at no charge to the Contractor plan room.

It is the responsibility of each prospective Bidder to download and print all bid documents for review and to verify the completeness of Bid Documents before submitting a bid. The City does not assume any liability or responsibility based on any defective or incomplete copying, excerpting, scanning, faxing, downloading, or printing of the Bid Documents.

Questions: All questions regarding this bid shall be submitted through Planet Bids no later than **2:00 PM on Friday, August 15, 2025.** Proposers shall not contact City personnel or Elected Officials with any questions or clarifications concerning this Invitation for Bids other than through Planet Bids. Any City response for this Bid that is not posted through Planet Bids is unauthorized and will be considered invalid.

Submittal of Bids: Electronic bids shall be submitted through Planet Bids until **2:00 PM on Thursday, August 28, 2025;** at which time they will be publicly opened and read in the City Council Chambers at 1315 Valley Drive, Hermosa Beach, CA. All bids shall be valid for a period of 90 calendar days after the bid opening date.

Bidder's Guarantee: Each bid must be accompanied by cash or a certified check or a cashier's check or Bidder's bond made payable to the City of Hermosa Beach for an amount equal to at least ten percent (10%) of the bid price. In accordance with Public Contract Code Section 20170, the Bidder's Bond shall be issued by a surety company admitted to do business in the State of California. Further, in accordance with Public Contract Code Section 20172, such guarantee shall be forfeited should the Bidder to whom the Contract is awarded fail to enter into the Contract within the specified time.

Payment, Performance Bonds: The successful Bidder will be required to furnish a Faithful Performance Bond and a Labor and Material Payment Bond, each in an amount equal to one hundred percent (100%) of the Contract Price. Each bond shall be in the forms set forth herein and shall be secured from a surety company that meets all State of California bonding requirements, as defined in California Code of Civil Procedure Section 995.120, and that is a California admitted surety insurer.

Substitution of Securities: Pursuant to Section 22300 of the Public Contract Code of the State of California, the successful Bidder may substitute certain securities for funds withheld by the City to ensure its performance under the Contract.

Contractor License: In accordance with provisions of Section 3300 of the California Public Contract Code, City of Hermosa Beach has determined that **the Contractor shall possess a valid "A" California Contractor's License.**

Failure to possess such license may render the bid as non-responsive and bar the award of the Contract to that non-responsive Bidder.

Prevailing Wages: Pursuant to Labor Code Section 1773, the 14Contractor shall pay the prevailing rate of per diem wages and the prevailing wage rate for holiday and overtime work applicable in Los Angeles County from the Director of the Department of Industrial Relations for each craft, classification, or type of worker needed to execute this Contract. A copy of these prevailing wage rates may be obtained by visiting: https://www.dir.ca.gov/Public-Works/Prevailing-Wage.html

In addition, a copy of the prevailing rate of per diem wages will be made available at the City's Public Works Department upon request. The successful Bidder shall post a copy of the prevailing wage rates at each job site. It shall be mandatory for the Bidder to whom the Contract is awarded, and for any subcontractors, to comply with all Labor Code provisions, which include but are not limited to the payment of not less than the said specified prevailing wage rates to all workers employed by them in the execution of the Contract, employment of apprentices, hours of labor, and debarment of Contractors and subcontractors.

Contractor's Registration with the Department of Industrial Relations (DIR): The Bidder's attention is directed to Labor Code Section 1725.5, which provides that a Contractor or subcontractor shall not 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 that is subject to Labor Code Section 1720 et seq., unless currently registered and qualified to perform public work pursuant to Labor Code Section 1725.5. No Bid will be accepted, nor any Contract entered into without proof of the Contractor's and subcontractors' current registration with the DIR to perform public work. If awarded a Contract, the Bidder and its subcontractors, of any tier, shall maintain active registration with the DIR for the duration of the Project.

Compliance Monitoring and Enforcement: Contractor's performance of the Work described in the Notice Inviting Bids is subject to compliance monitoring and enforcement by the California Department of Industrial Relations. In bidding on this Project, it shall be the Bidder's sole responsibility to evaluate and include the cost of complying with all labor compliance requirements under this Contract and applicable law in its Bid.

Award of Contract: The City shall award the Contract for the Project to the lowest responsive, responsible Bidder as determined by the City from the total base bid. City reserves the right to reject any or all bids or to waive any irregularities or informalities in any bids or in the bidding process.

III. INSTRUCTION TO BIDDERS

Form of Proposal: The proposal shall be fully executed and submitted on the forms provided by the City. Proposal forms can be obtained from Planet Bids.

Signatures: All places where signatures are required must be fully executed.

Proposal: Documents which shall be signed and returned to the City with the Bid Proposal are:

A. Proposal
B. Bid Schedule
C. Bid Bond
D. Bidder's Assurance
E. Bidder's Declaration
F. Certificate of Non-Discrimination by Contractors
G. Certification of Principal
H. Declaration of Eligibility to Contract
I. Non-Collusion Declaration
J. References for Work
K. SubContractor List
L. Iran Contracting Act Certification
M. Public Works Contractor Registration Certification
N. Fleet Certification Form

O. Addenda (if applicable)

Contract: Documents which shall be signed and returned to the City by the successful Bidder within 10 days of notification of intent to award Contract:

A. Contract Agreement
B. Agreement of Indemnification and Hold Harmless and Waiver of Subrogation and Contribution
C. Equals
D. Faithful Performance Bond
E. Payment Bond (Labor and Materials)
F. Guarantee to the City of Hermosa Beach
G. General Comprehensive Liability Additional Insured Endorsement
H. Automobile Liability Additional Insured Endorsement
I. Instructions for Completing, Executing, and Submitting Evidence of Insurance to the Owner
J. Worker's Compensation Insurance Certificate
K. Supplemental Information to be Completed by Principal
L. W-9 Form
M. Copy of City Business License

Delivery of Proposal: Each Bid prepared by Bidder shall be completed in itself and shall be submitted electronically through Planet Bids.

Prevailing Wage: In accordance with the provisions of Section 1770 et seq., of the Labor Code, the Director of the Department of Industrial Relations of the State of California has ascertained the general prevailing rate of wages which is the minimum amount which shall be paid to all workers employed to perform the work. A copy of the determination is on file in the office of the City Clerk and is hereby incorporated herein and made a part hereof as though fully set forth herein.
A copy of the determination will be made available to any interested person upon request and shall be posted at the job site.

Overtime: As per Labor Code Section 1810 et seq., eight (8) hours is the legal working day. The Contractor shall pay overtime for each worker who works in excess of the legal working day.

Payment: Refer to the Contract Agreement for payment information. Contractor shall submit progress payment requests on City approved form.

Required Bonds: Prior to the execution of the Contract, the successful Bidder shall file with the City surety bonds in the amounts and for the purposes noted below. The surety insurer shall be a California admitted surety insurer, as defined in Code of Civil Procedure section 995.120. Contractor shall pay all premiums and costs thereof and incidental thereto.

Per Civil Code section 3247, a Payment Bond is required if the Contract is for more than $25,000.

The successful Bidder shall give three (3) surety bonds with good and sufficient sureties:

"Payment Bond – Labor and Materials" shall be so conditioned as to insure to the benefit of persons furnishing materials for or performing labor upon the work. Bond to be in the sum of not less than 100% of the Contract price to assure the claims of materialmen supplying materials to Contractor, and for payment to laborers and subcontractors employed on the project.

“Faithful Performance Bond" in the sum of not less than 100% of the Contract price to assure the faithful performance of the Contract; shall be conditioned as to assure the faithful performance by the Contractor of all work under said Contract, in a manner that is satisfactory and acceptable to the City; that all materials and workmanship supplied by him will be free from original or developed defects; and that should original or developed defects or failures appear, the Contractor shall, at his own expense, make good such defects and failures and make all replacements and adjustments required, within a reasonable time after being notified by the City to do so, and to the satisfaction of the City.

Rejection of Proposals: The City reserves the right to reject any and all proposals and to waive any minor or technical discrepancies or irregularities. Proposals may be rejected if they show any alteration of form, additions not called for, conditional bids, incomplete bids, erasures, or irregularities of any kind.

Agents: When proposals are signed by an agent, other than the officer or officers of a corporation authorized to sign Contracts on its behalf or a member of a partnership, a "Power of Attorney" must be on file with the City prior to opening bids or shall be submitted with the proposal; otherwise, the proposal will be rejected as irregular and unauthorized.

Withdrawal of Proposals: Any bid may be withdrawn at any time prior to the time fixed in the public notice for the opening of bids only by written request for the withdrawal of the bid filed with the City Engineer. The request shall be executed by the Bidder or their duly authorized representative. The withdrawal of a bid does not prejudice the right of the Bidder to file a new bid. Bids are opened exactly at the time fixed in the public notice for opening bids. A bid will not be received after that time, nor may any bid be withdrawn after that time. No Bidder may withdraw his bid within ninety (90) days after the actual date of the opening thereof.

Insurance: Without limiting Contractor's indemnification, Contractor shall maintain in force at all times during the performance of this agreement the insurance provisions set out in the Contract Agreement.

City Business License and Permits: The successful Bidder shall obtain a valid City of Hermosa Beach Business License prior to commencing work under this Contract.

The successful Bidder will be required to obtain City Right of Way Permit to work in public right-of-way, issued at no fee for the project.

Increased or Decreased Quantities: The City reserves the right to increase, or decrease, or to entirely eliminate items or portions of items from work if found desirable or expedient.

Approximate Estimate: The quantities in the Bid Schedule are approximate only, being given as a basis for the comparison of bids. The City does not, expressly or by implication, agree that the actual amount of work will correspond therewith. The Contractor shall verify in the field the accuracy of the estimated quantities.

Examination of Plans, Specifications, Contract, and Site of Work: The Bidder shall examine carefully the site of the work contemplated, the Plans and Specifications, and the proposal and Contract forms therefor. The submission of a bid shall be conclusive evidence that the Bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality and scope of work to be performed, the quantities of materials to be furnished, and as to the requirements of the proposal, Plans, Specifications, and the Contract.

Where the City may have made investigations of subsurface conditions in areas where work is to be performed under the Contract, such investigations are made only for the purpose of study and design. Where such investigations have been made, Bidders or Contractors may, upon written request, inspect the records of the City as to such investigations subject to and upon the conditions hereinafter set forth. Such inspection of records may be made at the office of the City Engineer.

The records of such investigations are not a part of the Contract and are shown solely for the convenience of the Bidder or Contractor. It is expressly understood and agreed that the City assumes no responsibility whatsoever in respect to the sufficiency or accuracy of the investigations thus made, the records thereof, or of the interpretations set forth therein or made by the City in its use thereof and there is no warranty or guaranty, either expressed or implied, that the conditions indicated by such investigations or records thereof are representative of those existing throughout such areas, or any part thereof, or that unlooked for developments may not occur, or that materials other than, or in proportions different than these indicated, may not be encountered.

Bidders shall satisfy themselves by personal examination of the locations of the proposed work, and by such other means as they may choose as to actual conditions and requirements and as to the accuracy of the quantities stated in the Proposal forms. Information derived from the maps, plans, specifications, profiles, or drawings, or from the Engineer or his assistants (or the Architects or their assistants), shall not relieve the Bidder of this responsibility, and the interpretation of the data disclosed by borings or other preliminary investigations is not guaranteed nor is any liability assumed by the City.

If a prospective Bidder is in doubt as to the true meaning or intent of any part of the Contract Documents including the Specifications, or discovers discrepancies in, or omissions from, the Specifications or Drawings, they may submit to the Engineer a written request for an interpretation or a correction thereof via Planet Bids. Interpretations or corrections of the Contract Documents including the Specifications and Drawings, shall be made only by addendum duly issued by the Engineer, and a copy of such addendum will be uploaded on Planet Bids and such addendum shall be considered a part of and incorporated in the Contract Documents.

Relief of Bidders: If the Bidder claims a mistake was made in their bid, the Bidder shall give the City written notice within five (5) days after the opening of the bids of the alleged mistake, specifying in the notice in detail how the mistake occurred.

Disqualification of Bidders: More than one proposal from an individual, firm, partnership, corporation, or combination thereof under the same or different names will not be considered. Reasonable grounds for believing that any individual, firm, partnership, corporation, or combination thereof is interested in more than one proposal for the work contemplated may cause the rejection of all proposals in which such individual, firm, partnership, corporation, or combination thereof is interested. If there is reason for believing that collusion exists among the Bidders, any or all proposals may be rejected. Proposals in which the prices obviously are unbalanced due to mathematical errors may be rejected.

Award of Contract: The award of the Contract, if it be awarded, will be to the lowest responsible Bidder whose proposal complies with all of the requirements prescribed. Such award, if made, will normally be made within in ninety (90) calendar days of the opening of the proposals.

If the lowest responsible Bidder refuses or fails to execute the Contract, the City may award the Contract to the second lowest responsible Bidder. If the second lowest responsible Bidder refuses or fails to execute the Contract, the City may award the Contract to the third lowest responsible Bidder.

Execution of Contract: The Contract shall be signed by the successful Bidder and returned, together with the Contract bonds, insurance endorsements and certificates, and all other required documents within ten (10) business days after the Bidder has received notice of intent to award.

Failure to Execute Contract: Failure of the lowest responsible Bidder, the second lowest responsible Bidder, or the third lowest responsible Bidder to execute the Contract and file acceptable bonds as provided herein within ten (10) business days after such Bidder has received notice that the Contract has been awarded to them shall be just cause for the

forfeiture of the proposal guaranty. The successful Bidder may file with the City Engineer a written notice, signed by the Bidder, or his authorized representative, specifying that the Bidder will refuse to execute the Contract if presented to him. The filing of such notice shall have the same force and effect as the failure of the Bidder to execute the Contract and furnish acceptable bonds within the time herein above prescribed.

Return of Proposal Guaranties: Within ten (10) business days after the award of the Contract to the lowest responsible Bidder, the City will return the proposal guaranties, other than Bidder's bonds, accompanying such of the proposals as are not to be further considered in making the award. Retained proposal guaranties will be held until the Contract has been finally executed, after which all proposal guaranties, except Bidder's bonds and any guaranties which have been forfeited, will be returned to the respective Bidders whose proposals they accompany.

Qualifications of Bidders: Each Bidder shall be skilled and regularly engaged in the general class or type of work called for under the Contract. A statement setting forth their experience shall be submitted by each Bidder on the References of Work form provided herein.

Each Bidder shall possess valid active Contractor's License issued by the Contractor's State License Board at the time their bid is submitted. The class of license shall be applicable to the work specified in the Contract. Each Bidder shall also have no less than five (5) years' experience in the magnitude and the character of the work bid.

Pursuant to section 1103 of the Public Contract Code, City staff has determined that the following non-exhaustive experience is reasonably necessary to satisfactorily perform the public works Contract:

The Contractor shall have a minimum of five (5) projects of similar type of construction and magnitude with other public agencies within the past five (5) years.

The Contractor shall have been in the business under the same name and California Contractor's License for a minimum of five (5) continuous years prior to the bid opening date for this project. The license used to satisfy this requirement shall be of the same type as that required by the Contract.

The Contractor shall perform above 50% of the Contract with its own forces.

Bidders must be thoroughly competent and capable of satisfactorily performing the work covered by the proposal. They shall have had project experience similar to the project scope of work. When requested, they shall furnish such statements relative to previous experience on similar work, the plan or procedure proposed, and the organization, machinery, plant, and other equipment available for the contemplated work, and the financial condition and resources of the Bidder, as may be deemed necessary by the City Engineer in determining such competence and capability.

The City of Hermosa Beach will not enter into a Contract with any Bidder who is not properly licensed to do the work of this Contract under the provisions of Section 7000 et seq., of the Business and Professions Code, unless particularly exempted by the terms thereof. A bid by a Contractor who is not properly licensed shall be considered non-responsive and will be rejected. The Contractor must hold all sub-Contractors to these same Contract requirements.

The sheet for Bidder's signature in the Bid Proposal shall clearly show the Contractor's name, address, telephone number, State of California Contractor's license number, classification, and date of expiration.

Completeness of Bids: Bids are required for the entire work. The amount of the bid for comparison purposes will be the total bid price of all items. The Bidder shall set forth the bid price for each item in the respective spaces provided for these purposes.

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

a) As to lump sum items, the amount set forth in the "Total" column shall be the unit price.

b) As to unit price items, the amount set forth in the "Total" column shall be divided by the estimated quantity for the item and the price thus obtained shall be the unit price.

The City may waive technical or non-substantive inconsistencies in any bid.

Non-discrimination: Pursuant to the provisions of 31 CFR, Part 51, Section 51.55, the Revenue Sharing Act, notice is hereby given of the following policy, effective immediately:

The City of Hermosa Beach does not discriminate on the basis of handicapped status in admission or access to, or treatment of, or employment in, its programs and activities. The office that will coordinate compliance is that of Human Resources.

Workers' Compensation Insurance: Before execution of this Agreement by the City, the Contractor shall file with the City's Risk Manager the following signed certification:

"I am aware of, and will comply with, Section 3700 of the Labor Code, requiring every employer to be insured against liability for Workers' Compensation or to undertake self-insurance before commencing any of the work."

The Contractor shall also comply with Section 3700 of the Labor Code by securing, paying for and maintaining in full force and effect for the duration of this Agreement, complete Workers' Compensation Insurance, and shall furnish a Certificate of Insurance to the City's Risk Manager reflecting such insurance before this Agreement becomes effective. Contractor shall fully indemnify and hold harmless City, its attorneys, agents, officers, and employees for any claims in law or equity occasioned by the failure of Contractor to comply with the terms of this section. Every Workers' Compensation Insurance policy required hereunder, shall bear an endorsement, or shall have attached a rider, providing that in the event of expiration or proposed cancellation of such policy for any reason whatsoever, the City's Risk Manager shall be notified of such action by registered mail, postage prepaid, return receipt requested, at least 30 days before such expiration or cancellation becomes effective.

Indemnification: Bidders are instructed to refer to the Contract Agreement.

Subcontractors: Bidders must list the name, address of the place of business, Contractor license number, and DIR registration number for each subcontractor to be responsible for more than 1/2 of 1% of the total bid, and the portion of the job for which that subcontractor is responsible. Only one subcontractor may be listed for each portion of the job.

Unfair Business Practices Claims: In entering into a public works Contract or a subcontract to supply goods, services, or materials pursuant to a public works Contract, the Contractor or sub-Contractor offers and agrees to assign to the awarding body 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. Section 15) or under the Cartwright Act (Chapter 2, (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works Contract or the subcontract. This assignment shall be made and become effective at the time the awarding body renders final payment to the Contractor without further acknowledgment by the parties. (Section 7103.5, California Public Contract Code.)

Bidder Registration Requirement: Pursuant to Labor Code sections 1725.5 and 1771.1, all Contractors and subcontractors that wish to bid on, be listed in a bid proposal, or enter into a Contract to perform public work must be registered with the Department of Industrial Relations (DIR). No bid will be accepted, nor any Contract entered into without proof of the Contractor's and subcontractors' current registration with the DIR to perform public work. If awarded a Contract, the Bidder and its subcontractors, of any tier, shall maintain active registration with the DIR for the duration of the Project. To this end, Bidder shall sign and submit with its bid proposal the Public Works Contractor Registration Certification on the form provided, attesting to the facts contained therein. Failure to submit this form may render the bid non-responsive. In addition, each Bidder shall provide the registration number for each listed subcontractor in the space provided in the Subcontractors List form.

Claim Procedures: Bidders are instructed to refer to the Contract Documents, including by way of illustration and not by limitation the Contract Agreement.

Protest Procedures: Bidders may file a "protest" of a bid proposal with the City's City Manager. In order for a Bidder's protest to be considered valid, the protest must:

A. Be filed in writing within five (5) calendar days after the bid opening date;

B. Clearly identify the specific irregularity or accusation;

C. Clearly identify the specific City staff determination or recommendation being protested;

D. Specify in detail the grounds for protest and the facts supporting the protest;

E. Include all relevant supporting documentation with the protest at time of filing; and

F. Be transmitted concurrently to all other parties with a direct financial interest that may be adversely affected by the outcome of the protest. Such parties shall include all other Bidders or proposers who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.

If the protest does not comply with each of these requirements, the City may reject the protest

with or without further review.

If the protest is timely and complies with the above requirements, the City Manager, or other designated City staff member, shall review the protest, any response from the challenged Bidder(s), and all other relevant information, and will provide a written decision to the protestor.

The City Manager or designee shall have up to ten calendar days to decide whether to approve or reject the protest. The written decision of the City Manager or designee on the protest shall be served upon the protesting Bidder and any Bidder subject to the protest within fourteen (14) calendar days of receipt of the bid protest. The City Manager or designee may extend the ten (10) calendar days if necessary, to review additional information requested from any Bidder.

If the protester wishes to further contest the protest, it shall appeal this decision to the City Council by filing a statement of appeal with the City Clerk within five (5) days of the issuance of the City Manager's decision. Said statement of appeal shall include all information required of the original bid protest, as well as s short and plain statement setting forth why Protester disputes the City Manager's decision and the legal and factual basis for such dispute. Any person or entity may present a formal protest to the City with respect to solicitations being conducted by staff.

A Bidder whose bid has been protested by another Bidder may submit to the City Manager a written response to the protest by email or by personal delivery or overnight mail to City Hall, 1315 Valley Drive, Hermosa Beach, California 90254, so that it is received by the City no later than seven calendar days after the protest has been served by the protesting Bidder.

1. Definitions

    a. "Bidder" means any person or firm providing a timely, written response to the City solicitation.

    b. "Bid Protest" means any protest with regard to the response submitted by another Bidder.

    c. "Response" means the written response to the City solicitation provided by a person or firm.

    d. "Solicitation Protest" means a statement of protest, dispute, challenge, disagreement, disapproval or other objection regarding documents, determinations or actions taken or contemplated by the City with respect to a solicitation.

    e. "Solicitation" means the document by which the City identifies goods, equipment, services, or public construction projects for which it seeks a response.

2. Format – The protest must be in writing and include the following information at a minimum:

    a. The name, address, and phone number of the protester, or the authorized representative of the protester;

b. The signature of the protester or authorized representative of the protester;

c. The project number and title under which the protest is submitted;

d. A detailed description of the legal and/or factual grounds for the protest and all supporting documentation. For protests containing elements not based on publicly released information the protest must contain documentation clearly showing the date on which the protester received the information; and

e. The form of relief requested.

3. State or Federal Funding

   If the subject matter of the solicitation or project is receiving any state or federal funds which requires a protest procedure different than the procedures stated above, then that protest procedure shall control.

   In the event there is any lawsuit filed against the City relating to any federally funded project, the City will provide prompt notice of that lawsuit to all agencies who participated in the funding of the project.

4. Mandatory Procedure

   This administrative procedure and the time limits set forth herein are mandatory. Failure to comply with these mandatory procedures shall constitute a waiver of any right to pursue the bid protest, including filing a Government Code claim or any legal proceedings or actions.

IV. BID DOCUMENTS

A. PROPOSAL

CIP NO. 619 Kelly Courts Renovations

CONTRACTOR: _____ Date: _____

TO: City of Hermosa Beach
Honorable Mayor and Members of the City Council City Hall
Hermosa Beach, California, 90254

Ladies and Gentlemen:

The undersigned declares that he/she has carefully examined the location of the proposed work and that he/she has examined the Plans and Specifications, has read the Contract Documents, and hereby agrees to furnish all labor, materials, equipment, tools, transportation, and services to do all work required for:

CIP NO. 619 Kelly Courts Renovations

In accordance with the Plans and Specifications prepared by the Engineer, in accordance with the Special Provisions, the Contract Documents, and in accordance with the Standard Specifications for Public Works Construction 2021, Unified Building Code for Construction (current edition) (except Sections 1-9), and the requirements of the Engineer under said documents, for the prices shown herein.

The Contractor also certifies that he/she is registered with the Department of Industrial Relations.

All work shall be completed within forty (40) working days from the date the Notice to Proceed is issued by the Engineer.

_____ _____
Contractor Signature PWCR Registration Number

B. BID PROPOSAL

CIP NO. 619 Kelly Courts Renovations

Item No.	Estimated Quantity	Unit	Description of Work	Unit Price	Total
1	1	LS	General conditions including Mobilization and Demobilization (5% max. of total bid proposal cost)		$
2	1	LS	Erosion and sediment control		$
3	1	LS	Clearing, grubbing, and demolition. Includes the removal of court paint and concrete footings		$
4	1	LS	Temporary construction fence		$
5	1	LS	Grading		$
6	1	LS	Existing utilities- protect in-place		$
7	480	LF	Sawcut existing PCC pavement		$
8	205	SY	Cold Mill 2” existing asphalt		$
9	23	TN	Overlay 2” asphalt concrete		$
10	25	LF	Construction of 6” PCC retaining curb- paint green		$
11	100	LF	Construction of 8” PCC retaining curb- paint green		$
12	121	LF	Construction of PCC curb and gutter		$
13	1	LS	Relocate existing water valves and fixtures		$
14	1	LS	Painting of existing block wall green		$
15	580	SF	Construction of PPC concrete slab extension		$
16	668	SF	Construction of new 4’ thick PCC sidewalk		$
17	1	EA	Install detectable warning panel		$

Item No.	Estimated Quantity	Unit	Description of Work	Unit Price	Total
18	280	LF	Install new 10’ high green colored vinyl-coated fence with green windscreen		$
19	125	LF	Install new 10’ high green colored vinyl-coated fence without windscreen		$
20	51	LF	Install new 4’ high green colored vinyl-coated fence without windscreen		$
21	545	LF	Install new 10’ high green colored vinyl-coated fence fabric with green windscreen		$
22	5	EA	Install new green colored vinyl-coated single gate with green windscreen		$
23	1	EA	Install new green colored vinyl-coated single gate without windscreen		$
24	1	EA	Install new green colored vinyl-coated double gate with green windscreen		$
25	1	EA	Install green colored vinyl-coated fabric, painted posts, and green windscreen for existing double gate		$
26	3	EA	Install green colored vinyl-coated fabric, painted posts, and green windscreen for existing single gates		$
27	8	EA	Install light pole padding		$
28	120	LF	Install wall safety padding		$
29	1	LS	Paint and refurbish pickleball courts		$
30	1	LS	Paint and refurbish tennis court		$
31	1	LS	Paint and refurbish basketball courts		$
32	1	LS	Install Pavement Striping and markings (parking lot)		$
33	2	EA	Install signage – including posts and hardware (parking lot)		$
34	1	LS	Install new Musco light poles and luminaires		$

Item No.	Estimated Quantity	Unit	Description of Work	Unit Price	Total
35	1	LS	Install site electrical conduits/conductors includes trenching, installation of pull boxes, tie- in and installation of time clocks.		$
36	4	SETS	Install pickleball court posts, net, straps and anchor		$
37	1	SET	Install tennis court posts, net, straps and anchor		$
38	4	SETS	Install four (4) basketball uprights, backboards, nets, rings and paddings		$
39	1	LS	Modify existing irrigation		$
40	1	LS	Modify existing turf, soil prep, and planting of sod		$
41	1	LS	90-Day plant establishment and post installation maintenance		$

(Total Bid in Figures)

_____

(Total Bid in Words)

_____

Contractor Name: _____

(Total Bid in Figures) _____

(Total Bid in Words) _____

Contractor Name: _____

In case of any discrepancy between the words and the figures, the words shall prevail. If the unit price and the total amount for any item are not in agreement, the unit price alone shall be considered to represent the Bidder's intention and all totals will be corrected to conform thereto. Attached hereto is cash, a certified check, a cashier's check, or a Bidder's bond in the amount of _____Dollars, said amount being not less than ten (10) percent of the amount bid. It is agreed a portion equal to the difference between the low bid and second low bid shall be retained as liquidated damages by the City if the undersigned fails or refuses to execute the Contract and furnish the required bonds and certificates of insurance within the time provided.

Contractor Signature: _____

PW Registration #: _____

State License #: _____

Contractor Company Name: _____

C. BID BOND

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS, _____, (hereinafter referred to as "Contractor") intends to submit a bid to the City of Hermosa Beach, California, a Municipal Corporation, for the performance of certain work as required in the City of Hermosa Beach and said work being: **CIP NO. 619 Kelly Courts Renovations** as shown in this specification, and in compliance with the specifications therefore under an invitation of said City contained in a notice or advertisement for bids or proposals.

NOW, THEREFORE, we, the Contractor, as Principal, and _____ _____ a corporation organized and existing under the laws of the State of _____, duly authorized to transact business under the laws of the State of California as Surety, are held and firmly bound unto the City of Hermosa Beach, as Obligee, in the sum of _____ Dollars ($_____) lawful money of the United States of America, said sum being not less than ten percent (10%) of the bid amount for the payment of which sum well and truly to be made, the said Principal, and said Surety, 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 bid of the said Principal is rejected by the said Obligee; or if the said Obligee shall accept the bid of the said Principal and said Principal shall enter into an Agreement with said Obligee in accordance with the terms of the bid, and shall give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Agreement and for the prompt payment of labor and material furnished in the prosecution thereof; or in the event of the failure of said Principal to enter such Agreement and give such bond or bonds, if said Principal shall pay to said Obligee the difference not to exceed the penalty thereof between the amount specified in said bid and such larger amount for which said Obligee may in good faith Contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. In case suit is brought upon this bond, the court shall fix and award and the surety shall pay, in addition to the face amount hereof, costs and reasonable attorney's fees incurred by the City of Hermosa Beach in successfully enforcing said obligation.

IN WITNESS THEREOF, we have hereunto, set our hands and seals this _____ day of _____, _____.

_____
Principal
By _____

Title_____

_____

Surety

By _____

_____

Title

Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20___, before me, _____, Notary Public, personally

appeared _____, who proved to me on the basis of satisfactory

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature of Notary Public _____

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

¨ Individual
¨ Corporate Officer

_____
Title(s)

¨ Partner(s) ¨ Limited ¨ General
¨ Attorney-In-Fact
¨ Trustee(s)
¨ Guardian/Conservator
¨ Other:

Signer is representing:
Name Of Person(s) Or Entity(ies)

_____

_____

DESCRIPTION OF ATTACHED DOCUMENT

_____
Title or Type of Document

_____
Number of Pages

_____
Date of Document

_____
Signer(s) Other Than Named Above

D. BIDDER'S ASSURANCE

CIP NO. 619 Kelly Courts Renovations

FROM:

Name of Bidder: _____

Business Address: _____

_____

Telephone No: _____

TO:

Members of the City Council
c/o City Hall
City of Hermosa Beach, California

Members of the City Council:

Pursuant to your published Notice Inviting Bids for: **CIP NO. 619 Kelly Courts Renovations**

The undersigned declares that he/she has carefully examined the location of the proposed work; that he/she has carefully examined the Plans and Specifications, and read the accompanying Instructions to Bidders and hereby proposes to furnish all materials, machinery, tools, labor, and services and do all the work necessary to complete the project in accordance with said Plans and Specifications and other Contract Documents at the item prices on the bidding schedule.

BY: _____ TITLE: _____

E. BIDDER'S DECLARATION

CIP NO. 619 Kelly Courts Renovations

It is understood and agreed that:

1. The undersigned has carefully examined all documents which will form a part of the Contract; namely, the Notice Inviting Bids, the Instructions to Bidders, this Proposal, the Bid Bond, the Contract, the Faithful Performance Bond, Warranty Bond, the Payment Bond, the federal requirements, if any, the Plans and Specifications, the Special Provisions, and the Technical Provisions.

2. The undersigned has, by investigation at the site of the work and otherwise, satisfied himself as to the nature and location of the work and fully informed himself as to all conditions and matters, which can in any way affect the work or the cost thereof.

3. The undersigned fully understands the scope of work and has checked carefully all words and figures inserted in this Proposal and he further understands that the City will not be responsible for any errors or omissions in the preparation of the Proposal.

4. The undersigned agrees and acknowledges that he is aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that Code, and that the undersigned will comply with such provisions before commencing the performance of the Contract if it is awarded to the undersigned.

The undersigned will execute the Contract and furnish the required statutory bonds and certificates of insurance within the period of time specified in the Contract Documents.

The undersigned will begin work after award of Contract and a Notice to Proceed has been given as herein specified and will complete said work within the time specified in the Bidding Schedule.

5. The undersigned certifies that this Proposal is genuine and not sham or collusive, or made in the interest or on behalf of a person not herein named, and the undersigned has not directly or indirectly induced or solicited any other Bidder to put in a sham bid nor induced any other person, firm, or corporation to refrain from bidding.

6. The undersigned will accept an award and enter into a Contract for all work scheduled herein on which he puts in a bid. The awards for such work are to be entirely at the discretion of the Owner after evaluation of the bids as submitted. The undersigned agrees that the Owner shall recover or retain as liquidated damages an amount equal to the difference between the low bid and amount of the bid of the Bidder with whom the City enters into a Contract, and the surplus, if any, shall be returned to the lowest Bidder in accordance with the provisions of the Public Contract Code section 20174 in the event of his failure to execute a Contract and furnish required bonds and insurance therefor within the time provided.

7. This bid will not be withdrawn within a period of ninety (90) days after the date of its proper opening by the City.

8. The undersigned Bidder stated under penalty of perjury that the representations made in submitting this bid are, to the best of his/her knowledge, true, accurate, and complete.

Respectfully submitted,

Contractor's Business Name	Contractor Signature Title
Business Address: Street	By Title
City State Zip	Contractor's License No. and Classification
Business Phone Number	Date
Name Title	Residence: Street
City State Zip	Residence Phone Number

Note: If the bid is made by an individual, it must be signed with the full name of the Bidder, whose address must be given: if it is made by a firm, it must be signed in the co-partnership's name by a general partner thereof, who shall also sign his or her own name, and the name and full address of each member must be given; and if it is made by a corporation, it must be signed by a properly authorized officer, the corporate name shall be set forth, and the corporate seal shall be affixed.

F. CERTIFICATE OF NON-DISCRIMINATION BY CONTRACTORS

CIP NO. 619 Kelly Courts Renovations

As suppliers of goods or services to the City, the firm listed below certifies that it does not discriminate in its employment with regard to race, color, religion, sex, or national origin; that it is in compliance with all applicable federal, state, and local directives, and executive orders regarding non-discrimination in employment; and that it agrees to pursue positively and aggressively the principle of equal opportunity in employment.

We agree specifically:

1. To establish or observe employment policies which affirmatively promote opportunities for minority persons at all job levels.

2. To communicate this policy to all persons concerned, including all company employees, outside recruiting services, especially those serving minority communities, and to the minority communities at large.

3. To take affirmative steps to hire minority employees within the company.

FIRM _____

TITLE OF PERSON SIGNING _____

SIGNATURE _____

DATE_____

Please include any additional information available regarding equal opportunity employment programs now in effect within your company:

_____
_____
_____
_____
_____
_____
_____
_____

G. CERTIFICATION OF PRINCIPAL

CIP NO. 619 Kelly Courts Renovations

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. (Section 1861, Labor Code.)

Signature: _____

Name: _____

Title: _____

Name of Company: _____

H. DECLARATION OF ELIGIBILITY TO CONTRACT
[Labor Code Section 1777.1; Public Contract Code Section 6109]

CIP NO. 619 Kelly Courts Renovations

The undersigned, a duly authorized representative of the Contractor, certifies and declares that:

1. The undersigned Contractor is aware of Section 1771.1 and 1777.7 of the California Labor Code, which prohibit a Contractor or subcontractor who has been found by the Labor Commissioner or the Director of Industrial Relations to be in violation of certain provisions of the Labor Code, from bidding on, being awarded, or performing work as a subcontractor on a public works project for specified periods of time.

2. The undersigned Contractor is not ineligible to bid on, be awarded or perform work as a subcontractor on a public works project by virtue of the foregoing provisions of Sections 1771.1 or 1777.7 of the California Labor Code or any other provision of law.

3. The undersigned Contractor is aware of California Public Contract Code Section 6109, which states:

"(a) A public entity, as defined in Section 1100 [of the Public Contract Code], may not permit a Contractor or subcontractor who is ineligible to bid or work on, or be awarded, a public works project pursuant to Section 1777.1 or 1777.7 of the Labor Code to bid on, be awarded, or perform work as a subcontractor on, a public works project. Every public works project shall contain a provision prohibiting a Contractor from performing work on a public works project with a subcontractor who is ineligible to perform work on the public works project pursuant to Section 1771.1 or 1777.7 of the Labor Code."

"(b) Any Contract on a public works project entered into between a Contractor and a debarred subcontractor is void as a matter of law. A debarred subcontractor may not receive any public money for performing work as a subcontractor on a public works Contract, and any public money that may have been paid to a debarred subcontractor by a Contractor on the project shall be returned to the awarding body. The Contractor shall be responsible for the payment of wages to workers of a debarred subcontractor who has been allowed to work on the project."

4. The undersigned Contractor has investigated the eligibility of each and every subcontractor the undersigned Contractor intends to use on this public works project, and determined that none of them is ineligible to perform work as a subcontractor on a public works project by virtue of the foregoing provisions of the Public Contract Code, Sections 1771.1 or 1777.7 of the Labor Code, or any other provision of law.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct. Executed this _____ day of _____ _____, at _____*(place of execution)*, California.

Signature: _____
Name: _____
Title: _____
Name of Company: _____

I. NON-COLLUSION DECLARATION

CIP NO. 619 Kelly Courts Renovations

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].

_____
NAME OF BIDDER

_____
SIGNATURE OF BIDDER

_____
ADDRESS OF BIDDER

_____
CITY STATE ZIP

J. REFERENCES OF WORK

CIP NO. 619 Kelly Courts Renovations

Date: _____

The following are the names, addresses and phone numbers/ email addresses for at least three public agencies for which Bidder has performed similar work **within the past five years.**

All contact information must be current.

_____

Name and Address of Public Agency

_____

Name and Telephone Number of Project Manager

_____

_____

_____

Name and Description of Project

_____ _____

Contract Amount Date Completed

_____

Name and Address of Public Agency

_____

Name and Telephone Number of Project Manager

_____

_____

_____

Name and Description of Project

_____ _____

Contract Amount Date Completed

Name and Address of Public Agency

Name and Telephone Number of Project Manager

Name and Description of Project

Contract Amount

Date Completed

Name and Address of Public Agency

Name and Telephone Number of Project Manager

Name and Description of Project

Contract Amount

Date Completed

For additional References, please add separate sheets.

K. SUBCONTRACTORS LIST

CIP NO. 619 Kelly Courts Renovations

In compliance with the "Subletting and Subcontracting Fair Practices Act" being Sections 4100-4113 of the Government Code of the State of California, and any amendments thereto, each Bidder shall set forth below: (a) the name and location of the place of business, (b) the California Contractor license number, (c) the DIR public works Contractor registration number unless exempt pursuant to Labor Code Sections 1725.5 and 1771.1, and (d) the portion of the work which will be done by each subcontractor who will perform work or labor or render service to the prime Contractor in or about the construction of the work or improvement in an amount in excess of one-half (1/2) of one percent (1%) of the prime Contractor's total bid, and shall further set forth the portion of the work which will be done by each subcontractor. Only one subcontractor for each such portion shall be listed.

Notwithstanding the foregoing, if the work involves the construction of streets and highways, then the Bidder shall list each subcontractor who will perform work or labor or render service to the Bidder in or about the work in an amount in excess of one-half of one percent (0.5%) of the Bidder's Total Bid Price or $10,000, whichever is greater. No additional time shall be granted to provide the below requested information.

If the Contractor fails to specify a subcontractor for any portion of the work to be performed under the Contract, he shall be deemed to have agreed to perform such portion himself, and he shall not be permitted to subcontract that portion of the work except under the conditions hereinafter set forth.

Subletting or subcontracting of any portion of the work to which subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity, and then only after a finding reduced to writing as a public record of the legislative body of the Owner.

We propose to use the following listed subcontractors as per Public Contract Code Section 4100 et seq.: List all Subcontractors. The subcontractor shall be licensed for the type of work they are performing.

Sub-Contractors Name:	**Address:**
Description of Work:	
CSLB Contractor License No.	**DIR Registration No.**
Phone No.	**Dollar Amount of Work & % of Work**

Sub-Contractors Name:	Address:
Description of Work:	
CSLB Contractor License No.	DIR Registration No.
Phone No.	Dollar Amount of Work & % of Work

Sub-Contractors Name:	Address:
Description of Work:	
CSLB Contractor License No.	DIR Registration No.
Phone No.	Dollar Amount of Work & % of Work

Sub-Contractors Name:	Address:
Description of Work:	
CSLB Contractor License No.	DIR Registration No.
Phone No.	Dollar Amount of Work & % of Work

Sub-Contractors Name:	Address:
Description of Work:	
CSLB Contractor License No.	DIR Registration No.
Phone No.	Dollar Amount of Work & % of Work

Percent of work to be performed by sub-Contractors: _____%
(Note: 50% of work is required to be performed by general Contractor)
For additional Sub-Contractors, please add additional sheet(s)

L. IRAN CONTRACTING ACT CERTIFICATION
(Public Contract Code Section 2200 et seq.)

As required by California Public Contract Code Section 2204, the Contractor certifies subject to penalty for perjury that the option checked below relating to the Contractor's status in regard to the Iran Contracting Act of 2010 (Public Contract Code Section 2200 *et seq*.) is true and correct:

☐ The Contractor is not:

(1) identified on the current list of person and entities engaged in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203; or

(2) a financial instruction that extends, for 45 days or more, credit in the amount of $20,000,000 or more to any other person or entity identified on the current list of persons and entities engaging in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203, if that person or entity uses or will use the credit to provide goods or services in the energy sector in Iran.

☐ The City has exempted the Contractor from the requirements of the Iran Contracting Act of 2010 after making a public finding that, absent the exemption, the City will be unable to obtain the goods and/or services to be provided pursuant to the Contract.

☐ The amount of the Contract payable to the Contractor for the Project does not exceed $1,000,000.

Signature:_____

Printed Name:_____

Title:_____

Firm Name:_____

Date:_____

Note: In accordance with Public Contract Code Section 2205, false certification of this form shall be reported to the California Attorney General and may result in civil penalties equal to the greater of $250,000 or twice the Contract amount, termination of the Contract and/or ineligibility to bid on Contracts for three years.

M. PUBLIC WORKS CONTRACTOR REGISTRATION CERTIFICATION

Pursuant to Labor Code sections 1725.5 and 1771.1, all Contractors and subcontractors that wish to bid on, be listed in a bid proposal, or enter into a Contract to perform public work must be registered with the Department of Industrial Relations. See http://www.dir.ca.gov/Public-Works/PublicWorks.html for additional information.

No bid will be accepted nor any Contract entered into without proof of the Contractor's and subcontractors' current registration with the Department of Industrial Relations to perform public work.

Bidder hereby certifies that it is aware of the registration requirements set forth in Labor Code sections 1725.5 and 1771.1 and is currently registered as a Contractor with the Department of Industrial Relations.[1]

Name of Bidder: _____

DIR Registration Number: _____

DIR Registration Expiration: _____

Small Project Exemption: _____ Yes or _____ No

Unless Bidder is exempt pursuant to the small project exemption, Bidder further acknowledges:

1. Bidder shall maintain current DIR registration for the duration of the project.
2. Bidder shall maintain a current DIR registration for the duration of the project.
3. Bidder shall include the requirements of Labor Code sections 1725.5 and 1771.1 in its Contract with subcontractors and ensure that all subcontractors are registered at the time of bid opening and maintain registration status for the duration of the project.
4. Failure to submit this form or comply with any of the above requirements may result in a finding that the bid is non-responsive.

Name of Bidder_____

Signature_____

Name and Title_____

Dated_____

[1] If the Project is exempt from the Contractor registration requirements pursuant to the small project exemption under Labor Code Sections 1725.5 and 1771.1, please mark "Yes" in response to "Small Project Exemption."

N. FLEET COMPLIANCE CERTIFICATION

The California Air Resources Board ("CARB") implemented amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulations ("Regulation") which are effective on January 1, 2024 and apply broadly to all self-propelled off road diesel vehicles 25 horsepower or greater and other forms of equipment used in California. A copy of the Regulation is available at https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/off-roaddiesel/appa-1.pdf. Bidders are required to comply with all CARB and Regulation requirements, including, without limitation, all applicable sections of the Regulation, as codified in Title 13 of the California Code of Regulations section 2449 et seq. throughout the term of the Project. Bidders must provide, with their Bid, copies of Bidder's and all listed subcontractors the most recent, valid Certificate of Reported Compliance ("CRC") issued by CARB. Failure to provide valid CRCs as required herein may render the Bid non-responsive.

INSTRUCTIONS TO BIDDERS

COMPLIANCE WITH CARB REGULATIONS

The City is a Public Works Awarding Body, as defined under Title 13 California Code of Regulations section 2449(c)(46). Accordingly, Bidders must submit, with their Bids, a valid Certificate of Reported Compliance ("CRC") for the Bidder's and its listed subcontractors fleet (including any applicable leased equipment or vehicles) . Bidder must complete and submit the Fleet Compliance Certification, on the form included in the bid package. Failure to provide a valid CRC for the Bidder's fleet, and for the fleets of all listed subcontractors, or failure to complete the Fleet Compliance Certification, may render the Bid non-responsive.

Fleet Compliance Certification.

Bidder hereby acknowledges that they have reviewed the California Air Resources Board's policies, rules and regulations and are familiar with the requirements of Title 13, California Code of Regulations, Division 3, Chapter 9, effective on January 1, 2024 (the "Regulation"). Bidder hereby certifies, subject to penalty for perjury, that the option checked below relating to the Bidder's fleet, and/or that of their subcontractor(s) ("Fleet") is true and correct:

The Fleet is subject to the requirements of the Regulation, and the appropriate Certificate(s) of Reported Compliance have been attached hereto.

The Fleet is exempt from the Regulation under section 2449.1(f)(2), and a signed description of the subject vehicles, and reasoning for exemption has been attached hereto.

Bidder and/or their subcontractor is unable to procure R99 or R100 renewable diesel fuel as defined in the Regulation pursuant to section 2449.1(f)(3). Bidder shall keep detailed records describing the normal refueling methods, their attempts to procure renewable diesel fuel and proof that shows they were not able to procure renewable diesel (i.e. third party correspondence or vendor bids).

The Fleet is exempt from the requirements of the Regulation pursuant to section 2449(i)(4) because this Project has been deemed an Emergency, as defined under section 2449(c)(18). Bidder shall only operate the exempted vehicles in the emergency situation and records of the exempted vehicles must be maintained, pursuant to section 2449(i)(4).

The Fleet does not fall under the Regulation or are otherwise exempted and a detailed reasoning is attached hereto.

Name of Bidder: _____

Signature: _____

Name: _____

Title: _____

Date: _____

V. CONTRACT DOCUMENTS

CIP NO. 619 Kelly Courts Renovations

A. CONTRACT AGREEMENT

This Construction Agreement ("Agreement") is made and entered into as of the date executed by the Mayor and attested to by the City Clerk, by and between [INSERT CONTRACTOR NAME] (hereinafter referred to as "CONTRACTOR") and the City of Hermosa Beach, California, a municipal corporation (hereinafter referred to as "CITY").

R E C I T A L S

A. Pursuant to the Notice Inviting Sealed Bids for CIP NO. 619 Kelly Courts Renovations ("Project"), bids were received, publicly opened, and declared on the date specified in the notice; and

B. On [INSERT DATE], City's City Council declared CONTRACTOR to be the lowest responsible Bidder and accepted the bid of CONTRACTOR; and

C. The City Council has authorized the Mayor to execute a written Contract with CONTRACTOR for furnishing labor, equipment, and material for the CIP No. CIP NO. 619 Kelly Courts Renovations in the City of Hermosa Beach.

NOW, THEREFORE, in consideration of the foregoing and the mutual covenants herein contained, it is agreed:

1. GENERAL SCOPE OF WORK: CITY agrees to engage CONTRACTOR and CONTRACTOR agrees to furnish all necessary labor, tools, materials, appliances, and equipment for and do the work for the CIP NO. 619 Kelly Courts Renovations in the City of Hermosa Beach. The work shall be performed in accordance with the Plans and Specifications dated [INSERT DATE], (the "Specifications") on file in the office of the City Clerk and in accordance with bid prices set forth in CONTRACTOR'S Bid Proposal and in accordance with the instructions of the City Engineer.

2. INCORPORATED DOCUMENTS TO BE CONSIDERED COMPLEMENTARY: The Contract documents for the aforesaid project shall consist of the Notice Inviting Bids, Instructions to Bidders, Bid Proposal, Builders General Provisions, Standard Specifications 2021 edition, Special Provisions, Exhibit A and Exhibit B, and all referenced specifications, details, standard drawings, and appendices; together with this Agreement and all required bonds, insurance certificates, permits, notices and affidavits; and also, including any and all addenda or supplemental agreements clarifying, amending, or extending the work contemplated as may be required to insure its completion in an acceptable manner. All of the provisions of said Contract documents are made a part hereof as though fully set forth herein. This Contract is intended to require a complete and finished piece of work and anything necessary to complete the work properly and in accordance with the law and lawful governmental regulations shall be performed by CONTRACTOR whether set out specifically in the Contract or not. Should it be ascertained that any inconsistency exists between the aforesaid documents and this written agreement, the provisions of this Agreement, the Builders General Provisions and the Standard Specifications, in that order, shall control. Collectively, these Contract documents constitute the complete agreement between CITY and CONTRACTOR and supersede any previous agreements or understandings.

3. COMPENSATION: CONTRACTOR agrees to receive and accept the prices set forth in its Bid Proposal [INSERT VALUE] as full compensation for furnishing all materials, performing all work, and fulfilling all obligations hereunder. Said compensation shall cover all expenses, losses, damages, and consequences arising out of the nature of the work during its progress or prior to its acceptance including those for well and faithfully completing the work and the whole thereof in the manner and time specified in the aforesaid Contract documents; and also including those arising from actions of the elements, unforeseen difficulties or obstructions encountered in the prosecution of the work, suspension or discontinuance of the work, and all other unknowns or risks of any description connected with the work.

4. TIME OF PERFORMANCE: CONTRACTOR agrees to complete the work within [INSERT VALUE] working days from the date of the notice to proceed. By signing this Agreement, CONTRACTOR represents to CITY that the Contract time is reasonable for completion of the work and that CONTRACTOR will complete such work within the Contract time.

5. LIQUIDATED DAMAGES: In accordance with Government Code section 53069.85, it is agreed that CONTRACTOR will pay to CITY the sum set forth in Exhibit "A" for each and every calendar day of delay beyond the time prescribed in the Contract Documents for finishing the Work, as Liquidated Damages and not as a penalty or forfeiture. In the event this is not paid, CONTRACTOR agrees CITY may deduct that amount from any money due or that may become due CONTRACTOR under the Contract. This Article does not exclude recovery of other damages specified in the Contract Documents.

6. SUBSTITUTION OF SECURITIES: Pursuant to section 22300 of the Public Contract Code of the State of California, CONTRACTOR may request CITY to make retention payments directly to an escrow agent or may substitute securities for any money withheld by CITY to ensure performance under the Contract. At the request and expense of CONTRACTOR, securities equivalent to the amount withheld shall be deposited with CITY or with a state or federally chartered bank as the escrow agent who shall return such securities to CONTRACTOR upon satisfactory completion of the Contract. Deposit of securities with an escrow agent shall be subject to a written agreement substantially in the form provided in section 22300 of the Public Contract Code.

7. PREVAILING WAGES AND CALIFORNIA LABOR LAWS.

Pursuant to Labor Code §§ 1720 *et seq.*, and as specified in 8 California Code of Regulations § 16000 ("Prevailing Wage Laws"), CONTRACTOR must pay its workers prevailing wages. It is CONTRACTOR's responsibility to interpret and implement any prevailing wage requirements, and CONTRACTOR agrees to pay any penalty or civil damages resulting from a violation of the prevailing wage laws. CONTRACTOR shall defend, indemnify and hold the CITY, its officials, officers, employees and agents free and harmless from any claim or liability arising out of any failure or alleged failure to comply with the Prevailing Wage Laws. CONTRACTOR and any subcontractor shall forfeit a penalty of up to $200 per calendar day or portion thereof for each worker paid less than the prevailing wage rates.

In accordance with Labor Code § 1773.2, copies of the prevailing rate of per diem wages are available upon request from CITY's Engineering Division or the website for State of California Prevailing wage determination at http://www.dir.ca.gov/DLSR/PWD. CONTRACTOR must post a copy of the prevailing rate of per diem wages at the job site.

CITY directs CONTRACTOR's attention to Labor Code §§ 1777.5, 1777.6 and 3098 concerning the employment of apprentices by CONTRACTOR or any subcontractor.

Labor Code § 1777.5 requires CONTRACTOR or subcontractor employing tradesmen in any apprenticeship occupation to apply to the joint apprenticeship committee nearest the site of the public works project and which administers the apprenticeship program in that trade for a certificate of approval. The certificate must also fix the ratio of apprentices to journeymen that will be used in the performance of the Contract. The ratio of apprentices to journeymen in such cases will not be less than one to five except:

When unemployment in the area of coverage by the joint apprenticeship committee has exceeded an average of 15 percent in the 90 days before the request for certificate, or

When the number of apprentices in training in the area exceeds a ratio of one to five, or

When the trade can show that it is replacing at least 1/30 of its membership through apprenticeship training on an annual basis state-wide or locally, or

Assignment of an apprentice to any work performed under a public works Contract would create a condition that would jeopardize his or her life or the life, safety, or property of fellow employees or the public at large, or the specific task to which the apprentice is to be assigned is of a nature that training cannot be provided by a journeyman.

When CONTRACTOR provides evidence that CONTRACTOR employs registered apprentices on all of his Contracts on an annual average of not less than one apprentice to eight journeymen.

CONTRACTOR is required to make contributions to funds established for the administration of apprenticeship programs if CONTRACTOR employs registered apprentices or journeymen in any apprenticeable trade on such Contracts and if other Contractors on the public works site are making such contributions.

CONTRACTOR and any subcontractor must comply with Labor Code §§ 1777.5 and 1777.6 in the employment of apprentices.

Information relative to apprenticeship standards, wage schedules and other requirements may be obtained from the Director of Industrial Relations, ex-officio the Administrator of Apprenticeship, San Francisco, California, or from the Division of Apprenticeship Standards and its branch offices.

The CONTRACTOR or any subcontractor that is determined by the Labor Commissioner to have knowingly violated Section 1777.5 shall forfeit as a civil penalty an amount not exceeding $100 for each full calendar day of noncompliance, or such greater amount as provided by law.

CONTRACTOR and each subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work. The payroll records shall be certified and shall be available for inspection at all reasonable hours at the principal office of CONTRACTOR in the manner provided in Labor Code section 1776. In the event of noncompliance with the requirements of this section, CONTRACTOR shall have 10 days in which to comply subsequent to receipt of written notice specifying in what respects such CONTRACTOR must comply with this section. Should noncompliance still be evident after such 10-day period, CONTRACTOR shall, as a penalty to CITY, forfeit not more than $100.00 for each calendar day or portion thereof, for each worker, until strict compliance is effectuated. The amount of the forfeiture is to be determined by the Labor Commissioner. A Contractor who is found to have violated the provisions of law regarding wages on Public Works with the intent to defraud shall be ineligible to bid on Public Works Contracts for a period of one to three years as determined by the Labor Commissioner. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from progress payments then due. The responsibility for compliance with this section is on CONTRACTOR. The requirement to submit certified payroll records directly to the Labor Commissioner under Labor Code section 1771.4 shall not apply to work performed on a public works project that is exempt pursuant to the small project exemption specified in Labor Code Section 1771.4.

Any ineligible Contractor or subcontractor pursuant to Labor Code Sections 1777.1 and 1777.7 may not perform work on this Project.

