Appendix C

Supplementary Conditions

SECTION 00 73 00

SUPPLEMENTARY CONDITIONS

PART 1 GENERAL

1.01 PHILADELPHIA PARKING AUTHORITY DOCUMENT

A. The Supplementary Conditions applicable to the executed contract with the Prime Contractor are attached following this page.

1.02 RELATED REQUIREMENTS

A. Section 00 21 13 - Instructions to Bidders.

B. Section 00 41 00 - Bid Form Checklist and Bid Form.

C. Section 00 50 00 - Contracting Forms and Supplements.

D. Section 00 52 00 - Agreement Form.

E. Section 00 72 00 - General Conditions of the Contract.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 00 73 00

SUPPLEMENTARY CONDITIONS

SUPPLEMENTARY CONDITIONS TO THE CONSTRUCTION CONTRACT

These Supplementary Conditions amends, supplements and modifies the AIA Documents A101-2017 (the "Agreement") and A201-2017 (the "General Conditions") to which these Supplementary Conditions are attached. To the extent of any inconsistency between or among any of the terms, conditions or provisions in any of the aforesaid documents, the exhibits and documents which are attached and referenced in said documents, or these Supplementary Conditions, it shall be presumed that (i) the terms of these Supplementary Conditions shall prevail over any inconsistent terms, and (ii) generally, those terms, conditions or provisions having the more comprehensive, stricter or demanding requirement for the benefit of Owner shall control, and (iii) if there is any ambiguity or conflict among or between any provisions of the Contract Documents, the provisions of the Agreement, these Supplementary Conditions, the Bid Form, the Drawings and Specifications and the General Conditions shall be controlling in the foregoing order of reference thereto.

1. Definitions.

1.1 Agreement

The Agreement between the Owner and the Contractor, AIA Document A101-2017 "Standard Form of Agreement between Owner and Contractor, where the basis of payment is a Stipulated Sum," as modified, to which these Supplementary Conditions is attached.

1.2 AIA Document A201-2017 "General Conditions of the Contract for Construction", as modified by these Supplementary Conditions. All provisions not amended or supplemented by these Supplementary Conditions remain in full force and effect.

1.3 Project Manager:

The term Project Manager as used herein shall mean:

Glenn S. DeHaven, CCM
T&M Associates
1700 Market Street
Philadelphia, PA 19103
(215) 282-7850
gdehaven@tandmassociates.com

1.4 Architect:

The term Architect as used herein shall mean:

Carlos Raul Rodriguez Architect
1961 Browning Road
Pennsauken, NJ 08110-2941
(856) 663-0606
(856) 663-3216 FAX
crrarch@verizon.net

1.5 Owner:

The term Owner as used herein shall also mean the Tenant:

Philadelphia Parking Authority
701 Market Street, Suite 5400
Philadelphia, PA 19106
(215) 683-9600

1.6 Contractor:

The term Contractor as used herein shall refer to the various Prime Contractors and any superintendents, foremen, agents and employees thereof.

2. Architect. Although reference is made herein to various functions and duties of the Architect, as set forth in the Agreement all references to "Architect" shall be construed to mean "Owner or any representative of Owner, as Owner may designate." In addition to the inspections made by Architect, Owner shall have the right to designate its own construction representative for the purpose of making inspections and verifying compliance with the terms of this Contract, and each Contractor shall furnish its full cooperation to such representative. In no event shall the Architect have any right to interpret any matter which is in controversy, or to decide any controversy which may arise between the parties, except for interpretive matters of a purely aesthetic nature relating to Drawings and Specifications. Communications between Owner and the Contractor need not be made through the Architect.

3. Coordination. The Contractor shall comply with the directions of the Owner. Contractor agrees to be responsible for the coordination among its Subcontractors and for their adherence to the coordination directions of the Owner. The Contractor further agrees to coordinate its work with the work of other contractors in and around the Project site undertaken by Owner or others. The Contractor shall keep such full and detailed accounts as may be necessary for proper financial management under this Agreement. The Owner shall be afforded access to all the Contractor's records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda and similar data relating to this Agreement and its performance hereof. The Contractor shall preserve all such records for a period of three (3) years after final payment or longer if required by law.