By executing this Contract, CONTRACTOR verifies that it fully complies with all requirements and restrictions of state and federal law respecting the employment of undocumented aliens, including, but not limited to, the Immigration Reform and Control Act of 1986, as may be amended from time to time, and shall require all subcontractors and sub-subcontractors to comply with the same.

8. LEGAL HOURS OF WORK: Eight (8) hours of labor shall constitute a legal day's work for all workmen employed in the execution of this Contract, and CONTRACTOR and any subcontractor under it shall comply with and be governed by the laws of the State of California having to do with working hours set forth in Division 2, Part 7, Chapter 1, Article 3 of the Labor Code of the State of California as amended.

CONTRACTOR shall forfeit, as a penalty to City, twenty-five dollars ($25.00) for each laborer, workman or mechanic employed in the execution of the Contract, by him or any subcontractor under it, upon any of the work hereinbefore mentioned, for each calendar day during which the laborer, worker or mechanic is required or permitted to labor more than eight (8) hours in any one calendar day or 40 hours in any one calendar week in violation of the Labor Code.

9. PUBLIC WORKS CONTRACTOR REGISTRATION: Pursuant to Labor Code sections 1725.5 and 1771.1, all Contractors and subcontractors that wish to bid on, be listed in a bid proposal, or enter into a Contract to perform public work must be registered with the Department of Industrial

Relations (DIR). No bid will be accepted nor any Contract entered into without proof of the Contractor's and subcontractors' current registration with the DIR to perform public work. Notwithstanding the foregoing, the Contractor registration requirements mandated by Labor Code Sections 1725.5 and 1771.1 shall not apply to work performed on a public works project that is exempt pursuant to the small project exemption specified in Labor Code Sections 1725.5 and 1771.1.

10. LABOR COMPLIANCE AND STOP ORDERS: This Project is subject to compliance monitoring and enforcement by the DIR. It shall be CONTRACTOR's sole responsibility to evaluate and pay the cost of complying with all labor compliance requirements under this Contract and applicable law. Any stop orders issued by the DIR against CONTRACTOR or any subcontractor that affect CONTRACTOR's performance of Work, including any delay, shall be CONTRACTOR's sole responsibility. Any delay arising out of or resulting from such stop orders shall be considered CONTRACTOR caused delay subject to any applicable liquidated damages and shall not be compensable by the CITY. CONTRACTOR shall defend, indemnify and hold CITY, its officials, officers, employees and agents free and harmless from any claim or liability arising out of stop orders issued by the DIR against CONTRACTOR or any subcontractor.

11. DEBARMENT OF CONTRACTORS AND SUBCONTRACTORS: Contractors or subcontractors may not perform work on a public works project with a subcontractor who is ineligible to perform work on a public project pursuant to Labor Code section 1777.1 or 1777.7. Any Contract on a public works project entered into between a Contractor and a debarred subcontractor is void as a matter of law. A debarred subcontractor may not receive any public money for performing work as a subcontractor on a public works Contract. Any public money that is paid, or may have been paid to a debarred subcontractor by a Contractor on the Project shall be returned to the CITY. CONTRACTOR shall be responsible for the payment of wages to workers of a debarred subcontractor who has been allowed to work on the project.

12. LABOR/EMPLOYMENT SAFETY: CONTRACTOR shall comply with all applicable laws and regulations of the federal, state, and local government, including Cal/OSHA requirements and requirements for verification of employees' legal right to work in the United States

    CONTRACTOR shall maintain emergency first aid treatment for its employees which complies with the Federal Occupational Safety and Health Act of 1970 (29 U.S.C. § 651 *et seq*.), and California Code of Regulations, Title 8, Industrial Relations Division 1, Department of Industrial Relations, Chapter 4. CONTRACTOR shall ensure the availability of emergency medical services for its employees in accordance with California Code of Regulations, Title 8, Section 1512.

    CONTRACTOR shall submit the Illness and Injury Prevention Program and a Project site specific safety program to CITY prior to beginning Work at the Project site. CONTRACTOR shall maintain a confined space program that meets or exceeds the CITY Standards. CONTRACTOR shall adhere to CITY's lock out tag out program

13. TRAVEL AND SUBSISTENCE PAY: CONTRACTOR agrees to pay travel and subsistence pay to each worker needed to execute the work required by this Agreement as such travel and

subsistence payments are defined in the applicable collective bargaining agreements filed in accordance with Labor Code Section 1773.8.

14. CONTRACTOR'S LIABILITY: The City of Hermosa Beach and its officers, agents and employees ("Indemnitees") shall not be answerable or accountable in any manner for any loss or damage that may happen to the work or any part thereof, or for any of the materials or other things used or employed in performing the work; or for injury or damage to any person or persons, either workers or employees of CONTRACTOR, of its subcontractors or the public, or for damage to adjoining or other property from any cause whatsoever arising out of or in connection with the performance of the work. CONTRACTOR shall be responsible for any damage or injury to any person or property resulting from defects or obstructions or from any cause whatsoever.

To the fullest extent permitted by law, CONTRACTOR will indemnify Indemnities against and will hold and save Indemnitees harmless from any and all actions, claims, damages to persons or property, penalties, obligations or liabilities that may be asserted or claimed by any person, firm, entity, corporation, political subdivision, or other organization arising out of or in connection with the work, operation, or activities of CONTRACTOR, its agents, employees, subcontractors or invitees provided for herein, whether or not there is concurrent passive negligence on the part of City. In connection therewith:

a. CONTRACTOR will defend any action or actions filed in connection with any such claims, damages, penalties, obligations or liabilities and will pay all costs and expenses, including attorneys' fees, expert fees and costs incurred in connection therewith.

b. CONTRACTOR will promptly pay any judgment rendered against CONTRACTOR or Indemnitees covering such claims, damages, penalties, obligations and liabilities arising out of or in connection with such work, operations or activities of CONTRACTOR hereunder, and CONTRACTOR agrees to save and hold the Indemnitees harmless therefrom.

c. In the event Indemnitees are made a party to any action or proceeding filed or prosecuted against CONTRACTOR for damages or other claims arising out of or in connection with the work, operation or activities hereunder, CONTRACTOR agrees to pay to Indemnitees and any all costs and expenses incurred by Indemnitees in such action or proceeding together with reasonable attorneys' fees.

Contractor's obligations under this section apply regardless of whether or not such claim, charge, damage, demand, action, proceeding, loss, stop notice, cost, expense, judgment, civil fine or penalty, or liability was caused in part or contributed to by an Indemnitee. However, without affecting the rights of City under any provision of this agreement, to the extent required by Civil Code section 2782, Contractor shall not be required to indemnify and hold harmless City for liability attributable to the active negligence of City, provided such active negligence is determined by agreement between the parties or by the findings of a court of competent jurisdiction. In instances where City is shown to have been actively negligent and where City active negligence accounts for only a percentage of the liability involved, the obligation of Contractor will be for that entire portion or percentage of liability not attributable to the active negligence of City.

So much of the money due to CONTRACTOR under and by virtue of the Contract as shall be considered necessary by City may be retained by City until disposition has been made of such actions or claims for damages as aforesaid.

It is expressly understood and agreed that the foregoing provisions are intended to be as broad and inclusive as is permitted by the law of the State of California. This indemnity provision shall survive the termination of the Agreement and is in addition to any other rights or remedies which Indemnitees may have under the law.

This indemnity is effective without reference to the existence or applicability of any insurance coverage which may have been required under this Agreement or any additional insured endorsements which may extend to Indemnitees.

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, losses and liabilities arising out of or incident to activities or operations performed by or on behalf of the CONTRACTOR regardless of any prior, concurrent, or subsequent passive negligence by the Indemnitees.

15. THIRD PARTY CLAIMS. In accordance with Public Contract Code § 9201, CITY will promptly inform CONTRACTOR regarding third-party claims against CONTRACTOR, but in no event later than ten (10) business days after CITY receives such claims. Such notification will be in writing and forwarded in accordance with the "Notice" section of this Agreement. As more specifically detailed in the Contract documents, CONTRACTOR agrees to indemnify and defend the City against any third-party claim.

16. WORKERS COMPENSATION: In accordance with California Labor Code Sections 1860 and 3700, CONTRACTOR and each of its subcontractors will be required to secure the payment of compensation to its employees. In accordance with the provisions of California Labor Code Section 1861, CONTRACTOR, by signing this Contract, 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 worker's 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.

17. INSURANCE: CONTRACTOR shall procure and maintain for the duration of the Agreement, and for 1 year thereafter, insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the CONTRACTOR, its agents, representatives, employees, or subcontractors.

a. Minimum Scope and Limit of Insurance. Coverage shall be at least as broad as:

i. Commercial General Liability (CGL): Insurance Services Office (ISO) Form CG 00 01 covering CGL on an "occurrence" basis, including products and completed operations, property damage, bodily injury and personal & advertising injury with limits no less than $5,000,000 per occurrence. If a general aggregate limit applies, either the general aggregate limit shall apply separately to this

project/location (ISO CG 25 03 or 25 04) or the general aggregate limit shall be twice the required occurrence limit.

ii. Automobile Liability: Insurance Services Office Form CA 0001 covering Code 1 (any auto), with limits no less than $5,000,000 per accident for bodily injury and property damage.

iii. Workers' Compensation insurance as required by the State of California, with Statutory Limits, and Employers' Liability insurance with a limit of no less than $1,000,000 per accident for bodily injury or disease.

iv. Builder's Risk (Course of Construction) insurance utilizing an "All Risk" (Special Perils) coverage form, with limits equal to the completed value of the project and no coinsurance penalty provisions.

v. Professional Liability (if Design/Build), with limits no less than $2,000,000 per occurrence or claim, and $2,000,000 policy aggregate.

vi. Contractors' Pollution Legal Liability and/or Asbestos Legal Liability and/or Errors and Omissions (if project involves environmental hazards) with limits no less than $1,000,000 per occurrence or claim, and $2,000,000 policy aggregate.

vii. If the Contractor maintains broader coverage and/or higher limits than the minimums shown above, the CITY requires and shall be entitled to the broader coverage and/or the higher limits maintained by CONTRACTOR. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the CITY.

b. Self-Insured Retentions. Self-insured retentions must be declared to and approved by the CITY. At the option of the CITY, either: the CONTRACTOR shall obtain coverage to reduce or eliminate such self-insured retentions as respects the CITY, its officers, officials, employees, and volunteers; or the CONTRACTOR shall provide a financial guarantee satisfactory to the CITY guaranteeing payment of losses and related investigations, claim administration, and defense expenses. The policy language shall provide, or be endorsed to provide, that the self-insured retention may be satisfied by either the named insured or CITY.

c. Other Insurance Provisions. The insurance policies are to contain, or be endorsed to contain, the following provisions:

i. The CITY, its officers, officials, employees, and volunteers are to be covered as additional insureds on the CGL policy with respect to liability arising out of work or operations performed by or on behalf of the CONTRACTOR including materials, parts, or equipment furnished in connection with such work or operations and automobiles owned, leased, hired, or borrowed by or on behalf of the CONTRACTOR. General liability coverage can be provided in the form of an endorsement to the CONTRACTOR's insurance (at least as broad as ISO Form CG 20 10, CG 11 85 or both CG 20 10, CG 20 26, CG 20 33, or CG 20 38; and CG 20 37 forms if later revisions used).

ii. For any claims related to this project, the CONTRACTOR's insurance coverage shall be primary insurance coverage at least as broad as ISO CG 20 01 04 13 as respects the CITY, its officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by the CITY, its

officers, officials, employees, or volunteers shall be excess of the CONTRACTOR's insurance and shall not contribute with it.

iii. Each insurance policy required by this clause shall provide that coverage shall not be canceled, except with notice to the CITY.

d. Builder's Risk (Course of Construction) Insurance.

i. CONTRACTOR may submit evidence of Builder's Risk insurance in the form of Course of Construction coverage. Such coverage shall name the CITY as a loss payee as their interest may appear.

ii. If the Project does not involve new or major reconstruction, at the option of the CITY, an Installation Floater may be acceptable. For such projects, a Property Installation Floater shall be obtained that provides for the improvement, remodel, modification, alteration, conversion or adjustment to existing buildings, structures, processes, machinery, and equipment. The Property Installation Floater shall provide property damage coverage for any building, structure, machinery or equipment damaged, impaired, broken, or destroyed during the performance of the Work, including during transit, installation, and testing at the CITY's site.

e. Claims Made Policies. If any coverage required is written on a claims-made coverage form:

i. The retroactive date must be shown, and this date must be before the execution date of the Contract or the beginning of Contract work.

ii. Insurance must be maintained and evidence of insurance must be provided for at least five (5) years after completion of Contract work.

iii. If coverage is cancelled or non-renewed, and not replaced with another claims-made policy form with a retroactive date prior to the Contract effective, or start of work date, the CONTRACTOR must purchase extended reporting period coverage for a minimum of five (5) years after completion of Contract work.

iv. A copy of the claims reporting requirements must be submitted to the CITY for review.

v. If the services involve lead-based paint or asbestos identification/remediation, the Contractors Pollution Liability policy shall not contain lead-based paint or asbestos exclusions. If the services involve mold identification/remediation, the Contractors Pollution Liability policy shall not contain a mold exclusion, and the definition of Pollution shall include microbial matter, including mold.

f. Acceptability of Insurers. Insurance is to be placed with insurers authorized to conduct business in the state with a current A.M. Best rating of no less than A: VII, unless otherwise acceptable to the CITY.

g. Waiver of Subrogation. CONTRACTOR hereby agrees to waive rights of subrogation which any insurer of CONTRACTOR may acquire from CONTRACTOR by virtue of the payment of any loss. CONTRACTOR agrees to obtain any endorsement that may be necessary to affect this waiver

of subrogation. The Workers' Compensation policy shall be endorsed with a waiver of subrogation in favor of the CITY for all work performed by the CONTRACTOR, its employees, agents and subcontractors.

h. Verification of Coverage. CONTRACTOR shall furnish the CITY with original Certificates of Insurance including all required amendatory endorsements (or copies of the applicable policy language effecting coverage required by this clause) and a copy of the Declarations and Endorsement Page of the CGL policy listing all policy endorsements to CITY before work begins. However, failure to obtain the required documents prior to the work beginning shall not waive the CONTRACTOR's obligation to provide them. The CITY reserves the right to require complete, certified copies of all required insurance policies, including endorsements, required by these specifications, at any time.

i. Subcontractors. CONTRACTOR shall require and verify that all subcontractors maintain insurance meeting all requirements stated herein, and CONTRACTOR shall ensure that CITY is an additional insured on insurance required from subcontractors. For CGL coverage, subcontractors shall provide coverage with a form at least as broad as CG 20 38 04 13.

j. Special Risks or Circumstances. CITY reserves the right to modify these requirements, including limits, based on the nature of the risk, prior experience, insurer, coverage, or other circumstances.

18. COMPLIANCE WITH CARB REGULATIONS:

a. Contractor shall comply, and shall ensure all subcontractors comply, with all applicable requirements of the most current version of the regulations imposed by California Air Resources Board ("CARB") including, without limitation, all applicable terms of Title 13, California Code of Regulations Division 3, Chapter 9 and all pending amendments ("Regulation").

b. Throughout the Project, and for three (3) years thereafter, Contractor shall make available for inspection and copying any and all documents or information associated with Contractor's and its subcontractors' fleets including, without limitation, the Certificates of Reported Compliance ("CRCs"), fuel/refueling records, maintenance records, emissions records, and any other information the Contractor is required to produce, keep or maintain pursuant to the Regulation upon two (2) calendar days' notice from the City.

c. Contractor shall be solely liable for any and all costs associated with compliance with the Regulation as well as for any and all penalties, fines, damages, or costs associated with any and all violations, or failures to comply with the Regulation. Contractor shall defend, indemnify and hold harmless the City, its officials, officers, employees and authorized volunteers free and harmless from any claims, liabilities, costs, penalties or interest arising out of any failure or alleged failure to comply with the Regulation.

19. ASSIGNMENT: This Contract is not assignable nor the performance of either party's duties delegable without the prior written consent of the other party. Any attempted or purported assignment or delegation of any of the rights of obligations of either party without the prior written consent of the other shall be void and of no force and effect.

20. INDEPENDENT CONTRACTOR: CONTRACTOR is and shall at all times remain as to the CITY, a wholly independent Contractor. Neither the CITY nor any of its agents shall have control of the conduct of CONTRACTOR or any of CONTRACTOR'S employees, except as herein set

forth. CONTRACTOR shall not at any time or in any manner represent that it or any of its agents or employees are in any manner agents or employees of CITY.

21. TAXES: CONTRACTOR is responsible for paying all retail sales and use, transportation, export, import, special or other taxes and duties applicable to, and assessable against any work, materials, equipment, services, processes and operations incidental to or involved in this Contract. CONTRACTOR is responsible for ascertaining and arranging to pay them. The prices established in the Contract shall include compensation for any taxes CONTRACTOR is required to pay by laws and regulations in effect at the bid opening date.

22. LICENSES: CONTRACTOR represents and warrants to CITY that it has all licenses, permits, qualifications, insurance, and approvals of whatsoever nature which are legally required of CONTRACTOR to practice its profession. CONTRACTOR represents and warrants to CITY that CONTRACTOR shall, at its sole cost and expense, keep in effect or obtain at all times during the term of this Agreement any licenses, permits, insurance, and approvals which are legally required of CONTRACTOR to practice its profession. CONTRACTOR shall maintain a City of Hermosa Beach business license, if required under CITY ordinance.

Contractors are required by law to be licensed and regulated by the Contractors' State License Board which has jurisdiction to investigate complaints against Contractors if a complaint regarding a patent act or omission is filed within five (5) years of the date of the alleged violation. A complaint regarding a latent act or omission pertaining to structural defects must be filed within ten (10) years of the date of the alleged violation. Any questions concerning a Contractor may be referred to the Registrar, Contractors' State License Board, P.O. Box 26000, Sacramento, California 95826.

23. RECORDS: CONTRACTOR shall maintain accounts and records, including personnel, property, and financial records, adequate to identify and account for all costs pertaining to this Agreement and such other records as may be deemed necessary by CITY or any authorized representative, and will be retained for four years after the expiration of this Agreement. All such records shall be made available for inspection or audit by CITY at any time during regular business hours.

24. SEVERABILITY. If any portion of these Contract documents are declared by a court of competent jurisdiction to be invalid or unenforceable, then such portion will be deemed modified to the extent necessary in the opinion of the court to render such portion enforceable and, as so modified, such portion and the balance of this Agreement will continue in full force and effect.

25. WHOLE AGREEMENT: This Agreement supersedes any and all other agreements either oral or written, between the parties and contains all of the covenants and agreements between the parties pertaining to the work of improvements described herein. Each party to this Contract acknowledges that no representations, inducements, promises or agreements, orally or otherwise, have been made by any party, or anyone acting on behalf of any party, which are not embodied herein, and that any other agreement, statements or promise not contained in this Contract shall not be valid or binding. Any modifications of this Contract will be effective only if signed by the party to be charged.

26. AUTHORITY: CONTRACTOR affirms that the signatures, titles, and seals set forth hereinafter in execution of this Agreement represent all individuals, firm members, partners, joint ventures, and/or corporate officers having a principal interest herein. Each party warrants that the individuals who have signed this Agreement have the legal power, right, and authority to make this Agreement and to bind each respective party. This Agreement may be modified by written amendment. CITY's city manager may execute any such amendment on CITY's behalf.

27. NOTICES: All notices permitted or required under this Agreement shall be in writing, and shall be deemed made when delivered to the applicable party's representative as provided in this Agreement. Additionally, such notices may be given to the respective parties at the following addresses, or at such other addresses as the parties may provide in writing for this purpose. Such notices shall be deemed made when personally delivered or when mailed forty-eight (48) hours after deposit in the U.S. mail, first-class postage prepaid, and addressed to the party at its applicable address.

CITY OF HERMOSA BEACH
1315 Valley Drive
Hermosa Beach, CA 90254

Attention: _____ Project Manager

CONTRACTOR:

_____

_____

Attention: _____

28. DISPUTES. Effective January 1, 1991, Section 20104 et seq., of the California Public Contract Code prescribes a process utilizing informal conferences, non-binding judicial supervised mediation, and judicial arbitration to resolve disputes on construction claims of $375,000 or less. Effective January 1, 2017, Section 9204 of the Public Contract Code prescribes a process for negotiation and mediation to resolve disputes on construction claims. The intent of this Section is to implement Sections 20104 et seq. and Section 9204 of the California Public Contract Code. This Section shall be construed to be consistent with said statutes.

Claims. For purposes of this Section, "Claim" means a separate demand by CONTRACTOR, after a change order duly requested in accordance with the terms of this Contract has been denied by the CITY, for (A) a time extension, (B) payment of money or damages arising from Work done by or on behalf of CONTRACTOR pursuant to the Contract, or (C) an amount the payment of which is disputed by the CITY. A "Claim" does not include any demand for payment for which CONTRACTOR has failed to provide notice, request a change order, or otherwise failed to follow any procedures contained in the Contract Documents. Claims governed by this Section may not be filed unless and until CONTRACTOR completes all procedures for giving notice of delay or change and for the requesting of a time extension or change order, including but not necessarily

limited to the change order procedures contained herein, and CONTRACTOR's request for a change has been denied in whole or in part. Claims governed by this Section must be filed no later than fourteen (14) days after a request for change has been denied in whole or in part or after any other event giving rise to the Claim. The Claim shall be submitted in writing to the CITY and shall include on its first page the following in 16 point capital font: "THIS IS A CLAIM." Furthermore, the claim shall include the documents necessary to substantiate the claim. Nothing in this Section is intended to extend the time limit or supersede notice requirements otherwise provided by Contract for the filing of claims, including all requirements pertaining to compensation or payment for extra Work, disputed Work, and/or changed conditions. Failure to follow such Contractual requirements shall bar any claims or subsequent lawsuits for compensation or payment thereon.

Supporting Documentation. The CONTRACTOR shall submit all claims in the following format:

Summary of claim merit and price, reference Contract Document provisions pursuant to which the claim is made

List of documents relating to claim:

Specifications
Drawings
Clarifications (Requests for Information)
Schedules
Other

Chronology of events and correspondence

Analysis of claim merit

Analysis of claim cost

Time impact analysis in CPM format

If CONTRACTOR's claim is based in whole or in part on an allegation of errors or omissions in the Drawings or Specifications for the Project, CONTRACTOR shall provide a summary of the percentage of the claim subject to design errors or omissions and shall obtain a certificate of merit in support of the claim of design errors and omissions.

Cover letter and certification of validity of the claim, including any claims from subcontractors of any tier, in accordance with Government Code section 12650 *et seq*.

City's Response. Upon receipt of a claim pursuant to this Section, CITY shall conduct a reasonable review of the claim and, within a period not to exceed 45 days, shall provide CONTRACTOR a written statement identifying what portion of the claim is disputed and what portion is undisputed. Any payment due on an undisputed portion of the claim will be processed and made within 60 days after the public entity issues its written statement.

If CITY needs approval from its governing body to provide the CONTRACTOR a written statement identifying the disputed portion and the undisputed portion of the claim, and the

governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, CITY shall have up to three days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension, expires to provide CONTRACTOR a written statement identifying the disputed portion and the undisputed portion.

Within 30 days of receipt of a claim, CITY may request in writing additional documentation supporting the claim or relating to defenses or claims CITY may have against the CONTRACTOR. If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of CITY and the CONTRACTOR.

CITY's written response to the claim, as further documented, shall be submitted to CONTRACTOR within 30 days (if the claim is less than $50,000, within 15 days) after receipt of the further documentation, or within a period of time no greater than that taken by CONTRACTOR in producing the additional information or requested documentation, whichever is greater.

Meet and Confer. If the CONTRACTOR disputes CITY's written response, or CITY fails to respond within the time prescribed, the CONTRACTOR may so notify CITY, in writing, either within 15 days of receipt of CITY's response or within 15 days of CITY's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand, CITY shall schedule a meet and confer conference within 30 days for settlement of the dispute.

Mediation. Within 10 business days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, CITY shall provide the CONTRACTOR a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after CITY issues its written statement. Any disputed portion of the claim, as identified by CONTRACTOR in writing, shall be submitted to nonbinding mediation, with CITY and CONTRACTOR sharing the associated costs equally. CITY and CONTRACTOR shall mutually agree to a mediator within 10 business days after the disputed portion of the claim has been identified in writing unless the parties agree to select a mediator at a later time.

If the Parties cannot agree upon a mediator, each Party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each Party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator.

For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the Parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

Unless otherwise agreed to by CITY and CONTRACTOR in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Section 20104.4 to mediate after litigation has been commenced.

The mediation shall be held no earlier than the date CONTRACTOR completes the Work or the date that CONTRACTOR last performs Work, whichever is earlier. All unresolved claims shall be considered jointly in a single mediation unless a new unrelated claim arises after mediation is completed.

Procedures After Mediation. If following the mediation, the claim or any portion remains in dispute, CONTRACTOR must file a claim pursuant to Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time CONTRACTOR submits his or her written claim pursuant to subdivision (a) until the time the claim is denied, including any period of time utilized by the meet and confer conference or mediation.

Civil Actions. The following procedures are established for all civil actions filed to resolve claims subject to this Section:

Within 60 days, but no earlier than 30 days, following the filing or responsive pleadings, the court shall submit the matter to non-binding mediation unless waived by mutual stipulation of both parties or unless mediation was held prior to commencement of the action in accordance with Public Contract Code section 9204 and the terms of these procedures.. The mediation process shall provide for the selection within 15 days by both parties of a disinterested third person as mediator, shall be commenced within 30 days of the submittal, and shall be concluded within 15 days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court.

If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1114.11 of that code. The Civil Discovery Act of 1986 (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, (A) arbitrators shall, when possible, be experienced in construction law, and (B) any party appealing an arbitration award who does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, also pay the attorney's fees on appeal of the other party.

Government Code Claims. In addition to any and all Contract requirements pertaining to notices of and requests for compensation or payment for extra work, disputed work, claims and/or changed conditions, CONTRACTOR must comply with the claim procedures set forth in Government Code sections 900 et seq. prior to filing any lawsuit against the CITY. Such Government Code claims and any subsequent lawsuit based upon the Government Code claims shall be limited to those matters that remain unresolved after all procedures pertaining to extra work, disputed work, claims, and/or changed conditions have been followed by CONTRACTOR. If no such Government Code claim is submitted, or if any prerequisite Contractual requirements are not otherwise satisfied as specified herein, CONTRACTOR shall be barred from bringing and maintaining a valid lawsuit

against the CITY. A Government Code claim must be filed no earlier than the date the work is completed or the date CONTRACTOR last performs work on the Project, whichever occurs first. A Government Code claim shall be inclusive of all unresolved claims unless a new unrelated claim arises after the Government Code claim is submitted.

Non-Waiver. CITY's failure to respond to a claim from CONTRACTOR within the time periods described in this Section or to otherwise meet the time requirements of this Section shall result in the claim being deemed rejected in its entirety. CITY's failure to respond shall not waive CITY's rights to any subsequent procedures for the resolution of disputed claims.

24. NON-DISCRIMINATION: Contractor represents that it is an equal opportunity employer and that it shall not discriminate against any employee or applicant for employment because of race, religion, color, national origin, ancestry, sex, age or other interests protected by the State or Federal Constitutions. Such non-discrimination shall include, but not be limited to, all activities related to initial employment, upgrading, demotion, transfer, recruitment or recruitment advertising, layoff or termination. A violation of this section exposes CONTRACTOR to the penalties provided for in Labor Code Section 1735.

25. TERMINATION: This Contract may be terminated by CITY at any time, either with our without cause, by giving CONTRACTOR three (3) days advance written notice. In the event of termination by CITY for any reason other than the fault of CONTRACTOR, CITY shall pay CONTRACTOR for all Work performed up to that time as provided herein. In the event of breach of the Contract by Contractor, CITY may terminate the Contract immediately without notice, may reduce payment to CONTRACTOR in the amount necessary to offset CITY's resulting damages, and may pursue any other available recourse against CONTRACTOR. CONTRACTOR may not terminate this Contract except for cause. In the event this Contract is terminated in whole or in part as provided, CITY may procure, upon such terms and in such manner as it may determine appropriate, services similar to those terminated. Further, if this Contract is terminated as provided, CITY may require CONTRACTOR to provide all finished or unfinished documents, data, diagrams, drawings, materials or other matter prepared or built by CONTRACTOR in connection with its performance of this Contract.

26. ANTI-TRUST CLAIMS: This provision shall be operative if this Contract Agreement is applicable to California Public Contract Code Section 7103.5. In entering into this Contract Agreement to supply goods, services or materials, Contractor hereby offers and agrees to assign to the Agency 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. Section 15) or under the Cartwright Act (Chapter 2, commencing with Section 16700, of Part 2 of Division 7 of the Business and Professions Code) arising from purchases of goods, services, or materials pursuant to the Contract Agreement. This assignment shall be made and become effective at the time the Agency tender final payment to Contractor, without further acknowledgment by the Parties.

27. NO THIRD PARTY BENEFICIARY. This Contract and every provision herein is for the exclusive benefit of the Contractor and the City and not for the benefit of any other party. There will be no incidental or other beneficiaries of any of the Contractor's or the City's obligations under this Contract.

28. TIME IS OF ESSENCE. Time is of the essence for each and every provision of the Contract Documents.

29. FORCE MAJEURE. If CONTRACTOR is delayed in the performance or progress of the work by a Force Majeure Event, then the CONTRACTOR shall be entitled to a time extension, as provided in the Contract documents, when the work stopped is on the critical path and shall not be charged liquidated damages. Such a non-compensable adjustment shall be CONTRACTOR's sole and exclusive remedy for such delays and the CONTRACTOR will not receive an adjustment to the Contract price or any other compensation. Contractor must submit a timely request in accordance with the requirements of the Contract documents. A Force Majeure Event shall mean an event that materially affects a party's performance and is one or more of the following: (1) Acts of God or other natural disasters occurring at the project site; (2) terrorism or other acts of a public enemy; (3) orders of governmental authorities (including, without limitation, unreasonable and unforeseeable delay in the issuance of permits or approvals by governmental authorities that are required for the work); (4) pandemics, epidemics or quarantine restrictions; and (5) strikes and other organized labor action occurring at the project site and the effects thereof on the work, only to the extent such strikes and other organized labor action are beyond the control of CONTRACTOR and its subcontractors, of every tier, and to the extent the effects thereof cannot be avoided by use of replacement workers. For purposes of this section, "orders of governmental authorities," includes ordinances, emergency proclamations and orders, rules to protect the public health, welfare and safety, and other actions of the City in its capacity as a municipal authority.

30. PROVISIONS REQUIRED BY LAW AND CONTRACTOR COMPLIANCE. Each and every provision of law required to be included in these Contract Documents shall be deemed to be included in these Contract Documents. The Contractor shall comply with all requirements of applicable federal, state and local laws, rules and regulations, including, but not limited to, the provisions of the California Labor Code and California Public Contract Code which are applicable to this Work.

31. ACCEPTANCE OF FACSIMILE SIGNATURES. The Parties agree that this Contract, agreements ancillary to this Contract, and related documents to be entered into in connection with this Contract will be considered signed when the signature of a party is delivered by facsimile transmission. Such facsimile signature will be treated in all respects as having the same effect as an original signature.

32. GOVERNING LAW: This Agreement shall be governed by the laws of the State of California, and exclusive venue for any action involving this Contract will be in Los Angeles County.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement with all the formalities required by law on the respective dates set forth opposite their signatures.

State of California
CONTRACTOR'S License No. _____

CONTRACTOR

_____

_____

_____ By: _____
Date TITLE

CITY OF HERMOSA BEACH, CALIFORNIA

_____ By: _____
Date MAYOR

ATTEST:

_____ By: _____
Date CITY CLERK

CONTRACTOR'S Business Phone _____

Emergency Phone at which CONTRACTOR can be reached at any time: ( ) _____

APPROVED AS TO FORM:

_____
CITY ATTORNEY

_____
Date

B. AGREEMENT OF INDEMNIFICATION AND HOLD HARMLESS AND WAIVER OF SUBROGATION AND CONTRIBUTION

CIP NO. 619 Kelly Courts Renovations

Contract/Agreement/License/Permit No. or description:_____

Indemnitor(s) (list all names):

To the fullest extent permitted by law, Indemnitor hereby agrees, at its sole cost and expense, to defend, protect, indemnify, and hold harmless the City of Hermosa Beach and its respective elected officials, officers, attorneys, agents, employees, volunteers, successors, and assigns (collectively "Indemnitees") from and against any and all damages, costs, expenses, liabilities, claims, demands, causes of action, proceedings, expenses, judgments, penalties, liens, and losses of any nature whatsoever, including fees of accountants, attorneys, or other professionals and all costs associated therewith (collectively "Liabilities"), arising or claimed to arise, directly or indirectly, out of, in connection with, resulting from, or related to any act, failure to act, error, or omission of Indemnitor or any of its officers, agents, servants, employees, subcontractors, materialmen, suppliers or their officers, agents, servants or employees, arising or claimed to arise, directly or indirectly, out of, in connection with, resulting from, or related to the above-referenced Contract, agreement, license, or permit (the "Agreement") or the performance or failure to perform any term, provision, covenant, or condition of the Agreement, including this indemnity provision. 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. This indemnity provision shall survive the termination of the Agreement and is in addition to any other rights or remedies which 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 an Indemnitee shall be conclusive in favor of the Indemnitee's right to recover under this indemnity provision. Indemnitor shall pay Indemnitees for any attorney fees and costs incurred in enforcing this indemnification provision. Notwithstanding the foregoing, nothing in this instrument shall be construed to encompass (a) Indemnitees' sole negligence or willful misconduct to the limited extent that the underlying Agreement is subject to Civil Code 2782(a), or (b) the Contracting public agency's active negligence to the limited extent that the underlying Agreement is subject to Civil Code 2782(b). This indemnity is effective without reference to the existence or applicability of any insurance coverages which may have been required under the Agreement or any additional insured endorsements which may extend to Indemnitees.

Indemnitor, 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, losses and liabilities arising out of or incident to activities or operations performed by or on behalf of the Indemnitor regardless of any prior, concurrent, or subsequent active or passive negligence by the Indemnitees. Accountants, attorneys, or other professionals employed by Indemnitor to defend Indemnitees shall be selected by Indemnitees.

In the event there is more than one person or entity named in the Agreement as an Indemnitor, then all obligations, liabilities, covenants and conditions under this instrument shall be joint and several.

"Indemnitor"

Name_____ Name _____

By:_____ By:_____

C. EQUALS

CIP NO. 619 Kelly Courts Renovations

The undersigned desires to use the material, product, thing, or service described below, as "an equal" to such item as specified.

In accordance with the provisions under General Conditions, entitled EQUALS, if the City shall find any item so described equal to the respective item specified, then the undersigned may furnish such item, together with all necessary labor, materials, equipment and incidentals required to perform and complete the work.

_____ _____

Contractor's Name Date

_____ _____

Address Telephone Number

Materials, apparatus or equipment specified for which Bidder proposes "an equal"		**Complete description of the materials, apparatus or equipment the Bidder desires to use as "an equal" and name of Contractor if different**
Specify page number		
1.		
2.		
3.		

D. FAITHFUL PERFORMANCE BOND

CIP NO. 619 Kelly Courts Renovations

KNOW ALL PERSONS BY THESE PRESENTS:

THAT WHEREAS, the City of Hermosa Beach, (hereinafter referred to as "City") has awarded to _____, (hereinafter referred to as the "Contractor") an agreement for **Contract No.**_____, (hereinafter referred to as the "Project").

WHEREAS, the work to be performed by the Contractor is more particularly set forth in the Contract Documents for the Project dated _____, (hereinafter referred to as "Contract Documents"), the terms and conditions of which are expressly incorporated herein by reference; and

WHEREAS, the Contractor is required by said Contract Documents to perform the terms thereof and to furnish a bond for the faithful performance of said Contract Documents.

NOW, THEREFORE, we, _____, the undersigned Contractor and _____ as Surety, a corporation organized and duly authorized to transact business under the laws of the State of California, are held and firmly bound unto the City in the sum of _____ DOLLARS, ($_____), said sum being not less than one hundred percent (100%) of the total amount of the Contract, for which amount well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that, if the Contractor, his 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 agreements in the Contract Documents and any alteration thereof made as therein provided, on its part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their intent and meaning; and shall faithfully fulfill all obligations including the one (1) year guarantee of all materials and workmanship; and shall indemnify and save harmless the City, its officials, officers, employees, and authorized volunteers, as stipulated in said Contract Documents, 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 therefore, there shall be included costs and reasonable expenses and fees including reasonable attorney's fees, incurred by City in enforcing such obligation.

As a condition precedent to the satisfactory completion of the Contract Documents, unless otherwise provided for in the Contract Documents, the above obligation shall hold good for a period of one (1) year after the acceptance of the work by City, during which time if Contractor shall fail to make full, complete, and satisfactory repair and replacements and totally protect the City from loss or damage resulting from or caused by defective materials or faulty workmanship. The obligations of Surety hereunder shall continue so long as any obligation of Contractor remains.

Nothing herein shall limit the City's rights or the Contractor or Surety's obligations under the Contract, law or equity, including, but not limited to, California Code of Civil Procedure Section 337.15.

Whenever Contractor shall be, and is declared by the City to be, in default under the Contract Documents, the Surety shall remedy the default pursuant to the Contract Documents, or shall promptly, at the City's option:

i. Take over and complete the Project in accordance with all terms and conditions in the Contract Documents; or

ii. Obtain a bid or bids for completing the Project in accordance with all terms and conditions in the Contract Documents and upon determination by Surety of the lowest responsive and responsible Bidder, arrange for a Contract between such Bidder, the Surety and the City, and make available as work progresses sufficient funds to pay the cost of completion of the Project, less the balance of the Contract price, including other costs and damages for which Surety may be liable. The term "balance of the Contract price" as used in this paragraph shall mean the total amount payable to Contractor by the City under the Contract and any modification thereto, less any amount previously paid by the City to the Contractor and any other set offs pursuant to the Contract Documents.

iii. Permit the City to complete the Project in any manner consistent with California law and make available as work progresses sufficient funds to pay the cost of completion of the Project, less the balance of the Contract price, including other costs and damages for which Surety may be liable. The term "balance of the Contract price" as used in this paragraph shall mean the total amount payable to Contractor by the City under the Contract and any modification thereto, less any amount previously paid by the City to the Contractor and any other set offs pursuant to the Contract Documents.

Surety expressly agrees that the City may reject any Contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Contractor.

Surety shall not utilize Contractor in completing the Project nor shall Surety accept a bid from Contractor for completion of the Project if the City, when declaring the Contractor in default, notifies Surety of the City's objection to Contractor's further participation in the completion of the Project.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract Documents or to the Project to be performed thereunder shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract Documents or to the Project.

By their signatures hereunder, Surety and Contractor hereby confirm under penalty of perjury that surety is an admitted surety insurer authorized to do business in the State of California.

[REMAINDER OF PAGE LEFT INTENTIONALLY BLANK]

IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day of _____, 20___.

_____
Contractor/ Principal

By_____

Title_____

_____
Surety

By _____
Attorney-in-Fact

Title_____

The rate of premium on this bond is _____ per thousand. The total amount of premium charges is $_____.
(The above must be filled in by corporate attorney.)

THIS IS A REQUIRED FORM

Any claims under this bond may be addressed to:

(Name and Address of Surety) _____
_____
_____

(Name and Address of Agent or Representative for service of process in California, if different from above) _____
_____
_____

(Telephone number of Surety and Agent or Representative for service of process in California) _____

Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20___, before me, _____, Notary Public, personally

appeared _____, who proved to me on the basis of satisfactory

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

_____

Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

¨ Individual
¨ Corporate Officer

_____
Title(s)

¨ Partner(s) ¨ Limited ¨ General

¨ Attorney-In-Fact
¨ Trustee(s)
¨ Guardian/Conservator
¨ Other:

Signer is representing:
Name Of Person(s) Or Entity(ies)

_____

_____

DESCRIPTION OF ATTACHED DOCUMENT

_____
Title or Type of Document

_____
Number of Pages

_____
Date of Document

_____
Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for Contractor/Principal.

Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20___, before me, _____, Notary Public, personally

appeared _____, who proved to me on the basis of satisfactory

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature of Notary Public _____

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

¨ Individual
¨ Corporate Officer

_____
Title(s)

¨ Partner(s) ¨ Limited ¨ General
¨ Attorney-In-Fact
¨ Trustee(s)
¨ Guardian/Conservator
¨ Other:

Signer is representing:
Name Of Person(s) Or Entity(ies)

_____
_____

DESCRIPTION OF ATTACHED DOCUMENT

_____
Title or Type of Document

_____
Number of Pages

_____
Date of Document

_____
Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for the Attorney-in-Fact. The Power-of Attorney to local representatives of the bonding company must also be attached.

END OF PERFORMANCE BOND

E. PAYMENT BOND (LABOR AND MATERIALS)

CIP NO. 619 Kelly Courts Renovations

KNOW ALL MEN BY THESE PRESENTS That

WHEREAS, the City of Hermosa Beach (hereinafter designated as the "City"), by action taken or a resolution passed _____ , 20_____, has awarded to _____ hereinafter designated as the "Principal," a Contract for the work described as follows: **Contract No.**_____ (the "Project"); and

WHEREAS, said Principal is required to furnish a bond in connection with said Contract; providing that if said Principal or any of its Subcontractors shall fail to pay for any materials, provisions, provender, equipment, or other supplies used in, upon, for or about the performance of the work Contracted to be done, or for any work or labor done thereon of any kind, or for amounts due under the Unemployment Insurance Code or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of said Principal and its Subcontractors with respect to such work or labor the Surety on this bond will pay for the same to the extent hereinafter set forth.

NOW THEREFORE, we, the Principal and _____ as Surety, are held and firmly bound unto the City in the penal sum of _____ Dollars ($_____) 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 said Principal, his or its subcontractors, heirs, executors, administrators, successors or assigns, shall fail to pay any of the persons named in Civil Code Section 9100, fail to pay for any materials, provisions or other supplies, used in, upon, for or about the performance of the work Contracted to be done, or for any work or labor thereon of any kind, or amounts due under the Unemployment Insurance Code with respect to work or labor performed under the Contract, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department or Franchise Tax Board from the wages of employees of the Contractor and his subcontractors pursuant to Revenue and Taxation Code Section 18663, with respect to such work and labor the Surety or Sureties will pay for the same, in an amount not exceeding the sum herein above specified, and also, in case suit is brought upon this bond, all litigation expenses incurred by the City in such suit, including reasonable attorneys' fees, court costs, expert witness fees and investigation expenses.

This bond shall inure to the benefit of any of the persons named in Civil Code Section 9100 so as to give a right of action to such persons or their assigns in any suit brought upon this bond.

It is further stipulated and agreed that the Surety on this bond shall not be exonerated or released from the obligation of this bond by any change, extension of time for performance, addition, alteration or modification in, to, or of any Contract, plans, specifications, or agreement pertaining or relating to any scheme or work of improvement herein above described, or pertaining or relating to the furnishing of labor, materials, or equipment therefore, nor by any change or modification of

any terms of payment or extension of the time for any payment pertaining or relating to any scheme or work of improvement herein above described, nor by any rescission or attempted rescission or attempted rescission of the Contract, agreement or bond, nor by any conditions precedent or subsequent in the bond attempting to limit the right of recovery of claimants otherwise entitled to recover under any such Contract or agreement or under the bond, nor by any fraud practiced by any person other than the claimant seeking to recover on the bond and that this bond be construed most strongly against the Surety and in favor of all persons for whose benefit such bond is given, and under no circumstances shall Surety be released from liability to those for whose benefit such bond has been given, by reason of any breach of Contract between the owner or City and original Contractor or on the part of any obligee named in such bond, but the sole conditions of recovery shall be that claimant is a person described in Civil Code Section 9100, and has not been paid the full amount of his claim and that Surety does hereby waive notice of any such change, extension of time, addition, alteration or modification herein mentioned, including but not limited to the provisions of sections 2819 and 2845 of the California Civil Code.

By their signatures hereunder, Surety and Principal hereby confirm under penalty of perjury that surety is an admitted surety insurer authorized to do business in the State of California.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day of _____, 20__.

_____

Contractor/ Principal

By_____

Title_____

_____

Surety

By _____

Attorney-in-Fact

Title_____

Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20___, before me, _____, Notary Public, personally

appeared _____, who proved to me on the basis of satisfactory

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature of Notary Public _____

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

¨ Individual
¨ Corporate Officer

_____
Title(s)

¨ Partner(s) ¨ Limited ¨ General

¨ Attorney-In-Fact
¨ Trustee(s)
¨ Guardian/Conservator
¨ Other:

Signer is representing:
Name Of Person(s) Or Entity(ies)

_____
_____

DESCRIPTION OF ATTACHED DOCUMENT

_____
Title or Type of Document

_____
Number of Pages

_____
Date of Document

_____
Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for Contractor/Principal.

Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20___, before me, _____, Notary Public, personally

appeared _____, who proved to me on the basis of satisfactory

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature of Notary Public _____

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

- ☐ Individual
- ☐ Corporate Officer

_____
Title(s)

- ☐ Partner(s) ☐ Limited ☐ General
- ☐ Attorney-In-Fact
- ☐ Trustee(s)
- ☐ Guardian/Conservator
- ☐ Other:

Signer is representing:
Name Of Person(s) Or Entity(ies)

_____

_____

DESCRIPTION OF ATTACHED DOCUMENT

_____
Title or Type of Document

_____
Number of Pages

_____
Date of Document

_____
Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for the Attorney-in-Fact. The Power-of-Attorney to local representatives of the bonding company must also be attached.

END OF PAYMENT BOND

F. GUARANTEE TO THE CITY OF HERMOSA BEACH

CIP NO. 619 Kelly Courts Renovations

As a material inducement to the City to award the Contract for CIP No. _____ to the _____, the undersigned ("Guarantor") has agreed to enter into this guarantee. The Guarantor hereby unconditionally guarantees to the fullest extent allowed by law the following work included in this project: _____ ("the work").

Guarantor guarantees that the materials and equipment used by itself and its sub-Contractors will be free from defects and that the work will conform to the plans and specifications. Should any of the materials or equipment prove defective or should the work as a whole, or any part thereof, prove defective for any reason whatsoever (except due to intentional torts by the City), or should the work as a whole or any part thereof fail to operate properly or fail to comply with the plans and specifications, Guarantor will, at the City's sole election: 1) reimburse the City, upon written demand, for all of the City's expenses incurred replacing or restoring any such equipment or materials, including the cost of any work necessary to make such replacement or repairs; or 2) replace any such defective material or equipment and repair said work completely, all without any cost to the City. Guarantor further guarantees that any such repair work will conform to the plans and specifications for the project. This guarantee will remain in effect for one year from the date on which the Contract for the work is accepted by the City.

Guarantor understands and agrees that the City shall have the unqualified option to make any replacements or repairs itself or to have such replacement, repair, performed by the undersigned. The City shall have no obligation to consult with Guarantor before the City proceeds to perform any repair, replacement, or work itself. If the City elects to have Guarantor perform said repair, replacement, or work, Guarantor agrees that the repair, replacement, or work shall be performed within 15 days after receipt of a written demand from the City.

If the City elects to perform the replacement, repairs itself, Guarantor agrees to make reimbursement payment within 15 days after receipt of a written demand for payment from the City.

If the Guarantor fails or refuses to comply with this guarantee, the City shall be entitled to all costs and expenses, including attorneys and expert fees, reasonably incurred by reason of Guarantor's failure or refusal.

Guarantor

_____	_____
Contractor	Date
_____	_____
By	Title

G. GENERAL COMPREHENSIVE LIABLITY ADDITONAL INSURED ENDORSMENT

CIP NO. 619 Kelly Courts Renovations

NAME OF ADDRESS OF INSURED:

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

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

1. That the City of Hermosa Beach and its or their elected officials, officers, agents and employees are insureds thereunder in relation to those activities described generally above with regard to operations performed by or on behalf of the named insured.

2. Such insurance shall be primary, and not contributing with any other insurance maintained by the City.

3. The policy to which this endorsement is attached shall apply separately to each insured against whom claim is made or suit is brought except with respect to the limits of the company's liability.

4. The policy to which this endorsement is attached shall not be subject to cancellation, change in coverage, reduction of limits or non-renewal except after written notice to Risk Management, City of Hermosa Beach, by certified mail, return receipt requested, not less than thirty (30) days prior to the effective date thereto.

CANCELLATION NOTICE AND ENDORSEMENT TO BE SENT TO:

Risk Management
City of Hermosa Beach
1315 Valley Dr. Hermosa
Beach, CA 90254
(310) 318-0202

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.

Endorsement No. _____ Effective Date _____ Policy No. _____

TYPE OF COVERAGES TO WHICH LIMITS OF LIABILITY THIS ENDORSEMENT ATTACHES

POLICY PERIOD FROM _____ TO _____

Scheduled items or locations are to be identified on an attached sheet.

The following inclusions relate to the above coverages includes:

( ) Premises & Operations
( ) Contractual Liability
( ) Independent Contractors
( ) Products/Completed Operations
( ) Broad Form Property Damage
( ) Broad Form Liability Endorsement
( ) Explosion Hazard
( ) Collapse
( ) Underground Hazard
( ) Personal Injury
( ) _____

A deductible or self-insured retention (strike out one) of _____ applies to _____coverage.

DEDUCTIBLE APPLIES PER CLAIM, _____ PER OCCURRENCE _____

_____
INSURANCE COMPANY
ADDRESS:_____
_____

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 above-named insurance company to this endorsement and by my execution hereof, do so bind said company.

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

Executed at _____ , _____ on ,_____ 20 .

Phone No.: (___)_____

H. AUTOMOBILE LIABILITY ADDITIONAL INSURED ENDORSEMENT

CIP NO. 619 Kelly Courts Renovations

NAME OF ADDRESS OF INSURED:

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

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

1. That the City of Hermosa Beach and its or their elected officials, officers, agents and employees are insureds thereunder in relation to those activities described generally above with regard to operations performed by or on behalf of the named insured.

2. Such insurance shall be primary, and not contributing with any other insurance maintained by the City.

3. The policy to which this endorsement is attached shall apply separately to each insured against whom claim is made or suit is brought except with respect to the limits of the company's liability.

4. The policy to which this endorsement is attached shall not be subject to cancellation, change in coverage, reduction of limits or non-renewal except after written notice to Risk Management, City of Hermosa Beach, by certified mail, return receipt requested, not less than thirty (30) days prior to the effective date thereto.

CANCELLATION NOTICE AND ENDORSEMENT TO BE SENT TO:

Risk Management
City of Hermosa Beach
1315 Valley Dr. Hermosa
Beach, CA 90254
(310) 318-0202

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.

Endorsement No.	Effective Date	Policy No.

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

Scheduled items or locations are to be identified on an attached sheet.

The following inclusions relate to the above coverages includes:

( ) Owned Automobiles
( ) Non-owned Automobiles
( ) Hired Automobiles
( ) Owned, Non-owned and Hired Automobiles

A deductible or self-insured retention (strike out one) of _____ applies to _____coverage.

DEDUCTIBLE APPLIES PER CLAIM, _____ PER OCCURRENCE _____

_____
INSURANCE COMPANY

ADDRESS:_____
_____

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 above-named insurance company to this endorsement and by my execution hereof, do so bind said company.

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

Executed at _____ , _____ on ,_____ 20 .

Phone No.: ( )_____

I. INSTRUCTIONS FOR COMPLETING, EXECUTING, AND SUBMITTING EVIDENCE OF INSURANCE TO THE OWNER

CIP NO. 619 Kelly Courts Renovations

Insured: _____ Date: _____
(Contractor, Lessee, Permittee, etc.)

Insured

A. In order to reduce problems and time delays in providing evidence of insurance to the City, you are requested to give your insurance agent or broker a copy of the attached Insurance Requirements and endorsement forms along with these instructions for completing, executing, and submitting evidence of insurance.

If the agreement requires Workers' Compensation coverage and you have been authorized by the State of California to self-insure Workers' Compensation, then a copy of the certificate from the State authorizing self-insurance for Workers' Compensation shall meet the requirements for Workers' Compensation insurance covering activities within the State of California.

All questions relating to insurance should be directed to the department or office responsible for your Contract, lease, permit, or other agreement.

Insurance Agent or Broker

B. The appropriate Endorsement Form shall be used. No changes in the terms of the Endorsement will be permitted. Certificates of Insurance alone will not be accepted by the City.

More than one insurance policy may be required to comply with the insurance requirements. Endorsement forms appropriate to your insured's Contract, lease or permit are checked below and enclosed.

( ) Workers' Compensation/Employers Liability
( ) General Liability
( ) Automobile Liability
( ) Excess/umbrella Liability
( ) Professional Liability
( ) Property insurance
( ) Fine Arts Property Insurance

You shall have an authorized representative of the insurance company sign the completed endorsement forms, note his phone number at the bottom of page 2 and have said representative transmit the forms to the City. Signatures must be originals as the City will not accept facsimile (rubber stamp, photocopy, etc.) or initialed signatures.

The name of the Insurance Company underwriting the coverage and its address shall be noted on page 2 of the endorsement form.

The "General description of agreement(s) and/or activity(ies) insured" shall include reference to the activity and/or to either the specific City Contract number, lease number, permit number or construction approval number.
The coverages and limits for each type of insurance are specified in the attached sheet of insurance requirements. When coverage is on a scheduled basis, then a separate sheet is to be attached to the endorsement listing such scheduled locations, vehicles, etc., so covered.

Endorsements to excess policies will be required when primary insurance is insufficient in complying with the City's requirements.

If there is insufficient space on the form to note pertinent information, such as inclusions, exclusions or specific provisions, etc., a separate sheet may be attached.

When additional sheets are attached, change the number of pages at the bottom of the form.

Completed Endorsement(s) and questions relating to the required insurance are to be directed to:

Risk Management
City of Hermosa Beach
1315 Valley Dr. Hermosa
Beach, CA 90254
(310) 318-0202

Improperly completed Endorsements will be returned to your insured for correction by an authorized representative of the insurance company.

DELAY IN SUBMITTING PROPERLY COMPLETED ENDORSEMENT FORMS MAY DELAY YOUR INSURED'S INTENDED OCCUPANCY OR OPERATION UNDER AGREEMENT WITH THE OWNER.

For extensions or renewals of insurance policies which have the City's Endorsement Form(s) attached, the City will accept a copy of the endorsement (with an original signature) to extend the period of coverage as evidence of continued coverage.

J. WORKER'S COMPENSATION INSURANCE CERTIFICATE

CIP NO. 619 Kelly Courts Renovations

The Contractor shall execute the following form as required by the California Labor Code, Sections 1860 and 1861:

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 the Contract.

DATED: _____

CONTRACTOR: _____

By: _____
Signature

_____
Title

ATTEST:

By: _____
Signature

_____
Title

K. SUPPLEMENTAL INFORMATION TO BE COMPLETED BY PRINCIPAL

CIP NO. 619 Kelly Courts Renovations

If an individual, so state. If a firm or co-partnership, state the firm and give the names of all individual co-partners composing the partnership. If a corporation, state legal name of corporation; state also the names of the president, secretary, treasurer, and manager thereof.

_____

_____

_____

Business Address: _____

_____

_____

Telephone Number: _____

Date: _____

Print Name: _____

Principal

Signature: _____

L. W9 FORM

Form **W-9**
(Rev. October 2018)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

▶ **Go to *www.irs.gov/FormW9* for instructions and the latest information.**

Give Form to the requester. Do not send to the IRS.

Print or type. See **Specific Instructions** on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only **one** of the following seven boxes.

☐ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____

Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is **not** disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.

☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any) _____

Exemption from FATCA reporting code (if any) _____

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.) See instructions.

Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN,* later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number

			–			–				

or

Employer identification number

		–							

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here **Signature of U.S. person ▶** **Date ▶**

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to *www.irs.gov/FormW9.*

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, *later.*

COMPLIANCE WITH CARB REGULATIONS

The City is a Public Works Awarding Body, as defined under Title 13 California Code of Regulations section 2449(c)(46). Accordingly, Bidders must submit, with their Bids, a valid Certificate of Reported Compliance ("CRC") for the Bidder's and its listed subcontractors fleet (including any applicable leased equipment or vehicles) . Bidder must complete and submit the Fleet Compliance Certification, on the form included in the bid package. Failure to provide a valid CRC for the Bidder's fleet, and for the fleets of all listed subcontractors, or failure to complete the Fleet Compliance Certification, may render the Bid non-responsive.

Fleet Compliance Certification.

Bidder hereby acknowledges that they have reviewed the California Air Resources Board's policies, rules and regulations and are familiar with the requirements of Title 13, California Code of Regulations, Division 3, Chapter 9, effective on January 1, 2024 (the "Regulation"). Bidder hereby certifies, subject to penalty for perjury, that the option checked below relating to the Bidder's fleet, and/or that of their subcontractor(s) ("Fleet") is true and correct:

- ☐ The Fleet is subject to the requirements of the Regulation, and the appropriate Certificate(s) of Reported Compliance have been attached hereto.

- ☐ The Fleet is exempt from the Regulation under section 2449.1(f)(2), and a signed description of the subject vehicles, and reasoning for exemption has been attached hereto.

- ☐ Bidder and/or their subcontractor is unable to procure R99 or R100 renewable diesel fuel as defined in the Regulation pursuant to section 2449.1(f)(3). Bidder shall keep detailed records describing the normal refueling methods, their attempts to procure renewable diesel fuel and proof that shows they were not able to procure renewable diesel (i.e. third party correspondence or vendor bids).

- ☐ The Fleet is exempt from the requirements of the Regulation pursuant to section 2449(i)(4) because this Project has been deemed an Emergency, as defined under section 2449(c)(18). Bidder shall only operate the exempted vehicles in the emergency situation and records of the exempted vehicles must be maintained, pursuant to section 2449(i)(4).

- ☐ The Fleet does not fall under the Regulation or are otherwise exempted and a detailed reasoning is attached hereto.

Name of Bidder: _____

Signature: _____

Name: _____

Title: _____

Date: _____

CIP NO. 619 KELLY COURTS RENOVATIONS PROJECT

VI. TECHNICAL PROVISIONS

The following Technical Provisions supplement and amend the 2021 Standard Specifications for Public Works Construction (SSPWC). These Technical Provisions have been arranged into a format and sequence that parallels the Standard Specifications for Public Works Construction.

PROJECT MANUAL

City of Hermosa Beach
Hermosa Beach Pickle Ball Court Improvements
Hermosa Beach, California

Prepared by
NUVIS

425 Valley Drive
Hermosa Beach California 90254
Project Number 22-040.01

TABLE OF CONTENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS GROUP

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

INTRODUCTORY INFORMATION

00 01 10 Table of Contents

SPECIFICATIONS GROUP

FACILITY CONSTRUCTION SUBGROUP

DIVISION 02 - EXISTING CONDITIONS

02 41 19 SELECTIVE DEMOLITION

DIVISION 03 - CONCRETE

03 30 00 CAST-IN-PLACE CONCRETE

DIVISION 09 - FINISHES

09 96 23 ANTI-GRAFFITI COATING

FACILITY SERVICES SUBGROUP

DIVISION 26 - ELECTRICAL

26 00 10 SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL
26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 05 33.13 CONDUITS FOR ELECTRICAL SYSTEMS
26 05 33.16 BOXES AND COVERS FOR ELECTRICAL SYSTEMS
26 05 33.23 SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS
26 05 43 UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS
26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 09 23 LIGHTING CONTROL DEVICES

DIVISION 31 - EARTHWORK

31 10 00 SITE CLEARING
31 20 00 EARTH MOVING

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 13 13 CONCRETE PAVING
32 18 23.43 CONCRETE BASKETBALL & MULTI-PURPOSE COURT SURFACE COLOR COATING SYSTEM

32 18 23.53	CONCRETE TENNIS COURT SURFACE COLOR COATING SYSTEM
32 18 23.63	CONCRETE PICKLEBALL COURT SURFACE COLOR COATING SYSTEM
32 31 13	CHAIN LINK FENCES AND GATES
32 33 00	SITE FURNISHINGS

END OF TABLE OF CONTENTS

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected site elements.
2. Furnishing labor, materials and equipment necessary for demolition, dismantling, cutting and alterations as indicated, specified, or required for completion of the Work.

1.2 REFERENCES & RELATED SECTIONS

A. SSPWC - Standard Specifications for Public Works Construction, Latest Edition.

B. APWA - American Public Works Association.

1.3 REGULATORY REQUIREMENTS

A. Conform to Section 300, SSPWC, Latest Edition.

1.4 COORDINATION AND QUALITY ASSURANCE

A. Contractor shall secure and maintain all required permits and licenses and pay all fees necessary to legally complete the work of this section.

B. Contractor shall notify utility companies for all utilities to be cut off, modified, or relocated, and shall maintain and protect all active utilities.

C. Prior to commencement of Work, schedule a walkthrough with the City Authorized Representative, to confirm Owner property items have been removed from scheduled Work areas. Identify and mark remaining property items and schedule their removal.

D. Coordinate demolition for the correct sequence, limits, and methods. Schedule demolition Work to create the least possible inconvenience to the public and facility operations.

E. Contractor is required to take photo documentation of existing pavement condition at site entrance, adjacent lights (night), permanent structures, and other site conditions prior to start of work. Photos shall be submitted tothe City/Owner.

1.5 MATERIALS OWNERSHIP

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

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to the City/Owner that may be uncovered during demolition remain the property of the City/Owner

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.6 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1.7 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of selective demolition activities with starting and ending dates for each activity.

C. Predemolition photographs or video.

1.8 FIELD CONDITIONS

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

B. Notify Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Storage or sale of removed items or materials on-site is not permitted.

D. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

E. Maintain fire-protection facilities in service during selective demolition operations.

F. Arrange selective demolition schedule so as not to interfere with City/Owner’s operations.

G. Drawings may not indicate in detail all demolition Work to be performed. Examine existing conditions to determine the full extent of required demolition.

H. Repair damage to existing improvements or damage due to excessive demolition.

I. Provide all measures to avoid excessive damage from inadequate or improper means and methods, improper shoring, bracing or support.

J. If conditions are encountered that varies from those indicated, promptly notify the Engineer for clarification before proceeding.

1.9 WARRANTY

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

1.10 PROTECTION AND SAFETY

A. Contractor shall provide signs and construction fencing in all necessary locations to exclude persons, except those connected with the work, from entering the work area. Contractor is responsible for protecting the project site and adjacent properties from dirty water, mud, and water accumulation due to Contractor's operations, rainfall run-off or any water that enters the project site from any other source.

B. Contractor shall protect from any hazards resulting from his operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. All known underground utilities are noted on the plans and are approximate locations;

Contractor to pothole and locate all utilities prior to start of demolition.

B. Should the Contractor encounter existing underground utilities not shown on the drawings, he shall at once notify the City's Authorized Representative who will determine further procedure.

C. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

D. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. City's Authorized Representative will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of park site.

3.3 PROTECTION

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

1. Do not commence demolition until fencing, safety partitions, barricades, warning signs and other forms of protection are installed.
2. Provide all safeguards, including warning signs, lights and barricades, for protection of workers, occupants, and the public.
3. All existing palms, trees, curbs, paving, turf, etc. shall be protected in place as noted on the Drawings. Any damage to protected site features shall be repaired and/or replaced by the contractor at no additional cost to the Owner.
4. If applicable, See Section 02850, Tree Protection, for additional information.

B. Safety: If, at any time, safety of existing construction appears to be endangered, take immediate measures to correct such conditions; cease operations and immediately notify the Engineer.

C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION

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

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

C. Existing Items to Remain: Protect construction indicated to remain against damage during selective demolition.

D. Contractor shall notify the City's Authorized Representative prior to start of demolition to allow the Owner to identify items to be salvaged.

E. Clear the site to be improved of weed growth, rubbish and debris, and concrete/asphalt rubble, etc., that are to be removed for construction of the improvements shown on the Drawings. Roots 3” in diameter and larger, and rocks & broken masonry larger than 4” in the greatest dimension shall be removed to a minimum depth of 12” below finished grade, or as necessary to allow for improvements shown on plans.

F. All deleterious materials shall be disposed of off the site in a legal manner by the Contractor, who shall make all necessary arrangements and pay all related costs.

G. Do not throw or drop materials. Use ramps or chutes as required.

H. Remove existing construction only to extent necessary for proper installation of Work and interfacing with existing construction. Cut back finished surfaces to straight, plumb or level lines as required for a smooth transition.

I. Where openings are cut oversize or in improper locations, replace or repair to original condition.

J. Demolition and paving removal work shall be carefully done to avoid damage to existing facilities not designated for removal. Contractor shall repair and/or replace items demolished in excess of amounts indicated on the Drawings at their own expense.

3.5 CLEANING

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Clean existing materials to remain with appropriate tools and equipment.

1. Protect existing improvements during cleaning operations.
2. Debris shall be dampened by fog water spray prior to transporting by truck.
3. Debris pick-up area shall be kept broom-clean and shall be washed daily with clean water.
4. Remove waste and debris. Continuously clean up and remove items as demolition Work progresses.
5. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.6 DUST CONTROL

A. Dust shall be kept to a minimum during site clearing operations by means of wetting the site with water or other approved method. Application shall be made as often as necessary to keep dust from occurring.

B. Daily activity: After all clearing and grubbing operations are complete, sweep down all exiting sidewalks and roadways on and off the site that have become soiled due to Contractor's operations.

C. All concrete shall be power washed and final condition approved by City's Authorized Representative.

3.7 END OF SECTION

END OF SECTION 024119

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:

1. Section 031000 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
3. Section 033300 "Architectural Concrete" for general building applications of specially finished formed concrete.
4. Section 033543 "Polished Concrete Finishing" for concrete floors scheduled to receive a polished concrete finish.
5. Section 035300 "Concrete Topping" for concrete floor toppings.
6. Section 312000 "Earth Moving" for drainage fill under slabs-on-ground.
7. Section 321313 "Concrete Paving" for concrete pavement and walks.
8. Section 321316 "Decorative Concrete Paving" for decorative concrete pavement and walks.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement or blended hydraulic cement alone or in combination with one or more of the following:

1. Slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cementitious Materials (w/cm) Ratio: The ratio by weight of mixing water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for inspections and acceptance testing of concrete at Project site.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.
e. Special concrete finish Subcontractor.

2. Review the following:

    a. Special inspection and testing and inspecting agency procedures for field quality control.
    b. Construction joints, control joints, isolation joints, and joint-filler strips.
    c. Semirigid joint fillers.
    d. Vapor-retarder installation.
    e. Anchor rod and anchorage device installation tolerances.
    f. Cold- and hot-weather concreting procedures.
    g. Concrete finishes and finishing.
    h. Curing procedures.
    i. Forms and form-removal limitations.
    j. Shoring and reshoring procedures.
    k. Methods for achieving specified floor and slab flatness and levelness.
    l. Floor and slab flatness and levelness measurements.
    m. Concrete repair procedures.
    n. Concrete protection.
    o. Initial curing of standard-cured and field curing of field-cured test cylinders (ASTM C31/C31M.)
    p. Protection of field cured field test cylinders.
    q. Distribution of test reports.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Portland cement.
2. Blended hydraulic cement.
3. Performance-based hydraulic cement.
4. Slag cement.
5. Silica fume.
6. Natural or other pozzolans.
7. Aggregates.
8. Ground calcium carbonate and aggregate mineral fillers.
9. Admixtures:

    a. Include limitations of use. Admixtures that do not comply with reference ASTM International requirements must be submitted with test data for approval.

10. Color pigments.
11. Fiber reinforcement.
12. Vapor retarders.
13. Floor and slab treatments.
14. Liquid floor treatments.
15. Curing materials.

    a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment

manufacturer.

16. Joint fillers.
17. Repair materials.

B. Sustainable Design Submittals:

C. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Compressive strength at 28 days or other age as specified.
3. Compressive strength required at stages of construction.
4. Durability exposure classes for Exposure Categories F, S, W, and C.
5. Maximum w/cm ratio.
6. Calculated equilibrium and fresh density for lightweight concrete.
7. Slump or slump flow limit.
8. Air content.
9. Nominal maximum aggregate size.
10. Steel-fiber reinforcement content.
11. Synthetic microfiber content.
12. Synthetic macrofiber content.
13. Intended placement method.
14. Submit adjustments to design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant changes.

D. Shop Drawings:

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

    a. Location of construction joints is subject to approval of the Architect.

E. Concrete Schedule: For each location of each class of concrete indicated in "Concrete Mixture Class Types" Article, including the following:

1. Concrete class designation.
2. Location within Project.
3. Exposure class designation.
4. Formed surface finish designation and final finish.
5. Final finish for floors.
6. Floor treatment, if any.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Testing Agency: Include documentation indicating compliance with ASTM E329 or ASTM C1077 and copies of applicable ACI certificates for testing technicians or ACI Concrete Construction Special Inspector - MH, ASCC.

B. Material Certificates: For each of the following:

1. Cementitious materials.
2. Admixtures.
3. Fiber reinforcement.
4. Curing compounds.
5. Floor and slab treatments.
6. Bonding agents.
7. Adhesives.
8. Vapor retarders.
9. Semirigid joint filler.
10. Joint-filler strips.
11. Repair materials.

C. Material Test Reports: For the following:

1. Portland cement.
2. Blended hydraulic cement.
3. Performance-based hydraulic cement.
4. Slag cement.
5. Silica fume.
6. Natural or other pozzolans.
7. Aggregates.
8. Ground calcium carbonate and aggregate mineral filler.
9. Admixtures.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances in accordance with ACI 117 and in compliance with ASTM E1155.

E. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC's Acceptance Criteria AC380.

F. Preconstruction Test Reports: For each mix design.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified Installer who employs Project personnel qualified as an ACI-certified Concrete Flatwork Associate and Concrete Flatwork Finisher and a supervisor who is a certified ACI Advanced Concrete Flatwork Finisher/Technician or an ACI Concrete Flatwork Finisher with experience installing and finishing concrete.

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer's production facilities and delivery vehicles certified in accordance with NRMCA's certification requirements or equivalent approval by a State DOT.

C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing that performs duties on behalf of the Architect/Engineer.

1. Personnel performing laboratory tests to be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Level 1. Testing agency laboratory supervisor tests to be an ACI-certified Concrete Laboratory Testing Technician, Level 2.

D. Field Quality-Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests on plastic concrete properties are to be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with policies from ACI CPP 610.1 or an equivalent certification program.

E. Mockups: Cast concrete slab-on-ground and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship. Provide up to two batches of concrete to demonstrate the number of required mockups.

1. Slab-on-Ground: Build panel in the location indicated or, if not indicated, as directed by Architect.

a. Divide panel into four equal panels to demonstrate saw joint cutting.

2. Formed Surfaces: Build panel in the location indicated or, if not indicated, as directed by Architect.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 PRECONSTRUCTION TESTING

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

1. Include the following information in each test report:

a. Admixture dosage rates.
b. Slump.
c. Air content.
d. Seven-day compressive strength.

e. 28-day compressive strength.
f. Evaluation of permeability-reducing admixtures.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

1.9 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 as follows:

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When air temperature has fallen to, or is expected to fall below 40 deg F during the protection period, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE STANDARDS

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type V
2. Blended Hydraulic Cement: ASTM C595/C595M, Type IL, as shown on Drawings
3. Performance-Based Hydraulic Cement: ASTM C1157/C1157M: as shown on Drawings.
4. Pozzolans: ASTM C618, Class C, F, or N.
5. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
6. Ground Glass Pozzolan: ASTM C1866/C1866M, Type GS or GE.
7. Silica Fume: ASTM C1240.

C. Normal-Weight Aggregates:

1. Coarse Aggregate: ASTM C33/C33M, As shown on Drawings.
2. Maximum Coarse-Aggregate Size: As shown on Drawings nominal.
3. Fine Aggregate: ASTM C33/C33M.
4. Recycled Aggregate: Provide documentation of characteristics of recycled aggregate and mechanical properties and durability of proposed concrete, which incorporates recycled aggregate to conform to appliable requirements for the class of concrete.
5. Alkali-Silica Reaction: Comply with one of the following for each aggregate used:

    a. Expansion Result of Aggregate: Not more than 0.04 percent at one year when tested in accordance with ASTM C1293.
    b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567. Do not use this option with fly ash with an alkali content greater than 4.0 percent. Submit supporting data for each aggregate showing expansion in excess of 0.10 percent when tested in accordance with ASTM C1260.
    c. Alkali Content in Concrete: Not to exceed 4 lb./cu. yd. for aggregate with expansion greater than or equal to 0.04 percent and less than 0.12 percent or 3 lb./cu. yd. for aggregate with expansion greater than or equal to 0.12 percent and less than 0.24 percent. Test aggregate reactivity in accordance with ASTM C1293. Calculate alkali content of concrete in accordance with ACI 301. Do not use this option with natural pozzolan that has a calcium oxide content greater than 18 percent or an alkali content greater than 4.0 percent; or for an aggregate with expansion at one year greater than or equal to 0.24 percent when tested in accordance with ASTM C1293.

D. Lightweight Aggregate: ASTM C330/C330M, nominal maximum aggregate size as shown on Drawings.

1. Limit lightweight aggregate for internal curing to prewetted lightweight fine aggregate in accordance with ASTM C1761/C1761M.

E. Ground Calcium Carbonate or Aggregate Mineral Filler: ASTM C1797. Unless otherwise permitted, do not use mineral filler derived from carbonate sources in concrete for members assigned to Exposure Class S1, S2, or S3.

2.3 ADMIXTURES

A. Air-Entraining Admixture: ASTM C260/C260M.

B. Chemical Admixtures: Do not use calcium chloride or admixtures containing calcium chloride as shown on Drawings .

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Admixtures with special properties, with documentation of claimed performance enhancement, ASTM C494/C494M, Type S.

C. Mixing Water for Concrete Mixtures and Water Used to Make Ice: ASTM C1602/C1602M. Include documentation of compliance with limits for alkalis, sulfates, chlorides, or solids content of mixing water from Table 2 in ASTM C1602/C1602M.

2.4 FLOOR AND SLAB TREATMENTS

A. Emery Dry-Shake Floor Hardener: As shown on Drawings, factory-packaged, dry combination of portland cement, graded emery aggregate, and plasticizing admixture; with emery aggregate consisting of no less than 60 percent of total aggregate content.

1. Color: As shown on the Drawings..

B. Metallic Dry-Shake Floor Hardener: As shown on Drawings, factory-packaged, dry combination of portland cement, graded metallic aggregate, rust inhibitors, and plasticizing admixture; with metallic aggregate consisting of no less than 65 percent of total aggregate content.

1. Color: As shown on Drawings..

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:

a. Ambient Temperature Below 50 deg F (10 deg C): Black.
b. Ambient Temperature between 50 and 85 deg F (10 and 29 deg C): Any color.
c. Ambient Temperature Above 85 deg F (29 deg C): White.

C. Water: Potable water that does not cause staining of the surface.

2.6 ACCESSORIES

A. Expansion- and Isolation-Joint-Filler Strips: As shown on Drawings.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, as shown on Drawings, in accordance with ASTM D2240.

C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881/C881M, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

1. As shown on Drawings, for bonding hardened or freshly mixed concrete to hardened concrete.

2.7 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested in accordance with ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.

4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109/C109M.

2.8 CONCRETE MIXTURE MATERIALS

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, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland or hydraulic cement in concrete assigned to Exposure Class F3 as follows:

1. Pozzolans: 25 percent by mass.
2. Slag Cement: 50 percent by mass.
3. Silica Fume: 10 percent by mass.
4. Total of Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
5. Total of Pozzolans and Silica Fume: 35 percent by mass with pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
2. Use permeability-reducing admixture in concrete mixtures where indicated.

D. Color Pigment: Add color pigment to concrete mixture in accordance with manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.9 CONCRETE MIXTURE CLASS TYPES

A. Class A: Normal-weight concrete used for footings, grade beams, and tie beams.

1. Exposure Class: ACI 318 Class F0.
2. Minimum Compressive Strength: 3000 psi as shown on Drawings.
3. Maximum w/cm Ratio: 0.40.
4. Slump Limit: 4 inches, plus or minus 1 inch for concrete.
5. Slump Flow Limit: As shown on Drawings
6. Air Content:

    a. Exposure Class F1: As shown on Drawings.
    b. Exposure Classes F2 and F3: As shown on Drawings.

7. Limit water-soluble, chloride-ion content in hardened concrete to manufacturer’s

recommended percent by weight of cementitious materials.

8. Compressive strength or alternative methods of estimating in-place strength of concrete by maturity or other nondestructive testing with acceptable correlation between test results and concrete compressive strength as shown on Drawings,

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and furnish delivery ticket.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 TOLERANCES

A. Comply with ACI 117.

3.4 INSTALLATION OF EMBEDDED ITEMS

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.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install reglets to receive waterproofing and through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.5 INSTALLATION OF CAST-IN-PLACE CONCRETE

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

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Water addition in transit or at the Project site must be in accordance with ASTM C94/C94M and must not exceed the permitted amount indicated on the concrete delivery ticket.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.

    a. Do not use vibrators to transport concrete inside forms.
    b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.

d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.6 INSTALLATION OF JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
2. Place joints perpendicular to main reinforcement.

a. Continue reinforcement across construction joints unless otherwise indicated.

3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
8. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows and as indicated on Drawings:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.7 APPLICATION OF FINISHING FLOORS AND SLABS

A. Broom Finish: Apply a broom finish to exterior concrete landings, ramps, and locations indicated on Drawings.

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

B. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces in accordance with manufacturer's written instructions and as follows:

1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ftunless greater amount is recommended by manufacturer.
2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating.
3. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
4. After final floating, apply a trowel finish.
5. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.8 APPLICATION OF FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 (ACI 301M) Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.

    a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
    b. Remove projections larger than 1 inch.
    c. Tie holes do not require patching.
    d. Surface Tolerance: ACI 117, Class D.
    e. Apply to concrete surfaces for metal lap pan deck formed surfaces and those surfaces that are buried or covered with subsequent installed surfaces.

2. ACI 301 (ACI 301M) Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.

    a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
    b. Remove projections larger than 1/4 inch.
    c. Patch tie holes.
    d. Surface Tolerance: ACI 117, Class B.
    e. Locations: Apply to concrete surfaces exposed to public view,.

3. ACI 301 (ACI 301M) Surface Finish SF-3.0:

    a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
    b. Remove projections larger than 1/8 inch.
    c. Patch tie holes.
    d. Surface Tolerance: ACI 117 Class A.
    e. Locations: Apply to concrete surfaces exposed to public view,.

B. Rubbed Finish: Apply the following to as-cast surface finishes where indicated on Drawings:

1. Grout-Cleaned Rubbed Finish:

    a. Clean concrete surfaces after contiguous surfaces are completed and accessible.
    b. Do not clean concrete surfaces as Work progresses.
    c. Mix 1 part portland cement to 1-1/2 parts fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
    d. Wet concrete surfaces.
    e. 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.
    f. Maintain required patterns or variances as shown on Drawings or to match

design reference sample.

C. Abrasive-Blast Finish: Apply the following to as-cast surface finishes as indicated on Drawings:

1. Perform abrasive blasting after compressive strength of concrete exceeds 2000 psi.
2. Coordinate with formwork removal to ensure that surfaces to be abrasive blasted are treated at the same age.
3. Surface Continuity:

    a. Perform abrasive-blast finishing as continuous operation, maintaining continuity of finish on each surface or area of Work.
    b. Maintain required patterns or variances in depths of blast to match design reference sample.

4. Abrasive Blasting:

    a. Abrasive-blast corners and edges of patterns carefully, using backup boards to maintain uniform corner and edge lines.
    b. Determine type of nozzle pressure and blasting techniques required to match field sample.
    c. Depth of Cut: Use an abrasive grit of proper type and gradation to expose aggregate and surrounding matrix surfaces to match field sample, as follows:

        1) Brush Texture: Remove cement matrix to dull surface sheen and expose face of fine aggregate, with no significant reveal.
        2) Light Texture: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color, with maximum reveal of 1/16 inch.
        3) Medium Texture: Generally, expose coarse aggregate with slight reveal and with a maximum reveal of 1/4 inch.
        4) Heavy Texture: Expose and reveal coarse aggregate to a maximum projection of one-third its diameter, with reveal range of 1/4 to 1/2 inch.

    d. Maintain required patterns or variances in reveal projection to match design reference sample.

D. High-Pressure Water-Jet Finish: Apply the following to as-cast surface finishes as indicated on Drawings:

1. Perform high-pressure water jetting on concrete that has achieved a minimum compressive strength of 4500 psi.
2. Coordinate with formwork removal to ensure that surfaces to be high-pressure water-jet finished are treated at same age for uniform results.
3. Surface Continuity: Perform high-pressure water-jet finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work.
4. Maintain required patterns or variances in reveal projection to design reference

sample.

E. Bushhammer Finish: Apply the following to as-cast surface finishes as indicated on Drawings:

1. Perform bushhammer finish to concrete that has achieved a minimum compressive strength of 4500 psi.
2. Surface Continuity:

    a. Perform bushhammer finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work.

3. Surface Cut:

    a. Maintain required depth of cut and general aggregate exposure.
    b. Use power tool with hammer attachments for large, flat surfaces, and use hand hammers for small areas, at corners and edges, and for restricted locations where power tools cannot reach.

4. Remove impressions of formwork and form facings with exception of tie holes.
5. Maintain required patterns or variances of cut as shown on Drawings or to match design reference sample.
6. Maintain control of concrete chips, dust, and debris in each Work area, limiting migration of airborne materials and dust by use of tarpaulins, windbreaks, or similar devices.

3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling in:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to match color and texture with in-place construction exposed to view.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases As shown on Drawings. Unless otherwise indicated on Drawings and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: Unless otherwise noted on Drawing,3000 psi at

28 days.

4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.

    a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    b. Cast anchor-bolt insert into bases.
    c. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.

1. Cast-in inserts and accessories, as shown on Drawings.
2. Screed, tamp, and trowel finish concrete surfaces.

3.10 APPLICATION OF CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h, calculated in accordance with ACI 305R, before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period as follows:

    a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    b. Continuous Sprinkling: Maintain concrete surface continuously wet.
    c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
    d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
    e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's

written instructions.

1) Recoat areas subject to heavy rainfall within three hours after initial application.
2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing after finishing concrete.
2. Interior Concrete Floors:

a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but 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, and sealed by waterproof tape or adhesive.

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

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following not in cold weather:

a) Water.
b) Continuous water-fog spray.

b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but 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, and sealed by waterproof tape or adhesive.

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

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

   a) Water.
   b) Continuous water-fog spray.

c. Floors to Receive Polished Finish: Contractor has option of the following:

   1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

      a) Lap edges and ends of absorptive cover not less than 12 inches.
      b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

   2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

      a) Water.
      b) Continuous water-fog spray.

d. Floors To Receive Chemical Stain:

   1) As soon as concrete has sufficient set to permit application without marring concrete surface, install curing paper over entire area of floor.
   2) Install curing paper square to building lines, without wrinkles, and in a single length without end joints.
   3) Butt sides of curing paper tight; do not overlap sides of curing paper.
   4) Leave curing paper in place for duration of curing period, but not less than 28 days.

e. Floors To Receive Urethane Flooring:

   1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
   2) Rewet absorptive cover, and cover immediately with polyethylene

moisture-retaining cover with edges lapped 6 inches and sealed in place.

3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.
4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.

f. Floors To Receive Curing Compound:

1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Maintain continuity of coating, and repair damage during curing period.
4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

g. Floors To Receive Curing and Sealing Compound:

1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.11 INSTALLATION OF JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s).

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.12 INSTALLATION OF CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect.

2. Remove and replace concrete that cannot be repaired and patched to meet specification requirements.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks in excess of 0.01 inch spalls, air bubbles exceeding surface finish limits, honeycombs, rock pockets, fins and other projections on the surface exceeding surface finish limits, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.

    a. Limit cut depth to 3/4 inch.
    b. Make edges of cuts perpendicular to concrete surface.
    c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
    d. Fill and compact with patching mortar before bonding agent has dried.
    e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.

    a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
    b. Compact mortar in place and match surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance, as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

    a. Correct low and high areas.
    b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by adding patching mortar.

a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.

   a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
   b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.

   a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
   b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.

   a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
   b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
   c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
   d. Place, compact, and finish to blend with adjacent finished concrete.
   e. Cure in same manner as adjacent concrete.

8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.

   a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
   b. Dampen cleaned concrete surfaces and apply bonding agent.
   c. Place patching mortar before bonding agent has dried.
   d. Compact patching mortar and finish to match adjacent concrete.
   e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.13 FIELD QUALITY CONTROL

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

B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency to be responsible for providing curing facility for initial curing of strength test specimens on-site and verifying that test specimens are cured in accordance with standard curing requirements in ASTM C31/C31M.
2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency to report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

    a. Test reports to include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

        1) Project name.
        2) Name of testing agency.
        3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
        4) Name of concrete manufacturer.
        5) Date and time of inspection, sampling, and field testing.
        6) Date and time of concrete placement.
        7) Location in Work of concrete represented by samples.
        8) Date and time sample was obtained.
        9) Truck and batch ticket numbers.
        10) Design compressive strength at 28 days.
        11) Concrete mixture designation, proportions, and materials.
        12) Field test results of fresh concrete, including slump or slump flow, air content, temperature and density.
        13) Information on storage and curing of samples at the Project site, including curing method and maximum and minimum temperatures during initial curing period.
        14) Type of fracture and compressive break strengths at seven days and 28 days.

4. Provide a space and source of power or other resources for curing and access to test specimens by the testing agency.

C. Delivery Tickets: comply with ASTM C94/C94M.

D. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M to be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 150 cu. yd. or fraction thereof.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing is to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M:

    a. One test at point of delivery for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests as needed.

3. Slump Flow: ASTM C1611/C1611M:

    a. One test at point of delivery for each composite sample when strength test specimens are cast, but not less than one test for each day's pour of each concrete mixture.
    b. Perform additional tests as needed.

4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete; ASTM C173/C173M volumetric method, for structural lightweight concrete.

    a. One test for each composite sample when strength test specimens are cast, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C1064/C1064M:

    a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample when strength test specimens are cast.

6. Concrete Density: ASTM C138/C138M:

    a. One test for each composite sample when strength test specimens are cast.

7. Unit Weight: ASTM C138/C138M density of fresh structural lightweight concrete.

    a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture. The fresh density should be consistent with that associated with the equilibrium density within a tolerance of plus or minus 4 lb/ft.3.

8. Compression Test Specimens: ASTM C31/C31M:

a. Cast and standard cure two sets of two 6 inches by 12-inches or 4-inch by 8-inch cylindrical specimens for each composite sample.
b. Cast, and field cure two sets of two standard cylindrical specimens for each composite sample.

9. Compressive-Strength Tests: ASTM C39/C39M.

a. Test one set of two standard cured specimens at seven days and one set of two specimens at 28 other age days.
b. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.
c. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

10. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
11. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests of standard cured cylinders equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests:

a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.

1) Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.7.6.3.

14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 24 hours of completion of paving finishing and promptly report test results to Architect.

3.14 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using floor slab protective covering.

END OF SECTION 033000

SECTION 099623 - ANTI-GRAFFITI COATING

PART 1 - GENERAL

1.1 Anti-Graffiti Coating Summary:

A. Description: This section includes the application of graffiti resistant coatings to protect above grade, vertical masonry and concrete surfaces.

1. “Coatings” as used herein means all graffiti resistant coating system materials, including base coatings and top coatings required to achieve the performance requirements of this section.

a. Included:

1) Clear (transparent) graffiti resistant coating
2) Water repellant sealer

1.2 References:

A. ASTM D 2369-92 – Test method for volatile organic content of coatings.

B. ASTM D 3960-93 – Practice for volatile organic compound (VOC) content of paints and related coatings.

1.3 Submittals:

A. Product Data: In accordance with the provisions of submittal section, submit complete manufacturer’s literature and specifications, include complete lists of materials proposed for use, giving the manufacturers name, product numbers, and product information sheets for each specific item. Submit description for protection of surrounding areas and non-masonry surfaces, surface preparation, application, and final cleaning.

B. Maintenance Requirements: Submit manufacturer’s instructions for graffiti removal procedures.

C. Application and Safety: Submit manufacturer’s recommendation methods of installation including limitations, safety and environmental cautions, and material safety data sheets.

1.4 Quality Assurance

A. Applicator Qualifications:

1. Applicator must be trained by manufacturer on application of protective coating, safety practices, clean up, removal of graffiti and ongoing maintenance of coating.

    a. Outside applicator must be experienced applicator and have a history of successful applications within the past two years. Applicator must use skilled workers who are trained, experienced, and familiar with the specific requirements and methods of similar products.

B. Performance Requirements:

1. Graffiti resistant coating shall be a permanent coating. Products shall not require reapplication after removal for life of the warranty period provided that the manufacturer's specifications for removal have been followed throughout the life of the coating.
2. Product must be available to suit architectural aesthetics of substrate and must come in clear with a satin or gloss finish.
3. Coatings and removal products must have been in commercial use for a period of not less than five (5) years.

1.5 Environmental Regulations

A. Comply with the California Code of Regulations Title 24.

B. Comply with all applicable Federal, State, and local codes and regulations.

C. All products must not contain VOC (zero VOC), solvents or odors for the air quality management district where application takes place. Where those requirements conflict with this specification, comply with the more stringent provisions.

D. Reduction must be water.

E. Clean up with thinners and solvents. MEK, toluene, xylene will not be approved.

1.6 Test Panels

A. Before full-scale application, review the manufacturer's product data sheet and apply sealer and graffiti resistant coating to test panels to determine number of applications, coverage rates, mils thickness, compatibility, effectiveness, surface preparation, application procedures and desired results. Final specifications will be determined by this procedure.

B. Apply sealer and graffiti resistant coating to test panels in accordance with manufacturer's written instructions. Allow 48 hours or until test panels are thoroughly dry and tack free before evaluating final appearance and results. Do not begin full-scale application until test panels are reviewed and accepted by project official, architect, manufacturer, applicator and the construction manager.

C. Test Panel Requirements:

1. Size: minimum 4 feet each or as determined by project coordinator.
2. Locations: as determined by project coordinator.
3. Numbers: as required to completely test each sealer and graffiti resistant coating with each typical substrate to be protected.

    a. Test panel shall be tested in accordance with the performance of this section for the removal of all graffiti from the coating. Removal agent shall also be demonstrated to the satisfaction of the section.
    b. No evidence of ghosting, shadowing or staining shall remain after removal provided that all manufacturer's recommendations have been followed with regard to application of the coating and removal process.

D. Apply the system as specified in a designated area. This will serve an indication that the applicator can provide acceptable results and will be used as the standard for the rest of the work.

E. Retain and protect test panels approved by project manager in undisturbed condition during the work of this section, to be used as a standard for judging the graffiti resistance coating work.

1.7 Delivery, Storage, and Handling

A. Delivery: Deliver materials to site or specified address in manufacturer's original, unopened containers and packaging, bearing the manufacturer's label with the following information:

1. Name or title of material
2. Manufacturer's stock number and date of manufacturing (batch number)
3. Manufacturer's name
4. Contents by volume and weight
5. Application/instructions
6. Technical specifications
7. Color name number (if applicable)

B. Storage and Handling:

1. Store materials not in actual use, except those materials already catalyzed, in tightly covered containers. Maintain containers used in storage of paint in clean condition, free of foreign materials and residue.
2. Do not allow material to freeze. Protect from freezing where necessary, containers should be protected from prolonged exposure to hear or sunlight. Materials should be stored in an environment between 45 and 75 degrees Fahrenheit.
3. Keep storage area neat and orderly. Remove flammable rags and waste daily. Take all precautions to ensure that workman and work areas are adequately protected from the fire hazards and health hazards from handling, mixing, and application of paints.

1.8 Project Conditions

A. Apply Okon PLGR-5 CMU water repellant as base coat to provide water repellant surfaces, control pH and for overall aesthetics of surface. Follow manufacturer's directions for application.

B. Apply SCR 3 clear gloss top coat only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 90 degrees Fahrenheit. Allow first coat to dry before applying second coat. Do not apply wet on wet.

C. Do not apply topcoat when relative humidity exceeds 80%. Do not apply earlier than 24 hours after rain or if rain is predicted for a period of 12 hours after application, unless otherwise indicated by manufacturer's written instructions.

D. Do not apply to frozen substrates. Allow adequate time for substrate to thaw, if freezing conditions exist before application.

E. Do not apply under windy conditions such that graffiti control coating may be blown to surfaces not intended to be treated.

1.9 Maintenance Products

A. Extra Products: Furnish County Coordinator with the following extra products:

1. Graffiti Resistant Coating: 1 gallon
2. Graffiti Removal Agent: 1 gallon

1.10 Warranty

A. Warranty shall cover the original purchaser for a period of up to ten (10) years from the date of purchase.

B. Manufacturer shall warrant the removal of all graffiti defacement, chemical staining, ghosting, shadowing and normal environmental effects, without exception, and will retain reasonable gloss and color stability so long as product is applied and maintained according to manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 Manufacturers

A. Design is based on products manufactured by: Genesis Coating Incorporated in California (800) 533-4273

2.2 Graffiti Control Coatings

A. Graffiti control coating must be tested and approved by the Project Coordinator.

B. Graffiti control coating must have the capability of having all types of paints and graffiti materials (currently known to the public) completely removed without damaging both the coating and the substrate when removed according to manufacturer's written recommendations.

C. Removal agent shall be non-toxic and have a PH level between 7 and 8.5. After removal is complete, no evidence of graffiti shall be present when used in accordance with manufacturer's written recommendations.

D. The removal of graffiti materials shall not cause a change in appearance of the treated surface for the period of the warranty when removal is completed in compliance with manufacturer's written recommendations.

E. The graffiti control coating should follow the technical data as listed below:

1. Resin type of graffiti control coating should be aliphatic polyurethane.
2. Percent solids of mixed material should equal:

    a. Percent Solids by Weight: Clear 60%/Pigmented=66% (mixed)
    b. Percent Solids by Volume: Clear=58%/Pigmented=64% (mixed)

3. Specific gravity should equal 1.05.
4. Pot life of mixed material should be between 1.5 to 2 hours.
5. Full cure of applied material should be between 3 to 5 days depending on temperature and humidity.
6. Graffiti control coating should be a two-component coating system.
7. Graffiti control coating should be reducible with water.
8. Graffiti control coating should contain zero volatile organic compounds (VOC).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to the commencement of the Work of this Section, applicator must examine areas and conditions where graffiti control coating is to be applied. Applicator must notify Contractor in writing of conditions detrimental to proper and timely completion. Do not proceed with Work until unsatisfactory conditions have been corrected in a manner acceptable to the applicator.

B. Starting if coating Work will be construed as applicator's acceptance of the surfaces and conditions in any particular area.

C. Do not apply over dirt, rust, scale, grease, moisture, or conditions otherwise detrimental to formation of durable paint film as discussed in manufacturer's technical specifications.

3.2 Protection

A. Protect surrounding areas, landscaping, building occupants, pedestrians, vehicles, and non masonry surfaces not designated for protection during the Work from graffiti resistant coatings, masonry or concrete cleaners if used, residues, rinse water, fumes, wastes, and effluents in accordance with manufacturer's written specifications.

B. Cover finished work and materials of all other trades that may be affected by work of the Section during coating application. Protect all surrounding adjacent areas from overspray.

C. Divert and protect pedestrian and vehicle traffic.

3.3 Surface Preparation

A. General: Perform preparation and cleaning procedures in accordance with coating manufacturer's instruction and as herein specified for each particular substrate condition.

1. Clean surfaces to be painted before applying coating or surface treatments. Remove oil, grease, and other surface contaminants prior to mechanical cleaning. Program cleaning and painting so that contaminants from the cleaning process will not fall onto wet, newly surfaces.

B. Repair, patch, and fill all cracks, voids, defects, and damaged areas in surface as approved by Construction Manager. Allow repair materials to cure completely before application of graffiti resistant coatings.

C. Apply compatible sealant and caulking and allow to cure completely before application of graffiti resistance coating.

D. Seal all open joints

E. Apply new construction substrates to properly cure before graffiti control.

F. Properly clean the new substrates as specified in manufacturer's technical data.

3.4 Application of Graffiti Control Coating

A. General: Apply sealer and graffiti resistant coating in accordance with manufacturer's directions. Review material safety data sheets prior to use of material. Use application techniques best suited for substrate and type of material to be applied.

B. Applicator must know the substrate that is to be coated and understand the porosity, texture, and general conditions that will be present during the application to provide a correct bid and choose correct product acquisition.

C. Anti-graffiti coating must be reducible with clean, fresh water at a rate of 5%-20% depending on applications.

D. Do not mix two-component coating at any other rate than the ratio supplied by manufacturer.

E. Applicator must use caution when spraying materials. Applicator should wear OSHA approved respirator with organic vapor cartridge. Avoid over-spray and spillage. Mark all windows, move vehicles, cover air intakes, cover vegetation, and warn pedestrians prior to spraying. Applicator must make sure there is proper ventilation.

F. Do not apply in windy conditions.

G. Applicator shall do a test sample prior to application to confirm aesthetics, compatibility and coverage. Project Coordinator, architect and the construction manager must indicate acceptance of the test sample and sign off prior to full application.

H. Apply material between 50 degrees and 90 degrees Fahrenheit with a relative humidity not to exceed 80%.

3.5 Application Rates

A. Use Okon PLGR-5 CMU Water Repellant sealer to achieve a proper profile for a pinhole free, continuous coating. Allow sealer to cure based on product manufacturer’s direction.

B. Allow approximately 6-8 hours, or until tack free, dry time between each coat of GCR 3 Clear Top Coat. Full cure of material is approximately 3-5 days.

C. Temperature and humidity will affect and cure time of graffiti control coating.

D. Typically apply 2 mils dry (3-5 wet mil, do not exceed 7 wet mils) per coat to achieve optimal performance, however it is mandatory to determine the acceptable mils thickness for each specified job.

E. Mark time of application to establish pot life of material. Typical pot life is 1.5 to 2 hours depending on temperature and humidity. Exposure to direct sunlight, heat, or high humidity will decrease pot life of the material. Discard material after 2.5 hours.

F. Product should not be mixed with other products or containers of GCP 1000 Do not mix partial kits.

G. Follow manufacturer’s specified mixing instructions and dwell time charts. Never add water directly to activator or unanalyzed polyol.

H. Apply coating in a crosshatch pattern. One vertical pass and on horizontal pass are considered one coat.

I. Spray applications are recommended by manufacturer for optimal coverage and appearance. Material sets up quickly and pulls easily, use caution when backrolling.

J. Coverage rates are affected by porosity, texture, method of application and environmental conditions. Average coverage rates should be approximately 250 top

280 square feet per gallon per coat. Application will require two coats of material. Coverage rates for extremely porous surfaces will be substantially lower than normal rates. Applicator should establish coverage rates for job under these conditions. Do not use universal spec to determine coverage.

K. More material is not better. Over application will result in microblistering, poor adhesion, and blushing.

3.6 Graffiti Removal

A. Use manufacturer's recommended graffiti remover for the specific system.

B. Spray vandalized area, allow 1-3 minutes before aggravating with a soft bristle brush or sponge.

C. Wash graffiti off with damp towels or pressure washer (1500psi)

3.7 Cleaning, Touching Up and Refinishing

A. General: Clean equipment immediately with solvents. Do not allow catalyzed material to stay in hoses beyond pot life. Clean material on shin and hair immediately with industrial soap and water.

B. Carefully remove all splatters, spots, and blemishes caused by work of this Section.

C. Upon completion of the Work, remove all rubbish, cans, and accumulated materials resulting from the Work. All areas must be left in a clean and orderly condition.

D. Runs, sags, misses, holidays, stains and other defects ion the coated surface, including inadequate coverage and mil thickness, will be satisfactorily touched up or refinished.

3.8 Field Quality Control

A. Inspection: Inspect the graffiti resistant coating Work with the construction manager, applicator, Project Coordinator and manufacturer's representative, and compare with test panel results accepted by all of the above.

END OF SECTION 099623

SECTION 260010 - SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements generally applicable to all electrical Work on the Project, including but not limited to Work specified in Divisions 26, 27, and 28.

B. Related Requirements:

1. Section 018116 "Facility Environmental Requirements" specifies basis-of-design environmental conditions and performance criteria that are applicable to product selection and installation of the Work on the Project.
2. Section 018123 "Facility Seismic and Wind Criteria" specifies basis-of-design seismic and wind criteria for nonstructural components on the Project.

1.2 REFERENCES

A. Abbreviations and Acronyms for Electrical Terms and Units of Measure:

1. 8P8C: An 8-position 8-contact modular jack.
2. A: Ampere, unit of electrical current.
3. AC or ac: Alternating current.
4. AFCI: Arc-fault circuit interrupter.
5. AIC: Ampere interrupting capacity.
6. AL, Al, or ALUM: Aluminum.
7. ASD: Adjustable-speed drive.
8. ATS: Automatic transfer switch.
9. AWG: American wire gauge; see ASTM B258.
10. BAS: Building automation system.
11. BIL: Basic impulse insulation level.
12. BIM: Building information modeling.
13. BMS: Building management system.
14. CAD: Computer-aided design or drafting.
15. CATV: Community antenna television.
16. CB: Circuit breaker.
17. cd: Candela, the SI fundamental unit of luminous intensity.
18. CO/ALR: Copper-aluminum, revised.
19. COPS: Critical operations power system.
20. CU or Cu: Copper.
21. CU-AL or AL-CU: Copper-aluminum.
22. dB: Decibel, a unitless logarithmic ratio of two electrical, acoustical, or optical power values.
23. dB(A-weighted) or dB(A): Decibel acoustical sound pressure level with A-

weighting applied in accordance with IEC 61672-1.

24. dB(adjusted) or dBa: Decibel weighted absolute noise power with respect to 3.16 pW (minus 85 dBm).
25. dBm: Decibel absolute power with respect to 1 mW.
26. DC or dc: Direct current.
27. DCOA: Designated critical operations area.
28. DDC: Direct digital control (HVAC).
29. EGC: Equipment grounding conductor.
30. ELV: Extra-low voltage.
31. EMF: Electromotive force.
32. EMI: Electromagnetic interference.
33. EMP: Electrical maintenance program (operation and maintenance); electromagnetic pulse (transient analysis).
34. EPS: Emergency power supply.
35. EPSS: Emergency power supply system.
36. ESS: Energy storage system.
37. EV: Electric vehicle.
38. EVPE: Electric vehicle power export equipment.
39. EVSE: Electric vehicle supply equipment.
40. FACU: Fire-alarm control unit.
41. fc: Footcandle, an internationally recognized unit of illuminance equal to one lumen per square foot or 10.76 lx. The simplified conversion 1 fc = 10 lx in the Specifications is common practice and considered adequate precision for building construction activities. When there are conflicts, lux is the primary unit; footcandle is specified for convenience.
42. FLC: Full-load current.
43. ft: Foot.
44. ft-cd: Foot-candle, the antiquated U.S. standard unit of illuminance, equal to one international candle measured at a distance of one foot, that was superseded in 1948 by the unit "footcandle" when the SI unit candela (cd) replaced the international candle; see "fc."
45. FTP: File transfer protocol.
46. GEC: Grounding electrode conductor.
47. GFCI: Ground-fault circuit interrupter.
48. GFPE: Ground-fault protection of equipment.
49. GND: Ground.
50. HACR: Heating, air conditioning, and refrigeration.
51. HDPE: High-density polyethylene.
52. HID: High-intensity discharge.
53. HP or hp: Horsepower.
54. HVAC: Heating, ventilating, and air conditioning.
55. Hz: Hertz.
56. IBT: Intersystem bonding termination.
57. ICT: Information and communications technology.
58. inch: Inch. To avoid confusion, the abbreviation "in." is not used.
59. I/O: Input/output.
60. IP: Ingress protection rating (enclosures); Internet protocol (communications).
61. IR: Infrared.
62. IS: Intrinsically safe.
63. IT&R: Inspecting, testing, and repair.

64. ITE: Information technology equipment.
65. kAIC: Kiloampere interrupting capacity.
66. kcmil or MCM: One thousand circular mils.
67. kV: Kilovolt.
68. kVA: Kilovolt-ampere.
69. kvar: Kilovolt-ampere reactive.
70. kW: Kilowatt.
71. kWh: Kilowatt-hour.
72. LAN: Local area network.
73. lb: Pound (weight).
74. lbf: Pound (force).
75. LCD: Liquid-crystal display.
76. LCDI: Leakage-current detector-interrupter.
77. LED: Light-emitting diode.
78. Li-ion: Lithium-ion.
79. lm: Lumen, the SI-derived unit of luminous flux.
80. LNG: Liquefied natural gas.
81. LP-Gas: Liquefied petroleum gas.
82. LRC: Locked-rotor current.
83. LV: Low voltage.
84. lx: Lux, the SI-derived unit of illuminance equal to one lumen per square meter.
85. m: Meter.
86. MCC: Motor-control center.
87. MDC: Modular data center.
88. MG set: Motor-generator set.
89. MIDI: Musical instrument digital interface.
90. MLO: Main lugs only.
91. MPEG-2: Abbreviation for the ISO/IEC Moving Picture Experts Group's standard for generic coding of moving pictures and associated audio information (ISO/IEC 13818) released in 1995 and used for most over-the-air and satellite broadcast digital television.
92. MPEG-4: Abbreviation for the ISO/IEC Moving Picture Experts Group's standard framework for coding of audio-visual objects (ISO/IEC 14496) released in 1999, with digital rights management and more advanced compression algorithms than MPEG-2.
93. MOV: Metal-oxide varistor.
94. MV: Medium voltage.
95. MVA: Megavolt-ampere.
96. mW: Milliwatt.
97. MW: Megawatt.
98. MWh: Megawatt-hour.
99. N.C.: Normally closed.
100. Ni-Cd: Nickel-cadmium.
101. Ni-MH: Nickel-metal hydride.
102. NIU: Network interface unit.
103. N.O.: Normally open.
104. NPT: National (American) standard pipe taper.
105. OCPD: Overcurrent protective device.
106. ONT: Optical network terminal.
107. PC: Personal computer.

108. PCS: Power conversion system.
109. PCU: Power-conditioning unit.
110. PF or pf: Power factor.
111. PHEV: Plug-in hybrid electric vehicle.
112. PLC: Programmable logic controller.
113. PLFA: Power-limited fire alarm.
114. PoE: Power over Ethernet.
115. POTS: Plain old telephone service. See "public switched telephone network" definition.
116. PSTN: Public switched telephone network.
117. PV: Photovoltaic.
118. PVC: Polyvinyl chloride.
119. pW: Picowatt.
120. RFI: (electrical) Radio-frequency interference; (contract) Request for interpretation.
121. RMS or rms: Root-mean-square.
122. RPM or rpm: Revolutions per minute.
123. SCADA: Supervisory control and data acquisition.
124. SCCR: Short-circuit current rating.
125. SCR: Silicon-controlled rectifier.
126. SPD: Surge protective device.
127. sq.: Square.
128. SWD: Switching duty.
129. TCP/IP: Transmission Control Protocol/Internet Protocol.
130. TEFC: Totally enclosed fan-cooled.
131. TR: Tamper resistant.
132. TVSS: Transient voltage surge suppressor.
133. UL: (standards) UL Standards & Engagement Inc.; (product categories) UL, LLC.
134. UL CCN: UL Category Control Number.
135. UPS: Uninterruptible power supply.
136. USB: Universal serial bus.
137. UV: Ultraviolet.
138. V: Volt, unit of electromotive force.
139. V(ac): Volt, alternating current.
140. V(dc): Volt, direct current.
141. VA: Volt-ampere, unit of complex electrical power.
142. VAR: Volt-ampere reactive, unit of reactive electrical power.
143. VFC: Variable-frequency controller.
144. VOM: Volt-ohm-multimeter.
145. VoIP: Voice over Internet Protocol.
146. VPN: Virtual private network.
147. VRLA: Valve regulated lead acid; also called "sealed lead acid (SLA)" or "valve regulated sealed lead acid."
148. W: Watt, unit of real electrical power.
149. WAN: Wide area network.
150. Wh: Watt-hour, unit of electrical energy usage.
151. WPT: Wireless power transfer.
152. WPTE: Wireless power transfer equipment.
153. WR: Weather resistant.

B. Abbreviations and Acronyms for Electrical Raceway Types:

1. EMT: Electrical metallic tubing.
2. EMT-A: Aluminum electrical metallic tubing.
3. EMT-S: Steel electrical metallic tubing.
4. EMT-SS: Stainless steel electrical metallic tubing.
5. ENT: Electrical nonmetallic tubing.
6. EPEC: Electrical HDPE underground conduit (thin wall).
7. EPEC-A: Type A electrical HDPE underground conduit.
8. EPEC-B: Type B electrical HDPE underground conduit.
9. ERMC: Electrical rigid metal conduit.
10. ERMC-A: Aluminum electrical rigid metal conduit.
11. ERMC-S: Steel electrical rigid metal conduit.
12. ERMC-S-G: Galvanized-steel electrical rigid metal conduit.
13. ERMC-S-PVC: PVC-coated-steel electrical rigid metal conduit.
14. ERMC-SS: Stainless steel electrical rigid metal conduit.
15. FMC: Flexible metal conduit.
16. FMC-A: Aluminum flexible metal conduit.
17. FMC-S: Steel flexible metal conduit.
18. FMT: Steel flexible metallic tubing.
19. FNMC: Flexible nonmetallic conduit. See "LFNC."
20. HDPE: HDPE underground conduit (thick wall).
21. HDPE-40: Schedule 40 HDPE underground conduit.
22. HDPE-80: Schedule 80 HDPE underground conduit.
23. IMC: Steel electrical intermediate metal conduit.
24. LFMC: Liquidtight flexible metal conduit.
25. LFMC-A: Aluminum liquidtight flexible metal conduit.
26. LFMC-S: Steel liquidtight flexible metal conduit.
27. LFMC-SS: Stainless steel liquidtight flexible metal conduit.
28. LFNC: Liquidtight flexible nonmetallic conduit.
29. LFNC-A: Layered (Type A) liquidtight flexible nonmetallic conduit.
30. LFNC-B: Integral (Type B) liquidtight flexible nonmetallic conduit.
31. LFNC-C: Corrugated (Type C) liquidtight flexible nonmetallic conduit.
32. PVC: Rigid PVC conduit.
33. PVC-40: Schedule 40 rigid PVC conduit.
34. PVC-80: Schedule 80 rigid PVC Conduit.
35. PVC-A: Type A rigid PVC concrete-encased conduit.
36. PVC-EB: Type EB rigid PVC concrete-encased underground conduit.
37. RGS: See ERMC-S-G.
38. RMC: See ERMC.
39. RTRC: Reinforced thermosetting resin conduit.
40. RTRC-AG: Low-halogen, aboveground reinforced thermosetting resin conduit.
41. RTRC-AG-HW: Heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
42. RTRC-AG-SW: Standard wall, low-halogen, aboveground reinforced thermosetting resin conduit.
43. RTRC-AG-XW: Extra heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
44. RTRC-BG: Low-halogen, belowground reinforced thermosetting resin conduit.

C. Abbreviations and Acronyms for Electrical Single-Conductor and Multiple-Conductor Cable Types:

1. AC: Armored cable.
2. CATV: Coaxial general-purpose cable.
3. CATVP: Coaxial plenum cable.
4. CATVR: Coaxial riser cable.
5. CI: Circuit integrity cable.
6. CL2: Class 2 cable.
7. CL2P: Class 2 plenum cable.
8. CL2R: Class 2 riser cable.
9. CL2X: Class 2 cable, limited use.
10. CL3: Class 3 cable.
11. CL3P: Class 3 plenum cable.
12. CL3R: Class 3 riser cable.
13. CL3X: Class 3 cable, limited use.
14. CM: Communications general-purpose cable.
15. CMG: Communications general-purpose cable.
16. CMP: Communications plenum cable.
17. CMR: Communications riser cable.
18. CMUC: Under-carpet communications wire and cable.
19. CMX: Communications cable, limited use.
20. DG: Distributed generation cable.
21. FC: Flat cable.
22. FCC: Flat conductor cable.
23. FPL: Power-limited fire-alarm cable.
24. FPLP: Power-limited fire-alarm plenum cable.
25. FPLR: Power-limited fire-alarm riser cable.
26. IGS: Integrated gas spacer cable.
27. ITC: Instrumentation tray cable.
28. ITC-ER: Instrumentation tray cable, exposed run.
29. MC: Metal-clad cable.
30. MC-HL: Metal-clad cable, hazardous location.
31. MI: Mineral-insulated, metal-sheathed cable.
32. MTW: (machine tool wiring) Moisture-, heat-, and oil-resistant thermoplastic cable.
33. MV: Medium-voltage cable.
34. NM: Nonmetallic sheathed cable.
35. NMC: Nonmetallic sheathed cable with corrosion-resistant nonmetallic jacket.
36. NMS: Nonmetallic sheathed cable with signaling, data, and communications conductors, plus power or control conductors.
37. NPLF: Non-power-limited fire-alarm circuit cable.
38. NPLFP: Non-power-limited fire-alarm circuit cable for environmental air spaces.
39. NPLFR: Non-power-limited fire-alarm circuit riser cable.
40. NUCC: Nonmetallic underground HDPE conduit with conductors.
41. OFC: Conductive optical fiber general-purpose cable.
42. OFCG: Conductive optical fiber general-purpose cable.
43. OFCP: Conductive optical fiber plenum cable.
44. OFCR: Conductive optical fiber riser cable.
45. OFN: Nonconductive optical fiber general-purpose cable.

46. OFNG: Nonconductive optical fiber general-purpose cable.
47. OFNP: Nonconductive optical fiber plenum cable.
48. OFNR: Nonconductive optical fiber riser cable.
49. P: Marine shipboard cable.
50. PLTC: Power-limited tray cable.
51. PLTC-ER: Power-limited tray cable, exposed run.
52. PV: Photovoltaic cable.
53. RHH: (high heat) Thermoset rubber, heat-resistant cable.
54. RHW: Thermoset rubber, moisture-resistant cable.
55. SA: Silicone rubber cable.
56. SE: Service-entrance cable.
57. SER: Service-entrance cable, round.
58. SEU: Service-entrance cable, flat.
59. SIS: Thermoset cable for switchboard and switchgear wiring.
60. TBS: Thermoplastic cable with outer braid.
61. TC: Tray cable.
62. TC-ER: Tray cable, exposed run.
63. TC-ER-HL: Tray cable, exposed run, hazardous location.
64. THW: Thermoplastic, heat- and moisture-resistant cable.
65. THHN: Thermoplastic, heat-resistant cable with nylon jacket outer sheath.
66. THHW: Thermoplastic, heat- and moisture-resistant cable.
67. THWN: Thermoplastic, moisture- and heat-resistant cable with nylon jacket outer sheath.
68. TW: Thermoplastic, moisture-resistant cable.
69. UF: Underground feeder and branch-circuit cable.
70. USE: Underground service-entrance cable.
71. XHH: Cross-linked polyethylene, heat-resistant cable.
72. XHHW: Cross-linked polyethylene, heat- and moisture-resistant cable.

D. Abbreviations and Acronyms for Electrical Flexible Cord Types:

1. SEO: 600 V extra-hard-usage, hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp locations.
2. SEOW: 600 V extra-hard-usage, hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp or wet locations.
3. SEOO: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp locations.
4. SEOOW: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp or wet locations.
5. SJEO: 300 V hard-usage, junior hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp locations.
6. SJEOW: 300 V hard-usage, junior hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp or wet locations.
7. SJEOO: 300 V hard-usage, junior hard-service cord with oil-resistant

thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp locations.

8. SJEOOW: 300 V hard-usage, junior hard-service cord with oil-resistant thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp or wet locations.
9. SJO: 300 V hard-usage, junior hard-service cord with thermoset insulation and oil-resistant thermoset outer cover for damp locations.
10. SJOW: 300 V hard-usage, junior hard-service cord with thermoset insulation and oil-resistant thermoset outer cover for damp or wet locations.
11. SJOO: 300 V hard-usage, junior hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer cover for damp locations.
12. SJOOW: 300 V hard-usage, junior hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer cover for damp or wet locations.
13. SJTO: 300 V hard-usage, junior hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer cover for damp locations.
14. SJTOW: 300 V hard-usage, junior hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer cover for damp or wet locations.
15. SJTOO: 300 V hard-usage, junior hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer cover for damp locations.
16. SJTOOW: 300 V hard-usage, junior hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer cover for damp or wet locations.
17. SO: 600 V extra-hard-usage, hard-service cord with thermoset insulation and oil-resistant thermoset outer covering for damp locations.
18. SOW: 600 V extra-hard-usage, hard-service cord with thermoset insulation and oil-resistant thermoset outer covering for damp or wet locations.
19. SOO: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer covering for damp locations.
20. SOOW: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer covering for damp or wet locations.
21. STO: 600 V extra-hard-usage, hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer covering for damp locations.
22. STOW: 600 V extra-hard-usage, hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer covering for damp or wet locations.
23. STOO: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer covering for damp locations.
24. STOOW: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer covering for damp or wet locations.

E. Definitions:

1. 8-Position 8-Contact (8P8C) Modular Jack: An unkeyed jack with up to eight contacts commonly used to terminate twisted pair and multiconductor Ethernet cable. Also called a "TIA-1096 miniature 8-position series jack" (8PSJ), or an "IEC 8877 8-pole jack."

    a. Be careful when suppliers use "RJ45" generically. Obsolete RJ45 jacks used for analog telephone cables have rejection keys. 8P8C jacks used for

digital telephone cables and Ethernet cables do not have rejection keys.

2. Basic Impulse Insulation Level (BIL): Reference insulation level expressed in impulse crest voltage with a standard wave not longer than 1.5 times 50 microseconds and 1.5 times 40 microseconds.
3. Cable: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "cable" is (1) a conductor with insulation, or a stranded conductor with or without insulation (single-conductor cable); or (2) a combination of conductors insulated from one another (multiple-conductor cable).
4. Communications Jack: A fixed connecting device designed for insertion of a communications cable plug.
5. Communications Outlet: One or more communications jacks, or cables and plugs, mounted in a box or ring, with a suitable protective cover.
6. Conductor: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "conductor" is (1) a wire or combination of wires not insulated from one another, suitable for carrying an electric current; (2) (National Electrical Safety Code) a material, usually in the form of wire, cable, or bar, suitable for carrying an electric current; or (3) (general) a substance or body that allows a current of electricity to pass continuously along it.
7. Conduit: A structure containing one or more duct raceways.
8. Designated Seismic System: An architectural, electrical, or mechanical system and its components for which the component importance factor is greater than 1.0 when determined in accordance with Section 018123 "Facility Seismic and Wind Criteria."
9. Direct Buried: Installed underground without encasement in concrete or other protective material.
10. Duct Bank: An arrangement of conduit providing one or more continuous duct raceways between two points.
11. Duct Raceway: A single enclosed raceway for conductors or cable.
12. Electrical Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.
13. Enclosure: The case or housing of an apparatus, or the fence or wall(s) surrounding an installation, to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. Types of enclosures and enclosure covers include the following:

    a. Cabinet: An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.
    b. Concrete Box: A box intended for use in poured concrete.
    c. Conduit Body: A means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
    d. Conduit Box: A box having threaded openings or knockouts for conduit, EMT, or fittings.
    e. Cover Plate: A cover designed for protecting wiring devices installed in flush-mounted device boxes while permitting their safe operation; also

called a faceplate or wallplate.

f. Cutout Box: An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure.
g. Device Box: A box with provisions for mounting a wiring device directly to the box.
h. Extension Ring: A ring intended to extend the sides of an outlet box or device box to increase the box depth, volume, or both.
i. Floor Box: A box mounted in the floor intended for use with a floor box cover and other components to complete the floor box enclosure.
j. Floor-Mounted Enclosure: A floor box and floor box cover assembly with means to mount in the floor that is sealed against the entrance of scrub water at the floor level.
k. Floor Nozzle: An enclosure used on a wiring system, intended primarily as a housing for a receptacle, provided with a means, such as a collar, for surface-mounting on a floor, which may or may not include a stem to support it above the floor level, and is sealed against the entrance of scrub water at the floor level.
l. Junction Box: A box with a blank cover that joins different runs of raceway or cable and provides space for connection and branching of the enclosed conductors.
m. Outlet Box: A box that provides access to a wiring system having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for the entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting an outlet box cover, but without provisions for mounting a wiring device directly to the box.
n. Pedestal Floor Box Cover: A floor box cover that, when installed as intended, provides a means for typically vertical or near-vertical mounting of receptacle outlets above the floor's finished surface.
o. Pull Box: A box with a blank cover that joins different runs of raceway and provides access for pulling or replacing the enclosed cables or conductors.
p. Raised-Floor Box: A floor box intended for use in raised floors.
q. Recessed Access Floor Box: A floor box with provisions for mounting wiring devices below the floor surface.
r. Recessed Access Floor Box Cover: A floor box cover with provisions for passage of cords to recessed wiring devices mounted within a recessed floor box.
s. Ring: A sleeve, which is not necessarily round, used for positioning a recessed wiring device flush with the plaster, concrete, drywall, or other wall surface.
t. Ring Cover: A box cover, with raised center portion to accommodate a specific wall or ceiling thickness, for mounting wiring devices or luminaires flush with the surface.
u. Termination Box: An enclosure designed for installation of termination base assemblies consisting of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors, or both.

14. Emergency Systems: Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency

having jurisdiction that are designed to ensure continuity of lighting, electrical power, or both, to designated areas and equipment in the event of failure of the normal supply for safety to human life.

15. Essential Electrical Systems: (healthcare facilities) Those systems designed to ensure continuity of electrical power to designated areas and functions of a healthcare facility during disruption of normal power sources, and also to minimize disruption within the internal wiring system.
16. Fault Limited: Providing or being served by a source of electrical power that is limited to not more than 100 W when tested in accordance with UL 62368-1.

    a. The term "fault limited" is intended to encompass most Class 1, 2, and 3 power-limited sources complying with Article 725 of NFPA 70; Class ES1 and ES2 electrical energy sources that are Class PS1 electrical power sources (e.g., USB); and Class ES3 electrical energy sources that are Class PS1 and PS2 electrical power sources (e.g., PoE). See UL 62368-1 for discussion of classes of electrical energy sources and classes of electrical power sources.

17. High-Performance Building: A building that integrates and optimizes on a life-cycle basis all major high-performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.
18. Jacket: A continuous nonmetallic outer covering for conductors or cables.
19. Luminaire: A complete lighting unit consisting of a light source such as a lamp, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light.
20. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the Energy Independence and Security Act (EISA) of 2007.
21. Multi-Outlet Assembly: A type of surface, flush, or freestanding raceway designed to hold conductors, receptacles, and switches, assembled in the field or at the factory.
22. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein. Also called "single-line diagram."
23. Plenum: A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.
24. Protective Device: A device that senses when an abnormal current flow, abnormal voltage potential, or other abnormal electrical waveform exists and then disconnects the affected portion of the circuit from the system. Common protective devices include fuses, circuit breakers, relays, ground-fault circuit interrupters, and arc-fault circuit interrupters.
25. Public Switched Telephone Network (PSTN): Analog telephone technology that uses twisted pair cables from a telephone-provider central office for the transmission medium. "PSTN" refers to the telephone network; "POTS" refers to the individual subscriber line.
26. Receptacle: A fixed connecting device arranged for insertion of a power cord plug. Also called a power jack.
27. Receptacle Outlet: One or more receptacles mounted in a box with a suitable protective cover.

28. Sheath: A continuous metallic covering for conductors or cables.
29. UL Category Control Number (CCN): An alphabetic or alphanumeric code used to identify product categories covered by UL's Listing, Classification, and Recognition Services.
30. Voice over Internet Protocol (VoIP): Digital telephone packet technology that uses the internet for its transmission medium.
31. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:

    a. Control Voltage: Having electromotive force between any two conductors, or between a single conductor and ground, that is supplied from a battery or other Class 2 or Class 3 power-limited source.
    b. Line Voltage: (1) (controls) Designed to operate using the supplied low-voltage power without transformation. (2) (transmission lines, transformers, SPDs) The line-to-line voltage of the supplying power system.
    c. Extra-Low Voltage (ELV): Not having electromotive force between any two conductors, or between a single conductor and ground, exceeding 30 V(ac rms), 42 V(ac peak), or 60 V(dc).
    d. Low Voltage (LV): Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 30 V but not exceeding 1000 V.
    e. Medium Voltage (MV): Having electromotive force between any two conductors, or between a single conductor and ground, that is rated about 1 kV but not exceeding 69 kV.
    f. High Voltage: (1) (circuits) Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 69 kV but not exceeding 230 kV. (2) (safety) Having sufficient electromotive force to inflict bodily harm or injury.

32. Wire: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "wire" is a slender rod or filament of drawn metal. A group of small wires used as a single wire is properly called a "stranded wire." A wire or stranded wire covered with insulation is properly called an "insulated wire" or a "single-conductor cable." Nevertheless, when the context indicates that the wire is insulated, the term "wire" will be understood to include the insulation.

1.3 COORDINATION

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions:

1. Notify [**Architect**][**Construction Manager**][**Owner**][**Tenant**] no fewer than [**seven**]<**Insert number**> days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without [**Architect's**][**Construction Manager's**][**Owner's**][**Tenant's**] written permission.
3. Coordinate interruption with systems impacted by outage including, but not limited to, the following:

a. Exercising generators.
b. Emergency lighting.
c. Elevators.
d. Fire-alarm systems.

4. Arrange to provide temporary emergency and standby electrical [**service**][**or**][**power**] so facility may remain occupied during the outage in accordance with requirements specified in Section 015000 "Temporary Facilities and Controls." Coordinate power requirements with Owner.

B. Interruption of Existing Telephone Service: Do not interrupt telephone service to facilities occupied by Owner or others unless permitted under the following conditions:

1. Notify [**Architect**][**Construction Manager**][**Owner**][**Tenant**] no fewer than [**seven**]<**Insert number**> days in advance of proposed interruption of telephone service.
2. Do not proceed with interruption of telephone service without [**Architect's**][**Construction Manager's**][**Owner's**][**Tenant's**] written permission.

C. Interruption of Existing Internet Service: Do not interrupt internet service to facilities occupied by Owner or others unless permitted under the following conditions:

1. Notify [**Architect**][**Construction Manager**][**Owner**][**Tenant**] no fewer than [**seven**]<**Insert number**> days in advance of proposed interruption of internet service.
2. Do not proceed with interruption of internet service without [**Architect's**][**Construction Manager's**][**Owner's**][**Tenant's**] written permission.

D. Interruption of Existing Security System: Do not interrupt security system to facilities occupied by Owner or others unless permitted under the following conditions:

1. Notify [**Architect**][**Construction Manager**][**Owner**][**Tenant**] no fewer than [**seven**]<**Insert number**> days in advance of proposed interruption of security system.
2. Do not proceed with interruption of security system without [**Architect's**][**Construction Manager's**][**Owner's**][**Tenant's**] written permission.

E. Interruption of Existing Fire-Alarm System: Do not interrupt fire-alarm system to facilities occupied by Owner or others unless permitted under the following conditions:

1. Notify [**Architect**][**Construction Manager**][**Owner**][**Tenant**] no fewer than [**seven**]<**Insert number**> days in advance of proposed interruption of fire-alarm system.
2. Do not proceed with interruption of fire-alarm system without [**Architect's**][**Construction Manager's**][**Owner's**][**Tenant's**] written permission.

1.4 PREINSTALLATION MEETINGS

A. Electrical Preconstruction Conference: Schedule conference with Architect and Owner, not later than [**10**]<**Insert number**> days after Notice to Proceed. Agenda topics

include, but are not limited to, the following:

1. Electrical installation schedule.
2. Status of power system studies.
3. Value analysis proposals and requests for substitution of electrical equipment.
4. Utility work coordination and class of service requests.
5. Commissioning activities.
6. Sustainability activities[**, including Measurement and Verification Plan**].

B. Communications Preconstruction Conference: Schedule conference with Architect and Owner not later than [**10**]<**Insert number**> days after Notice to Proceed. Agenda topics include, but are not limited to, the following:

1. Installation schedule for communications systems.
2. Value analysis proposals and requests for substitution of communications equipment.
3. Utility services work coordination and monitoring service requests.
4. Commissioning activities.
5. Sustainability activities.

C. Electronic Safety and Security Preconstruction Conference: Schedule conference with Architect and Owner not later than [**10**]<**Insert number**> days after Notice to Proceed. Agenda topics include, but are not limited to, the following:

1. Installation schedule for security, fire-alarm, and other life-safety systems.
2. Value analysis proposals and requests for substitution of electronic safety and security equipment.
3. Monitoring services work coordination and monitoring service requests.
4. Commissioning activities.
5. Sustainability activities.

1.5 SEQUENCING

A. Conduct and submit results of power system studies before submitting product data and Shop Drawings for electrical equipment.

1.6 SCHEDULING

A. <**Insert requirements for unusual scheduling coordination**>.

1.7 ACTION SUBMITTALS

A. Coordination Drawings for Structural Supports: Show coordination of structural supports for equipment and devices, including restraints and bracing for control of seismic and wind loads, with other systems, equipment, and structural supports in the vicinity.

B. Coordination Drawings for Ceiling Areas: Where indicated on drawings, provide

reflected ceiling plan(s), supplemented by sections and other details, drawn to scale, in accordance with Section 013100 "Project Management and Coordination," 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 and suspension systems will be attached.
3. Size and location of access panels on ceilings.
4. Elevation, size, and route of sprinkler piping.
5. Elevation, size, and route of plumbing piping.
6. Elevation, size, and route of ductwork.
7. Elevation, size, and route of cable tray.
8. Elevation, size, and route of conduit.
9. Elevation and size of wall-mounted and ceiling-mounted equipment.
10. Access panels.
11. Sprinklers.
12. Air inlets and outlets.
13. Control modules.
14. Luminaires.
15. Communications devices.
16. Speakers.
17. Security devices.
18. Fire-alarm devices.
19. Indicate clear dimensions for maintenance access in front of equipment.
20. Indicate dimensions of fully open access doors.

C. Coordination Drawings for Cable Tray Routing: Reflected ceiling plan(s), supplemented by sections and other details, drawn to scale, in accordance with Section 013100 "Project Management and Coordination," on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Elevation, size, and route of cable trays.
2. Relationships between components and adjacent structural, electrical, and mechanical elements.
3. Vertical and horizontal offsets and transitions.
4. Elevation and size of sleeves for wall, ceiling, and floor cable penetrations.
5. Elevation of ceilings and size of ceiling tiles.
6. Locations of access panels on ceilings.
7. Locations where cable tray crosses or parallels sprinkler piping.
8. Locations where cable tray crosses plumbing piping.
9. Locations where cable tray crosses or parallels ductwork.
10. Locations of access panels on ductwork.
11. Locations where cable tray crosses conduit.
12. Items blocking access around cable trays, including the following:

    a. Light fixtures.
    b. Speakers.
    c. Fire-alarm devices.
    d. Power outlets.

e. Wall-mounted equipment.
f. Equipment racks.
g. Furniture.
h. Door swings.
i. Building features.

13. Indicate clear dimension between cable tray and walls or obstructions that are closer than 10 ft.
14. Highlight locations where cable tray is greater than 3 ft above ceilings. Explain how personnel access will be accommodated for cable tray maintenance.

D. Coordination Drawings for Conduit Routing: 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.

E. Coordination Drawings for Bus Assembly Routing: Floor plans and sections, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Scaled bus-assembly layouts and relationships between components and adjacent structural, mechanical, and electrical elements.
2. Vertical and horizontal enclosed bus-assembly runs, offsets, and transitions.
3. Clearances for access above and to the side of enclosed bus assemblies.
4. Vertical elevation of enclosed bus assemblies above the floor or bottom of structure.
5. Support locations, type of support, and weight on each support.
6. Location of adjacent construction elements, including luminaires, HVAC and plumbing equipment, fire sprinklers and piping, signal and control devices, and other equipment.

F. Coordination Drawings for Large Equipment Indoor Installations:

1. Location plan, drawn to scale, showing heavy equipment or truck access paths to loading dock or other freight access into building. Indicate available width and height of doors or openings.
2. Floor plan for entry floor and floor where equipment is located, drawn to scale, showing heavy equipment access paths for maintenance and replacement, with the following items shown and coordinated with each other, based on input from installers of the items involved:

a. Dimensioned concrete bases, outlines of equipment, conduit entries, and grounding equipment locations.
b. If freight elevator must be used, indicate width and height of door and depth of car. Indicate if large equipment must be tipped to use elevator.
c. Dimensioned working clearances and dedicated areas below and around electrical equipment where obstructions and tripping hazards are

prohibited.

3. Reflected ceiling plans for entry floor and floor where equipment is located, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

    a. Support locations, type of support, and weight on each support. Locate structural supports for structure-supported raceways[**, busways,**][**and seismic bracing**].
    b. Location of lighting fixtures, sprinkler piping and sprinklers, ducts and diffusers, and other obstructions, indicating available overhead clearance.
    c. Dimensioned working clearances and dedicated areas above and around electrical equipment where foreign systems and equipment are prohibited.

G. Coordination Drawings for Large Equipment Outdoor Installations:

1. Utilities site plan, drawn to scale, showing heavy equipment or truck access paths for maintenance and replacement, with the following items shown and coordinated with each other, based on input from installers of the items involved:

    a. Fences and walls, dimensioned concrete bases, outlines of equipment, conduit entries, and grounding and bonding locations.
    b. Indicate clear dimensions for fence gates and wall openings.
    c. Indicate depth and type of ground cover, and locations of trees, shrubbery, and other obstructions in access path.
    d. Indicate clear height below tree branches, overhead lines, bridges, and other overhead obstructions in access path, or where cranes and hoists will be needed to handle large electrical equipment.
    e. Support locations, type of support, and weight on each support. Locate structural supports for structure-supported raceways[**, busways,**][**and seismic bracing**].
    f. Dimensioned working clearances and dedicated areas around electrical equipment.

H. Coordination Drawings for Duct Banks:

1. Show duct profiles and coordination with other utilities and underground structures.
2. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.

I. Sustainable Design Submittals:

1.8 INFORMATIONAL SUBMITTALS

A. Electrical Installation Schedule: At preconstruction meeting, and periodically thereafter as dates change, provide schedule for electrical installation Work to Owner and Architect including, but not limited to, milestone dates for the following activities:

1. Submission of power system studies.

2. Submission of specified coordination drawings.
3. Submission of action submittals specified in Division 26.
4. Orders placed for major electrical equipment.
5. Arrival of major electrical equipment on-site.
6. Preinstallation meetings specified in Division 26.
7. Utility service outages.
8. Utility service inspection and activation.
9. Mockup reviews.
10. Closing of walls and ceilings containing electrical Work.
11. System startup, testing, and commissioning activities for major electrical equipment.
12. System startup, testing, and commissioning activities for emergency lighting.
13. System startup, testing, and commissioning activities for automation systems (SCADA, BMS, lighting, HVAC, fire alarm, fire pump, etc.).
14. Pouring of concrete housekeeping pads for electrical equipment and testing of concrete samples.
15. Requests for special inspections.
16. Requests for inspections by authorities having jurisdiction.

B. Installation Schedule for Communications Systems: At preconstruction meeting, and periodically thereafter as dates change, provide schedule for installation of the communications Work to Owner and Architect including, but not limited to, milestone dates for the following activities:

1. Submission of specified coordination drawings.
2. Submission of action submittals specified in Division 27.
3. Orders placed for major equipment.
4. Arrival of major equipment on-site.
5. Preinstallation meetings specified in Division 27.
6. Telephone and internet service outages.
7. Telephone and internet service inspection and activation.
8. Mockup reviews.
9. Closing of walls and ceilings containing the communications Work.
10. System startup, testing, and commissioning activities for communications equipment.
11. System startup, testing, and commissioning activities for the Work specified in other divisions that depends on the Work specified in Division 27.
12. System startup, testing, and commissioning activities for automation systems (SCADA, BMS, lighting, HVAC, fire alarm, fire pump, etc.).
13. Requests for special inspections.
14. Requests for inspections by authorities having jurisdiction.

C. Installation Schedule for Security, Fire-Alarm, and Other Life-Safety Systems: At preconstruction meeting, and periodically thereafter as dates change, provide schedule for installation of security, fire-alarm, and the other life-safety Work to Owner and Architect including, but not limited to, milestone dates for the following activities:

1. Submission of specified coordination drawings.
2. Submission of action submittals specified in Division 28.
3. Orders placed for major equipment.

4. Arrival of major equipment on-site.
5. Preinstallation meetings specified in Division 28.
6. Security and fire-alarm system outages.
7. Security and fire-alarm system inspection and activation.
8. Mockup reviews.
9. Closing of walls and ceilings containing the security and fire-alarm Work.
10. System startup, testing, and commissioning activities for security and fire-alarm equipment.
11. System startup, testing, and commissioning activities for fire-alarm interfaces with the Work specified in other divisions.
12. System startup, testing, and commissioning activities for automation systems (SCADA, BMS, lighting, HVAC, fire alarm, fire pump, etc.).
13. Requests for special inspections.
14. Requests for inspections by authorities having jurisdiction.

D. Welding certificates.

E. Seismic Performance Certificates: Provide special certification for designated seismic systems as required to meet requirements specified in Section 018123 "Facility Seismic and Wind Criteria" for all designated seismic systems identified on the Drawings or in the Specifications.

1. Include the following information:

a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
b. 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. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.
e. Equipment manufacturer's written certification for each designated active electrical seismic device and system, stating that it will remain operable following the basis-of-design seismic criteria specified in Section 018123 "Facility Seismic and Wind Criteria."
f. Equipment manufacturer's written certification that components with hazardous contents maintain containment following the basis-of-design seismic criteria specified in Section 018123 "Facility Seismic and Wind Criteria."
g. Evidence demonstrating compliance with these requirements for approval to authorities having jurisdiction after review and acceptance by qualified structural professional engineer.

F. Wind Performance Certificates: Provide special certification for systems and components designated on the Drawings or in the Specifications to be subject to high wind exposure and impact damage.

1. Include the following information:

a. Provide equipment manufacturer's written certification for each designated system and component, stating that it will remain in place and operable following the design wind event and comply with requirements of authorities having jurisdiction.
b. Certification must be based on ICC-ES or similar nationally recognized testing standard procedures acceptable to authorities having jurisdiction.

G. Qualification Statements:

1. For qualified regional manufacturer.
2. For structural professional engineer.
3. For electrical professional engineer.
4. For lighting professional engineer.
5. For EPM specialist.
6. For welder.
7. For ERMC-S-PVC raceway Installer.
8. For medium-voltage cable Installer.
9. For medium-voltage duct Installer.
10. For medium-voltage equipment Installer.
11. For electrical power monitoring Installer.
12. For switchboard Installer.
13. For EVSE Installer.
14. For generator set Installer.
15. For lightning protection system Installer.
16. For theatrical lighting Installer.
17. For exterior athletic lighting Installer.
18. For power quality specialist.
19. For [**medium-voltage and**]low-voltage electrical testing agency and on-site electrical testing supervisor.
20. For power-limited electrical testing agency and on-site power-limited testing supervisor.
21. For structural testing and inspecting agency.
22. For outdoor pole testing and inspecting agency.
23. For luminaire photometric testing laboratory.
24. For lighting testing and inspecting agency.
25. For communications design professional.
26. For communications cable Installer.
27. For communications testing agency and on-site communications testing supervisor.
28. For security design professional.
29. For life-safety professional engineer.
30. For fire-alarm cable Installer.
31. For security testing agency and on-site security testing supervisor.
32. For fire-alarm testing agency and on-site fire-alarm testing supervisor.

1.9 CLOSEOUT SUBMITTALS

A. Facility EMP Binders:

1. Complete Set: On [**approved online or cloud solution**][**and**][**USB media that is clearly and permanently labeled with attached placard on lanyard to prevent misplacement**].
2. Volumes 2 and 8: Reproducible hardcopy on archival quality, 28 lb, acid-free, bond paper.

B. Operation and Maintenance Data:

1. Provide emergency operation, normal operation, and preventive maintenance manuals for each system, equipment, and device listed below:

    a. <**Insert system, equipment, or device**>.

2. Include the following information:

    a. Manufacturer's operating specifications.
    b. User's guides for software and hardware.
    c. Schedule of maintenance material items recommended to be stored at the Project site.
    d. Detailed instructions covering operation under both normal and abnormal conditions.
    e. Time-current curves for overcurrent protective devices and manufacturer's written instructions for testing and adjusting their settings.
    f. List of load-current and overload-relay heaters with related motor nameplate data.
    g. List of lamp types and photoelectric relays used on the Project, with ANSI and manufacturers' codes.
    h. Manufacturer's instructions for setting field-adjustable components.
    i. Manufacturer's instructions for testing, adjusting, and reprogramming microprocessor controls.
    j. EPSS: Manufacturer's system checklists, maintenance schedule, and maintenance log sheets in accordance with NFPA 110.
    k. Exterior pole inspection and repair procedures.

C. Software and Firmware Operational Documentation: Provide software and firmware operational documentation[**in Facility EPM Binders**], including the following:

1. Software operating and upgrade manuals.
2. Names, versions, and website addresses for locations of installed software.
3. Device address list.
4. Printout of software application and graphic screens.
5. Testing and adjusting of panic and emergency power features.
6. For lighting controls, include the following:

    a. Adjustments of scene preset controls, adjustable fade rates, and fade overrides.
    b. Operation of adjustable zone controls.

D. Software:

1. Program Software Backup: Provide [**username and password for approved online**

or cloud solution][**and**][**USB media that is clearly and permanently labeled with attached placard on lanyard to prevent misplacement**].

2. Provide to Owner upgrades and unrestricted licenses[**for Government use**] for installed and backup software, including operating systems and programming tools required for operation and maintenance.

1.10 MOCKUPS

A. Simple Mockups for Coordinating Accessibility of Electrical Devices around Fixed Furnishings and Equipment:

1. Build simple mockups using art supplies and other inexpensive materials for verification of general arrangement, actual dimensions, and accessibility of <**Insert identification of room and fabrication**> by [**Architect**][**Owner**][**Tenant**]<**Insert approving stakeholders**> prior to fabrication and installation of Work. Depict products from all Divisions requiring coordination, including, but not limited to, fixed furnishings, casework, outlet covers and plates, HVAC controls, exposed raceway, exposed plumbing, equipment, and signage.

B. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.

PART 2 - PRODUCTS

2.1 SUBSTITUTION LIMITATIONS FOR ELECTRICAL EQUIPMENT

A. Substitution requests for electrical equipment will be entertained under the following conditions:

1. Substitution requests may be submitted for consideration prior to the Electrical Preconstruction Conference if accompanied by value analysis data indicating that substitution will comply with the Project performance requirements while significantly increasing value for Owner throughout life of facility.
2. Substitution requests may be submitted for consideration concurrently with submission of power system study reports when those reports indicate that substitution is necessary for safety of maintenance personnel and facility occupants.
3. Contractor is responsible for sequencing and scheduling power system studies and electrical equipment procurement. After the Electrical Preconstruction Conference, insufficient lead time for electrical equipment delivery will not be considered a valid reason for substitution.

2.2 SUBSTITUTION LIMITATIONS FOR COMMUNICATIONS EQUIPMENT

A. Substitution requests for communications equipment will be entertained under the following conditions:

1. Substitution requests may be submitted for consideration prior to the Communications Preconstruction Conference if accompanied by value analysis data indicating that substitution will comply with the Project performance requirements while significantly increasing value for Owner throughout life of facility.
2. Contractor is responsible for sequencing and scheduling equipment procurement. After the Communications Preconstruction Conference, insufficient lead time for equipment delivery will not be considered a valid reason for substitution.

2.3 SUBSTITUTION LIMITATIONS FOR ELECTRONIC SAFETY AND SECURITY EQUIPMENT

A. Substitution requests for electronic safety and security equipment will be entertained under the following conditions:

1. Substitution requests may be submitted for consideration prior to the Electronic Safety and Security Preconstruction Conference if accompanied by value analysis data indicating that substitution will comply with the Project performance requirements while significantly increasing value for Owner throughout life of facility.
2. Contractor is responsible for sequencing and scheduling equipment procurement. After the Electronic Safety and Security Preconstruction Conference, insufficient lead time for equipment delivery will not be considered a valid reason for substitution.

2.4 FACILITY ELECTRICAL MAINTENANCE PROGRAM (EMP) BINDERS

A. Description: Set of binders containing operation and maintenance data for facility's electrical equipment that was compiled during analysis of installed electrical Work for Facility EMP development.

B. Applicable Standards:

1. Regulatory Requirements: Comply with requirements in NFPA 70B.
2. General Characteristics:

a. Volume 1 - Introduction:

1) Summarize how Facility EMP analysis was performed, how data were collected, and how volumes are organized.
2) Describe Facility EMP and provide recommended policies and procedures for implementing the program and keeping it current.
3) Provide place for Owner to identify contact information for employees responsible for implementing and maintaining Facility EMP.

b. Volume 2 - Facility Safety, Hazards Awareness, and Emergency Procedures:

1) Include training requirements for employees and contractors.
2) Include list of known facility hazards impacting IT&R activities.
3) Include approval and permitting procedures for IT&R activities.
4) Include incident emergency response procedures.
5) Include emergency shutdown procedures.
6) Include electrical disaster recovery procedures.
7) Include procedures for investigating the following incidents:

    a) Electrical safety incidents.
    b) Equipment malfunctions.
    c) Unintended operations or alarms.
    d) Operation of protective devices.

c. Volume 3 - Operating Procedures for Electrical Equipment and Controls:

    1) <**Insert requirements**>.

d. Volume 4 - Facility Diagrams and Schedules:

    1) Include single-line diagrams.
    2) Include grounding and bonding diagrams.
    3) Include essential wiring diagrams.
    4) Include system automation diagrams (SCADA, BMS, lighting, HVAC, etc.).
    5) Include records of switchgear, switchboard, and panelboard schedules.
    6) Include time-current curves for overcurrent protective devices.
    7) Include list of load-current and overload-relay heaters with related motor nameplate data.

e. Volume 5 - Inventory of Facility Equipment Using Electrical Power:

    1) Include simplified floor plans showing equipment locations.
    2) Identify critical equipment (electrical or otherwise).
    3) Include identifying designations and nameplate data.
    4) Include warranty and maintenance contract information.

f. Volume 6 - Inventory of Facility Tools, Supplies, and Personnel Protective Equipment:

    1) Include schedules of maintenance material items recommended to be stored at facility.
    2) Include list of lamp types and photoelectric relays used in facility with ANSI and manufacturers' codes.
    3) Include calibration and servicing data for each item.

g. Volume 7 - Inspection, Testing, and Repair (IT&R) Plan:

    1) Include tables showing frequency of activities for each item.
    2) Include annual schedule with activities mapped to specific days of the year.

3) Include exterior pole inspection and repair procedures.

h. Volume 8 - Inspection, Testing, and Repair (IT&R) Forms:

1) <**Insert requirements**>.

i. Volume 9 - Inspection, Testing, and Repair (IT&R) Procedures:

1) <**Insert requirements**>.

j. Volume 10 - Spare Parts List:

1) Include list of all parts required to perform IT&R procedures.
2) Identify quantities of which parts are recommended to be stored on-site.
3) Include source contact information and budget cost for each item.

k. Volume 11 - Construction Project Closeout Record Documentation:

1) Include records of power system studies and photometric studies.
2) Include records of risk assessment studies.
3) Include records of electrical system startup and commissioning activities.
4) Include records of baseline inspections and tests.
5) Include records of baseline infrared photographs with normal light photographs showing the location, direction, angle, and conditions necessary for reproducing each infrared photograph.
6) Include records of baseline settings for adjustable equipment and devices.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. <**Insert Project requirements**>.

B. Preinstallation Testing:

1. <**Insert Project requirements**>.

C. Evaluation and Assessment:

1. <**Insert Project requirements**>.

3.2 PREPARATION

A. Protection of In-Place Conditions:

1. <**Insert Project requirements**>.

3.3 DEVELOPMENT OF FACILITY ELECTRICAL MAINTENANCE PROGRAM (EMP)

A. Facility EMP must be developed by qualified EMP specialist.

B. Conduct Facility EMP analysis in accordance with NFPA 70B requirements.

1. Renovation Projects:

a. Facility diagrams must include connected existing equipment for entire facility where known. Areas of uncertainty should be clearly indicated.
b. Obtain copies of existing operation and maintenance data and existing Facility EMP information from Owner.
c. Facility EMP analysis should identify existing equipment that does not have available operation and maintenance data, and should explain Owner's risks because this equipment is not included in Facility EMP.
d. Data for existing equipment outside scope of the Project may be inserted in Facility EMP Binders without analysis.
e. Data for existing equipment impacted by scope of the Project should be analyzed and documented similar to the Project's new equipment data as much as possible.

C. Compile operation and maintenance data from Facility EMP analysis and submit [**updated**]Facility EMP Binders.

3.4 INSTALLATION OF ELECTRICAL WORK

A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' written instructions, comply with NFPA 70 and NECA NEIS 1 for installation of electrical Work on the Project. Consult Architect for resolution of conflicting requirements.

3.5 CLEANING

A. Electrical or Electronic Waste Management:

1. <**Insert requirements for special handling or diversion of electrical and electronics waste for recycling or disposal**>.

3.6 CLOSEOUT ACTIVITIES

A. Training:

1. [**With assistance from factory-authorized service representatives, train**][**Train**] Owner's maintenance personnel on the following topics:

    a. How to implement [**updated**]Facility EMP.
    b. <**Insert system or equipment**>.

2. [**Provide video recordings of training sessions to Owner.**][**Allow Owner to record training sessions.**]

END OF SECTION 260010

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:

1. Section 018116 "Facility Environmental Requirements" specifies basis-of-design environmental conditions and performance criteria that are applicable to product selection and installation of the Work on the Project.
2. Section 018123 "Facility Seismic and Wind Criteria" specifies basis-of-design seismic and wind criteria for nonstructural components on the Project.
3. Section 260010 "Supplemental Requirements for Electrical" specifies additional requirements applicable to coordinating, scheduling, and sequencing of the Work specified in this Section.
4. Section 260513 "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 601 to 35 000 V.
5. Section 260523 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2, and 3 control cables.
6. Section 271313 "Communications Copper Backbone Cabling" for twisted pair cabling used for data circuits.
7. Section 271513 "Communications Copper Horizontal Cabling" for twisted pair cabling used for data circuits.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

C. Product Schedule: Indicate type, use, location, and termination locations.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 NONMETALLIC UNDERGROUND CONDUIT WITH CONDUCTORS, TYPE NUCC

A. Description: A factory assembly of conductors or cables inside a nonmetallic, smooth wall raceway with a circular cross section.

B. Applicable Standards:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics:

a. Reference Standards: UL 1990.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders:

1. Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
2. Copper for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Conductors must be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits:

1. Copper:

a. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
b. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

C. ASD Output Circuits Cable: Extra-flexible stranded for all sizes.

D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

E. PV Circuits: [**Copper**][**Aluminum**]. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: [**Type THHN/THWN-2, single conductors in raceway**][**Type XHHW-2, single conductors in raceway**][**Type USE, single conductor in raceway**][**Mineral-insulated, metal-sheathed cable, Type MI**][**Multiconductor cable, Type SE**].

B. Exposed Feeders: [**Type THHN/THWN-2, single conductors in raceway**][**Type XHHW-2, single conductors in raceway**][**Armored cable, Type AC**][**Metal-clad cable, Type MC**][**Mineral-insulated, metal-sheathed cable, Type MI**][**Nonmetallic-sheathed cable, Type NM**].

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: [**Type THHN/THWN-2, single conductors in raceway**][**Armored cable, Type AC**][**Metal-clad cable, Type MC**][**Mineral-insulated, metal-sheathed cable, Type MI**][**Nonmetallic-**

sheathed cable, Type NM].

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: [**Type THHN/THWN-2, single conductors in raceway**][**Type XHHW-2, single conductors in raceway**][**Underground feeder cable, Type UF**].

E. Feeders Installed below Raised Flooring: [**Type THHN/THWN-2, single conductors in raceway**][**Armored cable, Type AC**][**Metal-clad cable, Type MC**][**Mineral-insulated, metal-sheathed cable, Type MI**].

F. Feeders in Cable Tray: [**Type THHN/THWN-2, single conductors in raceway**][**Type XHHW-2, single conductors larger than No. 1/0 AWG**][**Armored cable, Type AC**][**Metal-clad cable, Type MC**][**Mineral-insulated, metal-sheathed cable, Type MI**][**Nonmetallic-sheathed cable, Type NM**].

G. Exposed Branch Circuits, Including in Crawlspaces: [**Type THHN/THWN-2, single conductors in raceway**][**Armored cable, Type AC**][**Metal-clad cable, Type MC**][**Mineral-insulated, metal-sheathed cable, Type MI**][**Nonmetallic-sheathed cable, Type NM**].

H. Branch Circuits Concealed in Ceilings, Walls, and Partitions: [**Type THHN/THWN-2, single conductors in raceway**][**Armored cable, Type AC**][**Metal-clad cable, Type MC**][**Mineral-insulated, metal-sheathed cable, Type MI**][**Nonmetallic-sheathed cable, Type NM**].

I. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: [**Type THHN/THWN-2, single conductors in raceway**][**Type XHHW-2, single conductors in raceway**][**Underground branch-circuit cable, Type UF**].

J. Branch Circuits Installed below Raised Flooring: [**Type THHN/THWN-2, single conductors in raceway**][**Armored cable, Type AC**][**Metal-clad cable, Type MC**][**Mineral-insulated, metal-sheathed cable, Type MI**].

K. Branch Circuits in Cable Tray: [**Type THHN/THWN-2, single conductors in raceway**][**Type XHHW-2, single conductors larger than No. 1/0 AWG**][**Armored cable, Type AC**][**Metal-clad cable, Type MC**][**Mineral-insulated, metal-sheathed cable, Type MI**][**Nonmetallic-sheathed cable, Type NM**].

L. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless steel, wire-mesh, strain relief device at terminations to suit application.

M. ASD Output Circuits: [**Type XHHW-2 in metal conduit**][**Type TC-ER cable with braided shield**][**Type TC-ER cable with dual tape shield**].

N. PV Circuits, Type USE-2: For PV source circuits rated at 600 V or less.

O. PV Circuits, Type PV: For PV source circuits rated at [**600**][**1000**][**2000**] V.

3.3 INSTALLATION, GENERAL

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points in accordance with Section 260533.13 "Conduits 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."

G. Complete cable tray systems installation according to Section 260536 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

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**].

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least [**6 inch**][**12 inch**] of slack.

D. Comply with requirements in Section 284600 "Fire Detection and Alarm" for connecting, terminating, and identifying wires and cables.

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. 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. After installing conductors and cables and before electrical circuitry has been energized, test [**service entrance and feeder conductors**][**and**][**conductors**] feeding the following critical equipment and services for compliance with requirements:

    a. <**Insert, in separate subparagraphs, critical equipment and services to be tested**>.

3. 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.

4. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

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

5. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.

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 SUMMARY

A. Related Requirements:

1. Section 018116 "Facility Environmental Requirements" specifies basis-of-design environmental conditions and performance criteria that are applicable to product selection and installation of the Work on the Project.
2. Section 018123 "Facility Seismic and Wind Criteria" specifies basis-of-design seismic and wind criteria for nonstructural components on the Project.
3. Section 260010 "Supplemental Requirements for Electrical" specifies additional requirements applicable to coordinating, scheduling, and sequencing of the Work specified in this Section.
4. Section 264113 "Lightning Protection for Structures" specifies bonding of lightning protection grounding electrodes to facility grounding electrodes.
5. Section 260553 "Identification for Electrical Systems" specifies electrical equipment labels and warning signs installed by this Section.
6. Section 270528 "Pathways for Communications Systems"[**and Section 271100 "Communications Equipment Room Fittings"**] specifies additional requirements for identification and grounding and bonding of communications equipment, raceways, boxes, and cable trays.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Product Listing: Include copy of unexpired approval letter, on letterhead of qualified electrical testing agency, certifying product's compliance with specified listing criteria.

    a. If listed manufacturer differs from selling manufacturer, indicate relationship between entities on submittal. Clearly indicate which entity warrants product performance and fitness for purpose.
    b. Listing criteria identified in approval letter must match specified listing criteria. UL label indicating approval of equipment's enclosure is not considered approval of equipment for intended application.
    c. Product identification in approval letter must match product branding and model numbers in submittal. Approval letters for discontinued or superseded products are unacceptable for submitted product.

B. Shop Drawings: Prepare and submit the following:

1. Plans showing dimensioned locations of grounding features described in "Field Quality Control for Grounding and Bonding" Article, including the following:

a. Grounding electrode access enclosures.
b. Grounding electrodes.
c. Grounding arrangements and connections for separately derived systems.
d. <**Insert items**>.

C. Sustainable Design Submittals:

1. Product data for sustainable design features for each type of product.

D. Field quality-control reports.

1.3 INFORMATIONAL SUBMITTALS

A. Manufacturer's published instructions.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. In addition to items specified in Section 260010 "Supplemental Requirements for Electrical," include the following:

a. Plans showing locations of grounding features described in "Field Quality Control for Grounding and Bonding" Article, including the following:

1) Grounding electrode access enclosures.
2) Grounding electrodes.
3) Grounding arrangements and connections for separately derived systems.
4) <**Insert items**>.

b. Instructions for periodic testing and inspection of grounding features at [**test wells**][**ring electrodes**][**grounding connections for separately derived systems**]<**Insert locations**> based on [**NETA MTS**][**NFPA 70B**]<**Insert reference**>.

1) Tests must determine if ground-resistance or impedance values remain within specified maximums, and instructions must recommend corrective action if values do not.
2) Include recommended testing intervals.

1.5 QUALIFICATIONS

A. Electrical Power Testing (EPT) Technician III: Possessing active NICET EPT Level III certification. Able to manage switching procedures, conduct tests of complex equipment, analyze test and equipment data, plan a job, and lead a team. Has experience performing NFPA 70B, IEEE, and NETA electrical tests.

B. Electrical Power Testing (EPT) Technician IV: Possessing active NICET EPT Level IV certification. Able to conduct tests of complex metering and relay systems, evaluate tests, test equipment, test results, and power system performance, recommend actions to maintain or improve system performance, and lead multi-team projects.

C. Electrical Power Testing and Inspecting Agency: Entities possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site electrical testing supervisors must possess active NICET EPT Technician [**III**][**IV**] certification.

1.6 SERVICE CONDITIONS FOR ELECTRICAL EQUIPMENT

A. Soil Resistivity: Grounding (earthing) Work on the Project must account for soil resistivity conditions specified in Section 018116 "Facility Environmental Requirements."

B. Electrical and ICT Equipment Grounding (Earthing): Do not exceed [**25 Ω**][**10 Ω**]<**Insert resistance value**> resistance to ground (earth).

1. Contact Architect for resolution if 25 Ω specified resistance to ground (earth) is not attained after complying with prescriptive requirements in Article 250 of NFPA 70.
2. Contact Architect for resolution if [**10 Ω**]<**Insert resistance value**> specified resistance to ground (earth) is not attained after second attempt to increase effectiveness of grounding (earthing) electrode.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Products or components listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

B. <**Insert additional performance requirements for the Project**>.

2.2 GROUNDING AND BONDING CONDUCTORS

A. Equipment Grounding Conductor:

1. Standard Features: 600 V, [**THHN/THWN-2**][**or**][**THWN-2**], [**copper**][**or**][**tinned-copper**] wire or cable, green color, in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Isolated Equipment Grounding Conductor:

1. Standard Features: 600 V, [**THHN/THWN-2**][**or**][**THWN-2**], [**copper**][**or**][**tinned-copper**] wire or cable, green color with one or more yellow stripes, in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

2.3 GROUNDING AND BONDING CLAMPS

A. Description: Clamps suitable for attachment of grounding and bonding conductors to grounding electrodes, pipes, tubing, and rebar. Grounding and bonding clamps specified in this article are also suitable for use with communications applications.

2.4 GROUNDING AND BONDING BUSHINGS

A. Description: Bonding bushings connect conduit fittings, tubing fittings, threaded metal conduit, and unthreaded metal conduit to metal boxes and equipment enclosures, and have one or more bonding screws intended to provide electrical continuity between bushing and enclosure. Grounding bushings have provision for connection of bonding or grounding conductor and may or may not also have bonding screws.

2.5 INTERSYSTEM BONDING BRIDGE GROUNDING CONNECTORS

A. Description: Devices that provide means for connecting communications systems grounding and bonding conductors at service equipment or at disconnecting means for buildings or structures.

2.6 GROUNDING AND BONDING BUSBARS

A. Description: Miscellaneous grounding and bonding devices that serve as common connection for multiple grounding and bonding conductors.

2.7 SIGNAL REFERENCE GRIDS

A. Description: Means for providing low-impedance path to ground over a large area, approximating an equipotential plan, while simultaneously mitigating large current spikes from faults or lightning.

2.8 GROUNDING ELECTRODE ENCLOSURES

A. Description: Enclosures designed to protect grounding electrodes from damage while providing access for inspection and testing of the grounding system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine facility's grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of electrical system.

B. Inspect test results of grounding system measured at point of electrical service equipment connection.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with connection of electrical service equipment only after unsatisfactory conditions have been corrected.

3.2 SELECTION OF GROUNDING AND BONDING PRODUCTS

A. Grounding and Bonding Conductors:

1. Provide solid conductor for [**8 AWG**]<**Insert wire size**> and smaller, and stranded conductors for [**6 AWG**]<**Insert wire size**> and larger unless otherwise indicated.
2. Custom-Length Insulated Equipment Bonding Jumpers: 6 AWG, 19-strand, Type THHN.
3. Bonding Cable: 28 kcmil, 14 strands of 17 AWG conductor, 1/4 inch in diameter.
4. Bonding Conductor: 4 AWG or 6 AWG, stranded conductor.
5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.
6. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.
7. Underground Grounding Conductors: Install bare [**tinned-**]copper conductor, [**2/0 AWG**]<**Insert wire size**> minimum.

B. Grounding and Bonding Connectors:

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.

C. Grounding and Bonding Busbars: Provide in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated on the Drawings.

D. Substation Signal Reference Grid:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with IEEE C2.

a. Install [**8 AWG**][**6 AWG**]<**Insert wire size from fault calculation**> bonding conductors below grade in a grid pattern on 2 ft centers. Bond grid conductors with exothermic welds where they cross each other.
b. Grid must fill entire area inside equipment yard fence, and extend minimum 6.5 ft outside fence, so someone walking or running outside yard may not touch fence or open gate without first stepping inside grid.
c. Bond each metal fence post and gate post to at least two grid conductors.
d. Inside grid, bond equipment reinforcing steel inside bases and sidewalks to at least two grid conductors.
e. Bond underground metal pipe and conduit passing under grid to nearest grid conductor at both ends.

E. Signal Reference Grid Tape Mesh:

1. Install tape mesh under floor finish with the following features:

a. Tape mesh, 2 inch by 16 mil solid copper, [**12 inch**][**24 inch**] spacing.

3.3 SELECTION OF GROUNDING AND BONDING PRODUCTS FOR COMMUNICATIONS

A. Comply with Section 270528 "Pathways for Communications Systems" and Section 271100 "Communications Equipment Room Fittings."

3.4 SELECTION OF GROUNDING AND BONDING PRODUCTS FOR TOWERS AND ANTENNAS

A. Special Techniques:

1. Ring Electrode: Buried at least 30 inch below grade and at least 24 inch from base of tower or mounting.
2. Bond each tower base and metallic frame of dish to ring electrode, buried at least 18 inch below grade.
3. Bond ring electrode and antenna bonding conductors to equipment room PBB or SBB, buried at least 30 inch below grade.
4. Bond metal fences located within 6 ft of towers and antennas to ring electrode, buried at least 18 inch below grade.
5. Special Requirements for Roof-Mounted Towers:

a. Roof Ring: Meet requirements for ring electrode except conductors must comply with NFPA 780.
b. Bond tower base footings steel, SBB in equipment room, and antenna support guys to roof ring.
c. Connect roof ring to perimeter conductors of lightning protection system.

6. Special Requirements for Waveguides and Coaxial Cable:

a. Bond cable shields at point of entry into building to nearest SBB and to cable entrance plate, using 2 AWG bonding conductors.

b. Bond coaxial cable surge arrester to ring electrode or roof ring using bonding conductor size recommended by surge-arrester manufacturer.

3.5 INSTALLATION OF GROUNDING AND BONDING

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Electrical Construction: ICC IBC, ICC IFC, NFPA 1, NFPA 70, and NECA NEIS 1.
2. Electrical Maintenance: NFPA 70B.
3. Electrical Safety: NFPA 70E.
4. Grounding and Bonding: NECA NEIS 331 and Article 250 of NFPA 70.
5. Communications Work: BICSI N1.
6. Work in ITE Rooms: NFPA 75.
7. Work in Health Care Facilities: NFPA 99 and Article 517 of NFPA 70.
8. Emergency and Standby Power Work: NFPA 110, NFPA 111, and NECA NEIS 416.
9. Work in Confined Spaces: NFPA 350.
10. Work in Basements and Other Developed Subterranean Spaces: NFPA 520.
11. 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.
12. Consult Architect for resolution of conflicting requirements.

C. Special Techniques:

1. Grounding and Bonding Conductors:

    a. 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. Underground Grounding Conductors:

        1) Bury at least 30 inch below grade.
        2) Duct-Bank Grounding Conductor: Bury 12 inch above duct bank when indicated as part of duct-bank installation.

2. Grounding and Bonding Connectors: 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.

    a. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
    b. Make connections with clean, bare metal at points of contact.

c. Make aluminum-to-steel connections with stainless steel separators and mechanical clamps.
d. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
e. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
f. 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 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 disconnect-type connection is required, use bolted clamp.

g. 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 bolted clamp connector or bolt lug-type connector to pipe flange by using one of lug bolts of flange. Where 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 bolted connector.
    3) Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

h. 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.
i. Grounding for Steel Building Structure: Install driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 ft apart.

3. Grounding and Bonding Busbars:

    a. Install busbar horizontally, on insulated spacers 2 inch minimum from wall, 6 inch above finished floor unless otherwise indicated.
    b. Where busbars are indicated on both sides of doorways, route bonding conductor up to top of door frame, across top of doorway, and down; connect to continuation of horizontal busbar.

4. Electrodes:

a. Ground Rods: Drive rods until tops are 2 inch below finished floor or final grade unless otherwise indicated.

1) Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2) Use exothermic welds for below-grade connections.

b. For grounding electrode system, install at least [**three**]<**Insert number**> rods spaced at least one-rod length from each other and located at least same distance from other grounding electrodes, and connect to service grounding electrode conductor.

c. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 260543 "Underground Ducts and Raceways for Electrical Systems," and must be at least 12 inch deep, with cover.

1) Install at least one test well for each service unless otherwise indicated. Install at ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

d. Ring Electrode: Install grounding conductor, electrically connected to each building structure ground rod and to each [**steel column**][**indicated item**], extending around perimeter of [**building**][**area or item indicated**].

1) Install tinned-copper conductor not less than [**2/0 AWG**]<**Insert wire size**> for ring electrode and for taps to building steel.
2) Bury ring electrode not less than [**24 inch**]<**Insert dimension**> from building's foundation.

e. Concrete-Encased Electrode (Ufer Ground):

1) Fabricate in accordance with NFPA 70; use minimum of [**20 ft**]<**Insert dimension**> of bare copper conductor not smaller than [**4 AWG**]<**Insert wire size**>.

a) If concrete foundation is less than [**20 ft**]<**Insert dimension**> long, coil excess conductor within base of foundation.
b) Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

2) Fabricate in accordance with NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 ft long. If reinforcing is in multiple pieces, connect together by usual steel tie wires or exothermic welding to create required length.

5. Grounding at Service:

a. Equipment grounding conductors and grounding electrode conductors must

be connected to ground busbar. Install main bonding jumper between neutral and ground buses.

6. Grounding Separately Derived Systems:

    a. Permanent Generators: Install grounding electrode(s) at location of permanent generators having switched neutral connections. Electrode must be connected to equipment grounding conductor and to frame of generator.

7. Grounding Underground Distribution System Components:

    a. Duct-Bank Grounding Conductor: Bury 12 inch above duct bank when indicated as part of duct-bank installation.
    b. Comply with IEEE C2 grounding requirements.
    c. Grounding Manholes and Handholes: Install driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inch will extend above finished floor. If necessary, install ground rod before manhole is placed and provide 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inch above to 6 inch below concrete. Seal floor opening with waterproof, nonshrink grout.
    d. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields in accordance with manufacturer's published instructions with splicing and termination kits.
    e. Pad-Mounted Transformers and Switches: Install two ground rods and ring electrode around pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than 2 AWG for ring electrode and for taps to equipment grounding terminals. Bury ring electrode not less than 6 inch from foundation.

8. Equipment Grounding and Bonding:

    a. Install insulated equipment grounding conductors with feeders and branch circuits.
    b. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

        1) Feeders and branch circuits.
        2) Lighting circuits.
        3) Receptacle circuits.

4) Single-phase motor and appliance branch circuits.
5) Three-phase motor and appliance branch circuits.
6) Flexible raceway runs.
7) Armored and metal-clad cable runs.
8) Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
9) X-Ray Equipment Circuits: Install insulated equipment grounding conductor in circuits supplying x-ray equipment.

c. 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.
d. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
e. Isolated Grounding Receptacle Circuits: Install insulated equipment grounding conductor connected to receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of applicable derived system or service unless otherwise indicated.
f. Isolated Equipment Enclosure Circuits: For designated equipment supplied by branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of applicable derived system or service unless otherwise indicated.
g. Poles Supporting Outdoor Lighting Fixtures: Bond insulated equipment grounding conductor to equipment grounding terminal inside pole base.
h. Metallic Fences: Comply with requirements of IEEE C2.

1) Grounding Conductor: Bare[**, tinned**] copper, not less than [**8 AWG**]<**Insert wire size**>.
2) Gates: Must be bonded to grounding conductor with flexible bonding jumper.
3) Barbed Wire: Strands must be bonded to grounding conductor.

9. Fence Grounding:

a. Grounding Method: At each grounding location, drive grounding rod vertically until top is 6 inch below finished grade. Connect rod to fence with 6 AWG conductor. Connect conductor to each fence component at grounding location.
b. Fences greater than 100 ft of Buildings, Structures, Walkways, and Roadways: Ground fence at maximum intervals of [**1500 ft**]<**Insert lesser distance if grounding resistance is high**>.

c. Fences within 100 ft of Buildings, Structures, Walkways, and Roadways: Ground fence at maximum intervals of [**750 ft**]<**Insert lesser distance if grounding resistance is high**>.

1) Gates and Other Fence Openings: Ground fence on each side of opening.

a) Bond metal gates to gate posts by connecting bonding jumper between gate post and gate frame.
b) Bond across openings, with and without gates, except at openings indicated as intentional fence discontinuities. Use 2 AWG wire and bury it at least 18 inch below finished grade.

d. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of power line crossing and at maximum distance of 150 ft on each side of crossing.
e. Bonding to Lightning-Protection System: If fence terminates at lightning-protected building or structure, ground fence and bond fence grounding conductor to lightning-protection down conductor or lightning-protection grounding conductor, complying with NFPA 780.

3.6 FIELD QUALITY CONTROL FOR GROUNDING AND BONDING

A. Administrant for Electrical Power Tests and Inspections:

1. [**Owner**][**Tenant**] will engage qualified electrical testing and inspecting agency to administer and perform tests and inspections.
2. Engage qualified electrical testing and inspecting agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
4. Administer and perform tests and inspections[**with assistance of factory-authorized service representative**].

B. Acceptance Testing Preparation:

1. <**Insert requirements**>.

C. Field tests and inspections must be witnessed by [**Architect**][**Tenant**][**authorities having jurisdiction**]<**Insert names or titles of witnesses**>.

D. 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 calibrated torque wrench in accordance with manufacturer's published instructions.
3. Test completed grounding system at each location where maximum ground-

resistance level is specified, at service disconnect enclosure grounding terminal[**, at ground test wells**][**, and at individual ground rods**]. Make tests at ground rods before conductors are connected.

a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by 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 in accordance with IEEE Std 81.
c. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

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 record of tests and observations. Include 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.

E. Nonconforming Work:

1. Grounding system will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective components and retest.

F. Collect, assemble, and submit test and inspection reports.

1. Report measured ground resistances that exceed the following values:

a. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: [**10 Ω**]<**Insert ohms**>.
b. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: [**5 Ω**]<**Insert ohms**>.
c. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: [**3 Ω**]<**Insert ohms**>.
d. Power Distribution Units or Panelboards Serving Electronic Equipment: [**1 Ω**][**3 Ω**]<**Insert ohms**>.
e. Substations and Pad-Mounted Equipment: [**5 Ω**]<**Insert ohms**>.
f. Manhole Grounds: [**10 Ω**]<**Insert ohms**>.
g. <**Insert application and maximum ground-resistance**>.

3.7 PROTECTION

A. After installation, protect grounding and bonding cables and equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION 260526

SECTION 260533.13 - CONDUITS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:

1. Section 018116 "Facility Environmental Requirements" specifies temperature, humidity, acoustical, and other field conditions applicable to the Work specified in this Section.
2. Section 018123 "Facility Seismic and Wind Criteria" specifies seismic hazard, wind hazard, other structural load design conditions applicable to the Work specified in this Section.
3. Section 260010 "Supplemental Requirements for Electrical" specifies additional coordination, scheduling, sequencing, submittal, and installation requirements applicable to the Work for electrical, communications, and electronic safety and security systems on the Project, including wiring methods.
4. Section 078413 "Penetration Firestopping" specifies firestopping referenced by this Section.
5. Section 260519 "Low-Voltage for Electrical Power Conductors and Cables" specifies nonmetallic underground conduit with conductors (Type NUCC).
6. Section 260529 "Hangers and Supports for Electrical Systems" specifies conduit hangers and supports referenced by this Section.
7. Section 260543 "Underground Ducts and Raceways for Electrical Systems" specifies exterior duct banks, manholes, and underground utility construction.
8. Section 260553 "Identification for Electrical Systems" specifies electrical equipment labels.
9. Section 270528 "Pathways for Communications Systems"[**and Section 271100 "Communications Equipment Room Fittings"**] specifies additional requirements for installation of conduits for communications cabling.

1.2 REFERENCES

A. Abbreviations and Acronyms for Electrical Raceway Types:

1. EMT: Electrical metallic tubing.
2. EMT-A: Aluminum electrical metallic tubing.
3. EMT-S: Steel electrical metallic tubing.
4. EMT-SS: Stainless steel electrical metallic tubing.
5. ENT: Electrical nonmetallic tubing.
6. EPEC: Electrical HDPE underground conduit (thin wall).
7. EPEC-A: Type A electrical HDPE underground conduit.
8. EPEC-B: Type B electrical HDPE underground conduit.
9. ERMC: Electrical rigid metal conduit.
10. ERMC-A: Aluminum electrical rigid metal conduit.
11. ERMC-S: Steel electrical rigid metal conduit.

12. ERMC-S-G: Galvanized-steel electrical rigid metal conduit.
13. ERMC-S-PVC: PVC-coated-steel electrical rigid metal conduit.
14. ERMC-SS: Stainless steel electrical rigid metal conduit.
15. FMC: Flexible metal conduit.
16. FMC-A: Aluminum flexible metal conduit.
17. FMC-S: Steel flexible metal conduit.
18. FMT: Steel flexible metallic tubing.
19. FNMC: Flexible nonmetallic conduit. See "LFNC."
20. HDPE: HDPE underground conduit (thick wall).
21. HDPE-40: Schedule 40 HDPE underground conduit.
22. HDPE-80: Schedule 80 HDPE underground conduit.
23. IMC: Steel electrical intermediate metal conduit.
24. LFMC: Liquidtight flexible metal conduit.
25. LFMC-A: Aluminum liquidtight flexible metal conduit.
26. LFMC-S: Steel liquidtight flexible metal conduit.
27. LFMC-SS: Stainless steel liquidtight flexible metal conduit.
28. LFNC: Liquidtight flexible nonmetallic conduit.
29. LFNC-A: Layered (Type A) liquidtight flexible nonmetallic conduit.
30. LFNC-B: Integral (Type B) liquidtight flexible nonmetallic conduit.
31. LFNC-C: Corrugated (Type C) liquidtight flexible nonmetallic conduit.
32. PVC: Rigid PVC conduit.
33. PVC-40: Schedule 40 rigid PVC conduit.
34. PVC-80: Schedule 80 rigid PVC Conduit.
35. PVC-A: Type A rigid PVC concrete-encased conduit.
36. PVC-EB: Type EB rigid PVC concrete-encased underground conduit.
37. RGS: See ERMC-S-G.
38. RMC: See ERMC.
39. RTRC: Reinforced thermosetting resin conduit.
40. RTRC-AG: Low-halogen, aboveground reinforced thermosetting resin conduit.
41. RTRC-AG-HW: Heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
42. RTRC-AG-SW: Standard wall, low-halogen, aboveground reinforced thermosetting resin conduit.
43. RTRC-AG-XW: Extra heavy wall, low-halogen, aboveground reinforced thermosetting resin conduit.
44. RTRC-BG: Low-halogen, belowground reinforced thermosetting resin conduit.

B. Definitions:

1. Conduit: A structure containing one or more duct raceways.
2. Direct Buried: Installed underground without encasement in concrete or other protective material.
3. Duct Bank: An arrangement of conduit providing one or more continuous duct raceways between two points.
4. Duct Raceway: A single enclosed raceway for conductors or cable.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product data for sustainable design features for each type of product.

C. Field quality-control reports.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer's published instructions.

1.5 QUALIFICATIONS

A. Electrical Power Testing (EPT) Technician III: Possessing active NICET EPT Level III certification. Able to manage switching procedures; conduct tests of complex equipment; analyze test and equipment data; plan a job; and lead a team. Has experience performing NFPA 70B, IEEE, and NETA electrical tests.

B. Electrical Power Testing (EPT) Technician IV: Possessing active NICET EPT Level IV certification. Able to conduct tests of complex metering and relay systems; evaluate tests, test equipment, test results, and power system performance; recommend actions to maintain or improve system performance; and lead multi-team projects.

C. Electrical Power Testing and Inspecting Agency: Entities possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site electrical testing supervisors must possess active NICET EPT Technician [**III**][**IV**] certification.

D. ERMC-S-PVC Installers: Installer possessing active qualifications specified in Section 014000 "Quality Requirements," and able to present unexpired certified Installer credentials issued by ERMC-S-PVC manufacturer prior to starting installation.

E. Communications Testing and Inspecting Agency: Entity possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site communications testing supervisor must have [**BICSI Technician (TECH)**]<**Insert certification program**> certification and documented training, and be experienced with testing communications equipment in accordance with [**BICSI**]<**Insert code enforced by authorities having jurisdiction**> testing standards.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Products or components listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

B. <**Insert additional performance requirements for the Project**>.

PART 3 - EXECUTION

3.1 SELECTION OF CONDUITS FOR ELECTRICAL SYSTEMS

A. Unless more stringent requirements are specified in the Contract Documents or manufacturer's published instructions, comply with NFPA 70 for selection of duct raceways. Consult Architect for resolution of conflicting requirements.

B. Special Instructions Regarding HDPE Conduits: Although Article 353 of NFPA 70 permits use of HDPE conduits where encased in concrete aboveground, UL CCN EAZX listing requirements state that HDPE[**and EPEC**] underground conduits are intended only for use where direct buried with or without being encased in concrete. Specified Type HDPE[**and Type EPEC**] underground conduits are not permitted to be used aboveground on the Project.

C. Outdoors:

1. Exposed and Subject to Severe Physical Damage: [**ERMC**][**IMC**].
2. Exposed and Subject to Physical Damage: [**ERMC**][**IMC**][**Corrosion-resistant EMT**].
3. Exposed and Not Subject to Physical Damage: [**ERMC**][**IMC**][**Corrosion-resistant EMT**][**PVC-80**][**RTRC-AG**].
4. Concealed Aboveground: [**ERMC**][**IMC**][**EMT**][**PVC-80**][**PVC-40**][**RTRC-AG**].
5. Direct Buried: [**PVC-80**][**PVC-40**][**HDPE-80**][**HDPE-40**][**RTRC-BG**].
6. Concrete Encased Not in Trench: [**PVC-80**][**PVC-40**][**PVC-A**][**RTRC-BG**].
7. Concrete Encased in Trench: [**PVC-80**][**PVC-40**][**PVC-A**][**PVC-EB**][**HDPE-80**][**HDPE-40**][**EPEC-A**][**EPEC-B**][**RTRC-BG**].
8. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): [**LFMC**][**LFNC-A**][**LFNC-B**].

D. Indoors:

1. Hazardous Classified Locations: [**ERMC**][**IMC**].
2. Exposed and Subject to Severe Physical Damage: [**ERMC**][**IMC**].
3. Exposed and Subject to Physical Damage: [**ERMC**][**IMC**][**EMT**].
4. Exposed and Not Subject to Physical Damage: [**ERMC**][**IMC**][**EMT**][**PVC-80**][**RTRC-AG**].

5. Concealed in Ceilings and Interior Walls and Partitions: [**ERMC**][**IMC**][**EMT**][**PVC-80**][**PVC-40**][**RTRC-AG**].
6. Damp or Wet Locations: [**ERMC**][**IMC**][**RTRC-AG**][**Corrosion-resistant EMT**].
7. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): [**LFMC**][**FMC**][**LFNC-A**][**LFNC-B**].
8. Circuits Operating Above 60 Hz: [**EMT-A**][**ERMC-A**][**RTRC-AG**]. Provide nonmetallic sleeve where aluminum duct raceways pass through concrete.

E. Duct Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.

1. ERMC and IMC: Provide threaded-type fittings unless otherwise indicated.

3.2 INSTALLATION OF CONDUITS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in the Contract Documents or manufacturer's published instructions, comply with the following:

1. Electrical Construction: ICC IBC, ICC IFC, NFPA 1, NFPA 70, and NECA NEIS 1.
2. Electrical Safety: NFPA 70E.
3. Commissioning of Active and Passive Fire Protection Features: NFPA 3 and NFPA 4.
4. Grounding and Bonding: NECA NEIS 331 and Article 250 of NFPA 70.
5. Communications Work: BICSI N1.
6. Life Safety and Means of Egress Work: NFPA 101.
7. Emergency and Standby Power Work: NFPA 110, NFPA 111, and NECA NEIS 416.
8. Work in Confined Spaces: NFPA 350.
9. Work in Basements and Other Developed Subterranean Spaces: NFPA 520.
10. Type EMT-A: Article 358 of NFPA 70 and NECA NEIS 102.
11. Type EMT-SS: Article 358 of NFPA 70 and NECA NEIS 101.
12. Type EMT-S: Article 358 of NFPA 70 and NECA NEIS 101.
13. Type ENT: Article 362 of NFPA 70 and NECA NEIS 102.
14. Type HDPE and Type EPEC: Article 353 of NFPA 70 and NECA NEIS 111.
15. Type ERMC-A: Article 344 of NFPA 70 and NECA NEIS 102.
16. Type ERMC-SS: Article 344 of NFPA 70 and NECA NEIS 101.
17. Type ERMC-S: Article 344 of NFPA 70 and NECA NEIS 101.
18. Type FMC-S: Article 348 of NFPA 70 and NECA NEIS 101.
19. Type FMC-A: Article 348 of NFPA 70 and NECA NEIS 102.
20. Type FMT: Article 360 of NFPA 70 and NECA NEIS 101.
21. Type IMC: Article 342 of NFPA 70 and NECA NEIS 101.
22. Type LFMC: Article 350 of NFPA 70 and NECA NEIS 101.
23. Type LFNC: Article 342 of NFPA 70 and NECA NEIS 111.
24. Type PVC: Article 356 of NFPA 70 and NECA NEIS 111.
25. Type RTRC: Article 355 of NFPA 70 and NECA NEIS 111.

26. Expansion Fittings: NEMA FB 2.40.
27. Consult Architect for resolution of conflicting requirements.

C. Special Installation Techniques:

1. General Requirements for Installation of Duct Raceways:

a. Complete duct raceway installation before starting conductor installation.
b. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 ft above finished floor.
c. Install no more than equivalent of three 90-degree bends in conduit run[**except for control wiring conduits, for which no more than equivalent of two 90-degree fewer bends are permitted**]. Support within 12 inch of changes in direction.
d. Make bends in duct raceway using large-radius preformed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
e. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
f. Support conduit within 12 inch of enclosures to which attached.
g. Install duct sealing fittings at accessible locations in accordance with NFPA 70 and fill them with listed sealing compound. For concealed duct raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install duct sealing fittings in accordance with NFPA 70.
h. Install devices to seal duct raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal interior of duct 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 duct raceway enters a building or structure.
3) Conduit extending from interior to exterior of building.
4) Conduit extending into pressurized duct raceway 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.

i. Do not install duct raceways or electrical items on "explosion-relief" walls or rotating equipment.
j. Do not install conduits within 2 inch of the bottom side of a metal deck roof.
k. Keep duct raceways at least 6 inch away from parallel runs of flues and steam or hot-water pipes. Install horizontal duct raceway runs above water and steam piping.
l. Cut conduit perpendicular to the length. For conduits metric designator 53 (trade size 2) and larger, use roll cutter or a guide to make cut straight and

perpendicular to the length. Ream inside of conduit to remove burrs.

m. Install pull wires in empty duct raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12 inch of slack at both ends of pull wire. Cap underground duct raceways designated as spare above grade alongside duct raceways in use.

n. Install duct raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.

1) Termination fittings with shoulders do not require two locknuts.

o. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to metric designator 35 (trade size 1-1/4) and insulated throat metal bushings on metric designator 41 (trade size 1-1/2) and larger conduits terminated with locknuts.[**Install insulated throat metal grounding bushings on service conduits**].

2. Types EMT-A, ERMC-A, and FMC-A: Do not install aluminum duct raceways or fittings in contact with concrete or earth.

3. Types ERMC and IMC:

a. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound that maintains electrical conductivity to threads of duct raceway and fittings before making up joints. Follow compound manufacturer's published instructions.

4. Type ERMC-S-PVC:

a. Follow manufacturer's installation instructions for clamping, cutting, threading, bending, and assembly.

b. Provide PVC-coated sealing locknut for exposed male threads transitioning into female NPT threads that do not have sealing sleeves, including transitions from PVC couplings/female adapters to Type ERMC-S-PVC elbows in direct-burial applications. PVC-coated sealing locknuts must not be used in place of conduit hub. PVC-coated sealing locknut must cover exposed threads on Type ERMC-S-PVC duct raceway.

c. Coat field-cut threads on PVC-coated duct raceway with manufacturer-approved corrosion-preventing conductive compound prior to assembly.

5. Types FMC, LFMC, and LFNC:

a. Provide a maximum of [**36 inch**][**72 inch**] of flexible conduit for [**recessed and semirecessed luminaires,**]equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

6. Types PVC, HDPE, and EPEC:

a. Do not install Type PVC, Type HDPE, or Type EPEC conduit where ambient temperature exceeds [**122 deg F**]<**Insert temperature**>. Conductor

ratings must be limited to 75 deg C except where installed in a trench outside buildings with concrete encasement, where 90 deg C conductors are permitted.

b. Comply with manufacturer's published instructions for solvent welding and fittings.

c. Join joints with solvent cement in accordance with manufacturer's published instructions and allowed to cure before handling. Joints to be bent, pushed, or pulled must set for minimum 24 h after joining.

7. Type RTRC: Do not install Type RTRC conduit where ambient temperature exceeds [**230 deg F**]<**Insert temperature**>.

8. Duct Raceways Embedded in Slabs:

   a. [**Run duct raceways larger than metric designator 27 (trade size 1) below concrete slab**][**Run duct raceways larger than metric designator 27 (trade size) parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place duct raceway close to slab support. Secure duct raceways to reinforcement at maximum 10 ft intervals**].

   b. Arrange duct raceways to cross building expansion joints with expansion fittings at right angles to the joint.

   c. Arrange duct raceways to ensure that each is surrounded by minimum of [**1 inch**][**2 inch**]<**Insert dimension**> of concrete without voids.

   d. Do not embed threadless fittings in concrete unless locations have been specifically approved by Architect.

   e. Change from ENT to [**PVC-80**][**PVC-40**][**ERMC**][**or**][**IMC**] before rising above floor.

9. Stub-ups to Above Recessed Ceilings:

   a. Provide EMT, IMC, or ERMC for duct raceways.

   b. Provide a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

10. Duct Raceway Terminations at Locations Subject to Moisture or Vibration:

    a. Provide insulating bushings to protect conductors, including conductors smaller than 4 AWG.[**Install insulated throat metal grounding bushings on service conduits**].

11. Duct Fittings: Install fittings in accordance with NEMA FB 2.10 guidelines.

    a. ERMC-S-PVC: Provide only fittings listed for use with this type of conduit. Patch and seal joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Provide sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.

    b. EMT: Provide [**setscrew**][**compression**], [**steel**][**cast-metal**] fittings. Comply with NEMA FB 2.10.

    c. Flexible Conduit: Provide only fittings listed for use with flexible conduit type. Comply with NEMA FB 2.20.

12. Expansion-Joint Fittings:

    a. Install in runs of aboveground PVC that are located where environmental temperature change may exceed 30 deg F and that have straight-run length that exceeds 25 ft. Install in runs of aboveground ERMC[**and EMT**] conduit that are located where environmental temperature change may exceed 100 deg F and that have straight-run length that exceeds 100 ft.
    b. Install type and quantity of fittings that accommodate temperature change listed for the following locations:

        1) Outdoor Locations Not Exposed to Direct Sunlight: [**125 deg F**]<**Insert temperature**> temperature change.
        2) Outdoor Locations Exposed to Direct Sunlight: [**155 deg F**]<**Insert temperature**> temperature change.
        3) Indoor Spaces Connected with Outdoors without Physical Separation: [**125 deg F**]<**Insert temperature**> temperature change.
        4) Attics: [**135 deg F**]<**Insert temperature**> temperature change.
        5) <**Insert location and corresponding temperature change**>.

    c. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
    d. Install expansion fittings at locations where conduits cross building or structure expansion joints.
    e. Install expansion-joint fitting with position, mounting, and piston setting selected in accordance with manufacturer's published instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

13. Duct Raceways Penetrating Rooms or Walls with Acoustical Requirements: Seal duct raceway openings on both sides of rooms or walls with acoustically rated putty[**or firestopping**].
14. Identification: Provide labels for conduit assemblies, duct raceways, and associated electrical equipment.

    a. Provide warning signs.

15. <**Insert more stringent installation requirements that supplement or supersede listed standards and manufacturer's published instructions**>.

D. Interfaces with Other Work:

1. Firestop penetrations of fire-rated floor and wall assemblies.
2. Provide conduit hangers and supports.
3. Coordinate installation of new products for <**Insert system or product family/category**> with existing conditions.

    a. <**Insert requirements for transition between new and existing**>.

4. Coordinate with <**Insert Section number and title**> for <**Insert description of interfacing related Work**>.

    a. <**Insert requirements for transition between this Section and related Work**>.

3.3 FIELD QUALITY CONTROL OF CONDUITS FOR ELECTRICAL SYSTEMS

A. Administrant for Electrical Power Tests and Inspections:

1. [**Owner**][**Tenant**] will engage qualified medium-voltage electrical testing and inspecting agency to administer and perform tests and inspections.
2. Engage qualified medium-voltage electrical testing and inspecting agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
4. Administer and perform tests and inspections[**with assistance of factory-authorized service representative**].

B. Administrant for Communications Tests and Inspections:

1. [**Owner**][**Tenant**] will engage qualified communications testing and inspecting agency to administer and perform tests and inspections.
2. Engage qualified communications testing and inspecting agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
4. Administer and perform tests and inspections[**with assistance of factory-authorized service representative**].

C. Acceptance Testing Preparation:

1. <**Insert requirements**>.

D. Field tests and inspections must be witnessed by [**Architect**][**Tenant**][**authorities having jurisdiction**]<**Insert names or titles of witnesses**>.

E. Tests and Inspections:

1. Perform manufacturer's recommended tests and inspections.
2. Pull solid aluminum or wood test mandrel through duct to prove joint integrity and adequate bend radii, and test for out-of-round duct. Provide minimum 12 inch long mandrel equal to duct size minus 1/4 inch. If obstructions are indicated, remove obstructions and retest.
3. Conduit Placement:

    a. Verify that center-line location and offsets are in accordance with the Drawings.
    b. Verify that hangers and supports for conduits are attached to structure [**in**

accordance with the Drawings][**as directed by qualified structural engineer**].

c. Verify that nuts on bolts or hanger rods are secure.
d. Verify that space between raceways and cored holes are filled with non-shrinking grout or other approved material indicated on the Drawings and the Specifications.
e. Verify that expansion devices are installed at locations indicated on the Drawings and the Specifications.
f. Verify that ends are cut square to provide flush-butting surfaces when spliced and inside edges are free of burrs that could impede installation of cables.
g. Verify minimum separation of utilities, or that approved mechanical protection has been provided to surrounding conduit(s) where minimum separation cannot be achieved.

4. Document all changes on Record Drawings.

F. Nonconforming Work:

1. Conduit will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

G. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.

3.4 CLEANING

A. Verify that bentonite or other drilling fluids are contained and removed, and site is restored to its original or improved condition.

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 260533.13

SECTION 260533.16 - BOXES AND COVERS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:

1. Section 018116 "Facility Environmental Requirements" specifies temperature, humidity, acoustical, and other field conditions applicable to the Work specified in this Section.
2. Section 018123 "Facility Seismic and Wind Criteria" specifies seismic hazard, wind hazard, other structural load design conditions applicable to the Work specified in this Section.
3. Section 260010 "Supplemental Requirements for Electrical" specifies additional coordination, scheduling, sequencing, submittal, and installation requirements applicable to the Work for electrical, communications, and electronic safety and security systems on the Project, including wiring methods.
4. Section 078413 "Penetration Firestopping" specifies materials and methods for sealing penetrations of rated walls and partitions referenced by this Section.
5. Section 260526 "Grounding and Bonding for Electrical Systems" specifies grounding and bonding referenced by this Section.
6. Section 260553 "Identification for Electrical Systems" specifies electrical equipment labels and warning signs installed by this Section.
7. Section 260573 "Power System Studies" specifies arc-flash hazard analysis and warning labels referenced by this Section.
8. Section 270528 "Pathways for Communications Systems"[**and Section 271100 "Communications Equipment Room Fittings"**] specifies additional requirements for identification of communications equipment and cabling.

1.2 DEFINITIONS

A. Communications Outlet: One or more communications jacks, or cables and plugs, mounted in a box or ring, with a suitable protective cover.

B. Enclosure: The case or housing of an apparatus, or the fence or wall(s) surrounding an installation, to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. Types of enclosures and enclosure covers include the following:

1. Cabinet: An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.
2. Concrete Box: A box intended for use in poured concrete.
3. Conduit Body: A means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box

requirements.

4. Conduit Box: A box having threaded openings or knockouts for conduit, EMT, or fittings.
5. Cover Plate: A cover designed for protecting wiring devices installed in flush-mounted device boxes while permitting their safe operation; also called a faceplate or wallplate.
6. Cutout Box: An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure.
7. Device Box: A box with provisions for mounting a wiring device directly to the box.
8. Extension Ring: A ring intended to extend the sides of an outlet box or device box to increase the box depth, volume, or both.
9. Floor Box: A box mounted in the floor intended for use with a floor box cover and other components to complete the floor box enclosure.
10. Floor-Mounted Enclosure: A floor box and floor box cover assembly with means to mount in the floor that is sealed against the entrance of scrub water at the floor level.
11. Floor Nozzle: An enclosure used on a wiring system, intended primarily as a housing for a receptacle, provided with a means, such as a collar, for surface-mounting on a floor, which may or may not include a stem to support it above the floor level, and is sealed against the entrance of scrub water at the floor level.
12. Junction Box: A box with a blank cover that joins different runs of raceway or cable and provides space for connection and branching of the enclosed conductors.
13. Outlet Box: A box that provides access to a wiring system having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for the entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting an outlet box cover, but without provisions for mounting a wiring device directly to the box.
14. Pedestal Floor Box Cover: A floor box cover that, when installed as intended, provides a means for typically vertical or near-vertical mounting of receptacle outlets above the floor's finished surface.
15. Pull Box: A box with a blank cover that joins different runs of raceway and provides access for pulling or replacing the enclosed cables or conductors.
16. Raised-Floor Box: A floor box intended for use in raised floors.
17. Recessed Access Floor Box: A floor box with provisions for mounting wiring devices below the floor surface.
18. Recessed Access Floor Box Cover: A floor box cover with provisions for passage of cords to recessed wiring devices mounted within a recessed floor box.
19. Ring: A sleeve, which is not necessarily round, used for positioning a recessed wiring device flush with the plaster, concrete, drywall, or other wall surface.
20. Ring Cover: A box cover, with raised center portion to accommodate a specific wall or ceiling thickness, for mounting wiring devices or luminaires flush with the surface.
21. Termination Box: An enclosure designed for installation of termination base assemblies consisting of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors, or both.

C. Receptacle: A fixed connecting device arranged for insertion of a power cord plug. Also

called a power jack.

D. Receptacle Outlet: One or more receptacles mounted in a box with a suitable protective cover.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of product requiring samples for source quality control.

C. Shop Drawings: Prepare and submit the following:

1. Shop Drawings for Floor Boxes: Show that floor boxes are located to avoid interferences and are structurally allowable. Indicate floor thickness [**at location**]where boxes are embedded in concrete floors and underfloor clearances where boxes are installed in raised floors.

D. Sustainable Design Submittals:

1. Product data for sustainable design features for each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer's published instructions.

1.5 QUALIFICATIONS

A. Electrical Power Testing (EPT) Technician III: Possessing active NICET EPT Level III certification. Able to manage switching procedures; conduct tests of complex equipment; analyze test and equipment data; plan a job; and lead a team. Has experience performing NFPA 70B, IEEE, and NETA electrical tests.

B. Electrical Power Testing (EPT) Technician IV: Possessing active NICET EPT Level IV certification. Able to conduct tests of complex metering and relay systems; evaluate tests, test equipment, test results, and power system performance; recommend actions to maintain or improve system performance; and lead multi-team projects.

C. Inspection and Testing of Fire-Alarm Systems (I&TFAS) Technician I: Possessing active NICET I&TFAS Level I certification. Able to perform periodic inspections and tests of basic fire-alarm systems and prepare related records and reports.

D. Inspection and Testing of Fire-Alarm Systems (I&TFAS) Technician II: Possessing active NICET I&TFAS Level II certification. Able to plan, perform, and coordinate periodic inspections and tests of complex fire-alarm systems (including one or more of suppression interfaces, networked control units, smoke control interfaces, air sampling systems, multi-zone voice evacuation systems, or high-rise applications) and prepare related records and reports.

E. Electrical Power Testing and Inspecting Agency: Entities possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site electrical testing supervisors must possess active NICET EPT Technician [**III**][**IV**] certification.

F. Communications Testing and Inspecting Agency: Entity possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site communications testing supervisor must have [**BICSI Technician (TECH)**]<**Insert certification program**> certification and documented training, and be experienced with testing communications equipment in accordance with [**BICSI**]<**Insert code enforced by authorities having jurisdiction**> testing standards.

G. Security Testing and Inspecting Agency: Entity possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site security testing supervisor must have [**ASIS**][**PSP**]<**Insert organization**> certification and documented training and experience with testing security equipment in accordance with [**ASIS**]<**Insert organization**> testing standards.

H. Fire-Alarm Testing Agency: Entity possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site fire-alarm testing supervisor must possess active NICET I&TFAS Technician [**I**][**II**] certification.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Products or components listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

B. <**Insert additional performance requirements for the Project**>.

2.2 METALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. Source Quality Control:

1. Samples:

a. Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each

type of floor box.

b. Raised Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.
c. Recessed Access-Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.
d. Concrete Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.

2.3 NONMETALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. Source Quality Control:

1. Samples:

a. Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.
b. Raised Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.
c. Recessed Access-Floor Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.
d. Concrete Box Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors and flooring inserts for each type of floor box.

PART 3 - EXECUTION

3.1 SELECTION OF BOXES AND COVERS FOR ELECTRICAL SYSTEMS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NFPA 70 for selection of boxes and enclosures. Consult Architect for resolution of conflicting requirements.

B. Degree of Protection:

1. Outdoors:

a. [**Type 3**][**Type 3R**][**Type 4**] unless otherwise indicated.
b. Locations Exposed to Hosedown: [**Type 4**][**Type 4X**][**Type 6**][**Type 6P**].
c. Locations Subject to Potential Flooding: Type 6P.
d. Locations Aboveground Where Mechanism Must Operate When Ice Covered: Type 3S.
e. Locations in-Ground or Exposed to Corrosive Agents: [**Type 4X**][**Type**

6P][**Type 3RX**].

f. Locations in-Ground or Exposed to Corrosive Agents Where Mechanism Must Operate When Ice Covered: Type 3SX.

2. Indoors:

a. Type 1 unless otherwise indicated.
b. Damp or Dusty Locations: [**Type 12**][**Type 2**][**Type 4**][**Type 5**].
c. Surface Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12.
d. Flush Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: [**Type 12**][**Type 12K**].
e. Locations Exposed to Airborne Dust, Lint, Fibers, or Flyings: [**Type 4**][**Type 6**].
f. Locations Exposed to Hosedown: [**Type 4**][**Type 6**][**Type 6P**].
g. Locations Exposed to Brief Submersion: [**Type 6**][**Type 6P**].
h. Locations Exposed to Prolonged Submersion: Type 6P.
i. Locations Exposed to Corrosive Agents: [**Type 4X**][**Type 6P**].
j. Locations Exposed to Spraying Oil or Coolants: Type 13.

C. Exposed Boxes Installed Less Than 2.5 m (8 ft) Above Floor:

1. [**Provide cast-metal boxes**][**Boxes with knockouts or unprotected openings are prohibited**].
2. Provide exposed cover. Flat covers with angled mounting slots or knockouts are prohibited.

3.2 INSTALLATION OF BOXES AND COVERS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Electrical Construction: ICC IBC, ICC IFC, NFPA 1, NFPA 70, and NECA NEIS 1.
2. Electrical Safety: NFPA 70E.
3. Commissioning of Active and Passive Fire Protection Features: NFPA 3 and NFPA 4.
4. Grounding and Bonding: NECA NEIS 331 and Article 250 of NFPA 70.
5. Communications Work: BICSI N1.
6. Life Safety and Means of Egress Work: NFPA 101.
7. Emergency and Standby Power Work: NFPA 110, NFPA 111, and NECA NEIS 416.
8. Work in Confined Spaces: NFPA 350.
9. Work in Basements and Other Developed Subterranean Spaces: NFPA 520.
10. Outlet, Device, Pull, and Junction Boxes: Article 314 of NFPA 70.
11. Consult Architect for resolution of conflicting requirements.

C. Special Installation Techniques:

1. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.
2. 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**][**top**][**bottom**] of box unless otherwise indicated.
3. 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, whether installed indoors or outdoors.
4. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
5. Locate boxes so that cover or plate will not span different building finishes.
6. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.
7. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.
8. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.
9. Set metal floor boxes level and flush with finished floor surface.
10. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
11. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.
12. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.
13. Boxes and Enclosures in Areas or Walls with Acoustical Requirements:

    a. Seal openings and knockouts in back and sides of boxes and enclosures with acoustically rated putty.
    b. Provide gaskets for cover plates and covers.

14. <**Insert more stringent installation requirements that supplement or supersede listed standards and manufacturers' published instructions**>.

D. Interfaces with Other Work:

1. Identification: Provide labels for boxes and associated electrical equipment.

    a. Identify field-installed conductors, interconnecting wiring, and components.
    b. Label each enclosure with engraved metal or laminated-plastic nameplate.
    c. Provide warning signs and arc-flash hazard warning labels for electrical equipment.

2. Coordinate installation of new products for <**Insert system or product family/category**> with existing conditions.

    a. <**Insert requirements for transition between new and existing**>.

3. Coordinate with <**Insert Section number and title**> for <**Insert description of**

interfacing related Work>.

a. <**Insert requirements for transition between this Section and related Work**>.

3.3 FIELD QUALITY CONTROL OF BOXES AND COVERS

A. Administrant for Electrical Power Tests and Inspections:

1. [**Owner**][**Tenant**] will engage qualified medium-voltage electrical testing and inspecting agency to administer and perform tests and inspections.
2. Engage qualified medium-voltage electrical testing and inspecting agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
4. Administer and perform tests and inspections[**with assistance of factory-authorized service representative**].

B. Administrant for Communications Tests and Inspections:

1. [**Owner**][**Tenant**] will engage qualified communications testing and inspecting agency to administer and perform tests and inspections.
2. Engage qualified communications testing and inspecting agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
4. Administer and perform tests and inspections[**with assistance of factory-authorized service representative**].

C. Administrant for Security Tests and Inspections:

1. [**Owner**][**Tenant**] will engage qualified security testing and inspecting agency to administer and perform tests and inspections.
2. Engage qualified security testing and inspecting agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
4. Administer and perform tests and inspections[**with assistance of factory-authorized service representative**].

D. Administrant for Fire-Alarm Tests and Inspections:

1. [**Owner**][**Tenant**] will engage qualified fire-alarm testing and inspecting agency to administer and perform tests and inspections.
2. Engage qualified fire-alarm testing and inspecting agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations,

including connections.

4. Administer and perform tests and inspections[**with assistance of factory-authorized service representative**].

E. Acceptance Testing Preparation:

1. <**Insert requirements**>.

F. Field tests and inspections must be witnessed by [**Architect**][**Tenant**][**authorities having jurisdiction**]<**Insert names or titles of witnesses**>.

G. Tests and Inspections:

1. Perform manufacturer's recommended tests and inspections.
2. Perform tests and inspections recommended by standards listed in "Reference Standards for Installation" Paragraph.

H. Nonconforming Work:

1. Boxes and covers will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

I. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.

3.4 CLEANING

A. Remove construction dust and debris from boxes before installing cover plates, covers, and hoods.

3.5 PROTECTION

A. After installation, protect boxes from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION 260533.16

SECTION 260533.23 - SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:

1. Section 018116 "Facility Environmental Requirements" specifies temperature, humidity, acoustical, and other field conditions applicable to the Work specified in this Section.
2. Section 018123 "Facility Seismic and Wind Criteria" specifies seismic hazard, wind hazard, and other structural design conditions applicable to the Work specified in this Section.
3. Section 260010 "Supplemental Requirements for Electrical" specifies additional coordination, scheduling, sequencing, submittal, and installation requirements applicable to the Work for electrical, communications, and electronic safety and security systems on the Project, including wiring methods.
4. Section 260526 "Grounding and Bonding for Electrical Systems" specifies grounding and bonding referenced by this Section.
5. Section 260553 "Identification for Electrical Systems" specifies warning signs referenced by this Section.
6. Section 270528 "Pathways for Communications Systems"[**and Section 271100 "Communications Equipment Room Fittings"**] specifies additional requirements for identification of communications equipment and cabling.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of product requiring samples for source quality control.

C. Sustainable Design Submittals:

1. Product data for sustainable design features for each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Manufacturer's published instructions.

1.4 QUALIFICATIONS

A. Electrical Power Testing (EPT) Technician III: Possessing active NICET EPT Level III certification. Able to manage switching procedures; conduct tests of complex equipment; analyze test and equipment data; plan a job; and lead a team. Has

experience performing NFPA 70B, IEEE, and NETA electrical tests.

B. Electrical Power Testing (EPT) Technician IV: Possessing active NICET EPT Level IV certification. Able to conduct tests of complex metering and relay systems; evaluate tests, test equipment, test results, and power system performance; recommend actions to maintain or improve system performance; and lead multi-team projects.

C. Electrical Power Testing and Inspecting Agency: Entities possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site electrical testing supervisors must possess active NICET EPT Technician [**III**][**IV**] certification.

D. Communications Testing and Inspecting Agency: Entity possessing active credentials from a qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site communications testing supervisor must have [**BICSI Technician (TECH)**]<**Insert certification program**> certification and documented training, and be experienced with testing communications equipment in accordance with [**BICSI**]<**Insert code enforced by authorities having jurisdiction**> testing standards.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Products or components listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2.2 SURFACE METAL RACEWAYS AND FITTINGS

A. Source Quality Control:

1. Samples:

a. Surface Metallic Raceway Nonmetallic Cover Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type, [**12 inch**]<**Insert dimension**> long.

2.3 SURFACE NONMETALLIC RACEWAYS

A. Source Quality Control:

1. Samples:

a. Surface Nonmetallic Raceway Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type, [**12 inch**]<**Insert dimension**> long.

2.4 STRUT-TYPE CHANNEL RACEWAYS AND FITTINGS

A. Source Quality Control:

1. Samples:

a. Strut-Type Channel Raceway Nonmetallic Covers for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type, [**12 inch**]<**Insert dimension**> long.

2.5 WIREWAYS AND AUXILIARY GUTTERS

A. Source Quality Control:

1. Samples:

a. Nonmetallic Wireway and Auxiliary Gutter Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type, [**12 inch**]<**Insert dimension**> long.

PART 3 - EXECUTION

3.1 INSTALLATION OF SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Electrical Construction: ICC IBC, ICC IFC, NFPA 1, NFPA 70, and NECA NEIS 1.
2. Electrical Safety: NFPA 70E.
3. Grounding and Bonding: NECA NEIS 331 and Article 250 of NFPA 70.
4. Communications Work: BICSI N1.
5. Work in Confined Spaces: NFPA 350.
6. Work in Basements and Other Developed Subterranean Spaces: NFPA 520.
7. Auxiliary Gutters: Article 366 of NFPA 70.
8. Surface Metal Raceway: Article 386 of NFPA 70.
9. Surface Nonmetallic Raceway: Article 388 of NFPA 70.
10. Consult Architect for resolution of conflicting requirements.

C. Special Installation Techniques:

1. Install surface raceways only where indicated on Drawings.
2. Install surface raceway with a minimum 2 inch radius control at bend points.
3. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inch and with no less than two supports per straight raceway section. Support surface raceway in accordance with manufacturer's published instructions. Tape and glue are unacceptable support methods.
4. <**Insert more stringent installation requirements that supplement or supersede listed standards and manufacturers' published instructions**>.

D. Interfaces with Other Work:

1. Identification: Provide labels for surface raceways and associated electrical equipment.

    a. Identify field-installed conductors, interconnecting wiring, and components.
    b. Provide warning signs.

2. Coordinate installation of new products for <**Insert system or product family/category**> with existing conditions.

    a. <**Insert requirements for transition between new and existing**>.

3. Coordinate with <**Insert Section number and title**> for <**Insert description of interfacing related Work**>.

    a. <**Insert requirements for transition between this Section and related Work**>.

3.2 FIELD QUALITY CONTROL OF SURFACE RACEWAYS

A. Administrant for Electrical Power Tests and Inspections:

1. [**Owner**][**Tenant**] will engage qualified medium-voltage electrical testing and inspecting agency to administer and perform tests and inspections.
2. Engage qualified medium-voltage electrical testing and inspecting agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
4. Administer and perform tests and inspections[**with assistance of factory-authorized service representative**].

B. Administrant for Communications Tests and Inspections:

1. [**Owner**][**Tenant**] will engage qualified communications testing and inspecting agency to administer and perform tests and inspections.
2. Engage qualified communications testing and inspecting agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

4. Administer and perform tests and inspections[**with assistance of factory-authorized service representative**].

C. Field tests and inspections must be witnessed by [**Architect**][**Tenant**][**authorities having jurisdiction**]<**Insert names or titles of witnesses**>.

D. Tests and Inspections:

1. Perform manufacturer's recommended tests and inspections.
2. Perform tests and inspections recommended by standards listed in "Reference Standards for Installation" Paragraph.

E. Nonconforming Work:

1. Boxes and covers will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

F. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.

3.3 CLEANING

A. Remove construction dust and debris from surface raceways before installing covers.

3.4 PROTECTION

A. After installation, protect surface raceways from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION 260533.23

SECTION 260543 - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" specifies additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" specifies seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. [**Section 013100 "Project Management and Coordination"**]<**Insert Section number and title**> specifies preinstallation conference procedures.
4. Section 260519 "Low-Voltage for Electrical Power Conductors and Cables" specifies nonmetallic underground conduit with conductors (Type NUCC).
5. Section 260553 "Identification for Electrical Systems" specifies underground-line warning tape and concrete cable routing markers (warning planks).

1.2 ALLOWANCES

A. See Section 012100 "Allowances" for description of allowances affecting items specified in this Section.

1.3 UNIT PRICES

A. See Section 012200 "Unit Prices" for description of unit prices affecting items specified in this Section.

1.4 ALTERNATES

A. See Section 012300 "Alternates" for description of alternates affecting items specified in this Section.

1.5 DEFINITIONS

A. Duct: A single raceway or multiple raceways, installed singly or as components of a duct bank.

B. Duct Bank: Two or more ducts installed in parallel, direct buried or with additional casing materials such as concrete.

C. Handhole: An underground chamber containing electrical cables, sized such that personnel are not required to enter in order to access the cables.

D. Manhole: An underground chamber containing electrical cables and equipment, sized to provide access with working space clearances.

E. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [**Project site**]<**Insert location**>.

B. Preinstallation Coordination Meeting(s): For underground ducts and raceways. Conduct meeting(s) [**as videoconference**][**or**][**at Project site**]<**Insert location**> before <**Insert construction activity**>.

1. Attendees: Installers, fabricators, representatives of manufacturers, and administrants for field tests and inspections. Notify Architect[**, Construction Manager**][**, and Owner's Commissioning Authority**] of scheduled meeting dates.

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For concrete and steel used in precast concrete [**manholes**][**and**][**handholes**], also include product certificates as required by ASTM C858.

B. Sustainable Design Product Data:

1. Laboratory Test Reports: For solvents and adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings:

1. Electric Utility Duct Banks and Structures:

a. Include plans, elevations, sections, and details, including attachments to other Work.
b. Indicate locations of private property boundaries and utility easements.
c. Include information required for approval by electric utility and for obtaining public space utility work permits.

2. Precast or Factory-Fabricated Concrete Structures:

a. Include plans, elevations, sections, and details, including attachments to other Work.
b. Include duct entry provisions, including locations and duct sizes, and methods and materials for waterproofing duct entry locations.

c. Include reinforcement details.
d. Include frame and cover design and manhole chimneys.
e. Include [**ladder**][**step**] details.
f. Include grounding details.
g. Include dimensioned locations of cable rack inserts, pulling-in and lifting irons, sumps, and other accessories.
h. Include joint details.

3. Factory-Fabricated Handholes and Boxes Other Than Precast Concrete:

a. Include dimensioned plans, sections, and elevations, and fabrication and installation details.
b. Include duct entry provisions, including locations and duct sizes, and methods and materials for waterproofing duct entry locations.
c. Include cover design.
d. Include grounding details.
e. Include dimensioned locations of cable rack inserts, pulling-in and lifting irons, and other accessories.

D. Field quality-control reports.

1.8 INFORMATIONAL SUBMITTALS

A. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

B. Field Reports:

1. Factory Test Reports: For handholes and boxes.
2. Manufacturer's field reports for field quality-control support.

1.9 MAINTENANCE MATERIAL SUBMITTALS

A. Spare Parts: Furnish to Owner spare parts necessary for repairing or adding more cables to manholes or handholes that are packaged with protective covering for storage and identified with labels describing contents.

1. Cable-Support Stanchions, Arms, and Associated Fasteners: [**Five**]<**Insert number**> percent of quantity of each item installed.
2. Insulators: [**Five**]<**Insert number**> percent of quantity of each item installed.
3. <**Insert accessories and specialties**>.

1.10 REGULATORY AGENCY APPROVALS

A. Shop Drawing submittals for electric utility duct banks and structures must be signed and sealed by qualified electrical professional engineer responsible for their preparation. [**Obtain approval by electric utility prior to submitting for action by Architect.**][**Submit for action by Architect prior to submitting for approval by electric**

utility.]

B. Submit Shop Drawings for electric utility duct banks and structures for action by Architect prior to submitting for approval by electric utility.

PART 2 - PRODUCTS

2.1 TYPE EPEC RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 651A and UL CCN EAZX.

2.2 TYPE ERMC-SS RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 6A and UL CCN DYWV.

2.3 TYPE ERMC-S RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 6 and UL CCN DYIX.

2.4 TYPE IMC RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 1242 and UL CCN DYBY.

2.5 TYPE PVC RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

2. General Characteristics: UL 651 and UL CCN DZYR.

2.6 TYPE RTRC-BG RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 2420 and UL CCN DZKT, for Type BG.

2.7 FITTINGS FOR CONDUIT, TUBING, AND CABLE

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

2.8 SOLVENT CEMENTS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: As recommended by conduit manufacturer in accordance with UL 514B and UL CCN DWTT.
3. Sustainability Characteristics:

2.9 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics:

    a. ASTM C858 for design and manufacturing processes.
    b. SCTE 77.

2.10 MANHOLES FOR EXTERIOR UNDERGROUND WIRING

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics:

a. ASTM C858 for design and manufacturing processes.
b. SCTE 77.

B. Cast-in-Place Concrete Manholes:

1. Description: Underground utility structures, constructed in place, complete with accessories, hardware, and features. Include concrete knockout panels for duct entrance and sleeve for ground rod.
2. Additional Criteria: Comply with Section 033000 "Cast-in-Place Concrete."

2.11 SOURCE QUALITY CONTROL

A. Factory Tests for Handholes and Boxes:

1. Testing Administrant: [**Owner will engage**][**Engage**] qualified structural testing agency to evaluate handholes and boxes.

a. Tests of materials must be performed by independent testing agency.
b. Strength tests of complete boxes and covers must be by independent testing agency or manufacturer. Qualified registered professional engineer must certify tests by manufacturer.

2. Factory Tests and Inspections: Perform the following tests and inspections on handholes and boxes, by, or under supervision of, qualified electrical testing laboratory recognized by authorities having jurisdiction, before delivering to site. Affix label with name and date of [**manufacturer's**][**qualified testing laboratory's**] certification of system compliance.

a. Precast Concrete Utility Structures: Test and inspect in accordance with ASTM C1037.
b. Polymer Concrete and Nonconcrete Handhole and Pull-Box Prototypes: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests must be for specified tier ratings of products supplied. Testing machine pressure gages must have current calibration certification, complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

3. Nonconforming Work:

a. Equipment that does not pass tests and inspections will be considered defective.

4. Factory Test Reports: Prepare and submit factory test and inspection reports.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate layout and installation of duct, duct bank, manholes, handholes, and boxes

with final arrangement of other utilities, site grading, and surface features as determined in field. Notify Architect if there is conflict between areas of excavation and existing structures or archaeological sites to remain.

B. Coordinate elevations of duct and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of duct and duct banks, as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations as required to suit field conditions and to ensure that duct and duct bank will drain to manholes and handholes, and as approved by Architect.

C. Clear and grub vegetation to be removed, and protect vegetation to remain in accordance with Section 311000 "Site Clearing." Remove and stockpile topsoil for reapplication in accordance with Section 311000 "Site Clearing."

3.2 SELECTION OF UNDERGROUND DUCTS

A. Duct for Electrical Cables More Than 600 V: [**PVC-80**][**PVC-40**][**EPEC-40**][**EPEC-80**], concrete encased unless otherwise indicated.

B. Duct for Electrical Feeders 600 V and Less: [**PVC-80**][**PVC-40**][**EPEC-40**][**EPEC-80**], [**concrete encased**][**direct buried**] unless otherwise indicated.

C. Duct for Electrical Branch Circuits: [**PVC-80**][**PVC-40**][**EPEC-40**][**EPEC-80**], direct buried unless otherwise indicated.

D. Bored Underground Duct: [**EPEC-40**][**EPEC-80**] unless otherwise indicated.

E. Underground Ducts Crossing Paved Paths Walks and Driveways: [**PVC-80**][**PVC-40**][**direct buried**][**encased in reinforced concrete**].

F. Underground Ducts Crossing Roadways and Railroads: [**PVC-80**][**PVC-40**], encased in reinforced concrete.

G. Stub-ups: Concrete encased, [**PVC-80**][**PVC-40**][**ERMC-S**][**ERMC-S-PVC**][**IMC**].

3.3 SELECTION OF UNDERGROUND ENCLOSURES

A. Handholes and Boxes:

1. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete, AASHTO HB 17, [**H-10**][**H-20**] structural load rating.
2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: [**Precast concrete, AASHTO HB 17, H-10**][**Precast concrete, AASHTO HB 17, H-20**][**Polymer concrete, SCTE 77, Tier 15**][**Fiberglass enclosures with polymer concrete frame and cover, SCTE 77, Tier 15**][**Fiberglass-reinforced polyester resin, SCTE 77, Tier 15**][**High-density plastic, SCTE 77, Tier 15**] structural load rating.
3. Units in Sidewalk and Similar Applications with Safety Factor for Nondeliberate Loading by Vehicles: [**Precast concrete, AASHTO HB 17, H-10**][**Polymer**

concrete units, SCTE 77, Tier 8][**Heavy-duty fiberglass units with polymer concrete frame and cover, SCTE 77, Tier 8**][**High-density plastic, SCTE 77, Tier 8**] structural load rating.

4. Units Subject to Light-Duty Pedestrian Traffic Only: [**Fiberglass-reinforced polyester resin**][**High-density plastic**], structurally tested in accordance with SCTE 77 with 3000 lbf vertical loading.
5. Cover design load must not exceed load rating of handhole or box.

B. Manholes: [**Precast**][**or**][**cast-in-place**] concrete.

1. Units Located in Roadways and Other Deliberate Traffic Paths by Heavy or Medium Vehicles: H-20 structural load rating in accordance with AASHTO HB 17.
2. Units Not Located in Deliberate Traffic Paths by Heavy or Medium Vehicles: H-10 load rating in accordance with AASHTO HB 17.

3.4 EARTHWORK

A. Excavation and Backfill: Comply with Section 312000 "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restoration: Restore area [**immediately after backfilling is completed**][**or**][**after construction vehicle traffic in immediate area is complete**].

C. Restore surface features at areas disturbed by excavation, and re-establish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

D. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Section 329200 "Turf and Grasses" and Section 329300 "Plants."

E. Cut and patch existing pavement in path of underground duct, duct bank, and underground structures in accordance with "Cutting and Patching" Article in Section 017300 "Execution."

3.5 INSTALLATION OF DUCTS AND DUCT BANKS

A. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NEMA TCB 2 for installation of underground ducts and duct banks.
2. Consult Architect for resolution of conflicting requirements.

B. Special Techniques:

1. Where indicated on Drawings, install duct, spacers, and accessories into duct-bank configuration shown. Duct installation requirements in this Section also

apply to duct bank.

2. Steel raceway, bends, and fittings in [**single duct run or duct bank**][**on Project**] must be of same type.
3. Slope: Pitch duct minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope duct from high point between two manholes to drain in both directions.
4. Expansion and Deflection Fittings: Install expansion and deflection fitting in each duct in area of disturbed earth adjacent to manhole or handhole.
5. Install expansion fitting near center of straight line duct with calculated expansion of more than 3/4 inch.
6. Curves and Bends:

    a. Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with minimum radius of [**48 inch**][**12.5 ft**][**25 ft**], both horizontally and vertically, at other locations unless otherwise indicated.
    b. Field bending must be in accordance with NFPA 70 minimum radii requirements, except bends over 45 degrees must be made with minimum radius of [**48 inch**][**12.5 ft**][**25 ft**]. Use only equipment specifically designed for material and size involved. Use PVC heating bender for bending PVC conduit.
    c. Duct must have maximum of 180 degrees of bends between pull points.

7. Joints: Use solvent-cemented joints in nonmetallic duct and fittings and make watertight in accordance with manufacturer's published instructions. Stagger couplings so those of adjacent duct do not lie in same plane. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with minimum 3 inch of concrete for minimum of 12 inch on each side of coupling.

    a. Install insulated grounding bushings on steel raceway terminations that are less than 12 inch below grade or floor level and do not terminate in hubs.

8. Installation Adjacent to High-Temperature Steam Lines: Where duct is installed parallel to underground steam lines, perform calculations showing duct will not be subject to environmental temperatures above 104 deg F. Where environmental temperatures are calculated to rise above 104 deg F, and anywhere duct crosses above underground steam line, install insulation blankets listed for direct burial to isolate duct bank from steam line to maintain maximum environmental temperature of 104 deg F.
9. End Bell Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately 10 inch o.c. for 5 inch duct, and vary proportionately for other duct sizes.

    a. Begin change from regular spacing to end-bell spacing 10 ft from end bell, without reducing duct slope and without forming trap in line.
    b. Grout end bells into structure walls from both sides to provide watertight entrances.

10. Duct Terminators for Entrances to Cast-in-Place Manholes and Concrete

Handholes: Use manufactured, cast-in-place duct terminators, with entrances into structure spaced approximately 6 inch o.c. for 4 inch duct, and vary proportionately for other duct sizes.

a. Begin change from regular spacing to terminator spacing 10 ft from terminator, without reducing duct line slope and without forming trap in line.

11. Building Wall Penetrations: Make transition from underground duct to steel raceway at least 10 ft outside building wall, without reducing duct line slope away from building and without forming trap in line. Use fittings manufactured for transition to steel raceway type installed. Install steel raceway penetrations of building walls as specified in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
12. Install manufactured steel raceway elbows for stub-ups at poles unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.

    a. Couple steel elbows to ducts with adapters designed for this purpose, and encase coupling with minimum 3 inch of concrete for minimum of 12 inch on each side of coupling.

13. Sealing: Provide temporary closure at terminations of duct with pulled cables. Seal spare duct at terminations. Use sealing compound and plugs to withstand at least 15 psig hydrostatic pressure.
14. Pulling Cord: Install 200 lbf test nylon cord in empty ducts.
15. Concrete-Encased Ducts and Duct Bank:

    a. Excavate trench bottom to provide firm and uniform support for duct. Prepare trench bottoms as specified in Section 312000 "Earth Moving" for pipes 6 inch or less in nominal diameter.
    b. Width: Excavate trench [**3 inch**][**12 inch**] wider than duct on each side.
    c. Depth: Install so top of duct envelope is at least 24 inch below finished grade in areas not subject to deliberate traffic, and at least 30 inch below finished grade in deliberate traffic paths for vehicles unless otherwise indicated. Install so top of duct envelope is below local frost line.
    d. Support duct on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
    e. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than [**four**][**five**] spacers per 20 ft of duct. Place spacers within 24 inch of duct ends. Stagger spacers approximately 6 inch between tiers. Secure spacers to earth and to duct to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
    f. Minimum Space between Ducts: 3 inch between edge of duct and exterior envelope wall, 2 inch between ducts for like services, and 4 inch between power and communications ducts.
    g. Elbows:

        1) Use manufactured duct elbows for stub-ups and at changes of direction in duct unless otherwise indicated. Extend encasement

throughout length of elbow.

2) Use manufactured steel elbows for stub-ups, at building entrances, and at changes of direction in duct run.

h. Stub-ups to Outdoor Equipment: Extend concrete-encased steel raceway horizontally minimum of 60 inch from edge of equipment base.

1) Stub-ups must [**terminate in coupling installed flush with**][**be minimum 4 inchabove**] finished floor and minimum 3 inch from conduit side to edge of slab.

i. Stub-ups to Indoor Equipment: Extend concrete-encased steel raceway horizontally minimum of 60 inch from edge of wall. Install insulated grounding bushings on terminations at equipment.

1) Stub-ups must [**terminate in coupling installed flush with**][**be minimum 4 inchabove**] finished floor and no less than 3 inch from conduit side to edge of slab.

j. Reinforcement: Reinforce concrete-encased duct where crossing disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.

k. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.

l. Concrete Cover: Install minimum of 3 inch of concrete cover between edge of duct to exterior envelope wall, 2 inch between duct of like services, and 4 inch between power and communications ducts.

m. Place minimum 6 inch of engineered fill above concrete encasement of duct.

n. Concreting Sequence: Pour each run of envelope between manholes or other terminations in one continuous operation.

1) Start at one end and finish at other, allowing for expansion and contraction of duct as its temperature changes during and after pour. Use expansion fittings installed in accordance with manufacturer's published instructions, or use other specific measures to prevent expansion-contraction damage.

2) If more than one pour is necessary, terminate each pour in vertical plane and install 3/4 inch reinforcing-rod dowels extending minimum of 18 inch into concrete on both sides of joint near corners of envelope.

o. Pouring Concrete: Comply with requirements in "Concrete Placement" Article in Section 033000 "Cast-in-Place Concrete." Place concrete carefully during pours to prevent voids under and between duct and at exterior surface of envelope. Do not allow heavy mass of concrete to fall directly onto ducts. Allow concrete to flow around duct and rise up in middle, uniformly filling open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-installation application.

16. Direct-Buried Duct and Duct Bank:

    a. Excavate trench bottom to provide firm and uniform support for duct. Comply with requirements in Section 312000 "Earth Moving" for preparation of trench bottoms for pipes less than 6 inch in nominal diameter.
    b. Width: Excavate trench [**3 inch**][**12 inch**] wider than duct on each side.
    c. Depth: Install top of duct at least 36 inch below finished grade unless otherwise indicated.
    d. Set elevation of top of duct bank below frost line.
    e. Place minimum 3 inch of sand as bed for duct. Place sand to minimum of 6 inch above top level of duct.
    f. Support ducts on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
    g. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than [**four**][**five**] spacers per 20 ft of duct. Place spacers within 24 inch of duct ends. Stagger spacers approximately 6 inch between tiers. Secure spacers to earth and to ducts to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
    h. Install duct with minimum of 3 inch between ducts for like services and 6 inch between power and communications duct.
    i. Install manufactured duct elbows for stub-ups, at building entrances, and at changes of direction in duct direction unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
    j. Install manufactured steel elbows for stub-ups, at building entrances, and at changes of direction in duct.

        1) Couple RNC duct to steel raceway with adapters designed for this purpose, and encase coupling with minimum 3 inch of concrete.
        2) Stub-ups to Outdoor Equipment: Extend concrete-encased steel raceway horizontally minimum of 60 inch from edge of base. Install insulated grounding bushings on terminations at equipment.

            a) Stub-ups must [**terminate in coupling installed flush with**][**be minimum 4 inch above**] finished base and minimum 3 inch from conduit side to edge of base.

        3) Stub-ups to Indoor Equipment: Extend concrete-encased steel raceway horizontally on exterior of wall minimum of 60 inch from edge of wall. Install insulated grounding bushings on terminations at equipment.
        4) Stub-ups through interior floors must [**terminate in coupling installed flush with**][**be minimum 4 inch above**] finished floor and no less than 3 inch from conduit side to edge of equipment pad or floor slab.

    k. After installing first tier of duct, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process.

Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inch over duct and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction. Comply with requirements in Section 312000 "Earth Moving" for installation of backfill materials.

17. Warning Planks: Bury warning planks approximately 12 inch above direct-buried duct, placing them 36 inch o.c. Align planks along width and along centerline of duct or duct bank. Provide additional plank for each 12 inch increment of duct-bank width over nominal 18 inch. Space additional planks 12 inch apart, horizontally across width of ducts.
18. Underground-Line Warning Tape: Bury [**nonconducting**][**conducting**] underground line specified in Section 260553 "Identification for Electrical Systems" no less than 12 inch above concrete-encased duct and duct banks[**and approximately 12 inch below grade**]. Align tape parallel to and within 3 inch of centerline of duct bank. Provide additional warning tape for each 12 inch increment of duct-bank width over nominal 18 inch. Space additional tapes 12 inch apart, horizontally across width of ducts.
19. Ground ducts and duct banks in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Interfaces with Other Work:

1. Coordinate installation of new products for <**Insert system or product group**> with existing conditions.

   a. <**Insert requirements for transition between new and existing**>.

2. Coordinate with <**Insert Section number and title**> for <**Insert description of interfacing related Work**>.

   a. <**Insert requirements for transition between this Section and related Work**>.

3.6 INSTALLATION OF CONCRETE MANHOLES, HANDHOLES, AND BOXES

A. Reference Standards:

1. Precast Concrete Handholes: Comply with ASTM C891 unless otherwise indicated.
2. Consult Architect for resolution of conflicting requirements.

B. Special Techniques:

1. Cast-in-Place Manholes:

   a. Finish interior surfaces with smooth-troweled finish.
   b. Knockouts for Future Duct Connections: Form and pour concrete knockout panels 1-1/2 to 2 inch thick, arranged as indicated.

c. Comply with requirements in Section 033000 "Cast-in-Place Concrete" for cast-in-place concrete, formwork, and reinforcement.

2. Precast Concrete Handholes and Manholes:

   a. Install units level and plumb and with orientation and depth coordinated with connecting duct to minimize bends and deflections required for proper entrances.
   b. Unless otherwise indicated, support units on level bed of crushed stone or gravel graded from 1 inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
   c. Field-cut openings for conduits in accordance with enclosure manufacturer's published instructions. Cut wall of enclosure with tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3. Elevations:

   a. Manhole Roof: Install with rooftop at least 15 inch below finished grade.
   b. Manhole Frame: In paved areas and trafficways, set frames flush with finished grade. Set other manhole frames 1 inch above finished grade.
   c. Install handholes with bottom below frost line, <**Insert depth of frost line below grade at Project site**> below grade.
   d. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch above finished grade.
   e. Where indicated, cast handhole cover frame integrally with handhole structure.

4. Drainage: Install drains in bottom of manholes where indicated. Coordinate with drainage provisions indicated.
5. Manhole Access: Circular opening in manhole roof; sized to match cover size.

   a. Manholes with Fixed Ladders: Offset access opening from manhole centerlines to align with ladder.
   b. Install chimney, constructed of [**precast concrete**][**cast-iron**] collars and rings, and cast-iron frame to connect cover with manhole roof opening. Provide moisture-tight joints and waterproof grouting for frame and chimney.

6. Waterproofing: Apply waterproofing to exterior surfaces of manholes[**and handholes**] after concrete has cured at least three days. Waterproofing materials and installation are specified in [**Section 071353 "Elastomeric Sheet Waterproofing"**][**Section 071354 "Thermoplastic Sheet Waterproofing"**]<**Insert waterproofing Section**>. After duct has been connected and grouted, and before backfilling, waterproof joints and connections, and touch up abrasions and scars. Waterproof exterior of manhole chimneys after mortar has cured at least three days.
7. Dampproofing: Apply dampproofing to exterior surfaces of manholes[**and handholes**] after concrete has cured at least three days. Dampproofing materials and installation are specified in Section 071113 "Bituminous Dampproofing."

After ducts are connected and grouted, and before backfilling, dampproof joints and connections, and touch up abrasions and scars. Dampproof exterior of manhole chimneys after mortar has cured at least three days.

8. Hardware: Install removable hardware, including pulling eyes, cable stanchions, [**and**]cable arms, [**and insulators,**]as required for installation and support of cables and conductors and as indicated.
9. Fixed Manhole Ladders: Arrange to provide for safe entry with maximum clearance from cables and other items in manholes.
10. Field-Installed Bolting Anchors in Manholes and Concrete Handholes: Do not drill deeper than 3-7/8 inch for manholes and 2 inch for handholes, for anchor bolts installed in field. Use minimum of two anchors for each cable stanchion.
11. Ground manholes, handholes, and boxes in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Interfaces with Other Work:

1. Coordinate installation of new products for <**Insert system or product group**> with existing conditions.

   a. <**Insert requirements for transition between new and existing**>.

2. Coordinate with <**Insert Section number and title**> for <**Insert description of interfacing related Work**>.

   a. <**Insert requirements for transition between this Section and related Work**>.

3.7 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

A. Reference Standards:

1. <**Insert reference standard**> for <**Insert reason**>.
2. Consult Architect for resolution of conflicting requirements.

B. Special Techniques:

1. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting duct, to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of duct, and seal joint between box and extension as recommended by manufacturer.
2. Unless otherwise indicated, support units on level bed of crushed stone or gravel, graded from 1/2 inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
3. Elevation: In paved areas and trafficways, set cover flush with finished grade. Set covers of other handholes 1 inch above finished grade.
4. Install handholes and boxes with bottom below frost line, <**Insert depth of frost line below grade at Project site**> below grade.
5. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space

for future cables, but short enough to preserve adequate working clearances in enclosure.

6. Field cut openings for duct in accordance with enclosure manufacturer's published instructions. Cut wall of enclosure with tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.
7. For enclosures installed in [**asphalt paving**][**and**]<**Insert material**> and subject to occasional, nondeliberate, heavy-vehicle loading, form and pour concrete ring encircling, and in contact with enclosure entry, and with top surface screeded to top of box cover frame. Bottom of ring must rest on [**compacted earth**]<**Insert material**>.

    a. Concrete: 3000 psi, 28-day strength, complying with Section 033000 "Cast-in-Place Concrete," with troweled finish.
    b. Dimensions: [**10 inch wide by 12 inch deep**]<**Insert dimensions**>.

8. Ground handholes and boxes in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Interfaces with Other Work:

1. Coordinate installation of new products for <**Insert system or product group**> with existing conditions.

    a. <**Insert requirements for transition between new and existing**>.

2. Coordinate with <**Insert Section number and title**> for <**Insert description of interfacing related Work**>.

    a. <**Insert requirements for transition between this Section and related Work**>.

3.8 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. <**Insert requirements**>.

B. Field tests and inspections must be witnessed by [**Architect**][**Tenant**][**authorities having jurisdiction**]<**Insert names or titles of witnesses**>.

C. Tests and Inspections:

1. Demonstrate capability and compliance with requirements on completion of installation of underground duct, duct bank, and utility structures.
2. Pull solid aluminum or wood test mandrel through duct to prove joint integrity and adequate bend radii, and test for out-of-round duct. Provide minimum 12 inch long mandrel equal to duct size minus 1/4 inch. If obstructions are indicated, remove obstructions and retest.
3. Test manhole[**and handhole**] grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as

specified in Section 260526 "Grounding and Bonding for Electrical Systems."

D. Nonconforming Work:

1. Underground ducts, raceways, and structures will be considered defective if they do not pass tests and inspections.
2. Correct deficiencies and retest as specified above to demonstrate compliance.

E. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.

F. Manufacturer Services: Engage factory-authorized service representative to [**support**][**supervise**] field tests and inspections.

1. Manufacturer's Field Reports for Field Quality-Control Support: Prepare and submit report after each visit by factory-authorized service representative, documenting activities performed at Project site.

3.9 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of duct until duct cleaner indicates that duct is clear of dirt and debris. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

B. Clean internal surfaces of manholes, including sump, and building interiors affected by Work.

1. Sweep floor, removing dirt and debris.
2. Remove foreign material.

END OF SECTION 260543

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:

1. Section 018116 "Facility Environmental Requirements" specifies basis-of-design environmental conditions and performance criteria that are applicable to product selection and installation of the Work on the Project.
2. Section 018123 "Facility Seismic and Wind Criteria" specifies basis-of-design seismic and wind criteria for nonstructural components on the Project.
3. Section 260010 "Supplemental Requirements for Electrical" specifies additional requirements applicable to coordinating, scheduling, and sequencing of the Work specified in this Section.
4. Section 284600 "Fire Detection and Alarm"[**and Section 284614 "Single- and Multiple-Station Alarms"**] specifies fire detection and alarm devices referenced in this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: For each piece of electrical equipment and electrical system components to be index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 LABELS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
2. Listing Criteria: UL CCN PGDQ2 for components; including UL 969.

2.2 EXTRUDED INSULATING TUBING

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
2. Listing Criteria: UL CCN YDPU2 for components; including UL 224.

2.3 TAPES AND STENCILS

A. Concrete Cable Route Markers <**Insert drawing designation**>:

1. Description: Concrete markers visually aid tracing the route of electrical cables. Monument markers are typically installed at grade. Protective cover markers are typically installed above the cables at grade or below grade.
2. Product Characteristics:

a. Material: Precast reinforced concrete.
b. Marker Type:

1) Above-Ground Monument Post:

a) Nominal Dimensions (Height, Width, Depth): 30 inch, 6 inch, 3 inch.

2) Above-Ground Monument Block:

a) Nominal Dimensions (Height, Width, Depth): [**12 inch, 12 inch, 6 inch**][**24 inch, 24 inch, 4 inch**].

3) In-Ground Protective Cover (Plank or Slab):

a) Nominal Dimensions (Length, Width, Depth): [**36 inch, 6 inch, 2 inch**][**36 inch, 9 inch, 2 inch**][**12 inch, 12 inch, 2 inch**][**24 inch, 12 inch, 2 inch**][**36 inch, 12 inch, 2 inch**].

c. Legend: [**"DANGER - ELECTRICITY"**][**"ELECTRIC CABLES"**][**"ELECTRIC SPLICE"**].
d. Lettering: Approximately 1/8 inch deep, not less than [**1 inch**][**1.5 inch**] high, symmetrically spaced; marked on both sides to allow for reversal.

3. Required Product Options:

a. Color: [**Red**]<**Insert color**> dye added to concrete during batching.
b. Attach metal medallion or sign stamped with [**feeder number**]<**Insert required information**>.

B. Stenciled Legend: In nonfading, waterproof, [**black**]<**Insert color**> ink or paint. Minimum letter height must be [**1 inch**]<**Insert dimension**>.

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 SELECTION OF COLORS AND IDENTIFICATION MARKINGS

A. Comply with 29 CFR 1910.144 for color identification of hazards, and the following:

1. Fire-protection[**and fire-alarm**] equipment[**, including raceways,**] must be finished, painted, or suitably marked safety red.
2. Ceiling-mounted hangers, supports, cable trays, and raceways must be finished, painted, or suitably marked safety yellow where less than [**7.7 ft**]<**Insert height**> above finished floor.

B. Pipe and Conduit Labeling: Comply with ASME A13.1[**and IEEE C2**].

C. Color-Coding for Phase- and Voltage-Level Identification, 1000 V or Less: Use colors listed below for ungrounded [**service**][**feeder**][**and**][**branch-circuit**] conductors.

1. Color must be factory applied[**or field applied for sizes larger than 6 AWG when permitted by authorities having jurisdiction**].
2. Colors for 208Y/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 480Y/277 V Circuits:

    a. Phase A: Brown.
    b. Phase B: Orange.
    c. Phase C: Yellow.

5. Color for Neutral (Grounded Conductor): [**White**][**or**][**gray**].
6. Color for Equipment Ground: [**Bare copper**][**Green**][**Green with yellow stripe**].
7. Color for Isolated Ground: Green with two or more yellow stripes.

D. Color-Coding Raceways, Cable Trays, Junction Boxes, and Conductors for Intrinsically-Safe Circuits: Light blue. When used to identify intrinsically-safe circuits, Article 504 of NFPA 70 requires that the color light blue not be used for any other

purpose.

E. Color-Coding Instructional Signs: Self-adhesive labels, including color code for grounded and ungrounded conductors.

F. Accessible Fittings for Raceways: Identify cover of junction and pull box of the following systems with wiring system legend and system voltage. System legends must be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."
4. <**Insert name**>.

G. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

H. Locations of Underground Lines: Underground-line warning tape for power and lighting.

I. Vaults, Manholes, Handholes, and Pull and Junction Boxes, More Than 1000 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use [**write-on tags**][**nonmetallic preprinted tags colored and marked to indicate phase, and separate tag with circuit designation**].

J. Concealed Raceways, Duct Banks, More Than 1000 V, within Buildings: Tape and stencil. Stencil legend "DANGER - CONCEALED HIGH-VOLTAGE WIRING" with 3 inch high, black letters on 20 inch centers.

1. Locate identification at changes in direction, at penetrations of walls and floors, and at [**10 ft**][**30 ft**] maximum intervals.
2. Identify system voltage[**and system or service type**] with black letters on orange field.
3. Apply floor marking tape to the following finished surfaces:

    a. Floor surface directly above conduits running beneath and within 12 inch of floor that is in contact with earth or is framed above unexcavated space.
    b. Wall surfaces directly external to raceways concealed within wall.
    c. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in building, or concealed above suspended ceilings.

K. Accessible Raceways, Armored and Metal-Clad Cables, More Than 1000 V: [**Vinyl wraparound labels**][**Snap-around labels**][**Self-adhesive labels**][**Snap-around color-coding bands for raceway and cables**].

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.
2. Identify system voltage[**and system or service type**] with black letters on orange field.

L. Vaults, Manholes, Handholes, and Pull and Junction Boxes, 1000 V or Less: For

conductors in vaults, pull and junction boxes, manholes, and handholes, use [**vinyl wraparound labels**][**self-adhesive wraparound labels**][**snap-around labels**][**snap-around color-coding bands**][**self-adhesive vinyl tape**] to identify phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.
2. Identify system voltage[**and system or service type**] with [**black letters on orange field**]<**Insert color scheme**>.

M. Accessible Raceways and Metal-Clad Cables, 1000 V or Less, for Service, Feeder, and Branch Circuits, More Than [**30**]<**Insert number**> A and [**120**]<**Insert number**> V to Ground: Identify with self-adhesive [**raceway labels**][**vinyl tape applied in bands**].

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.
2. Identify system voltage[**and system or service type**] with [**black letters on orange field**]<**Insert color scheme**>.

N. Conductors to Be Extended in Future: Attach [**write-on tags**][**marker tape**] to conductors[**and list source**].

O. Cover Plates: Label individual cover plates with self-adhesive labels. Place label at top of cover plate. Label cover plate with the following information, in the order listed:

1. Panelboard designation.
2. Colon or dash.
3. Branch circuit number.

P. Workspace Indication: Apply [**floor marking tape**][**or**][**tape and stencil**] to finished surfaces. Show working clearances in direction of access to live parts. Workspace must 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.

Q. Equipment Identification Labels:

1. Black letters on white field.
2. Indoor Equipment: [**Self-adhesive label**][**Baked-enamel signs**][**Metal-backed butyrate signs**][**Laminated acrylic or melamine plastic sign**].
3. Outdoor Equipment: [**Laminated acrylic or melamine sign**][**Stenciled legend 4 inch high**].
4. Equipment to Be Labeled:

    a. Racks, Frames, and Enclosures: Identify front and rear of each with self-adhesive labels[**containing equipment designation**].
    b. Panelboards: Typewritten directory of circuits in location provided by panelboard manufacturer. Panelboard identification must be in form of [**self-adhesive, engraved,**][**engraved,**] laminated acrylic or melamine label.
    c. Enclosures and electrical cabinets.
    d. Access doors and panels for concealed electrical items.

e. Switchgear.
f. Switchboards.
g. Transformers: Label that includes tag designation indicated on Drawings for transformer, feeder, and panelboards or equipment supplied by secondary.
h. Substations.
i. Emergency system boxes and enclosures.
j. Motor-control centers.
k. Enclosed switches.
l. Enclosed circuit breakers.
m. Enclosed controllers.
n. Variable-speed controllers.
o. Push-button stations.
p. Power-transfer equipment.
q. Contactors.
r. Remote-controlled switches, dimmer modules, and control devices.
s. Uninterruptible power supplies.
t. Battery-inverter units.
u. Battery racks.
v. Power-generating units.
w. Monitoring and control equipment.
x. <**Insert equipment**>.

R. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.3 SELECTION OF IDENTIFICATION PRODUCTS FOR COMMUNICATIONS, CONTROL, AUXILIARY, AND LIFE SAFETY SYSTEMS

A. Comply with Section 270528 "Pathways for Communications Systems" and Section 271100 "Communications Equipment Room Fittings."

3.4 INSTALLATION

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. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes typical for electrical equipment environments specified in Section 018116 "Facility Environmental Requirements" and Section 260010 "Supplemental Requirements for Electrical."

C. 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).

D. Fasteners for Labels and Signs: Self-tapping, stainless steel screws or stainless steel machine screws with nuts and flat and lock washers.

E. 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.

F. Install identifying devices before installing acoustical ceilings and similar concealment.

G. Verify identity of item before installing identification products.

H. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

I. Apply identification devices to surfaces that require finish after completing finish work.

J. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

K. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from floor.

L. Vinyl Wraparound Labels:

1. Secure tight to surface of raceway or cable at location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to location and substrate.

M. Snap-Around Labels: Secure tight to surface at location with high visibility and accessibility.

N. Self-Adhesive Wraparound Labels: Secure tight to surface at location with high visibility and accessibility.

O. Snap-Around Color-Coding Bands: Secure tight to surface at location with high visibility and accessibility.

P. Heat-Shrink, Preprinted Tubes: Secure tight to surface at location with high visibility and accessibility.

Q. Marker Tapes: Secure tight to surface at location with high visibility and accessibility.

R. Self-Adhesive Vinyl Tape: Secure tight to surface at location with high visibility and accessibility.

1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for minimum distance of 6 inch where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

S. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

T. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's instructions.

U. Underground Line Warning Tape:

1. During backfilling of trenches, install continuous underground-line warning tape not less than 12 inch directly above cables or raceways buried 18 inch or more below grade. Use multiple tapes where width of multiple lines installed in common trench [**or concrete envelope**]exceeds 16 inch overall.
2. Limit use of underground-line warning tape to direct-buried cables.
3. Install underground-line warning tape for direct-buried cables and cables in raceways.

V. Concrete Cable Route Markers: [**As indicated on Drawings**]<**Insert Project-specific requirements**>.

W. Metal Tags:

1. Place in location with high visibility and accessibility.
2. Secure using [**general-purpose**][**UV-stabilized**][**plenum-rated**] cable ties.

X. Nonmetallic Preprinted Tags:

1. Place in location with high visibility and accessibility.
2. Secure using [**general-purpose**][**UV-stabilized**][**plenum-rated**] cable ties.

Y. Write-on Tags:

1. Place in location with high visibility and accessibility.
2. Secure using [**general-purpose**][**UV-stabilized**][**plenum-rated**] cable ties.

Z. Baked-Enamel Signs: Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.

AA. Metal-Backed Butyrate Signs: Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.

BB. Laminated Acrylic or Melamine Plastic Signs: Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.

END OF SECTION 260553

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Time switches.
2. Outdoor photoelectric switches.
3. Daylight-harvesting controls.
4. Business occupancy and vacancy sensors.
5. Storage occupancy sensors.
6. Outdoor motion sensors.
7. Industrial control switches.
8. Emergency lighting controls.

B. Related Requirements:

1. Section 018116 "Facility Environmental Requirements" specifies temperature, humidity, acoustical, and other field conditions applicable to the Work specified in this Section.
2. Section 018123 "Facility Seismic and Wind Criteria" specifies seismic hazard, wind hazard, other structural design conditions applicable to the Work specified in this Section.
3. Section 260010 "Supplemental Requirements for Electrical" specifies additional coordination, scheduling, sequencing, submittal, and installation requirements applicable to the Work for electrical, communications, and electronic safety and security systems on the Project, including wiring methods.
4. Section 260526 "Grounding and Bonding for Electrical Systems" specifies grounding and bonding of lighting control devices referenced by this Section.
5. Section 260529 "Hangers and Supports for Electrical Systems" specifies hangers and supports referenced by this Section.
6. Section 260553 "Identification for Electrical Systems" specifies electrical equipment labels and warning signs referenced by this Section.
7. [**Section 262726 "Wiring Devices"**][**Section 262726.11 "General-Use Switches, Dimmer Switches, and Fan-Speed Controller Switches"**] for wall-box dimmers and manual light switches.

1.2 DEFINITIONS

A. BCELTS: Branch circuit emergency lighting transfer switch.

B. DPDT: Double pole double throw.

C. DPST: Double pole single throw.

D. N.C.: Normally closed.

E. N.O.: Normally open.

F. PIR: Passive infrared.

G. SPDT: Single pole double throw.

H. SPST: Single pole single throw.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Product Listing: Include copy of unexpired approval letter, on letterhead of qualified electrical testing agency, certifying product's compliance with specified listing criteria.

    a. If listed manufacturer differs from selling manufacturer, indicate relationship between entities on submittal. Clearly indicate which entity warrants product performance and fitness for purpose.
    b. Listing criteria identified in approval letter must match specified listing criteria. UL label indicating approval of equipment's enclosure is not considered approval of equipment for intended application.
    c. Product identification in approval letter must match product branding and model numbers in submittal. Approval letters for discontinued or superseded products are unacceptable for submitted product.

2. Include manufacturer's sample extended warranty language.

B. Shop Drawings: Prepare and submit the following:

1. Show installation details for the following:

    a. Occupancy sensors.
    b. Vacancy sensors.

2. Interconnection diagrams showing field-installed wiring.
3. Diagrams for power, signal, and control wiring.

C. Sustainable Design Submittals:

1. ASHRAE/IES 90.1 LPD Compliance Documentation: Prepare plans and calculations demonstrating that as-constructed lighting power density complies with mandatory provisions of ASHRAE/IES 90.1 and that as-constructed lighting, including daylighting and controls, improves on baseline energy performance. If included with Project, indicate locations of energy meters for lighting loads.
2. Lighting Control Documentation: Floor plans indicating the following information:

    a. As-installed locations of switches and dimmers.

b. Lighting zones and control strategy for each switch or dimmer, including unoccupied time-delay setting for shut-off and override time-delay setting for shut-off.
c. Multilevel or dimming range capability for each switch or dimmer.
d. Which switches or dimmers are operated by occupancy sensors, vacancy sensors, daylighting sensors, or time clocks.

D. Field quality-control reports.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer's published instructions.

B. Field Reports:

1. Manufacturer's field reports for field quality-control support.
2. Field reports for software and firmware upgrades.

1.5 CLOSEOUT SUBMITTALS

A. Warranty documentation.

B. Software and firmware service agreement.

1.6 QUALIFICATIONS

A. Electrical Power Testing (EPT) Technician III: Possessing active NICET EPT Level III certification. Able to manage switching procedures, conduct tests of complex equipment, analyze test and equipment data, plan a job, and lead a team. Has experience performing NFPA 70B, IEEE, and NETA electrical tests.

B. Electrical Power Testing (EPT) Technician IV: Possessing active NICET EPT Level IV certification. Able to conduct tests of complex metering and relay systems; evaluate tests, test equipment, test results, and power system performance; recommend actions to maintain or improve system performance; and lead multiteam projects.

C. Electrical Power Testing and Inspecting Agency: Entities possessing active credentials from qualified electrical testing laboratory recognized by authorities having jurisdiction.

1. On-site electrical testing supervisors must possess active NICET EPT Technician [**III**][**IV**] certification.

D. Lighting Testing and Inspecting Agency: Entity possessing active qualifications specified in Section 014000 "Quality Requirements" with documented training and experience with testing and inspecting lighting installations in accordance with applicable IES standards.

1.7 WARRANTY

A. Special Installer Extended Warranty: Installer warrants that installed lighting control devices perform in accordance with specified requirements and agrees to repair or replace components or products that fail to perform as specified within extended-warranty period. Warranty must convey to Owner upon acceptance of the Work.

1. Extended-Warranty Period: [**Two**][**Three**][**Four**]<**Insert number**> years from date of Substantial Completion; full coverage for labor, materials, and equipment.

B. Special Manufacturer Extended Warranty: Manufacturer warrants that lighting control devices perform in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within extended-warranty period. Warranty must convey to Owner upon acceptance of the Work.

1. Failures include, but are not limited to, the following:

a. Faulty operation of lighting control software.
b. Faulty operation of lighting control devices.
c. <**Insert failure modes**>.

2. Initial Extended-Warranty Period: [**Three**][**Four**][**Five**]<**Insert number**> years from date of Substantial Completion; [**full**][**prorated**] coverage for labor, materials, and equipment.
3. Follow-On Extended-Warranty Period: [**Eight**]<**Insert number**> years from date of Substantial Completion; [**full**][**prorated**] coverage for materials only, free on board [**origin**][**destination**], freight prepaid.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements:

1. Products or components listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
2. Must comply with CCR Title 24.

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 SELECTION OF CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than 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 [**18 AWG**][**22 AWG**][**24 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 [**14 AWG**][**16 AWG**][**18 AWG**]. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 INSTALLATION OF LIGHTING CONTROL DEVICES

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in the Contract Documents or manufacturer's published instructions, comply with the following:

1. Electrical Construction: ICC IBC, ICC IFC, NFPA 1, NFPA 70, and NECA NEIS 1.
2. Electrical Maintenance: NFPA 70B.
3. Electrical Safety: NFPA 70E.
4. Grounding and Bonding: NECA NEIS 331 and Article 250 of NFPA 70.
5. Communications Work: BICSI N1.
6. Life Safety and Means of Egress Work: NFPA 101.
7. Work in Basements and Other Developed Subterranean Spaces: NFPA 520.
8. Consult Architect for resolution of conflicting requirements.

C. Special Installation Techniques:

1. 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.
2. 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 instructions.
3. Installation of Industrial Control Switches: Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration

isolators.

4. Installation of Wiring:

    a. Conduit: Minimum conduit size is 1/2 inch.
    b. Wiring within Enclosures: Separate power-limited and nonpower-limited conductors in accordance with conductor manufacturer's published instructions.
    c. Size conductors in accordance with lighting control device manufacturer's published instructions unless otherwise indicated.
    d. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, device, and outlet boxes; terminal cabinets; and equipment enclosures.

D. Interfaces with Other Work:

1. Identification: Provide labels for lighting control devices and associated electrical equipment.

    a. Identify field-installed conductors, interconnecting wiring, and components.
    b. Label each enclosure with engraved metal or laminated-plastic nameplate.
    c. Identify controlled circuits in lighting contactors.
    d. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
    e. Label time switches and contactors with a unique designation.

3.4 FIELD QUALITY CONTROL

A. Administrant for Electrical Power Tests and Inspections:

1. [**Owner**][**Tenant**] will engage qualified electrical testing and inspecting agency to administer and perform tests and inspections.
2. Engage qualified electrical testing and inspecting agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
4. Administer and perform tests and inspections[**with assistance of factory-authorized service representative**].

B. Administrant for Lighting Tests and Inspections:

1. [**Owner**][**Tenant**] will engage qualified lighting testing and inspecting agency to administer and perform tests and inspections.
2. Engage qualified lighting testing and inspecting agency to administer and perform tests and inspections.
3. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
4. Administer and perform tests and inspections[**with assistance of factory-authorized service representative**].

C. Field tests must be witnessed by [**Architect**][**Tenant**][**authorities having jurisdiction**]<**Insert names or titles of witnesses**>.

D. 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.

E. Nonconforming Work:

1. Lighting control devices will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

F. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.

G. Manufacturer Services: Engage factory-authorized service representative to [**support**][**supervise**] field tests and inspections.

1. Manufacturer's Field Reports for Field Quality-Control Support: Prepare and submit report after each visit by factory-authorized service representative, documenting activities performed at the Project site.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within [**12**]<**Insert number**> months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to [**two**]<**Insert number**> visits to the Project site during other-than-normal occupancy hours for this purpose. Some of the Work may be required during hours of darkness.

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. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.6 CLOSEOUT ACTIVITIES

A. Demonstration:

1. [**With assistance from factory-authorized service representatives, demonstrate**][**Demonstrate**] to Owner's maintenance and clerical personnel[**and building occupants**] how to operate the following systems and equipment:

a. Lighting control devices.

B. Training:

1. [**With assistance from factory-authorized service representatives, train**][**Train**] Owner's maintenance personnel on the following topics:

a. How to adjust, operate, and maintain lighting control devices.

3.7 MAINTENANCE

A. Software and Firmware Service Agreement:

1. Technical Support: Beginning at Substantial Completion, verify that software and firmware service agreement includes software support for [**two**]<**Insert number**> years.
2. Upgrade Service: At Substantial Completion, update software and firmware to latest version. Install and program software upgrades that become available within [**two**]<**Insert number**> years from date of Substantial Completion. Verify upgrading software includes operating system and new or revised licenses for using software.

a. Upgrade Notice: Not less than [**30 days**]<**Insert duration**>; to allow Owner to schedule and access the system[**and to upgrade computer equipment if necessary**].

3. Field Reports for Software and Firmware Upgrades: Prepare and submit report after each update, documenting upgrades installed.

END OF SECTION 260923

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping, or sealing site utilities.
7. Temporary erosion and sedimentation control.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled or otherwise to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site in a legal manner.

1.4 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises as indicated and approved by the Engineer.

C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection," and as noted on the drawings.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site according to requirements in Section

015639 "Temporary Tree and Plant Protection," and as noted on the drawings.

B. Repair or replace vegetation indicated to remain or be relocated that are damaged by construction operations as noted on the drawings.

3.4 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.

1. Arrange with utility companies to shut off indicated utilities.

B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without the Engineer’s written permission.

C. Removal of underground utilities is included in earthwork sections; in applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security, and utilities sections; and in Section 024116 "Structure Demolition" and Section 024119 "Selective Demolition."

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Grind down stumps and remove roots larger than 3 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed sub grade.
2. Use only hand methods or air spade for grubbing within protection zones.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. As applicable, remove sod and grass before stripping topsoil.

B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or

other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other no recyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Excavation and/or embankment from existing ground to subgrade, including soil sterilant, for roadways, driveways, parking areas, building pads, walks, paths, or trails and any other site improvements called for on the Plans.

1.2 SECTION EXCLUDES

A. Earthwork related to underground utility installation shall be performed in accordance with Sections 31 21 00, Utility Trenching and Backfill.

1.3 RELATED SECTIONS

A. Section 01 10 00, Supplemental General Requirements

B. Section 01 50 50, Erosion Control

C. Section 31 10 00, Site Clearing

1.4 RELATED DOCUMENTS

A. ASTM

1. D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort
2. D1586, Method for Penetration Tests and Split-Barrel Sampling of Soils
3. D2487, Classification of Soils for Engineering Purposes
4. D3740, Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
5. D4318. Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils
6. E329, Specification for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
7. E548, Guide for General Criteria Used for Evaluating Laboratory Competence

B. California Building Code, California Code of Regulations, Title 24, Part 2, Chapter 18, Soils and Foundations, and Chapter 33, Safeguards During Construction

C. Caltrans Standard Specifications, 2015

1. Section 17, General
2. Section 19, Earthwork

D. CAL/OSHA, Title 8.

1.5 DEFINITIONS

A. Borrow: Approved soil material imported from off-site for use as Structural Fill or Backfill.

B. Excavation: Removal of material encountered above subgrade elevations.

1. Authorized Over-Excavation: Excavation below subgrade elevations or beyond indicated horizontal dimensions as shown on plans or authorized by the Engineer.
2. Unauthorized Over-Excavation: Excavation below subgrade elevations or beyond indicated horizontal dimensions without authorization by the Geotechnical Engineer. Unauthorized excavation shall be without additional compensation.

C. Geotechnical Testing Agency: An independent testing agency qualified according to ASTM E329 to conduct soil materials and rock definition testing, as documented according to ASTM D3740 and ASTM E548.

D. Structural Backfill: Soil materials approved by the Engineer and used to fill excavations resulting from removal of existing below grade facilities, including trees.

E. Structural Fill: Soil materials approved by the Engineer and used to raise existing grades.

F. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material ¾ cubic yards or more in volume that when tested by an independent geotechnical testing agency, according to ASTM D1586, exceeds a standard penetration resistance of 100 blows/2 inches.

G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man made stationary features constructed above or below grade.

H. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, base or topsoil materials.

I. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and other deleterious materials.

J. Unsuitable Material: Any soil material that is not suitable for a specific use on the Project. The Engineer will determine if a soil material is unsuitable.

K. Relative Compaction: In-place dry density of soil expressed as percentage of maximum dry density of same materials, as determined by laboratory test procedure ASTM D1557.

L. Utilities: onsite underground pipes, conduits, ducts and cables.

1.6 SUBMITTALS

A. Follow submittal procedure outlined in Section 01 10 00, Supplemental General Requirements.

B. Samples:

1. If required by the Engineer, provide 20 pound samples, sealed in airtight containers, tagged with source locations and suppliers of each proposed soil material from on-site or borrow sources, 72 hours prior to use. Do not import materials to the Project without written approval of the Engineer.
2. Provide materials from same source throughout work. Change of source requires approval of the Engineer.

C. Material Test Reports: Provide, from a qualified testing agency, the following test results showing compliance with the project requirements

D. Classification according to ASTM D2487 of each onsite or borrow soil material proposed for fill and backfill.

1. Laboratory compaction curve in conformance with ASTM D1557 for each onsite or borrow soil material proposed for fill and backfill.

1.7 QUALITY ASSURANCE

A. Provide an independent testing agency qualified according to ASTM E329 to conduct soil materials and rock definition testing, as documented according to ASTM D3740 and ASTM E548.

B. Conform all work and materials to the recommendations or requirements of the Geotechnical Report and meet the approval of the Engineer.

C. Conform all work in accordance with Caltrans Standard Specification Section 17, General and Section 19, Earthwork.

D. Percentage of compaction specified shall be the minimum acceptable. The percentage represents the ratio of the dry density of the compacted material to the maximum dry density of the material as determined by the procedure set forth in ASTM D1557.

E. Perform excavation, filling, compaction and related earthwork under the observation of the Engineer. Materials placed without approval of the Engineer will be presumed to be defective and, at the discretion of the Geotechnical Engineer, shall be removed and replaced at no cost to the City. Notify the Engineer at least 24 hours prior to commencement of earthwork and at least 48 hours prior to testing.

F. The Engineer will perform observations to enable him to form an opinion of the acceptability of the Project earthwork. Correct earthwork that, in the opinion of the

Engineer, does not meet the requirements of these Technical Specifications .

G. Upon completion of the construction work, certify that all compacted fills and foundations are in place at the correct locations, and have been constructed in accordance with sound construction practice. In addition, certify that the materials used are of the types, quality and quantity required by these Technical Specifications . The Contractor shall be responsible for the stability of all fills and backfills constructed by his forces and shall replace portions that in the opinion of the Engineer have been displaced or are otherwise unsatisfactory due to the Contractor's operations.

H. Finish subgrade tolerance at completion of grading:

1. Building and paved areas: □0.05 feet
2. Other areas: □0.10 feet

1.8 PROJECT CONDITIONS

A. Promptly notify the City's Representative of surface or subsurface conditions differing from those disclosed in the Technical Specifications. First notify the City's Representative verbally to permit verification and extent of condition and then in writing. No claim for conditions differing from those anticipated in the Contract Documents will be allowed unless the Contractor has notified the City's Representative in writing of differing conditions prior to the Contractor starting work on affected items.

B. Protect open excavations, trenches, and the like with fences, covers and railings to maintain safe pedestrian and vehicular traffic passage.

C. Prevent erosion of freshly-graded areas during construction and until such time as permanent drainage and erosion control measures have been installed in accordance with Section 01 50 50, Erosion Control.

D. Temporarily stock-pile fill material in an orderly and safe manner and in a location approved by the City's Representative.

E. Environmental Requirements: When unfavorable weather conditions necessitate interrupting earthwork operation, areas shall be prepared by compaction of surface and grading to avoid collection of water. Provide adequate temporary drainage to prevent erosion. After interruption, compaction specified in last layer shall be re-established before resuming work.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: On-site soils are considered suitable for use as fill provided the materials are placed in accordance with Engineer's recommendations. Highly expansive soils shall not be used as select structural fill, or used as backfill for trenches located within hardscape areas.

B. Imported fill soils, if required, should be predominantly granular in nature, and should be free of organics, debris, or rocks over 3 inches in size, and shall be approved by the Engineer before importing to the site. Imported non-expansive soils shall have a Plasticity Index less than 15 as determined by ASTM D4318, an R-value of at least 20, and fines content between 15 and 65 percent. Import fill shall be considered non-hazardous per Department of Toxic Substances Control guidelines (DTSC, 2017) and non-corrosive per Caltrans Corrosion Guidelines (Caltrans, 2015).

2.2 SOIL STERILANT

A. Commercial chemical for weed control, registered by EPA. Provide granular, liquid or wet-able powder form.

PART 3 - EXECUTION

3.1 GENERAL

A. Perform work in accordance with Caltrans Standard Specification Section 19, Earthwork, as modified by the Contract Documents.

B. Placement and compaction of material by flooding, ponding, or jetting will not be permitted.

C. The use of explosives will not be permitted.

D. Grading and earthwork operations shall be observed and tested by a representative of the Engineer for conformance with the project plans/specifications and the geotechnical recommendations. This work includes site preparation, selection of satisfactory materials, and placement and compaction of the subgrades and fills. Sufficient notification prior to commencement of earthwork is essential to make certain that the work will be properly observed.

3.2 CONTROL OF WATER AND DEWATERING

A. Comply with Section 31 23 19, Dewatering, if dewatering is necessary.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding the site and surrounding area. Provide dewatering equipment necessary to drain and keep excavations and site free from water.

C. Dewater during backfilling operation so that groundwater is maintained a least 1 foot below level of compaction effort.

D. Obtain the Engineer’s approval for proposed control of water and dewatering methods.

E. Protect subgrades from softening, undermining, washout and damage by rain or water

accumulation.

F. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations.

G. Maintain dewatering system in place until dewatering is no longer required.

3.3 WET WEATHER CONDITIONS

A. Do not prepare subgrade, place or compact soil materials if subgrade or materials are above optimum moisture content.

B. If the Engineer allows work to continue during wet weather conditions, conform to supplemental recommendations provided by the Engineer.

3.4 BRACING AND SHORING

A. Conform to California and Federal OSHA requirements.

B. Place and maintain such bracing and shoring as may be required to support the sides of the excavations for the proper protection of workmen; to facilitate the work; to prevent damage to the facility being constructed; and to prevent damage to adjacent structures or facilities. Remove all bracing and shoring upon completion of the work.

C. Be solely responsible for all bracing and shoring and, if requested by the City’s Representative, submit details and calculations to the City’s Representative. The City’s Representative may forward the submittal to the the Consulting Engineer and/or the California Division of Industrial Safety for their review. The Contractor's submittal shall include the basic design, assumed soils conditions and estimation of forces to be resisted, together with plans and specifications of the materials and methods to be used, and shall be prepared by a civil engineer or structural engineer registered in California. No excavations related to the proposed facility shall precede a response to the submittal by the City’s Representative.

D. Be solely responsible for installing and extracting the sheathing in a manner which will not disturb the position or operation of the facility being constructed or adjacent utilities and facilities.

3.5 TOPSOIL STRIPPING

A. Remove topsoil in accordance with Section 31 10 00, Site Clearing.

3.6 EXCAVATION

A. Excavate earth and rock to lines and grades shown on plans and to the neat dimensions indicated on the plans, required herein or as required to satisfactorily compact backfill.

B. Remove and dispose of large rocks, pieces of concrete and other obstructions encountered during excavation.

C. Excavation through buried concrete and other unknown obstructions will require specialized techniques for demolition and removal.

D. Where forming is required, excavate only as much material as necessary to permit placing and removing forms.

E. Provide supports, shoring and sheet piles required to support the sides of excavations or for protection of adjacent existing improvements.

3.7 GRADING

A. Uniformly grade the Project to the elevations shown on plans

B. Finish ditches, gutters and swales to the sections, lines and grades indicated and to permit proper surface drainage.

C. Round tops and bottoms of slopes as indicated or to blend with existing contours.

3.8 SUBGRADE PREPARATION

A. Subgrade Preparation: Prior to backfilling depressions created by the removal of old foundations and utility lines, scarify the bottom of the excavation to an approximate depth of 8 inches and uniformly moisture condition the scarified surfaces to a moisture content that is at least 2 percent over optimum. Compact the scarified surfaces to a minimum of 90 percent relative compaction at above optimum moisture content.

B. Over-excavate any remaining soft (pumping) areas down to firm soil and backfill the area.

C. Subgrade shall be maintained in a moist, but not wet, condition by periodically sprinkling water prior to the placement of additional fill or installation of roads. Subgrade that has been permitted to dry out and loosen or develop desiccation cracking should be scarified, moisture conditioned, and re-compacted as recommended above.

D. Install underground utilities and service connections prior to final preparation of subgrade and placement of base materials for final surface facilities. Extend services so that final surface facilities are not disturbed when service connections are made.

E. Prepare subgrades under the structural section of paved areas, curbs, gutters, walks, structures, other surface facilities and areas to receive structural fill.

F. Protect utilities from damage during compaction of subgrades and until placement of final pavements or other surface facilities.

G. Obtain the Engineer’s approval of subgrades prior to placing pavement structural

section.

3.9 KEYWAYS AND BENCHES

A. Provide keyways as indicated for fill slopes steeper than 6 horizontal to 1 vertical. Extend keyway 5 feet minimum into competent, undisturbed soil or 3 feet minimum into competent, undisturbed rock as directed by the Geotechnical Engineer.

B. Place subsurface drains in bottom of keyway in accordance with Section 33 46 00, Subdrainage.

C. Bench subgrade as indicated above toe of fill.

D. Place subsurface drains at benches every 20 vertical feet or as directed by the Engineer.

3.10 LOT FINISH GRADING

A. Blade finish lots to lines and grades indicated.

3.11 FILL PLACEMENT AND COMPACTION

A. Place fill in uniformly moisture conditioned and compacted lifts not exceeding 8 inches in loose thickness. Each lift should be thoroughly moisture conditioned and compacted to 90 percent before successive fill layers are placed.

B. In order to achieve satisfactory compaction in the subgrade and fill soils, it may be necessary to adjust the soil moisture content at the time of soil compaction per geotechnical recommendations. This may require that water be added and thoroughly mixed into any soils which are too dry or that scarification and aeration be performed in any soils which are too wet.

C. Obtain the Engineer’s approval of surface to receive structural fill prior to placement of structural fill material.

D. Place structural fill on prepared subgrade.

E. Do not drop fill on structures. Do not backfill around, against or upon concrete or masonry structures until structure has attained sufficient strength to withstand loads imposed and the horizontal structural system had been installed.

F. Do not compact by ponding, flooding or jetting.

G. Perform compaction using rollers, pneumatic or vibratory compactors or other equipment and mechanical methods approved by the Engineer.

H. Compaction requirements (unless specified otherwise by the Geotechnical Engineer):

1. Compact structural fills less than 5 feet thick to 90 percent compaction.
2. Compact structural fill 5 feet thick or greater to 95 percent compaction.
3. Compact the upper 6 inches of subgrade soils beneath pavements, curbs and gutters to 95 percent compaction. Extend compaction 5 feet beyond pavement edges unless specified otherwise by the Engineer.
4. Compact the upper 6 inches of subgrade soils under walks, structures and areas to receive structural fill to 90 percent compaction.

3.12 SOIL STERILIZATION

A. Apply soil sterilant to areas indicated, such as beneath asphalt concrete pavement, brick pavement, concrete pavement and at grade concrete slabs, including sidewalks, curbs and gutters. Also where indicated apply soil sterilant below expansion and control joints and at areas where pipes, ducts or other features penetrate slabs.

B. Apply soil sterilant uniformly and at the rates recommended by the manufacturer.

C. Apply soil sterilant to prepared subgrade, or after installation of aggregate base as recommended by the manufacturer.

3.13 DISPOSAL

A. Lawfully dispose of all unsuitable and excess or surplus material off-site at no cost to the City.

END OF SECTION 312000

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes Concrete Paving for the following:

1. Curbs and gutters
2. Sidewalks
3. Concrete paving

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of product, ingredient, or admixture requiring color selection.

C. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.3 QUALITY ASSURANCE

A. Ready-Mix-Concrete 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" (Quality Control Manual - Section 3, "Plant Certification Checklist").

1.4 PRECONSTRUCTION TESTING

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

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 STEEL REINFORCEMENT

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

B. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed bars.

D. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.

E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified.

2.3 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland cement: ASTM C 150/C 150M, gray Portland cement Type V.
2. Fly Ash: N/A.
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
4. Blended Hydraulic Cement: ASTM C 595/C 595M Type IL, Portland-limestone cement.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, uniformly graded. Provide aggregates from a single source.

C. Air-Entraining Admixture: ASTM C 260/C 260M.

D. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

E. Color Pigment: ASTM C 979/C 979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

1. Color: As selected by Landscape Architect from manufacturer's full range.

F. Water: Potable and complying with ASTM C 94/C 94M.

2.4 FIBER REINFORCEMENT

A. Synthetic Fiber: Monofilament polypropylene fibers engineered and designed for use in

decorative concrete paving, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches long.

B. Synthetic Fibers: Fibrillated polypropylene fibers engineered and designed for use in decorative concrete paving, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches long.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 10oz./sq. yd. dry or cotton mats.

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

C. Water: Potable.

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

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.

2.6 RELATED MATERIALS

A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.

B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

2.7 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

B. Cementitious Materials: Use 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. Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash or Pozzolan: N/A.

2. Slag Cement: 50 percent.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 5%-8% percent plus or minus 1-1/2 percent.

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

E. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd..

F. Color Pigment: Add color pigment, if applicable, to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

G. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 3500 psi.
2. Maximum W/C Ratio at Point of Placement: per civil engineer’s drawings
3. Slump Limit: 4 inches , plus or minus 1 inch.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proof-roll prepared subbase surface below concrete walk, paving, and pads to identify soft pockets and areas of excess yielding.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT INSTALLATION

A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness and details in the Landscape plans:

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

B. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

D. Screed paving surface with a straightedge and strike off.

E. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.
3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

C. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on paving surface according to manufacturer's written instructions.

1. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.
2. After curing, lightly work surface with a steel-wire brush or abrasive stone and water to expose nonslip aggregate.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by curing compound per Green Book 201-4.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.

2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-feet- long; unleveled straightedge not to exceed 1/2 inch.
4. Joint Spacing: 3 inches.
5. Contraction Joint Depth: Plus 1/4 inch, no minus.
6. Joint Width: Plus 1/8 inch, no minus.

3.10 REPAIR AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321823.43 - CONCRETE BASKETBALL & MULTI-PURPOSE COURT SURFACE COLOR COATING SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete basketball & multi-purpose court surface color coating system.

1.2 RELATED REQUIREMENTS

A. Section 03300 (03 30 00) – Cast-in-Place Concrete.

B. Section 03400 (03 40 00) – Precast Concrete.

1.3 REFERENCE STANDARDS

A. American Sports Builders Association (ASBA).

B. United States Tennis Association (USTA) Rules of Tennis.

C. National Basketball Association (NBA) Official Rules

D. National Federation of State High School Associations (NFHS) Rule Book

E. National Collegiate Athletic Association (NCAA) Rule Book

1.4 SUBMITTALS

A. Comply with Section 01330 (01 33 00) – Submittal Procedures.

B. Product Data: Submit manufacturer’s product data, including surface and crack preparation and application instructions.

C. Samples: Submit manufacturer’s color samples of color coating.

D. Test Reports:

1. Submit independent test results for solar reflectance index.
2. Submit independent test results for 2000 Hour ASTM G154, accelerated weathering UV test, to demonstrate long-term durability and fade resistance.
3. Submit independent test results for 2000 Hour, accelerated weathering ASTM G155 Xenon Arc test, to demonstrate long-term fade resistance and quality of pigment.

E. Manufacturer’s Certification: Submit manufacturer’s certification that materials comply with specified requirements and are suitable for intended application.

F. Manufacturer’s Project References: Submit manufacturer’s list of successfully completed concrete basketball & multi-purpose court surface color coating system projects, including project name, location, and date of application.

G. Applicator’s Project References: Submit applicator’s list of successfully completed concrete basketball & multi-purpose court surface color coating system projects, including project name, location, type and quantity of color coating system applied, and date of application.

H. Warranty Documentation: Submit manufacturer’s standard warranty.

I. Authorized Installer Certificate: Submit manufacturer’s authorized installer certificate.

1.5 QUALITY ASSURANCE

A. A. Manufacturer’s Qualifications:

1. Manufacturer regularly engaged, for past 5 years, in manufacture of concrete basketball & multi-purpose court surface color coating systems of similar type to that specified.
2. United States owned company.
3. Member: ASBA.

B. Applicator's Qualifications:

1. Applicator regularly engaged, for past 3 years, in application of basketball & multi-purpose court surface color coating systems of similar type to that specified.
2. Employ persons trained for application of basketball & multi-purpose court surface color coating systems.
3. Applicator must be authorized installer of the surfacing brand used.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:

1. Store and handle materials in accordance with manufacturer’s instructions.
2. Keep materials in manufacturer’s original, unopened containers and packaging until application.
3. Store materials in clean, dry area indoors.
4. Store materials out of direct sunlight.
5. Keep materials from freezing.

6. Protect materials during storage, handling, and application to prevent contamination or damage.
7. Close containers when not in use.
8. Retain manufacturer batch codes on each container and application dates, for warranty purposes.

1.7 AMBIENT CONDITIONS

A. Do not apply concrete basketball & multi-purpose court surface color coating system when air or surface temperatures are below 50°F (10°C) during application or within 24 hours after application.

B. Do not apply concrete basketball & multi-purpose court surface color coating system when rain is expected during application or within 24 hours after application.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. SportMaster Sport Surfaces, PO Box 2277, 2520 South Campbell Street, Sandusky, Ohio 44870. Toll Free 800-326-1994. Fax 877-825-9226. Website www.sportmaster.net. E-mail moreinfo@sportmaster.net. All other brands must be pre-approved by the architect/owner, 7 days prior to the bid date. If submitting another brand, bidder must furnish copies of all submittal documents under section 1.4

2.2 MATERIALS

A. Concrete Basketball & Multi-Purpose Court Surface Color Coating System: SportMaster Color Coating System.

B. Crack Sealant: SportMaster “Crack Magic”.

1. 100 percent acrylic emulsion elastomeric crack sealant.
2. Seals cracks and expansion joints up to 1/2 inch wide in concrete pavement.
3. Weight per Gallon at 77 Degrees F: 8.8 lbs., plus or minus 0.5 lbs.
4. Non-Volatile Material: 61 percent, plus or minus 5 percent.

C. Crack Filler: SportMaster “Acrylic Crack Patch”.

1. 100 percent acrylic emulsion trowel-grade crack filler.
2. Fills cracks in concrete pavement up to 1 inch wide.
3. Chemical Characteristics, by Weight, Minimum:

a. Acrylic Emulsion: 10.0 percent.
b. Hiding Pigment: 0.2 percent.
c. Mineral Inert Fillers: 78.0 percent.
d. Film Formers, Additives: 1.8 percent.

e. Water: 8.5 percent.

4. Weight per Gallon at 77 Degrees F: 15.2 lbs., plus or minus 1.0 lbs.
5. Non-Volatile Material: 80 percent, plus or minus 5 percent.
6. Color: Neutral

D. Patch Binder: SportMaster “Acrylic Patch Binder”.

1. 100 percent acrylic emulsion liquid binder.
2. Mix on-site with sand and cement.
3. Levels and repairs low spots and depressions up to 3/4 inch deep in concrete pavement.
4. Weight per Gallon at 77 Degrees F: 8.8 lbs., plus or minus 0.5 lbs.

E. Filler Course: SportMaster “Acrylic Resurfacer”.

1. 100 percent acrylic emulsion resurfacer.
2. Mix on-site with silica sand.
3. Apply to adhesion promoter or previously colored acrylic surfaces in preparation of color coating system.
4. Chemical Characteristics, by Weight, Minimum:

a. Acrylic Emulsion: 44.0 percent.
b. Hiding Pigment: 2.0 percent.
c. Mineral Inert Fillers: 5.0 percent.
d. Film Formers, Additives: 0.2 percent.
e. Water: 45.0 percent.

5. Weight per Gallon at 77 Degrees F: 8.5 lbs., plus or minus 0.5 lbs.
6. Non-Volatile Material: 27.5 percent, plus or minus 5.0 percent.
7. Color: Neutral.

F. Adhesion Promoter: SportMaster “Acrylic Adhesion Promoter”.

1. Acrylic emulsion primer.
2. Primes concrete surface and promotes adhesion of color coating system materials.
3. Weight per Gallon at 77 Degrees F: 8.7 lbs., plus or minus 0.5 lbs.

G. Color Coating: SportMaster “ColorPlus System”.

1. 100 percent acrylic emulsion coating.
2. Mix on-site with silica sand and water.
3. Color coats basketball and multi-purpose courts.
4. Weight per Gallon at 77 Degrees F: 9.2 lbs., plus or minus 0.5 lbs.
5. Color: As shown on the construction drawings.

H. Line Markings Primer: SportMaster “Stripe-Rite”.

1. 100 percent acrylic emulsion primer, clear drying.
2. Primes line markings and prevents bleed-under for sharp lines.

3. Chemical Characteristics, by Weight, Nominal:

    a. Acrylic Emulsion: 38.0 percent.
    b. Hiding Pigment: 0.0 percent.
    c. Mineral Inert Fillers: 7.0 percent.
    d. Film Formers, Additives: 1.5 percent.
    e. Water: 50.0 percent.

4. Weight per Gallon at 77 Degrees F: 8.9 lbs., plus or minus 0.5 lbs.
5. Non-Volatile Material: 29 percent, plus or minus 5 percent.

I. Line Paint: SportMaster “Textured Line Paint”.

1. Pigmented, 100 percent acrylic emulsion line paint.
2. Line marking on concrete basketball and multi-purpose courts.
3. Chemical Characteristics, by Weight, Nominal:

    a. Acrylic Emulsion: 25.89 percent.
    b. Pigment: 14.90 percent.
    c. Mineral Inert Fillers: 13.12 percent.
    d. Additives: 4.73 percent.
    e. Water: 41.36 percent.

4. Weight per Gallon at 77 Degrees F: 10.65 lbs., plus or minus 0.75 lbs.
5. Non-Volatile Material: 45.17 percent, plus or minus 5 percent.
6. Color: White.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine concrete basketball and multi-purpose court surfaces to receive color coating system.

B. Verify:

1. Suitable vapor barrier beneath concrete slab.
2. Perimeter drainage to prevent moisture accumulation beneath concrete surface.
3. No curing compounds have been applied to surface.
4. Concrete basketball and multi-purpose courts meet ASBA requirements.

C. Notify City/Owner of conditions that would adversely affect application or subsequent use.

D. Do not begin surface preparation or application until unacceptable conditions are corrected or until noted items are approved by the City/Owner.

3.2 SURFACE PREPARATION

A. Protection of In-Place Conditions: Protect adjacent surfaces and landscaping from contact with concrete basketball and multi-purpose court surface color coating system.

B. Prepare surfaces in accordance with manufacturer's instructions.

C. New Concrete:

1. Cure new concrete surfaces a minimum of 28 days before application of concrete basketball and multi-purpose court surface color coating system.
2. Provide medium broom finish or similar roughened texture.
3. Do not steel trowel finish.
4. Acid etch with phosphoric or muriatic acid and rinse thoroughly prior to application of color
5. coating system.

D. Existing Concrete:

1. Sandblast, shotblast, or scarify smooth concrete surfaces to roughened texture similar to medium broom finish. If shot blasting, a shot blast profile of CSP3 or CSP4 is recommended.
2. If existing concrete is uncoated, acid etch with phosphoric or muriatic acid and rinse thoroughly prior to application of color coating system.

E. Remove dirt, dust, debris, oil, grease, sealers, curing compounds, vegetation, loose coatings, loose materials, and other surface contaminants which could adversely affect application of concrete basketball and multi-purpose court surface color coating system. Pressure wash entire surface.

F. Repair cracks, depressions, and surface defects in accordance with manufacturer's instructions before application of color coating.

G. Repair spalled areas and level depressions 1/8 inch and deeper with patch binder in accordance with manufacturer's instructions.

H. Apply adhesion promoter over entire concrete surface in accordance with manufacturer's instructions.

I. Apply 1 coat of filler course to provide smooth underlayment for application of color coating.

J. Ensure surface repairs are flush and smooth to adjoining surfaces.

3.3 APPLICATION

A. Apply concrete basketball and multi-purpose court surface color coating system in accordance with manufacturer's instructions at locations indicated on the Drawings.

B. Mix materials in accordance with manufacturer's instructions.

C. Apply Filler Course and Color Coating with a 50-60 durometer, soft rubber squeegee.

D. Filler Course:

1. Apply 1 coat on new concrete or existing acrylic surfaces with minimal repairs.
2. Apply 2 coats on existing acrylic surfaces with extensive cracks or low spot repair.

E. Apply a minimum of 2 coats of color coating to prepared surfaces in accordance with manufacturer's instructions.

F. Allow material drying times in accordance with manufacturer's instructions before applying other materials or opening completed surface to foot traffic.

3.4 LINE MARKINGS

A. Lay out court line markings in accordance with appropriate governing body:

1. NFHS Rules for high school basketball
2. Other required game layout

B. Apply line markings primer, after masking tape has been laid, to seal voids between masking tape and court surface to prevent bleed-under when line paint is applied.

C. Apply a minimum of 1 coat of line paint in accordance with manufacturer's instructions.

3.5 PROTECTION

A. Allow a minimum of 24 hours curing time before opening courts for play.

B. Protect applied concrete basketball and multi-purpose court surface color coating system to ensure that, except for normal weathering, coating system will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 321823.43

SECTION 321823.53 - CONCRETE TENNIS COURT SURFACE COLOR COATING SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete tennis court surface color coating system.

1.2 RELATED REQUIREMENTS

A. Section 03300 (03 30 00) – Cast-in-Place Concrete.

B. Section 03400 (03 40 00) – Precast Concrete.

1.3 REFERENCE STANDARDS

A. American Sports Builders Association (ASBA).

B. United States Tennis Association (USTA) Rules of Tennis.

C. International Tennis Federation (ITF).

1.4 SUBMITTALS

A. Comply with Section 01330 (01 33 00) – Submittal Procedures.

B. Product Data: Submit manufacturer’s product data, including surface and crack preparation and application instructions.

C. Samples: Submit manufacturer’s color samples of color coating.

D. Test Reports:

1. Submit independent test results for solar reflectance index.
2. Submit independent test results for 2000 Hour ASTM G154, accelerated weathering UV test, to demonstrate long-term durability and fade resistance.
3. Submit independent test results for 2000 Hour, accelerated weathering ASTM G155 Xenon Arc test, to demonstrate long-term fade resistance and quality of pigment.

E. Manufacturer’s Certification: Submit manufacturer’s certification that materials comply with specified requirements and are suitable for intended application.

F. Manufacturer’s Project References: Submit manufacturer’s list of successfully completed concrete tennis court surface color coating system projects, including

project name, location, and date of application.

G. Applicator's Project References: Submit applicator's list of successfully completed concrete tennis court surface color coating system projects, including project name, location, type and quantity of color coating system applied, and date of application.

H. Warranty Documentation: Submit manufacturer's standard warranty.

I. Authorized Installer Certificate: Submit manufacturer's authorized installer certificate.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Manufacturer regularly engaged, for past 5 years, in manufacture of concrete tennis court surface color coating systems of similar type to that specified.
2. United States owned company.
3. Member: ASBA.
4. Manufacturer has surfaces that are classified by the ITF's (International Tennis Federation) pace classification program.

B. Applicator's Qualifications:

1. Applicator regularly engaged, for past 3 years, in application of tennis court surface color coating systems of similar type to that specified.
2. Employ persons trained for application of tennis court surface color coating systems.
3. Applicator must be authorized installer of the surfacing brand used.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:

1. Store and handle materials in accordance with manufacturer's instructions.
2. Keep materials in manufacturer's original, unopened containers and packaging until application.
3. Store materials in clean, dry area indoors.
4. Store materials out of direct sunlight.
5. Keep materials from freezing.
6. Protect materials during storage, handling, and application to prevent contamination or damage.
7. Close containers when not in use.
8. Retain manufacturer batch codes on each container and application dates, for warranty purposes.

1.7 AMBIENT CONDITIONS

A. Do not apply concrete tennis court surface color coating system when air or surface temperatures are below 50°F (10°C) during application or within 24 hours after application.

B. Do not apply concrete tennis court surface color coating system when rain is expected during application or within 24 hours after application.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. A. SportMaster Sport Surfaces, PO Box 2277, 2520 South Campbell Street, Sandusky, Ohio 44870. Toll Free 800-326-1994. Fax 877-825-9226. Website www.sportmaster.net. E-mail moreinfo@sportmaster.net.

All other brands must be pre-approved by the architect/owner, 7 days prior to the bid date. If submitting another brand, bidder must furnish copies of all submittal documents under section 1.4

2.2 MATERIALS

A. Concrete Tennis Court Surface Color Coating System: SportMaster Color Coating System.

B. Crack Sealant: SportMaster “Crack Magic”.

1. 100 percent acrylic emulsion elastomeric crack sealant.
2. Seals cracks and expansion joints up to 1/2 inch wide in concrete pavement.
3. Weight per Gallon at 77 Degrees F: 8.8 lbs., plus or minus 0.5 lbs.
4. Non-Volatile Material: 61 percent, plus or minus 5 percent.
5. Color: Neutral

C. Crack Filler: SportMaster “Acrylic Crack Patch”.

1. 100 percent acrylic emulsion trowel-grade crack filler.
2. Fills cracks in concrete pavement up to 1 inch wide.
3. Chemical Characteristics, by Weight, Minimum:

    a. Acrylic Emulsion: 10.0 percent.
    b. Hiding Pigment: 0.2 percent.
    c. Mineral Inert Fillers: 78.0 percent.
    d. Film Formers, Additives: 1.8 percent.
    e. Water: 8.5 percent.

4. Weight per Gallon at 77 Degrees F: 15.2 lbs., plus or minus 1.0 lbs.
5. Non-Volatile Material: 80 percent, plus or minus 5 percent.

6. Color: Neutral

D. Patch Binder: SportMaster “Acrylic Patch Binder”.

1. 100 percent acrylic emulsion liquid binder.
2. Mix on-site with sand and cement.
3. Levels and repairs low spots and depressions up to 3/4 inch deep in concrete pavement.
4. Fills Cracks in concrete up to 1” in width.
5. Weight per Gallon at 77 Degrees F: 8.8 lbs., plus or minus 0.5 lbs.

E. Adhesion Promoter: SportMaster “Acrylic Adhesion Promoter”.

1. Acrylic emulsion primer.
2. Primes concrete surface and promotes adhesion of color coating system materials.
3. Weight per Gallon at 77 Degrees F: 8.7 lbs., plus or minus 0.5 lbs.

F. Filler Course: SportMaster “Acrylic Resurfacer”.

1. 100 percent acrylic emulsion resurfacer.
2. Mix on-site with silica sand.
3. Apply to adhesion promoter or previously colored acrylic surfaces in preparation of color coating system.
4. Chemical Characteristics, by Weight, Minimum:

    a. Acrylic Emulsion: 44.0 percent.
    b. Hiding Pigment: 2.0 percent.
    c. Mineral Inert Fillers: 5.0 percent.
    d. Film Formers, Additives: 0.2 percent.

5. Water: 45.0 percent.
6. Weight per Gallon at 77 Degrees F: 8.5 lbs., plus or minus 0.5 lbs.
7. Non-Volatile Material: 27.5 percent, plus or minus 5.0 percent.
8. Color: Neutral.

G. Color Coating: SportMaster “ColorPlus System”.

1. 100 percent acrylic emulsion coating.
2. Mix on-site with silica sand and water.
3. Color coats tennis and multipurpose courts.
4. Weight per Gallon at 77 Degrees F: 9.2 lbs., plus or minus 0.5 lbs.
5. Color: As indicated on plans.

H. Line Markings Primer: SportMaster “Stripe-Rite”.

1. 100 percent acrylic emulsion primer, clear drying.
2. Primes line markings and prevents bleed-under for sharp lines.
3. Chemical Characteristics, by Weight, Nominal:

    a. Acrylic Emulsion: 38.0 percent.

b. Hiding Pigment: 0.0 percent.
c. Mineral Inert Fillers: 7.0 percent.
d. Film Formers, Additives: 1.5 percent.
e. Water: 50.0 percent.

4. Weight per Gallon at 77 Degrees F: 8.9 lbs., plus or minus 0.5 lbs.
5. Non-Volatile Material: 29 percent, plus or minus 5 percent.

I. Line Paint: SportMaster “Textured Line Paint”.

1. Pigmented, 100 percent acrylic emulsion line paint.
2. Line marking on concrete tennis courts.
3. Chemical Characteristics, by Weight, Nominal:

a. Acrylic Emulsion: 25.89 percent.
b. Pigment: 14.90 percent.
c. Mineral Inert Fillers: 13.12 percent.
d. Additives: 4.73 percent.
e. Water: 41.36 percent.

4. Weight per Gallon at 77 Degrees F: 10.65 lbs., plus or minus 0.75 lbs.
5. Non-Volatile Material: 45.17 percent, plus or minus 5 percent.
6. Color: White.

PART 3 - EXECUTION

3.1 3.1 EXAMINATION

A. Examine concrete tennis court surfaces to receive color coating system.

B. Verify:

1. Suitable vapor barrier beneath concrete slab.
2. Perimeter drainage to prevent moisture accumulation beneath concrete surface.
3. Curing compounds have not been used on concrete surface.
4. Concrete tennis courts meet ASBA construction requirements.

C. Notify City/Owner of conditions that would adversely affect application or subsequent use.

D. Do not begin surface preparation or application until unacceptable conditions are corrected.

3.2 SURFACE PREPARATION

A. Protection of In-Place Conditions: Protect adjacent surfaces and landscaping from contact with concrete tennis court surface color coating system.

B. Prepare surfaces in accordance with manufacturer's instructions.

C. New Concrete:

1. Cure new concrete surfaces a minimum of 28 days before application of concrete tennis court surface color coating system.
2. Provide medium broom finish or similar roughened texture.
3. Do not steel trowel finish.
4. Acid etch with phosphoric or muriatic acid and rinse thoroughly prior to application of color coating system.

D. Existing Concrete:

1. Sandblast, shotblast, or scarify smooth concrete surfaces to roughened texture similar to medium broom finish. If shot blasting, a shot blast profile of CSP3 or CSP4 is recommended.
2. If existing concrete is uncoated, acid etch with phosphoric or muriatic acid and rinse thoroughly prior to application of color coating system

E. Remove dirt, dust, debris, oil, grease, sealers, curing compounds, vegetation, loose coatings, loose materials, and other surface contaminants which could adversely affect application of concrete tennis court surface color coating system. Pressure wash entire surface.

F. Repair cracks, depressions, and surface defects in accordance with manufacturer's instructions before application of color coating.

G. Repair spalled areas and level depressions 1/8 inch and deeper with patch binder in accordance with manufacturer's instructions.

H. Apply adhesion promoter over entire concrete surface in accordance with manufacturer's instructions.

I. Apply 1 coat of filler course to provide smooth underlayment for application of color coating.

J. Ensure surface repairs are flush and smooth to adjoining surfaces.

3.3 APPLICATION

A. Apply concrete tennis court surface color coating system in accordance with manufacturer's instructions at locations indicated on the Drawings.

B. Mix materials in accordance with manufacturer's instructions.

C. Apply Filler Course and Color Coating with a 50-60 durometer, soft rubber squeegee.

D. Filler Course:

1. Apply 1 coat on new concrete or existing acrylic surfaces with minimal repairs.

2. Apply 2 coats on existing acrylic surfaces with extensive cracks or low spot repair.

E. Apply a minimum of 2 coats of color coating to prepared surfaces in accordance with manufacturer's instructions.

F. Allow material drying times in accordance with manufacturer's instructions before applying other materials or opening completed surface to foot traffic.

3.4 LINE MARKINGS

A. Lay out tennis court line markings in accordance with USTA Rules of Tennis.

B. Apply line markings primer, after masking tape has been laid, to seal voids between masking tape and tennis court surface to prevent bleed-under when line paint is applied.

C. Apply a minimum of 1 coat of line paint in accordance with manufacturer's instructions.

3.5 PROTECTION

A. Allow a minimum of 24 hours curing time before opening tennis courts for play.

B. Protect applied concrete tennis court surface color coating system to ensure that, except for normal weathering, coating system will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 321823.53

SECTION 321823.63 - CONCRETE PICKLEBALL COURT SURFACE COLOR COATING SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete pickleball court surface color coating system.

1.2 RELATED REQUIREMENTS

A. Section 03300 (03 30 00) – Cast-in-Place Concrete.

B. Section 03400 (03 40 00) – Precast Concrete.

1.3 REFERENCE STANDARDS

A. American Sports Builders Association (ASBA).

B. United States of America Pickleball Association (USAPA) Rules of Pickleball.

1.4 SUBMITTALS

A. Comply with Section 01330 (01 33 00) – Submittal Procedures.

B. Product Data: Submit manufacturer’s product data, including surface and crack preparation and application instructions.

C. Samples: Submit manufacturer’s color samples of color coating.

D. Test Reports:

1. Submit independent test results for solar reflectance index.
2. Submit independent test results for 2000 Hour ASTM G154, accelerated weathering UV test, to demonstrate long-term durability and fade resistance.
3. Submit independent test results for 2000 Hour, accelerated weathering ASTM G155 Xenon Arc test, to demonstrate long-term fade resistance and quality of pigment.

E. Manufacturer’s Certification: Submit manufacturer’s certification that materials comply with specified requirements and are suitable for intended application.

F. Manufacturer’s Project References: Submit manufacturer’s list of successfully completed concrete pickleball court surface color coating system projects, including project name, location, and date of application.

G. Applicator’s Project References: Submit applicator’s list of successfully completed concrete pickleball court surface color coating system projects, including project name, location, type and quantity of color coating system applied, and date of application.

H. Warranty Documentation: Submit manufacturer’s standard warranty.

I. Authorized Installer Certificate: Submit manufacturer’s authorized installer certificate.

1.5 QUALITY ASSURANCE

A. Manufacturer’s Qualifications:

1. Manufacturer regularly engaged, for past 5 years, in manufacture of concrete pickleball court surface color coating systems of similar type to that specified.
2. United States owned company.
3. Member: ASBA.

B. Applicator's Qualifications:

1. 1. Applicator regularly engaged, for past 3 years, in application of pickleball court surface color coating systems of similar type to that specified.
2. 2. Employ persons trained for application of pickleball court surface color coating systems.
3. 3. Applicator must be authorized installer of the surfacing brand used.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:

1. Store and handle materials in accordance with manufacturer’s instructions.
2. Keep materials in manufacturer’s original, unopened containers and packaging until application.
3. Store materials in clean, dry area indoors.
4. Store materials out of direct sunlight.
5. Keep materials from freezing.
6. Protect materials during storage, handling, and application to prevent contamination or damage.
7. Close containers when not in use.
8. Retain manufacturer batch codes on each container and application dates, for warranty purposes.

1.7 CONDITIONS

A. Do not apply concrete pickleball court surface color coating system when air or surface

temperatures are below 50°F (10°C) during application or within 24 hours after application.

B. Do not apply concrete pickleball court surface color coating system when rain is expected during application or within 24 hours after application.

C. MANUFACTURER

D. SportMaster Sport Surfaces, PO Box 2277, 2520 South Campbell Street, Sandusky, Ohio 44870. Toll Free 800-326-1994. Fax 877-825-9226. Website www.sportmaster.net. E-mail moreinfo@sportmaster.net.All other brands must be pre-approved by the architect/owner, 7 days prior to the bid date. If submitting another brand, bidder must furnish copies of all submittal documents under section 1.4

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete Pickleball Court Surface Color Coating System: SportMaster Color Coating System.

B. Crack Sealant: SportMaster “Crack Magic”.

1. 100 percent acrylic emulsion elastomeric crack sealant.
2. Seals cracks and expansion joints up to 1/2 inch wide in concrete pavement.
3. Weight per Gallon at 77 Degrees F: 8.8 lbs., plus or minus 0.5 lbs.
4. Non-Volatile Material: 61 percent, plus or minus 5 percent.
5. Color: Neutral

C. Crack Filler: SportMaster “Acrylic Crack Patch”.

1. 100 percent acrylic emulsion trowel-grade crack filler.
2. Fills cracks in concrete pavement up to 1 inch wide.
3. Chemical Characteristics, by Weight, Minimum:

    a. Acrylic Emulsion: 10.0 percent.
    b. Hiding Pigment: 0.2 percent.
    c. Mineral Inert Fillers: 78.0 percent.
    d. Film Formers, Additives: 1.8 percent.
    e. Water: 8.5 percent.

4. Weight per Gallon at 77 Degrees F: 15.2 lbs., plus or minus 1.0 lbs.
5. Non-Volatile Material: 80 percent, plus or minus 5 percent.
6. Color: Neutral

D. Patch Binder: SportMaster “Acrylic Patch Binder”.

1. 100 percent acrylic emulsion liquid binder.
2. Mix on-site with sand and cement.

3. Levels and repairs low spots and depressions up to 3/4 inch deep in concrete pavement.
4. Fills Cracks in concrete up to 1” in width.
5. Weight per Gallon at 77 Degrees F: 8.8 lbs., plus or minus 0.5 lbs.

E. Adhesion Promoter: SportMaster “Acrylic Adhesion Promoter”.

1. Acrylic emulsion primer.
2. Primes concrete surface and promotes adhesion of color coating system materials.
3. Weight per Gallon at 77 Degrees F: 8.7 lbs., plus or minus 0.5 lbs.

F. Filler Course: SportMaster “Acrylic Resurfacer”.

1. 100 percent acrylic emulsion resurfacer.
2. Mix on-site with silica sand.
3. Apply to adhesion promoter or previously colored acrylic surfaces in preparation of color coating system.
4. Chemical Characteristics, by Weight, Minimum:

    a. Acrylic Emulsion: 44.0 percent.
    b. Hiding Pigment: 2.0 percent.
    c. Mineral Inert Fillers: 5.0 percent.
    d. Film Formers, Additives: 0.2 percent.
    e. Water: 45.0 percent.

5. Weight per Gallon at 77 Degrees F: 8.5 lbs., plus or minus 0.5 lbs.
6. Non-Volatile Material: 27.5 percent, plus or minus 5.0 percent.
7. Color: Neutral.

G. Color Coating: SportMaster “ColorPlus System”.

1. 100 percent acrylic emulsion coating.
2. Mix on-site with silica sand and water.
3. Color coats pickleball, tennis, and multipurpose courts.
4. Weight per Gallon at 77 Degrees F: 9.2 lbs., plus or minus 0.5 lbs.
5. Color: As indicated on the construction drawings.

H. Line Markings Primer: SportMaster “Stripe-Rite”.

1. 100 percent acrylic emulsion primer, clear drying.
2. Primes line markings and prevents bleed-under for sharp lines.
3. Chemical Characteristics, by Weight, Nominal:

    a. Acrylic Emulsion: 38.0 percent.
    b. Hiding Pigment: 0.0 percent.
    c. Mineral Inert Fillers: 7.0 percent.
    d. Film Formers, Additives: 1.5 percent.
    e. Water: 50.0 percent.

4. Weight per Gallon at 77 Degrees F: 8.9 lbs., plus or minus 0.5 lbs.

5. Non-Volatile Material: 29 percent, plus or minus 5 percent.

I. Line Paint: SportMaster “Textured Line Paint”.

1. Pigmented, 100 percent acrylic emulsion line paint.
2. Line marking on concrete pickleball courts.
3. Chemical Characteristics, by Weight, Nominal:

a. Acrylic Emulsion: 25.89 percent.
b. Pigment: 14.90 percent.
c. Mineral Inert Fillers: 13.12 percent.
d. Additives: 4.73 percent.
e. Water: 41.36 percent.

4. Weight per Gallon at 77 Degrees F: 10.65 lbs., plus or minus 0.75 lbs.
5. Non-Volatile Material: 45.17 percent, plus or minus 5 percent.
6. Color: White.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine concrete pickleball court surfaces to receive color coating system.

B. Verify:

1. Suitable vapor barrier beneath concrete slab.
2. Perimeter drainage to prevent moisture accumulation beneath concrete surface.
3. Curing compounds have not been used on concrete surface.
4. Concrete pickleball courts meet ASBA requirements.

C. Notify City/Owner of conditions that would adversely affect application or subsequent use.

D. Do not begin surface preparation or application until unacceptable conditions are corrected.

3.2 SURFACE PREPARATION

A. Protection of In-Place Conditions: Protect adjacent surfaces and landscaping from contact with concrete pickleball court surface color coating system.

B. Prepare surfaces in accordance with manufacturer’s instructions.

C. New Concrete:

1. Cure new concrete surfaces a minimum of 28 days before application of concrete pickleball court surface color coating system.

2. Provide medium broom finish or similar roughened texture.
3. Do not steel trowel finish.
4. Acid etch surface per manufacturers specifications, then rinse thoroughly.

D. Existing Concrete:

1. Sandblast, shotblast, or scarify smooth concrete surfaces to roughened texture similar to medium broom finish. If shot blasting, a shot blast profile of CSP3 or CSP4 is recommended.
2. If existing concrete is uncoated, acid etch with phosphoric or muriatic acid and rinse thoroughly prior to application of color coating system

E. Remove dirt, dust, debris, oil, grease, sealers, curing compounds, vegetation, loose coatings, loose materials, and other surface contaminants which could adversely affect application of concrete pickleball court surface color coating system. Pressure wash entire surface.

F. Repair cracks, depressions, and surface defects in accordance with manufacturer's instructions before application of color coating.

G. Repair spalled areas and level depressions 1/8 inch and deeper with patch binder in accordance with manufacturer's instructions.

H. Apply adhesion promoter over entire concrete surface in accordance with manufacturer's instructions.

I. Apply 1 coat of filler course to provide smooth underlayment for application of color coating.

J. Ensure surface repairs are flush and smooth to adjoining surfaces.

3.3 APPLICATION

A. Apply concrete pickleball court surface color coating system in accordance with manufacturer's instructions at locations indicated on the Drawings.

B. Mix materials in accordance with manufacturer's instructions.

C. Apply Filler Course and Color Coating with a 50-60 durometer, soft rubber squeegee.

D. Filler Course:

1. Apply 1 coat on new concrete or existing acrylic surfaces with minimal repairs.
2. Apply 2 coats on existing acrylic surfaces with extensive cracks or low spot repair.

E. Apply a minimum of 2 coats of color coating to prepared surfaces in accordance with manufacturer's instructions.

F. Allow material drying times in accordance with manufacturer's instructions before

applying other materials or opening completed surface to foot traffic.

3.4 LINE MARKINGS

A. Lay out pickleball court line markings in accordance with USAPA Rules of Pickleball.

B. Apply line markings primer, after masking tape has been laid, to seal voids between masking tape and pickleball court surface to prevent bleed-under when line paint is applied.

C. Apply a minimum of 1 coat of line paint in accordance with manufacturer's instructions.

3.5 PROTECTION

A. Allow a minimum of 24 hours curing time before opening pickleball courts for play.

B. Protect applied concrete pickleball court surface color coating system to ensure that, except for normal weathering, coating system will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 321823.63

SECTION 323113 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Chain-link fence framework.
2. Chain-link fence fabric.
3. Chain-link fittings.
4. Chain-link wires and ties.
5. Chain-link swing gates.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for cast-in-place concrete for post footings.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Inspect and discuss equipment bases, and other preparatory work specified elsewhere.
2. Review sequence of operation for each type of gate operator.
3. Review coordination of interlocked equipment specified in this Section and elsewhere.
4. Review required testing, inspecting, and certifying procedures.

1.3 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
b. Fence and gate posts, rails, and fittings.
c. Chain-link fabric, reinforcements, hardware, and attachments.
d. Gates and hardware.

B. Shop Drawings: For each type of fence and gate assembly.

1. Include plans, elevations, sections, ground details, mounting, post spacing, and attachments to other work.

2. Include accessories andhardware.

C. Samples for Initial Selection: For each type of factory-applied finish.

D. Samples for Verification: For each type of component with factory-applied finish, prepared on Samples of size indicated below:

1. Polymer-Coated Components: In 6-inch lengths for components and on full-sized units for accessories.

E. Delegated Design Submittal: For structural performance of chain-link fence and gate frameworks, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Product Certificates: For each type of chain-link fence, and gate.

C. Product Test Reports: For framework strength in accordance with ASTM F1043, for tests performed by a qualified testing agency.

D. Field quality-control reports.

E. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For gate operators to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing fence grounding; member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

B. Emergency Access Requirements: In accordance with requirements of authorities having jurisdiction for gates with automatic gate operators serving as a required means of access.

C. Mockups: Build mockups to set quality standards for fabrication and installation.

1. Build mockup for typical chain-link fence and gate, including accessories.

a. Size: 10 ft. length of fence.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.8 WARRANTY

A. Special Warranty: Installer agrees to repair or replace components of fences that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to comply with performance requirements.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design chain-link fence and gate frameworks.

B. Structural Performance: Chain-link fence and gate frameworks are to withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated in accordance with ASCE/SEI 7.

1. Design Wind Load: As indicated on Drawings.

a. Minimum Post Size: Determine in accordance with ASTM F1043 for post spacing not to exceed as shown on drawings for Material Group IA, ASTM F1043, Schedule 40 steel pipe.
b. Minimum Post Size and Maximum Spacing: Determine in accordance with CLFMI WLG 2445, based on mesh size and pattern specified.

C. Lightning Protection System: Maximum resistance-to-ground value of 25 ohms at each grounding location along fence under normal dry conditions.

D. Accessibility: Pedestrian gates to comply with the United States Access Board's ADA-ABA Accessibility Guidelines.

2.2 CHAIN-LINK FENCES, GENERAL

A. CLFMI Publications: Comply with the CLFMI Product Manual unless modified by requirements in the Contract Documents.

B. Chain-Link Fence and Gate Assemblies: Include materials applicable for a complete assembly of application types, consisting of commercial, industrial, and security chain-link fences and gates.

1. Source Limitations: Obtain chain-link fence and gate components from single source or manufacturer.

2.3 CHAIN-LINK FENCE FRAMEWORK

A. Posts and Rails As shown on Drawings: ASTM F1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thicknesses in accordance with ASTM F1043 or ASTM F1083 based on the following:

1. Fence Height: As shown on Drawings..
2. Light-Industrial-Strength Material: Group IC-L, round steel pipe, electric-resistance-welded pipe.

a. Line Post: as shown on Drawings. .
b. End, Corner, and Pull Posts: as shown on Drawings. .

3. Heavy-Industrial-Strength Material: Group IC, round steel pipe, electric-resistance-welded pipe.

a. Line Post: as shown on Drawings.
b. End, Corner, and Pull Posts: as shown on Drawings.

4. Horizontal Framework Members: As indicated on the drawings rails in accordance with ASTM F1043.

a. Top Rail: as shown on Drawings.

5. Brace Rails: ASTM F1043.
6. Metallic Coating for Steel Framework:

a. Type A: Not less than minimum 2.0 oz./sq. ft. average zinc coating in accordance with ASTM A123/A123M or 4.0 oz./sq. ft. zinc coating in accordance with ASTM A653/A653M.
b. Type B: Zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film.
c. External, Type B: Zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film. Internal, Type D, consisting of 81 percent, not less than 0.3-mil- thick, zinc-pigmented coating.

d. Type C: Zn-5-Al-MM alloy, consisting of not less than 1.8 oz./sq. ft. coating.
e. Coatings: Any coating above.

7. Polymer coating over metallic coating.

a. Color: Match chain-link fabric, in accordance with ASTM F934.

2.4 CHAIN-LINK FENCE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist in accordance with "CLFMI Product Manual" and requirements indicated below:

1. Fabric Height: As indicated on Drawings.
2. Steel Wire for Fabric: Wire diameter of 0.192 inch.

a. Mesh Size: 2 inches.
b. Aluminum-Coated Fabric: ASTM A491, Type I, 0.40 oz./sq. ft..
c. Zinc-Coated Fabric: ASTM A392, Type II, Class 2, 2.0 oz./sq. ft. with zinc coating applied before weaving.
d. Polymer-Coated Fabric: ASTM F668,

1) Color: As noted on drawings andin accordance with ASTM F934.

e. Coat selvage ends of metallic-coated fabric before the weaving process with manufacturer's standard clear protective coating.

3. Aluminum Wire Fabric: ASTM F1183, with mill finish, and wire diameter of 0.192 inch.

a. Mesh Size: 2 inches.

4. Selvage: Twisted top and knuckled bottom.

2.5 CHAIN-LINK FITTINGS

A. Provide fittings in accordance with ASTM F626.

B. Post Caps: Provide for each post.

1. Provide line post caps with loop to receive tension wire or top rail.

C. Rail and Brace Ends: For each gate, corner, pull, and end post.

D. Rail Fittings: Provide the following:

1. Top Rail Sleeves: As shown on Drawings and not less than 6 inches long.
2. Rail Clamps: Line and corner boulevard clamps for connecting rails to posts.

E. Tension and Brace Bands: Pressed steel.

F. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

G. Truss Rod Assemblies: As shown on Drawings.

H. Tie Wires, Clips, and Fasteners: In accordance with ASTM F626.

1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, in accordance with the following:

a. Hot-Dip Galvanized Steel: ; galvanized coating thickness matching coating thickness of chain-link fence fabric.
b. Aluminum: ASTM B211/B211M; Alloy 1350-H19; 0.192-inch- diameter, mill-finished wire.

I. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft. of zinc.

a. Polymer coating over metallic coating.

2. Aluminum: Mill finish.

2.6 CHAIN-LINK WIRE AND TIES

A. Metallic-Coated Steel Wire: 0.177-inch- diameter, marcelled tension wire in accordance with ASTM A817 or ASTM A824, with the following metallic coating:

1. Type I: Aluminum coated (aluminized).
2. Type II: Zinc coated (galvanized) by hot-dip process, with the following minimum coating weight:

a. Matching chain-link fabric coating weight.

3. Type III: Zn-5-Al-MM alloy with the following minimum coating weight:

a. Matching chain-link fabric coating weight.

B. Polymer-Coated Steel Wire: 0.177-inch- diameter, tension wire in accordance with ASTM F1664, Class 1 over aluminum-coated steel wire.

1. Color: Black, in accordance with ASTM F934.

C. Aluminum Wire: 0.192-inch- diameter tension wire, mill finished, in accordance with ASTM B211, Alloy 6061-T94 with 50,000-psi minimum tensile strength.

2.7 CHAIN-LINK SWING GATES

A. General: ASTM F900 for gate posts and single anddouble swing gate types.

1. Gate Leaf Width: As indicated.
2. Framework Member Sizes and Strength: Based on gate fabric height as indicated.

B. Swing Gate Pipe and Tubing:

1. Swing Gate Posts: Round tubular steel.
2. Gate Frames and Bracing: steel .
3. Zinc-Coated Steel: ASTM F1043 and ASTM F1083; manufacturer's standard protective coating and finish.
4. Aluminum: ASTM B429/B429M; mill finish.

C. Swing Frame Corner Construction: Welded.

D. Swing Gate Extended Posts and Frame Members: Fabricate gate posts and frame end members to extend as indicated above top of chain-link fabric at both ends of gate frame to attach barbed

E. Swing Gate Hardware:

1. Hinges: 180-degree inward swing.
2. Latch: Permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
3. Lock: Manufacturer's standard internal device.
4. Padlock and Chain: Masterlock with two keys.
5. Closer: Manufacturer's standard.

2.8 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout, recommended in writing by manufacturer, for exterior applications.

B. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating, and that is recommended in writing by manufacturer for exterior applications.

2.9 CONCRETE

A. Concrete Post Footings: Minimum 28-day compressive strength of 2500 psi, or per City standards.

2.10 GROUNDING MATERIALS

A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connectors and Grounding Rods: Listed and labeled for complying with UL 467.

1. Connectors for Below-Grade Use: Exothermic welded type.
2. Grounding Rods: Copper-clad steel, 5/8 by 96 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for a certified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by City/Owner.

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

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION OF CHAIN-LINK FENCES

A. Install chain-link fencing in accordance with ASTM F567 and more stringent requirements specified.

1. Install fencing on established boundary lines inside property line.

B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

a. Exposed Concrete: Unless otherwise shown on Drawings, extend 2 inches above grade; shape and smooth to shed water.
b. Concealed Concrete: Place top of concrete as indicated on Drawingsto allow covering with surface material.
c. Posts Set into Sleeves in Concrete: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed in accordance with anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.
d. Posts Set into Holes in Concrete: Form or core drill holes not less than 5 inches deep and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed in accordance with anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.

D. Terminal Posts: Install terminal end, corner, and gate posts in accordance with ASTM F567 and terminal pull posts at changes in horizontal or vertical alignment of as indicated on Drawings. For runs exceeding 500 feet, space pull posts an equal distance between corner or end posts.

E. Line Posts: Space line posts uniformly at as shown on Drawings

F. Post Bracing and Intermediate Rails: Install in accordance with ASTM F567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.

1. Locate horizontal braces at midheight of fabric 72 inches or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

G. Tension Wire: Install in accordance with ASTM F567, maintaining plumb position and alignment of fence posts. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:

1. Extended along top and bottom of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.
2. Extended along top of extended posts and top of fence fabric to support barbed tape.
3. As indicated on Drawings.

H. Top Rail: Install in accordance with ASTM F567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as

recommended in writing by fencing manufacturer.

I. Intermediate and Bottom Rails: Secure to posts with fittings.

J. Chain-Link Fabric: Apply fabricas shown on Drawings of enclosing framework. Leave 1-inch bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

K. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches o.c.

L. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric in accordance with ASTM F626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.

M. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.4 INSTALLATION OF GATES

A. Install gates in accordance with manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests.

B. Grounding Tests: Comply with requirements in Section 264113 "Lightning Protection for Structures."

C. Prepare test reports.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train City's maintenance personnel to adjust, operate, and maintain chain-link fences and gates.

END OF SECTION 323113

SECTION 323300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Basketball backboard, ring, net, and upright
2. Pickleball Posts and Nets.
3. Tennis Posts and Nets
4. Safety Pole Pads
5. Wall Safety Pad

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 BASKETBALL UPRIGHT, BACKBOARD, RING AND NET

A. Provide basketball equipment as indicated in Construction Legend and on the drawings.

2.2 PICKLEBALL POSTS AND NETS

A. Provide pickleball equipment as indicated in Construction Legend and on the drawings.

2.3 TENNIS POSTS AND NET

A. Provide tennis equipment as indicated in the Construction Legend and on the drawings.

2.4 SAFETY POLE PADS

A. Provide safety pole pad as indicated in the Construction Legend and on the drawings.

2.5 WALL SAFETY PAD

A. Provide wall safety pad as indicated in the Construction legend and on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with material recommended by manufacturer, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

F. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with material recommended by manufacturer, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION 323300

CIP NO. 619 KELLY COURTS RENOVATIONS PROJECT

VII. SPECIAL PROVISIONS

The following Special Provisions supplement and amend the 2021 Standard Specifications for Public Works Construction (SSPWC). These Special Provisions have been arranged into a format and sequence that parallels the Standard Specifications for Public Works Construction.

TABLE OF CONTENTS

VII. SPECIAL PROVISIONS…… SP-1

PART 1 – GENERAL PROVISIONS……. SP--4

PREFACE: STANDARD SPECIFICATIONS AND STANDARD DRAWINGS…… SP-4

SECTION 1 – GENERAL…….. SP-4

1-2 TERMS AND DEFINITIONS……. SP-4

SECTION 2 – SCOPE OF THE WORK……. SP-4

2-2 PERMITS…… SP-4

2-5 THE CONTRACTOR'S EQUIPMENT AND FACILITIES……. SP-5

2-5.5 Contractor's Responsibility for Work…….. SP-5

2-5.6 Notice and Service Thereof…… SP-5

2-11 RETENTION OF IMPERFECT WORK…….. SP-6

SECTION 3 – CONTROL OF THE WORK…….. SP-6

3-6 THE CONTRACTOR'S REPRESENTATIVE…… SP-6

3-7 CONTRACT DOCUMENT…… SP-7

3-8 SUBMITTALS……. SP-7

3-12 WORK SITE MAINTENANCE…… SP-8

3-13 COMPLETION, ACCEPTANCE, AND WARRANTY……. SP-9

SECTION 5 - LEGAL RELATIONS AND RESPONSIBILITIES……. SP-9

5-3 LABOR……. SP-9

5-4 INSURANCE…….. SP-9

5-7 SAFETY……. SP-11

5-8 LAWS TO BE OBSERVED…….. SP-11

5-9 FAIR EMPLOYMENT PRACTICE COMMISSION CERTIFICATION….. SP-13

SECTION 6 – PROSECUTION AND PROGRESS OF THE WORK…….. SP-13

6-1 CONSTRUCTION SCHEDULE AND COMMENCEMENT OF THE WORK….. SP-13

6-9 LIQUIDATED DAMAGES…….. SP-15

SECTION 7 – MEASUREMENT AND PAYMENT……. SP-15

7-3 PAYMENT…….. SP-15

7-6 PAYMENT FOR PROJECT BID ITEMS…….. SP-18

PART 2 – CONSTRUCTION MATERIALS……. SP-21

SECTION 200 – ROCK MATERIALS…… SP-21

200-2 UNTREATED BASE MATERIALS…… SP-21

SECTION 201 – CONCRETE, MORTAR, AND RELATED MATERIALS…… SP-21

201-1 PORTLAND CEMENT CONCRETE…… SP-21

203-6 ASPHALT CONCRETE…… SP-21

PART 3 – CONSTRUCTION METHODS……. SP-22

SECTION 300 – EARTHWORK…… SP-22

300-1 CLEARING AND GRUBBING…… SP-22

SECTION 301 – SUBGRADE PREPARATION, TREATED MATERIALS, AND PLACEMENT OF BASE MATERIALS…….. SP-23

301-1 SUBGRADE PREPARATION…… SP-23

SECTION 302 – ROADWAY SURFACING……. SP-23

302-5 ASPHALT CONCRETE PAVEMENT…… SP-23

SECTION 303 – CONCRETE AND MASONRY CONSTRUCTION……. SP-24

303-5 CONCRETE CURBS, WALKS, GUTTERS, CROSS GUTTERS, ALLEY INTERSECTIONS, ACCESS RAMPS, AND DRIVEWAYS……. SP-24

PART 4 – EXISTING IMPROVEMENTS…… SP-27

SECTION 400 – PROTECTION AND RESTORATION…….. SP-27

400-4 TREES…… **SP-**27

400-5 SIGNPOST…….. SP-27

SECTION 401– REMOVAL……. SP-27

401-8 TREES…….. SP-27

PART 6 – TEMPORARY TRAFFIC CONTROL……. SP-29

SECTION 600 – ACCESS…….. SP-29

600-1 GENERAL…….. SP-29

SECTION 601 – TEMPORARY TRAFFIC CONTROL FOR CONSTRUCTION AND MAINTENANCE WORK ZONES…… SP-30

601-1 GENERAL…… SP-30

601-3.5.2 PAYMENT…… SP-**Error! Bookmark not defined.**

PART 9 – SPECIFIC CONDITIONS…….. SP-32

SECTION 900 – CONSTRUCTION MANAGEMENT…… SP-32

900-1 PROCORE SOFTWARE…….. SP-32

SECTION 901- SOLID WASTE BINS …… SP-32

901.1- TEMPORARY STORAGE OF SOLID WASTE BINS DURING CONSTRUCTION.. SP-32

EXHIBITS ..... SP- 33

PART 1 – GENERAL PROVISIONS

PREFACE: STANDARD SPECIFICATIONS AND STANDARD DRAWINGS

The Standard Specifications for Public Works Construction (SSPWC), written and promulgated by the Southern California Chapter of the American Public Works Association and the Southern California Districts of the Associated General Contractors of California, shall be the Standard Specifications of the City. All work shall conform to the edition indicated in this document and in the bid proposal documents, including supplements, of the SSPWC, these Special Provisions which supplement or modify the SSWPC, the Standard Plans for Public Works Construction (SPPWC) of the same edition as the SSPWC, and the Standard Drawings as issued by the City available at the time bids are opened unless otherwise specified in the Contract documents.

The above referenced Standard Specifications, Special Provisions and Standard Drawings are hereby made a part of the Contract documents.

SECTION 1 – GENERAL.

1-2 TERMS AND DEFINITIONS.

Whenever the following terms are used in the SSPWC, they shall be understood to mean and refer to the following:

a) Board – The City Council of the City of Hermosa Beach
b) Contract documents – Documents including but not limited to the proposal forms, Special Provisions, Bonds, Insurance, Contract, and all Addenda setting forth any modifications to the documents.
c) Engineer – The Director of Public Works/City Engineer or their authorized representative
d) Bidder – An individual, co-partnership, association, or corporation submitting a proposal for the work contemplated, acting directly or through a duly authorized representative.
e) Legal Address of Contractor – The address given on the Contractor's bid and is hereby designated as the place to which all notices, letters or other communications to the Contractor shall be mailed or delivered.

SECTION 2 – SCOPE OF THE WORK.

2-2 PERMITS.

Add the following:

Prior to beginning work, the Contractor shall obtain authorization and permits from the City of Hermosa Beach. The Contractor will be responsible to protect and preserve all property and improvements in accordance with the Contract documents.

The Contractor must have or obtain a valid City of Hermosa Beach Business License in accordance with the provisions of the Hermosa Beach Municipal Code.

City Right of Way Permit

A City Right of Way Permit is required to work within public right-of-way and will be issued at no cost to the Contractor.

Right of Way Permits

When work occurs in the right-of-way of other entities, the Contractor shall obtain a no fee right of way permit as required for an encroachment from that entity.

2-5 THE CONTRACTOR'S EQUIPMENT AND FACILITIES.

2-5.4 Haul Routes.

Replace the entire subsection with the following:

Hall Routes shall be per the City of Hermosa Beach Truck Routes map. See Exhibit "D" of the Contract Documents.

Add the following subsections:

2-5.5 Contractor's Responsibility for Work.

Until the formal acceptance of the work by the City, the Contractor shall have the charge and care thereof and shall, subject to the insurance protection furnished, bear the risk of accident, loss or damage to any part thereof by action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore and otherwise correct damages to any portion of the work occasioned by any of the above causes before its acceptance.

In case of suspension of work from any cause whatever, the Contractor shall be responsible for all materials and the proper temporary storage thereof.

2-5.6 Notice and Service Thereof.

Any notice required or given by one party to the other under the Contract shall be in writing and shall be dated and signed by the party giving such notice or by a duly authorized representative of such party. Any such notice shall not be effective for any purpose whatever unless served in the following manner:

Notice shall be given to the City by personal delivery thereof to the City's Engineer or by depositing the same in the United States mail enclosed in a sealed envelope, registered and with postage prepaid, addressed to:

Public Works Department
City of Hermosa Beach
1315 Valley Dr.
Hermosa Beach, CA 90254

Notice shall be given to the Contractor by personal delivery thereof to said Contractor or to his authorized representative at the site of the project, or by depositing the same in the United States mail, enclosed in a sealed envelope addressed to said Contractor at the address established for the conduct of the work under this Contract, postage prepaid and registered.

Notice shall be given to the Surety, or any other person, by personal delivery to said Surety or other person, or by depositing the same in the United States Mail, enclosed in a sealed envelope addressed to such Surety or persons at the address of said Surety or persons last communicated to the party giving the notice, postage prepaid and registered.

2-5.7 Warranty of Title.

No materials, supplies, or equipment for the work under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale Contract or other agreement by which an interest therein or any part thereof is retained by the seller or supplier. The Contractor warrants clear and good title to all materials, supplies, and equipment installed and incorporated in the work, and agrees upon completion of all work to deliver the premises, together with all improvements and appurtenances constructed or placed thereon by them to the City free from any claims, liens, encumbrances, or charges, and further agrees that neither they nor any person, firm, or corporation furnishing any material or labor for work covered by the Contract shall have any right to a lien upon the premises or any improvement or appurtenance thereon; provided, that this shall not preclude the Contractor from installing metering devices or other equipment of utility companies the title of which is commonly retained by the utility company.

Nothing contained in this section, however, shall defeat or impair the right of such persons furnishing materials or labor under any bond given by the Contractor for their protection, or any right under any law permitting such persons to look to funds due the Contractor, which are in the hands of the City.

2-11 RETENTION OF IMPERFECT WORK.

If any portion of the work done or materials furnished under the Contract proves defective or not in accordance with the specifications and Contract drawings, and if the imperfection in the same is not of sufficient magnitude or importance to make the work dangerous or undesirable, or if the removal of such work is impracticable or will create conditions which are dangerous or undesirable in the opinion of the Engineer, the Engineer shall have the right and authority to retain the work instead of requiring it to be removed and reconstructed, but he shall make such deductions therefor in the payment due the Contractor as may be just and reasonable.

SECTION 3 – CONTROL OF THE WORK.

3-6 THE CONTRACTOR'S REPRESENTATIVE.

Add the following:

The Contractor shall provide the Engineer with the name, address, and business and home telephone numbers of the person responsible for the maintenance of barricades, traffic control signs, lights and other safety devices.

3-7 CONTRACT DOCUMENT.

3-7.2 Precedence of Contract documents.

Replace the entire subsection with the following:

If there is a conflict between any of the Contract documents, the document highest in the order of precedence shall control. The order of precedence, from highest to lowest, shall be as follows:

1. Requirements of law, including the Code and Ordinances of the City of Hermosa Beach.
2. Permits from other agencies as may be required by law.
3. Permits from City of Hermosa Beach Departments as may be required by law or ordinance.
4. The Contract.
5. The Bid Proposal.
6. Addenda.
7. Notice Inviting Bids.
8. Instructions to Bidders.
9. Special and General Provisions.
10. Plans.
11. City of Hermosa Beach Standard Plans.
12. Other Standard Plans.
13. Standard Specifications for Public Works Construction.
14. Reference Specifications.

Change orders, supplemental agreements, and approved revisions to Plans and Specifications will take precedence over documents listed above, except those listed as FIRST, SECOND, and THIRD. Detailed plans shall have precedence over general plans.

3-8 SUBMITTALS.

3-8.1 General.

Add the following:

The Contractor shall submit the following submittals within ten (10) days of notification of the City's intent to award this Contract:

- Project Construction Schedule, sequence, and phase sequence plan
- Preconstruction video on USB, 2 copies
- Copy of City Business License (Prime and Subcontractors)

- 24 Hr. Emergency Phone Call List
- Letters identifying site authorized Contractor's representative or "Superintendent" and Contractor's "Competent Person"
- Vehicular and Pedestrian Traffic Control Plan
- WPCP / Best Management Practices
- Asphalt Concrete material specifications and mix design
- Concrete material specifications and mix design
- Crushed Aggregate Base material specifications
- Topsoil material specifications
- Decomposed Granite specifications
- Detectable Warning System/Truncated Domes for access ramps
    - One (1) ADA tile sample, minimum 6" x 6"
    - Shop drawings for access ramp products showing fabrication details, composite structural system, tile surface profile, sound on cane amplification feature, plans showing tile placement including joints, and material to be used as well as outlining installation materials and procedure
- Constructions Notices sample template shall be provided by the City to the Contractor and modified and submitted to the engineer for review and approval. Approved Construction Notice shall be distributed by Contactor. See Exhibit "B".
- Others as requested by the Engineer

3-12 WORK SITE MAINTENANCE.

3-12.6.2 Best Management Practices (BMPs).

Replace the entire subsection with the following:

Best Management Practices (BMPs) shall be defined as a method used to prevent or control stormwater runoff and the discharge of pollutants, including sediment, into local storm drains and/or drainage facilities leading to waterbodies. The contractor shall obtain and refer to the California Stormwater Quality Association's *2023 Construction BMP Handbook*, the City of Hermosa Beach Community Development Department's *Best Management Practices for Small Construction Sites* brochure, and any other materials provided by the City. The contractor shall, based on those documents, the contract documents, and latest industry best practices, provide a project-specific erosion control plan which will specify which BMPs will be utilized for wind erosion control, tracking control, erosion and sediment control, non-storm water control, and waste management and materials pollution control.

The contractor shall be responsible for installing, constructing, inspecting, maintaining, and removing and disposing of BMPs in accordance with the erosion control plan and as requested by

the Engineer throughout the duration of construction, including outside of working hours. Additional BMPs may be required due to change(s) in field conditions, contractor activities, or construction operations. The contractor shall be responsible for adjusting BMPs as requested by the Engineer to achieve erosion control objectives. The contractor shall also be responsible for BMP implementation and maintenance throughout any temporary suspension of the work.

Payment for BMPs shall be made per contract unit price per Lump Sum. The Contractor shall comply with the requirements described above in implementing BMPs including obtaining any required permits. No additional compensation will be made thereof.

3-13 COMPLETION, ACCEPTANCE, AND WARRANTY.

Add the following subsection:

3-13.4 Completion and Acceptance.

In addition to the guarantees as required in Section 2-4 of the Standard Specifications, the Faithful Performance Bond shall remain in full force and effect for a period of one year after acceptance of the work by the City to insure that defects, which appear within said period, will be repaired, replaced, or corrected by the Contractor, at its own cost and expense, to the satisfaction of the Engineer within thirty (30) days of written notice thereof by the City.

SECTION 5 - LEGAL RELATIONS AND RESPONSIBILITIES.

5-3 LABOR.

Add the following subsection:

5-3.6 Laws.

Each Bidder must submit with the Bid Proposal a fully executed Certificate of Non-Discrimination by Contractors. Bids will not be considered unless accompanied by the completed Certificate.

After the opening of bids and the determination of the low Bidder, said low Bidder shall submit to the Public Works Department, no later than 5:00 P.M. on the third working day following the bid opening, a completed "Fair Employment Practices Contractor Compliance Report".

The Contractor shall comply with all applicable provisions of Sections 1776, 1777.5 and 1777.7 of the California Labor Code. The Contractor shall be responsible for compliance with Section 1776 and shall insert a provision in all subcontracts requiring subcontractors to comply with said section.

The Contractor is prohibited from performing work on this project with a subcontractor who is ineligible to perform work on the project pursuant to Section 1777.1 or 1777.7 of the Labor Code.

5-4 INSURANCE.

Replace the entire subsection with the following:

The Contractor shall, at its expense, maintain in effect all times during the performance of work under the Contract not less than the following coverage and limits of insurance, which shall be maintained with insurers licensed to sell insurance in the State of California and having a "A-"or

higher rating in the latest edition of Best's Insurance Guide, and shall be subject to approval by the City's Risk Manager:

Workers' Compensation and Employer's Liability

- Workers' Compensation – coverage as required by law
- Employer's Liability – limits of at least $1,000,000 per occurrence

Comprehensive General Liability

- $5,000,000 per occurrence.

Automobile Liability

$5,000,000 per accident for bodily injury and property damage.

All of the Contractor's policies shall contain an endorsement providing written notice shall be given to the City at least 30 calendar days prior to termination, cancellation or reduction of coverage in the policy

The Bodily Injury and Property Damage Liability policies shall contain the following:

1. An endorsement extending coverage to the City as an insured, in the same manner as the named insured as respects liabilities arising out of the performance of any work under the Contract. Such insurance shall be primary insurance as respects the interest of the City, and any other insurance maintained by the City shall be excess and not contributing insurance with the insurance required hereunder.
2. "Severability of Interest" clause.
3. Elimination of any exclusion regarding loss or damage to property caused by explosion or resulting from collapse of buildings or structures or damage to property underground, commonly referred to by insurers as the "XCU" hazards.
4. Provision or endorsement stating that such insurance, subject to all of its other terms and conditions, applies to the liability assumed by the Contractor under the Contract.

Promptly on execution of the Contract, and prior to commencement of any work, the Contractor shall deliver to the City copies of all required policies and endorsements thereto on the forms supplied by the City.

The Contractor shall require and verify similar insurance on the part of its subcontractors.

The foregoing requirements as to the types, limits and City approval of insurance coverage to be maintained by the Contractor are not intended to and shall not in any manner limit or qualify the liabilities and obligation assumed by the Contractor under the Contract.

Any policy or policies of insurance that the Contractor or his Subcontractors elects to carry as insurance against loss or damage to their construction equipment and tools or other personal property used in fulfillment of this Contract shall include a provision waiving the insurer's right of subrogation against the City.

The cost of all insurance shall be included in the Contractor's bid.

5-7 SAFETY.

Add the following subsection:

5-7.9 Emergency Provisions.

Unusual conditions may arise on the work which will require that immediate and unusual provision be made to protect the public from danger or loss or damage to life and property, due directly or indirectly to the prosecution of the work, and it is part of the service required of the Contractor to make such provisions and to furnish such protection.

Whenever, in the opinion of the City, an emergency exists of which the City is aware and against which the Contractor has not taken sufficient precaution for the safety of the public or the protection of utilities or of adjacent structures or property which may be injured by the progress of construction; and whenever, in the opinion of the City, immediate action shall be considered necessary in order to protect public or private personnel or property interests, or prevent likely loss of human life or damage on account of the operations under the Contract, then in that event the City may provide suitable protection to said interests by causing such work to be done and material to be furnished, as in the opinion of the City may seem reasonable and necessary, all at the expense of the Contractor.

Add the following subsections:

5-8 LAWS TO BE OBSERVED.

5-8.1 Laws and Regulations.

The Contractor shall keep himself fully informed of all Federal and State laws, County and City ordinances and regulations which, in any manner, affect those engaged or employed on the work, the materials used in the work or the conduct of the work. If any discrepancy or inconsistency should be discovered in this Contract or in the Plans or Specifications herein referred to, in relation to any such law, ordinance or regulation, the Contractor shall forthwith report the same in writing to the Engineer. The Contractor shall, at all times, observe and comply with and shall cause all his agents and employees to observe and comply with all such applicable laws, ordinances and regulations in effect or which may become effective before completion of this Contract. He shall protect and indemnify the City and its officers and agents against any claim or liability arising from or based on the violations of any such laws, ordinances or regulations whether by himself or by his employees or his subcontractors or their employees.

Except as otherwise explicitly provided in these Specifications, all permits and licenses necessary to the prosecution of the work shall be secured by the Contractor at his own expense and he shall pay all taxes properly assessed against his equipment or property used or required in connection with the work.

All state laws, all county and city ordinances and regulations now imposed by competent authority and relating to any materials required to be furnished under these specifications and works required to be done hereunder, shall be deemed to be and hereby are made controlling and part of these specifications.

5-8.2 General.

The Contractor shall keep himself fully informed of all existing state and national laws and

municipal ordinances and regulations which in any manner affect those engaged or employed in the work, or the materials used in the work or which in any way affect the conduct of the work and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same.

5-8.3 Eight-Hour Law.

Eight (8) hours labor constitutes a legal day's work. The Contractor shall forfeit as a penalty $25.00 (Twenty-five dollars) for each workman employed in the execution of the Contract by the Contractor or any subcontractor under him for each calendar day during which such workman is required or permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week in violation of the provisions of the Labor Code and in particular, Section 1810 to Section 1815 thereof inclusive except that work performed by employees of Contractors in excess of eight (8) hours per day and forty (40) hours during any one week, shall be compensated at not less than one and one-half (1 1/2) times the basic rate of pay as provided in Section 1815.

5-8.4 Prevailing Rate of Per Diem Wages.

Pursuant to the provisions of Section 1773 of the Labor Code, the general prevailing wage rates in the County in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates. The Federal Minimum wage rates for this project as predetermined by the United States Secretary of labor are set forth herein by addenda and in copies that may be examined at the offices described above where project plans, special provisions, and proposal forms may be seen. Addenda to modify the federal minimum wage rates, if necessary, will be issued to holders. Future effective general prevailing wage rates which have been predetermined and are on file with the California Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

Attention is directed to the Federal minimum wage rate requirements in these Special Provisions. If there is a difference between the minimum wage rates predetermined by the Secretary of labor and the general prevailing wage rates determined by the Director of the California Department of Industries Relations for similar classifications of labor, the Contractor and subcontractor shall pay not less than the higher wage rate. The City will not accept lower State wage rates not specifically included in the Federal minimum wage determination. This includes “helper” (or other classifications based on hours of experience) or any other classifications not appearing in the Federal wage rate determination. Where Federal wage determinations do not contain the State wage rate determination otherwise available for use by the Contractor and subcontractor, the Contractor and subcontractor shall pay not less than the Federal minimum wage rate which most closely approximates the duties of the employees in question.

The U.S. Department of Transportation (DOT) provides a toll-free “hotline” service to report bid rigging activities. Bid rigging activities can be reported Mondays through Fridays, between 8:00 a.m. and 5:00 p.m., eastern time, Telephone No. 1-800-424-9071. Anyone with knowledge of possible bid, Bidder collusion, or other fraudulent activities should use the “hotline” to report these activities. The “hotline” is part of the DOT’s continuing effort to identify and investigate highway construction Contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information with be treated confidentially and caller

anonymity will be respected.

The Contractor shall comply with Labor Code Section 1775. In accordance with said section, the Contractor shall forfeit as a penalty to the City $50.00 (fifty dollars) for each calendar day, or portion thereof, for each workman paid less than the stipulated prevailing rates for such work or craft in which such workman is employed for any work done under the Contract by him or by `any subcontractor under him in violation of the provisions of the Labor Code and in particular Labor Code Sections 1770 to 1780, inclusive. In addition to said penalty and pursuant to said Section 1775, the difference between such stipulated prevailing wage rates and the amount paid to each workman for each calendar day or portion thereof for which each workman was paid less than the stipulated prevailing wage rate shall be paid to each workman by the Contractor.

5-8.5 Certified Payroll.

Pursuant to Section 1776 of the Labor Code, the Contractor and/or subcontractors shall submit weekly to the City for each week in which any Contract work is performed a certified copy of all payroll records. Should the Contractor fail to provide such payroll certificates, the City may withhold.

$1,000.00 for each weekly payroll certificate not received from payment due.

5-9 FAIR EMPLOYMENT PRACTICE COMMISSION CERTIFICATION.

The Contractor's attention is directed to the requirements in Section 12990 of the Government Code for nondiscrimination and compliance employment programs.

SECTION 6 – PROSECUTION AND PROGRESS OF THE WORK.

6-1 CONSTRUCTION SCHEDULE AND COMMENCEMENT OF THE WORK.

6-1.1 Construction Schedule.

Add the following:

The Contractor’s proposed construction schedule shall be submitted to the Engineer within ten (10) days of notification of the City’s intent to award this Contract. The schedule shall be supported by written statements from each supplier of materials or equipment indicating that all orders have been placed and acknowledged and setting forth the dates that each item will be delivered.

In preparation of the construction schedule, the following items shall be considered:

- The City observes the following holidays, which shall be considered non-working days. If the Contractor elects to work on any of the City holidays the Contractor shall be responsible for paying any associated inspection costs, including overtime and holiday premiums. **Any work not completed and fully open to public traffic shall be maintained in a safe and delineated condition. Traffic control and safety devices shall be maintained at all times.**
    - New Year’s Day
    - Martin Luther King Jr.’s Birthday

- Washington's Birthday
- Cesar Chavez Day
- Memorial Day
- Juneteenth
- Independence Day
- Labor Day
- Veterans Day
- Thanksgiving
- Christmas Day

- The Contractor's working hours shall be limited to the hours between 8:00 A.M. and 6:00 P.M., Monday through Friday. Deviation from normal working hours will not be allowed unless written permission has been duly obtained beforehand from the office of the City Engineer. The Contractor shall provide adequate light for proper prosecution of the work, for the safety of the workmen and the public, and for proper inspection.

- In the event of either a requested or emergency deviation, inspection service fees will be charged against the Contractor. The service fees will be calculated at overtime rates including benefits, overhead and travel time. The service fees will be deducted from any amounts due to the Contractor.

Prior to issuing the Notice to Proceed, the Engineer will schedule a preconstruction meeting with the Contractor to review the proposed construction schedule and delivery dates, arrange utility coordination, discuss construction methods and clarify inspection procedures.

The names, addresses, and telephone numbers of the Contractor and subcontractors, or their representatives, shall be filed with the Public Works Manager and the City Police Department prior to beginning work.

The Contractor shall also notify the City of Hermosa Beach and the owners of all utilities and substructures not less than 72 hours prior to starting construction. The following utility companies list of names and telephone numbers is intended for the convenience of the Contractor and is not guaranteed to be complete or correct:

Southern California Edison Co.	310/783-9332
The Gas Co.	310/605-7837
Verizon	818/837-0394
Hermosa Beach Police & Fire	310/524-2750
Time Warner (Cable TV)	310/216-4184
West Basin Municipal Water District	310/217-2411
Athens Services	626/934-4696
California Water Service Co.	310/257-1428
Underground Service Alert	800/227-2600
Los Angeles County Flood Maintenance	562/861-0316

The Contractor shall submit periodic Progress Reports to the Director of Public Works by the tenth day of each month. The report shall include an updated Construction Schedule. Any deviations from the original schedule shall be explained. Progress payments will be withheld pending receipt of any outstanding reports.

6-4.3 Payment for Delays.

To the furthest extent permitted by law, replace the entire subsection with the following:

In compliance with the provisions of California Public Contract Code § 7102, the Contractor will be compensated for damages incurred due to delays in completing the Work due solely to the fault of the City, where such delay is unreasonable under the circumstances and not contemplated by the parties. The Contractor and City agree that determining actual damages is impracticable and extremely difficult. As such, the Contractor shall be entitled to the appropriate time extension and to payment of liquidated damages in the sum of $1,200 per Day of delay in excess of the time specified for the Completion of the Work. Such amount shall constitute the only payment allowed and shall necessarily include all overhead (direct or indirect), all profit, all administrative costs, all bond costs, all labor, materials, equipment and rental costs, and any other costs, expenses and fees incurred or sustained as a result of such delay. The Contractor expressly agrees to be limited solely to the liquidated damages for all such delays as defined in this subsection.

6-9 LIQUIDATED DAMAGES.

Add the following:

The amount of liquidated damages is hereby amended to **$1,200** for each consecutive calendar day.

SECTION 7 – MEASUREMENT AND PAYMENT.

7-3 PAYMENT.

7-3.2 Partial and Final Payment.

Replace the entire subsection with the following:

The closure date for periodic progress payments shall be the twenty-fifth day of each month. Authorization to pay is commonly received on the tenth day of the following month. However, payments will be withheld pending receipt of any outstanding reports required by the Contract documents.

Each month, the Contractor shall meet with the Engineer, a minimum of three working days prior to the submittal of the progress payment to the City, to finalize and receive approval regarding the measurement of the Work performed through the closure date and the estimated value of the progress payment based on the contract Unit Prices or as provided for in the bid schedule. Any progress payment submitted without such approval will be considered incomplete and returned to the Contractor and no payment shall be considered until such approval is obtained. Payments will be withheld pending receipt of any outstanding reports required by the contract documents.

The final progress payment will not be released until the Contractor returns the control set of specifications and plans indicating the as-built conditions.

7-3.4 Mobilization.

Replace the entire subsection with the following:

Mobilization and demobilization shall include all site visits; preparation of all submittals; BMPs; obtaining all permits, insurance, and bonds; video recording of the site existing conditions; moving onto the site all materials and equipment; set up of any temporary facilities (e.g. sanitary facilities, parking, construction water, equipment and materials staging area, distribution of all notification materials; removal of same at completion of the work; site cleanup; and other work as required to perform and complete the work.

It shall be the Contractor's responsibility to secure the entire limit of the work site with temporary construction fencing. The fencing limits and layout are subject to approval by the Engineer.

No material, equipment, or vehicles to be left overnight on sidewalks or streets unless approved the Engineer.

A minimum of one week prior to the start of construction, the Contractor shall video record all areas where construction is to take place. Such video recordings shall be provided to the Engineer before construction commences. These video recordings shall serve as a record of the existing conditions for disputes arising from restoration and should therefore be taken along the line of construction and site access and staging areas at sufficient detail as necessary to clearly depict details of existing conditions. Video recordings shall document existing sidewalks, and adjacent conditions. The video recordings shall be on two USB copies and given to the Engineer. All video recordings shall be indexed and catalogued in such a manner that each photographed area is readily identifiable and shall also indicate the date and time (hour, minutes, and seconds) on which the recording was made. The Contractor shall also video record any unusual conditions encountered during construction that are not already a matter of photographic record. In any areas where existing conditions cannot be determined by means of video recording, the area shall be restored as approved by the Engineer at Contractor's expense. All video recordings shall become the property of the City.

Mobilization shall consist of preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, materials and incidentals to the project site necessary for work on the project and for all other work and operations which must be performed or costs incurred including bonds, insurance, construction permits and/or permit riders as may be required by law, and financing prior to beginning work on the various contract items on the project site.

Mobilization shall also include the cost, time and labor to move the necessary construction equipment to and from the job site, supervisory time on the job by the Contractor's personnel to keep the construction site in a safe condition and all other related work as required for all non-working days during the course of construction. Contractor is responsible for securing an adequate storage site for equipment and materials.

Mobilization shall include any work shown on the plans, including removal and/or relocation of an item of work shown on construction documents, which has no corresponding bid item for said

work. It shall also include removal of vegetation, removal and/or modifications to the existing planters, wall, fences, gates within the project area, on private properties and within the public right of way as shown on the construction documents. Full compensation relating to that work, including the furnishing of labor and materials, and the disposal of materials shall be included herein.

Mobilization shall include compliance with water quality and air quality laws; furnishing all water required for the construction work; protection of utilities, trees, fences, walls, landscaping, and other facilities; and the relocations as shown on the plans. All complaints received by the City associated with the construction alleging damage to private property and vehicles shall be responded to by the Contractor within one working day of notification. Failure to comply with this provision may result in a penalty of one hundred and fifty dollars ($150.00) per occurrence.

The Contractor shall have on the work site at all times, as its agent, a competent superintendent capable of reading and thoroughly understanding the plans, specifications, other related documents, and directions from the Engineer.

Contractor shall confine his operations and work area within the project area. No encroachment into private property will be permitted without the prior written consent of the property owner. Obtaining this consent will be the responsibility and the costs of the Contractor. Material shown on the plans or designated in the Special Provisions which is to be used in the reconstructed work and which has been damaged or destroyed as a result of the Contractor's operations shall be repaired or replaced at the option of the Engineer by the Contractor at the Contractor's sole expense.

The Contractor shall provide personnel to keep the construction site in a safe condition at all times, including non-working hours. Mobilization shall include scheduling and phasing of the work per the requirements of the City. The Contractor shall coordinate all construction activities with the City.

Payment for mobilization shall be per the Lump Sum (LS) price bid not exceeding 5% of the total bid amount for the project and shall include obtaining and paying for all bonding, insurance, business licenses and permits, as required for entire project, from the City of Hermosa Beach and all related agencies including but not limited to utility companies and private and public agencies. The City of Hermosa Beach will waive its permit fee.

The Contractor shall comply with the requirements specified by each license or permit. Compensation also includes furnishing a crew to pothole at the discretion of the Engineer. Progress payments for this item shall be paid in accordance with the completion percentage of the project and shall include the costs of such mobilization and administration for the entire contract period.

Add the following subsection:

7-3.9 Work Performed Without Direct Payment.

Tools and materials of any class for which no price is fixed in the Proposal, it shall be understood that such work, equipment, labor, tools, and materials shall be provided without extra charge, allowance, or direct payment of any kind. The cost of performing such work or furnishing such equipment, labor, tools, and materials shall be included in the unit bid prices in the Proposal and no additional compensation will be paid therefor.

7-4.2 Basis for Establishing Costs.

7-4.2.1 Labor.

Replace the entire subsection with the following:

The costs of labor will be the actual cost for wages of workers performing the extra work at the time the extra work is done, plus the employer payments of payroll taxes, health and welfare, pension, vacation, apprenticeship funds, and other direct costs, resulting from Federal, State, or local laws, as well as assessments or benefits required by collective bargaining agreements.

7-4.3 Markup

7-4.3.1 Work by the Contractor.

Replace the entire subsection with the following:

An allowance for overhead and profit shall be added to the Contractor's costs and shall constitute the full and complete markup for all overhead and profit on extra work performed by the Contractor. The Contractor shall also be compensated for the actual increase in the Contractor's bond premium caused by the extra work. The markup shall be:

a. Labor – 20%
b. Materials – 15%
c. Tool and Equipment Rental – 15%
d. Other Items – 15%

7-4.3.2 Work by a Subcontractor.

When any of the extra work is performed by a subcontractor, the markup shall be applied to the subcontractor's costs. An allowance for the Contractor's overhead and profit shall be added to the sum of the subcontractor's costs and markup and shall constitute the full and complete markup for all overhead and profit for the Contractor on work by the subcontractor. For Contractor markup of subcontractor's costs, the allowance shall be 10% on the first $2,000 or portion thereof and 5% on costs in excess of $2,000.

Add the following section:

7-6 PAYMENT FOR PROJECT BID ITEMS.

7-6.1 Traffic Control and Public Safety.

The Contractor shall provide and maintain all construction area traffic controls in accordance with Part 6 of the Standard Specifications for Public Works Construction, the latest version of the California Manual on Uniform Traffic Control Devices (CA MUTCD), and Work Area Traffic Control Handbook (WATCH), and as noted herein. All necessary traffic control devices shall be in place prior to the start of work on a project section.

The Contractor shall so conduct his operations as to offer the least possible obstruction and inconvenience to public traffic. Every effort shall be made to provide a clear and unobstructed view of all traffic control signs, signals, and markers.

The Contractor shall maintain access for emergency vehicles at all times. The Contractor shall maintain a 24-hour emergency service to remove, install, relocate, and maintain warning devices and shall furnish to the Engineer names and telephone numbers of three persons responsible for this emergency service. In the event these persons do not promptly respond when notified, or it becomes necessary to call other forces to accomplish emergency service, the Contractor will be responsible for any cost incurred.

All existing permanent traffic control signs, barricades, and devices shall remain in effective operation unless a substitute operation is arranged for and approved by the Engineer. In the event that a temporary traffic control device or sign conflicts with a permanent one, the Contractor shall cover the permanent device to eliminate the conflict.

Prior to the start of each workday, the Contractor shall perform all necessary work incidental to and commensurate with the proper signing, detouring, barricading, etc., heretofore and hereinafter specified that is required for that particular day's schedule of operations. No construction shall be permitted until such signing and detouring operations have been completed.

The Contractor may post "Temporary No Parking" signs only after notifying and receiving approval from the Engineer. Type of sign, method, and location of such posting shall conform to the California MUTCD sign chart. The Contractor shall be required to provide and maintain all necessary flag persons, barricades, delineators, signs, flashers, and any other safety equipment as set forth in the latest publication of the California MUTCD, or as required by the Engineer to ensure safe passage of traffic (vehicles, pedestrians, cyclists, etc.).

The Contractor shall submit a traffic control and phasing plan for approval prior to beginning construction. No work shall commence on a phase until the previous phase is completed unless approved by the Engineer. The Contractor shall include these sequences in their work progress schedule to be submitted. The Contractor shall provide written notification to all businesses and residents near the construction one week prior to the work start date. The notice shall be prepared by the Contractor, approved by the City, distributed by the Contractor, and will include a preliminary schedule, name of the job superintendent/foreman and a telephone number where they can be reached 24 hours a day in case of emergency.

The cost for all project noticing will be included in the price of the traffic control. Failure or refusal by the Contractor to comply with the above requirements shall be sufficient cause for the Engineer to order the work done by City forces and for all costs thereof to be borne by the Contractor.

This item shall also include non-skid steel plates and temporary AC including installation and removal; all associated temporary signing and striping; flashing arrow signs; flagging and/or flagger costs; and other items as requested by the Engineer to safely complete the work.

Should the Contractor appear to be negligent in furnishing warning and protective measures as above provided, the Engineer may direct attention to the existence of a hazard, and the necessary warning and protective measures shall be furnished and installed by the Contractor, at their expense. Should the Engineer point out the inadequacy of warning and protective measures, such action on the part of the Engineer shall not relieve the Contractor from responsibility for public safety or abrogate its obligation to furnish and pay for these devices.

The Contractor shall provide access as required to accommodate special circumstance at any residence including access for disabled, impaired, special medical needs, etc.

Payment for Traffic Control and Public Safety shall be made per contract unit price per Lump Sum and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involving placing, removing, storing, maintaining, moving to new locations, replacing and disposing of the components of traffic control system as specified in the SSPWC and these specifications, and as directed by the City.

7-6.2 Survey and Construction Staking.

The Contractor shall perform all necessary survey and construction staking required to complete the work per the contract documents.

Payment for Survey and Construction Staking shall be included in cost of other items of work and no additional compensation will be allowed thereof.

7-6.3 Temporary Construction Fencing.

It shall be the Contractor's responsibility to secure the entire limit of the work site with temporary construction fencing including installation of windscreen material. The fencing limits and layout are subject to approval by the Engineer.

Payment for Temporary Construction Fencing shall be included in cost of other items of work and no additional compensation will be allowed thereof.

7-6.4 Bid items 1 through 34 per Project's Bid Schedule

The price paid for the work items listed in the Bid Schedule shall include full compensation for furnishing the labor, material, tools and equipment and doing all of the related and incidental work involved to complete the work per the plans, specifications and contract documents. Contractor will include the cost of work not listed but necessary to complete the project designated in the Contract Documents in the various listed work items on the Bid Form.

The General Provisions and specifications which are not listed in the schedule of work items of the bid form are, in general, applicable to more than one listed work item, and no separate work item is provided thereof. Include the cost of work not listed, but necessary to complete the project designated in the contract documents, in the various listed work items of the bid form. This shall include, but not be limited to, keeping a neat and orderly work site, free of trash, and based on the City's site inspections, the City shall back-charge the Contractor for any remedial trash pickup determined to be required by the City.

The bids for the work are intended to establish a total cost for the work in its entirety. Should the Contractor feel that the cost for the work has not been established by specific items in the bid form, he shall include the cost for that work in some related bid item so that his proposal for the project does reflect his total cost for completing the work in its entirety.

Work for bid schedule items shall be constructed per the plans, specifications and contract documents, complete-in-place.

PART 2 – CONSTRUCTION MATERIALS

SECTION 200 – ROCK MATERIALS.

200-2 UNTREATED BASE MATERIALS.

200-2.1 General.

Replace the entire subsection with the following:

Materials for use as untreated base or subbase shall be crushed aggregate base.

SECTION 201 – CONCRETE, MORTAR, AND RELATED MATERIALS.

201-1 PORTLAND CEMENT CONCRETE.

200-1.1 General.

Add the following:

Concrete shall be type 520-C-2500 PSI concrete per the

203-6 ASPHALT CONCRETE.

203-6.1 General.

Add the following:

Asphalt concrete shall be type C2-PG 64-10 for surface courses. No reclaimed asphalt concrete material (RAP) is allowed.

PART 3 – CONSTRUCTION METHODS

SECTION 300 – EARTHWORK.

300-1 CLEARING AND GRUBBING.

300-1.2 Root Pruning and Tree Trimming.

Replace the entire section with the following:

a. Equipment

Pruning of roots shall be done using a Vermeer trenching machine with a root pruning attachment or a comparable piece of equipment, as approved by the Engineer. The equipment shall safely cut a narrow trench four to six inches wide to accommodate the installation of the root barrier.

Where sidewalks, curb ramp, or curbs are removed, the roots can be severed at the point adjacent to the edge of the new sidewalk, curb ramp, or curb to be installed, using other pneumatic tools to make the break-out and removal work more efficient.

Any roots over three inches in diameter must be cleanly cut using a chain saw or other sawing tool before the barrier is installed and the trench backfilled.

b. Execution

Tree roots and other objectionable material shall be removed from areas of construction to a depth of 6 inches below the bottom of concrete. Tree roots shall be removed from parkways if visible or if instructed by Engineer.

Cleanly cut roots do not need to be painted or treated in any way other than the installation of root deflection barrier.

300-1.4 Payment.

Replace the entire subsection with the following:

There shall be no separate payment for root pruning or tree trimming; all costs thereto shall be considered included in the Contract unit price for the items of work for which the pruning or trimming is required.

SECTION 301 – SUBGRADE PREPARATION, TREATED MATERIALS, AND PLACEMENT OF BASE MATERIALS.

301-1 SUBGRADE PREPARATION.

301-1.1 General.

Add the following:

Base is required under all PCC and AC improvements as shown on the Plans.

A minimum of 4 inches of CAB shall be placed under sidewalks and access ramps.

A minimum of 8 inches of CAB shall be placed under curb and gutter.

301-1.7 Payment.

Add the following:

There shall be no separate payment for placement and preparation of subgrade material under curb, curb and gutter, sidewalks, and access ramps; all costs thereto shall be considered included in the Contract unit prices for the items of work for which subgrade material is required.

SECTION 302 – ROADWAY SURFACING

302-5 ASPHALT CONCRETE PAVEMENT.

302-5.4 Tack Coat.

Replace the first sentence of the first paragraph with the following:

If the asphalt concrete pavement is being constructed directly upon an existing hard-surfaced pavement, a tack coat of performance grade PG 64-10 paving asphalt conforming to 203-1 applied at an approximate rate of 0.25 L/m^2 (0.05 gallon per square yard), or SS-1h emulsified asphalt applied at an approximate rate of 0.25 L/m^2 to 0.45 L/m^2 (0.05 to 0/10 gallon per square yard), shall be uniformly applied upon the existing pavement preceding the placement of the asphalt concrete.

Add the following paragraph:

A Tack Coat shall be applied between base and surface courses when the surface course is not placed immediately after the base course, and to existing paved surfaces where new asphalt concrete overlaps or abuts existing pavement. Tack Coat shall be as specified in Section 302-5.4. There shall be no separate payment for Tack Coat.

302-5.5 Distribution and Spreading.

Add the following:

The surface course shall be flush with adjacent existing pavement surface. Maximum variance of 1/8”. Surface course adjacent to edge of gutter shall have a 3/8” lip over the top longitudinal edge of the gutter.

302-5.8 Manhole (and other structures).

Add the following:

Contractor shall be required to protect and maintain existing utility access frames, grates, and lids during paving operations. No grade difference at lip, between utility frame and asphalt concrete finished grade pavement, shall be allowed.

SECTION 303 – CONCRETE AND MASONRY CONSTRUCTION.

303-5 CONCRETE CURBS, WALKS, GUTTERS, CROSS GUTTERS, ALLEY INTERSECTIONS, ACCESS RAMPS, AND DRIVEWAYS.

303-5.1 Requirements.

303-5.1.1 General.

Add the following:

PCC access ramps, sidewalks, and driveways shall not be poured monolithically with any new concrete adjacent to them.

303-5.5 Finishing.

303-5.5.2 Curb.

Add the following:

Unless otherwise approved by the Engineer, the entire affected concrete curb or curb and gutter portion shall be removed by sawcutting the adjacent AC pavement two (2) feet from the edge of the area to be removed. The Contractor shall reconstruct this two-foot-wide section in accordance with Standard Plan 111-5 of the SPPWC or as directed by the Engineer.

Curb and curb and gutter shall be constructed within 72 hours of removal of sidewalks, ADA curb ramp, and curb and gutter in each location. Clearing and grubbing shall be in accordance with Subsection 300-1, per the SSPWC, including removal and disposal of materials, and pruning and removal of interfering tree roots underneath or adjacent to existing access ramp.

The Contractor shall contact the Engineer a minimum of 24 hours prior to performing any excavations within a 25-foot radius of a street tree. Any damage to the street tree may result in tree replacement by Contractor or payment of replacement costs by Contractor based on the value of the damaged tree.

303-5.5.3 Walk.

Add the following:

Sidewalk shall be constructed within 72 hours of removal of sidewalks in each location. The Contractor shall remove all existing concrete sidewalk shown on the plans to the nearest control joint. Clearing and grubbing shall be in accordance with Subsection 300-1, per the SSPWC, including removal and disposal of materials, and pruning and removal of interfering tree roots underneath existing sidewalk or adjacent to sidewalk.

Finished surfaces shall match the finish and color of adjacent concrete.

The Contractor shall be responsible for protecting newly constructed concrete improvements from damage. Contractor shall remove and replace all concrete damaged prior to acceptance. Concrete shall be replaced score line to score line unless otherwise directed by the Engineer. Patching damaged concrete is not allowed.

The Contractor shall contact the Engineer a minimum of 24 hours prior to performing any excavations within a 25-foot radius of a street tree. Any damage to the street tree may result in tree replacement by Contractor or payment of replacement costs by Contractor based on the value of the damaged tree.

The expansion joint and weakened joint pattern shall be maintained and reconstructed, unless otherwise directed by the Engineer.

The Contractor shall mark all manholes, valves, substructures, survey monuments, vaults, utility boxes, or any other items that are visible on the surface and that will interfere with constructing a fully compliant sidewalk. The Contractor shall protect and adjust to grade any such items to match grade of the surrounding concrete to the satisfaction of the Engineer.

Vegetation interfering with construction operations shall be carefully trimmed without damaging the integrity of the vegetation. Vegetation, which must be removed for construction, shall be removed, and disposed of by the Contractor. The Contractor shall protect in place or reconstruct any irrigation lines and sprinkler heads hindering (and adjacent to) the construction activity area as directed by the Engineer. Damage to existing irrigation lines and sprinkler heads shall be replaced at Contractors expense.

303-5.5.5 Alley Intersections, Access Ramps, and Driveways.

Add the following:

Unless otherwise approved by the Engineer, the entire affected concrete curb or curb and gutter portion shall be removed by sawcutting the adjacent AC pavement two (2) feet from the edge of the area to be removed. The Contractor shall reconstruct this two (2) foot wide section in accordance with Standard Plan 111-5 of the SPPWC or as directed by the Engineer.

Curb ramps shall be constructed within 72 hours of removal of sidewalks, ADA curb ramp, and curb and gutter in each location. Clearing and grubbing shall be in accordance with Subsection 300-1, per the SSPWC, including removal and disposal of materials, and pruning and removal of interfering tree roots underneath or adjacent to existing access ramp.

The Contractor shall contact the Engineer a minimum of 24 hours prior to performing any excavations within a 25-foot radius of a street tree. Any damage to the street tree may result in tree replacement by Contractor or payment of replacement costs by Contractor based on the value of the damaged tree.

Where necessary to match existing grades at the back or side of the ramp, the Contractor shall construct a rear curb for curb ramps. Curb height shall be constructed to match existing grade. Where existing walls are adjacent to curb ramp construction, the rear side curb shall be constructed to protect existing walls. Contractor shall protect in place existing vegetation and miscellaneous items adjacent to rear curb for access ramps adjacent to private property.

The Contractor shall mark all manholes, valves, substructures, survey monuments, vaults, utility

boxes, or any other items that are visible on the surface and that will interfere with constructing a fully compliant curb ramp. The Contractor shall protect and adjust to grade any such items to match grade of the surrounding concrete to the satisfaction of the Engineer.

Vegetation interfering with construction operations shall be carefully trimmed without damaging the integrity of the vegetation. Vegetation, which must be removed for construction, shall be removed, and disposed of by the Contractor. The Contractor shall protect in place or reconstruct any irrigation lines and sprinkler heads hindering (and adjacent to) the construction activity area as directed by the Engineer. Damage to existing irrigation lines and sprinkler heads shall be replaced at Contractors expense.

The Contractor shall relocate existing facilities such as street sign poles that are within the curb ramp area that conflict with the new proposed improvement. Any damaged signs due to construction shall be replaced at the Contractor's expense. The new location for such facility shall be as directed by the Engineer, if not already included in the plans, in the field and shall be within the general vicinity of the existing.

The Contractor shall tie down any survey monuments/markers obliterated during construction and reestablish said monuments/markers following construction.

PART 4 – EXISTING IMPROVEMENTS

SECTION 400 – PROTECTION AND RESTORATION.

Add the following subsections:

400-4 TREES.

The Contractor shall take care to protect all trees not approved for removal by the Engineer.

There shall be no separate payment for protection of existing trees; all costs thereto shall be considered included in the Contract unit prices for the items of work for which the protection is required.

400-5 SIGNPOST.

Contractor shall remove existing sign post from parkway when shown on plans to be removed by excavating to a depth necessary to remove the post and any existing foundation or anchoring assembly. Contractor shall protect and store the existing post and signs for reinstallation.

Contractor shall install a new anchoring assembly and reinstall the existing post with signs.

Contractor shall obtain approval by the Engineer of sign placement before permanently installing the new post. All signs and posts shall be reset the same day as the existing signs and posts are removed.

The bottom of the lowest sign shall be 7 feet above the sidewalk, if applicable. The lowest sign can be lower if in the parkway as approved by the Engineer.

Where there is no curb, the lateral distance between the edge of the sign panel and the edge of the nearest travel say shall be a minimum of 6 feet. Where there is a curb, the lateral distance between the edge of the sign panel and the flowline shall be a minimum of 2 feet.

See Section 7 for payment details.

SECTION 401– REMOVAL.

401-8 TREES.

The Contractor shall notify the Public Works Inspector 48 hours prior to beginning any work performed under this specification.

The Contractor shall notify all affected property owners, in writing, of the proposed construction 72 hours prior to beginning any work. The notification shall be in the form of fliers. The City Construction Notice Template is attached in Exhibit “B” ; template shall be modified by the Contractor and sent to the Engineer for review and approval. Contractor shall distribute notices to residents and commercial establishments affected by the construction once approved by the Engineer.

The Contractor shall be responsible for the removal of any trees adjacent to repair, removal, and/or replacement sites which, in the opinion of the City, require root loss that would mortally wound the tree, or result in destabilizing the tree to an unacceptable level.

Where a tree to be removed in close proximity to an overhead utility line or guy line, extreme caution shall be taken to avoid damage to these lines. Any damage that does occur shall be promptly reported to the City Police Department, and to the utility company that is involved. The cost of repair of the damage will be at the Contractor's expense.

If damage occurs to any adjacent shrubs or trees that are to remain, immediate treatment or necessary replacement of same type of shrubs or trees shall be carried out under the direction of the City at the Contractor's expense.

Where shown on the Plans, or as requested by the Engineer, tree removal shall consist of notifications; cutting and complete removal of the tree stump, branches, and large roots (those with a diameter larger than one inch) to a minimum depth of 24 inches from top of curb; excavation; hauling; disposal; backfill; and restoration of removal area. Stump grindings will be removed and replaced with Class A topsoil to grade within the tree well or parkway.

See Section 7 for payment details.

PART 6 – TEMPORARY TRAFFIC CONTROL

SECTION 600 – ACCESS.

600-1 GENERAL.

Add the following:

Access to street intersections, public and private parking lots, commercial businesses, residences, and other public and private properties shall be maintained at all times. At least 72 hours in advance of commencing any work that may affect the access to private properties, the Contractor shall provide construction notices to adjacent residential properties, and commercial establishments. The Construction Notice template (Exhibit "B") shall be modified by the Contractor and sent to the engineer for review and approval. The Contractor shall distribute notices to residents and commercial establishments affected by construction once approved by the Engineer. Vehicular access to and from commercial and residential driveways and parking lots shall be maintained at all times, except when performing items of work which cannot be accomplished without access restriction.

When access must be restricted, as determined by the Engineer, it shall occur only for the time period required to accomplish the particular item of work.

Modifications to traffic control shall be performed to correct any deficiencies in traffic flow (vehicular, bicycle, pedestrian, etc.) as deemed necessary by the Engineer or Public Works Inspector.

All traffic lanes shall be open for public use on the days and at the times specified below:

1. Saturdays, Sundays, and legal holidays: from 12:00 a.m. to 11:59 p.m.
2. Fridays and any day preceding a legal holiday: from 5:00 a.m. to 11:59 p.m.
3. All days not covered in 1 and 2 above: 7:00 a.m. to 8:30 a.m. and 4:00 p.m. to 6:00 p.m.
4. Non-construction hours: all hours when the Contractor's employees are not physically present at the construction site actively performing Contract work.
5. In the vicinity of any Elementary or Middle School, the Contractor shall determine arrival and departure times of said school and shall provide for adequate traffic control for any school age pedestrian and/or bicycle routes to the school during the arrival and departure periods. The submittal of traffic control plans shall include arrival and departure times for each school. At no time will traffic control be allowed in the immediate vicinity so as to cause a hazard to a school pedestrian crosswalk during arrival and departure time periods.

On those days and hours when closure of traffic lanes is not prohibited under the provisions of the preceding subparagraph A, no more than one lane may be closed at any time during construction hours. During any lane closure, Type II flashing arrow boards shall be used in accordance with the most recent Edition of the Manual on Uniform Traffic Control Devices (MUTCD), the California Supplement to the MUTCD hereinafter referred as CAMUTCD issued by the State of California.

SECTION 601 – TEMPORARY TRAFFIC CONTROL FOR CONSTRUCTION AND MAINTENANCE WORK ZONES.

601-1 GENERAL.

Replace the first paragraph with the following:

All work required for maintaining and controlling traffic shall conform to the most recent Edition of the Manual on Uniform Traffic Control Devices (MUTCD), the California Supplement to the MUTCD hereinafter referred as CAMUTCD issued by the State of California, Department of Transportation (Caltrans), and the "Work Area Traffic Control Handbook," published by Building News, Inc.

Add the following:

All construction work and traffic control shall be scheduled and constructed to provide for a minimum of inconvenience and a maximum of safety to the public vehicular, bicycle and pedestrian traffic.

The Contractor shall be responsible for the protection of vehicular, bicycle and pedestrian traffic until the work called for in the Plans, the Standard Specifications, and Special Provisions have been accepted by the Engineer.

The Contractor shall notify the Engineer of intent to begin work following notice to proceed before work is to begin. The Contractor shall cooperate with the Engineer relative to handling traffic through the area and shall make all arrangements relative to keeping the working area clear of parked vehicles.

Contractor's equipment and personal vehicles of the Contractor's employees shall not be parked on the traveled way nor on any section where traffic is restricted at any time.

During any period when two-way traffic is not provided, as approved by the engineer, the Contractor shall employ flaggers to control traffic through the construction zone.

The Contractor shall notify the Engineer of any operation that will affect two-way flow of traffic more than five minutes for every half hour of working time, at least two working days in advance of such operation. Submitted traffic control plans must be signed/stamped by a licensed Traffic Engineer.

If the Contractor fails to maintain and control traffic at any time during the construction period such that the safety to public vehicular, bicycle and/or pedestrian traffic is compromised in any way in the opinion of the Engineer or the City Police Department, the City will require the Contractor to stop work and open all traffic lanes, or immediately modify the traffic control plan, subject to approval by the City, to ensure that the unsafe situation is corrected. If, due to the nature of the work, it is impossible to open all traffic lanes, or the Contractor is unable to immediately modify the traffic control plan to restore safe and adequate traffic control, the City may mobilize emergency forces to re-establish adequate and safe traffic control. The emergency forces may include Police Department, Maintenance Services Division, Engineering Division, Contractors or consultants hired by the City or other personnel as required to re-establish adequate and safe traffic control.

The Contractor shall pay for the full and complete time and material cost for any emergency response by City forces and firms hired by the City as described herein. This payment shall be in addition to the liquidated damages provided for in Section 6-9 of these specifications. Contractor agrees to pay such costs as provided for in this paragraph, and in case the same are not paid, Contractor agrees that City may deduct the amount of such costs from any money that is due or that may be due the Contractor under the Contract. The Contractor shall not be entitled to any delay claims for work stopped by the City in order to correct an unsafe traffic condition, regardless of whether traffic control was set up in accordance with an approved traffic control plan.

601-3.5 Signs and Signage.

601-3.5.1 General.

Replace the entire subsection with the following:

Signs shall conform to the most recent Edition of the Manual on Uniform Traffic Control Devices (MUTCD), the California Supplement to the MUTCD hereinafter referred as CAMUTCD issued by the State of California, Department of Transportation (Caltrans), and the "Work Area Traffic Control Handbook," published by Building News, Inc. Each sign shall consist of a base, standard or framework, and a sign panel. Sign units shall be capable of being delivered to the work site and placed into immediate operation.

Signs shall include all temporary signs required for the direction of traffic through or around the work site. Sign placement shall conform to the documents listed above and the Traffic Control Plan.

Advance warning signs shall be provided with orange warning flags in advance of temporary stop signs. Temporary stop signs are required any time a traffic signal is dark. Temporary stop signs shall be mounted at 7 feet high.

The Contractor shall post standard "NO PARKING" construction zone signs 72 hours prior to construction, not more than 50 feet apart within the work area, showing the date and time of construction. “NO PARKING” signs are to have the language “By order of the H.B.P.D. 318-0360 CVC 22658 / HBMC 10.32.220 & 10.12.040” on the signs. Signs can be obtained from the City.

601-3.5.2 Payment.

Replace the entire subsection with the following:

See Section 7 for payment details.

PART 9 – SPECIFIC CONDITIONS

SECTION 900 – CONSTRUCTION MANAGEMENT.

900-1 PROCORE SOFTWARE.

The contractor shall use the Procore construction management software (with account for the project made available by the City at no additional cost) for various construction management activities related to the project including but not limited to submission of schedules, project material submittals, and RFIs. Project documents including plans and specifications will also be made available on Procore for the contractor's use for the duration of the project.

EXHIBIT "A" – SCHEDULE OF PERFORMANCE

CIP NO. 619 KELLY COURTS RENNOVATIONS

SECTION 1. BEGINNING OF WORK, TIME OF COMPLETION

1. Attention is directed to the provisions of Section 6-1 ("Construction Schedule and Commencement of the Work"), Section 6-1.1 ("Construction Schedule"), and Section 6-9 ("Liquidated Damages"), of the State Specifications, and these Provisions.

2. The Contractor shall complete work within **forty (40)** working days after receiving the "Notice to Proceed".

3. The Contractor and its securities will pay the sum of one thousand two hundred dollars **($1,200)** as liquidated damages for each consecutive calendar day of delay in the performance of the work in this agreement and as shown on the plans.

EXHIBIT "B" – SOLID WASTE REPORTING

Pursuant to the California Integrated Solid Waste Management Act of 1989, the City is required to report the amount of solid waste generated within the City and the disposal of that waste with the ultimate required goal of being a reduction of at least 50% in the amount of solid waste being disposed in landfills. To permit the City to comply with this State law, the contractor is required to complete the Solid Waste Report form, a copy of which is included in these special provisions. The report includes a summary of the solid waste generated by the project, a summary of solid waste disposed of at class III landfills and a summary of solid waste diverted form disposal through recycling and re-use. The contractor may use a self-generated report format that includes all of the information included on the City form.

The report shall be filed with the City after project completion and prior to final payment. If the project time span includes more than one calendar year, a separate report is required for the solid waste in each calendar year. A report for a calendar year that does not coincide with project completion shall be filed with the City on or before January 31st.

Supporting documents to be submitted with the report shall include legible copies of weigh tickets, receipts, or invoices that specifically identify the job site location that generated the waste materials. If materials are taken to a location where weigh tickets, receipts, or invoices are not available, the contractor shall provide the documentation on its own company letterhead.

The contractor is encouraged to divert solid waste from disposal at landfills through recycling and re-use when possible while maintaining compliance with all other contract specifications and special provisions.

Contractor's Construction and Demolition
Waste Diversion Reporting Form

Job Site Address (where waste was generated): _____

City Permit No.: _____

Material	Name of Facility/Site Where Taken	Disposal	Aggregate	Recycled or Reused				
				Alter-native landfill	Compost	Engineered Fill	Mulch	Other
		Tons	Tons	Tons	Tons	Tons	Tons	Tons
ASPHALT								
CONCRETE								
DIRT								
GREEN WASTE								
METAL								
OTHER SEGREGATED MATERIALS(Describe)								
ROCKS								
WOOD								
MIXED WASTE								
OTHER CONSTRUCTION OR DEMOLITION WASTE								
TOTAL								

COMPANY NAME: _____ DATE OF REPORT: _____

EXHIBIT "C" – CONSTRUCTION NOTICE TEMPLATE

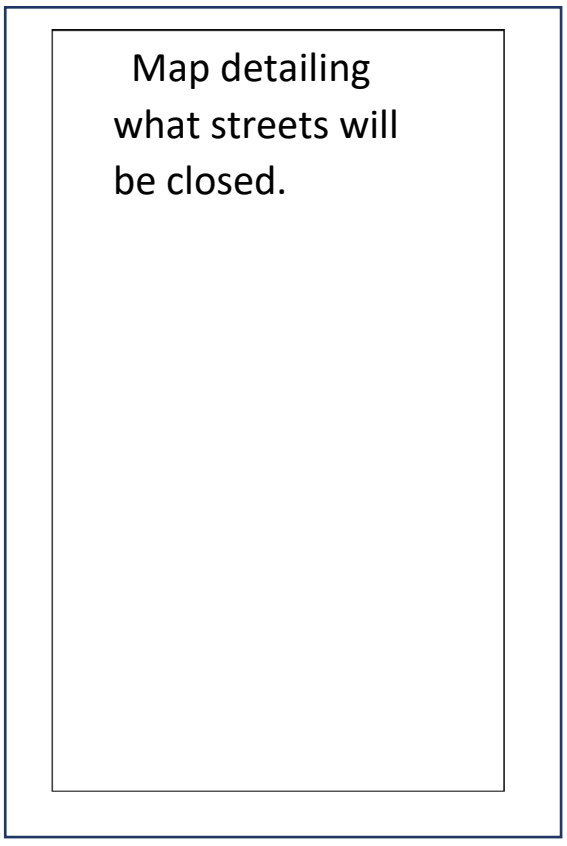
COMPANY LETTERHEAD

NOTICE OF WORK/CONSTRUCTION

Name of Project Date of Notice

Dear Residents and Businesses (if applicable):

Provide a brief description of the work that is to be performed. Four to five sentences should suffice.



What: Provide a brief description of what is happening. One sentence should suffice.

Start/Duration: When is the project expected to start and how long is it anticipated to take for it to be completed? If there are different phases, indicate the estimated time.

What to Expect: Will there be noise? Will there be flaggers directing traffic? Will residents have access, or will it be a full closure? Will parking be temporarily blocked? Include enough details.

Equipment in Use: What kind of equipment will be seen?

Working Hours: What are the working hours and days?

Contact Information

Always include contact information for residents and business owners in case they have questions or concerns.

We apologize for any inconvenience and thank you for your patience. Sincerely,

Contractor Name

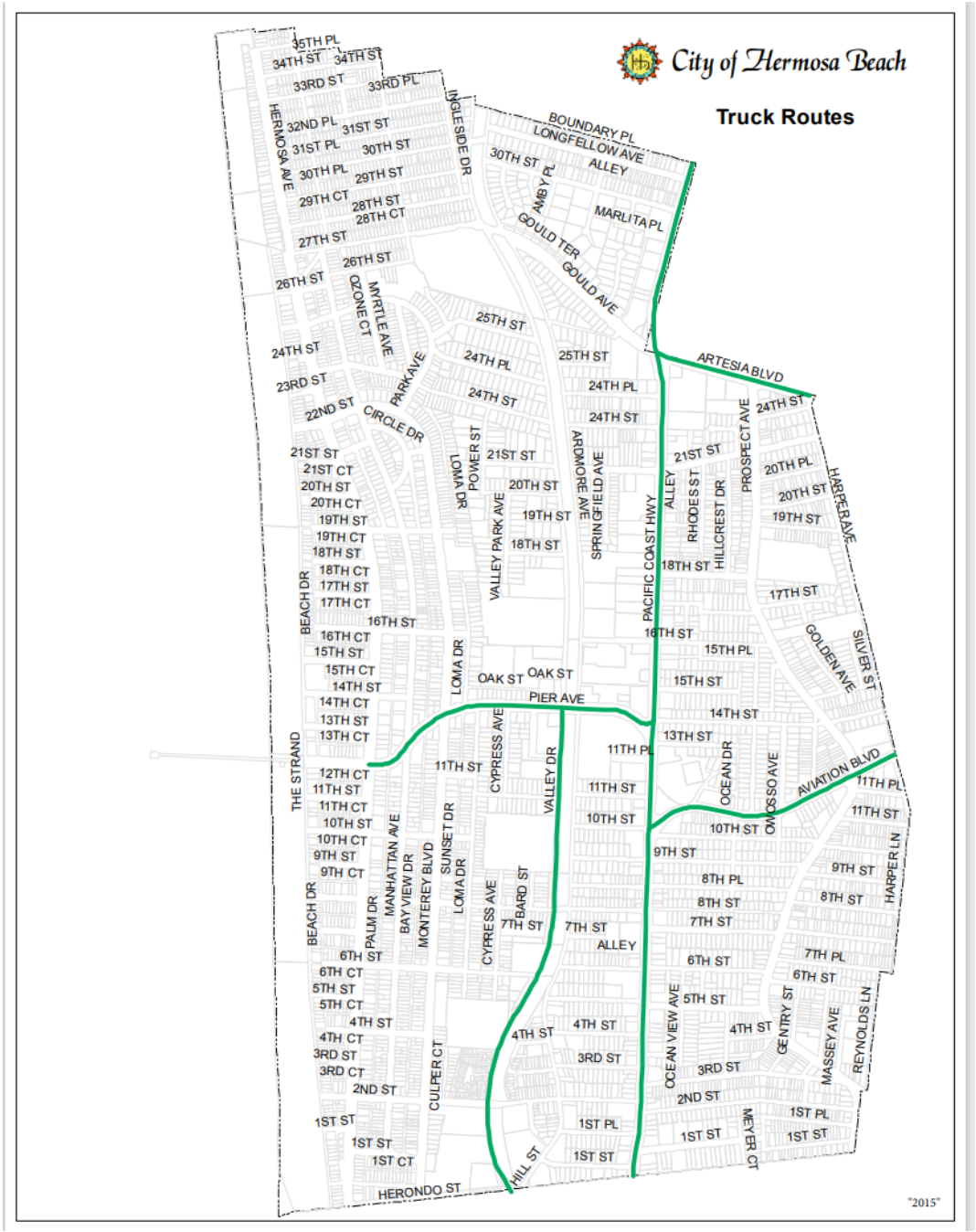



EXHIBIT "D"- HAUL ROUTES