4. Intent. The Work shall consist not only of all items specifically included in the Contract Documents but also all additional items of work which are reasonably inferable from that which is specified in the Contract Documents in order to complete the Work in accordance with the Contract Documents, including, without limitation, any additional items necessary to coordinate the Work with work of other Contractors. In connection with the foregoing, the Contract Documents are complementary, and what is required by any one Contract Document shall be as binding as if required by all. To the extent that any additional work is reasonably inferable from the Contract Documents, Contractor shall perform the same as part of the Work at no additional costs or time to Owner.

5. Safety. The Contractor shall create and enforce appropriate safety programs and procedures and shall review the safety programs of each of the subcontractors and shall make appropriate recommendations. The Contractor shall perform such inspections as are necessary for adequate review and recommendations. The Contractor shall implement additional safety programs or procedures as may be recommended by Owner or Architect for the purpose of reducing injuries or risks associated with the Work. Compliance with such recommended safety programs or procedures shall not be considered as an addition to the Contract Sum.

6. Substantial Completion. "Substantial Completion" shall mean that (a) the Project referred to in the Contract Documents is in such state of completion, as will allow the Project to be used, occupied for its intended operational purpose, except for minor "punch list items" which do not materially affect such use, occupancy or operation and which can be completed by the

Contractor without material interference with the use and operation of the Project by users of the Project, (b) a permanent Certificate of Occupancy for the Project has been obtained, lawfully permitting occupancy thereof and all designated or required governmental inspections and certifications have been made and posted, (c) all systems and facilities included in the Work are in good operating order and condition, and (d) if the Contract Documents include the performance of site work, access and/or parking areas, all such site work, access and parking areas have been substantially completed and are usable as intended.

7. Subcontracts. The Contractor shall, upon request, provide Owner with copies of all subcontracts, which shall be in writing and shall contain mechanics' lien waiver provisions as set forth below in Paragraph 8 of these Supplementary Conditions, and indemnification provisions as required in Paragraph 15.17 of these Supplementary Conditions. All subcontracts shall provide that if for any reason this Contract is terminated, each subcontractor will, at the option and request of Owner (as hereinafter defined), continue to perform in accordance with the terms of its subcontract for the benefit of Owner. At Owner's option, payments otherwise owed to Contractor under this Contract for the benefit of its subcontractors and suppliers may be made directly to such suppliers and subcontractors. Contractor shall require all subcontractors to execute and submit, to Contractor and the Philadelphia Parking Authority, a Quality Control Plan (which must designate the subcontractor's Quality Control Manager), for such subcontractor's work. Contractor shall require all subcontractors to execute and submit, to Contractor and the Philadelphia Parking Authority, a Quality Control Plan (which must designate the subcontractor's Quality Control Manager), for such subcontractor's work Contractor's failure to comply with any of the provisions of this Paragraph shall be deemed a material breach and default by Contractor.

8. Mechanics' Liens.

8.1 Any and all issues relating to, arising from, or resulting from a right to a lien and waiver of lien rights under the Agreement and the General Conditions shall be governed by the Pennsylvania Mechanics' Lien Law of 1963, 49 P.S. § 1101 *et. seq*.

8.2 Contractor shall provide a lien waiver to the Owner in consideration for payment for the work, services, materials or equipment provided and only to the extent that such payment is actually received.

8.3 Subcontractor(s) shall provide a lien waiver to the Contractor in consideration for payment for the work, services, materials or equipment provided and only to the extent that such payment is actually received, or unless the Contractor has posted a bond guaranteeing payment for labor and materials provided by Subcontractors.

8.4 To the extent that lien rights may be validly waived by Contractor or Subcontractor(s) or where the Contractor has posted a bond, a written contract between the Owner and a Contractor, or a separate written instrument signed by the Contractor, which provides that no claim shall be filed by anyone, shall be binding: but the only admissible evidence thereof, as against Subcontractor, shall be proof of actual notice thereof to him before any labor or materials were furnished by him; or proof that such contract or separate written instrument was filed in the office of the prothonotary prior to the commencement of the Work upon the ground or within ten (10) days after the execution of the principal contract or not less than ten (10) days prior to the contract with the claimant Subcontractor, indexed in the name of the Contractor as defendant and the Owner as plaintiff and also in the name of the Contractor as plaintiff and the Owner as defendant. The only admissible evidence that such a provision has, notwithstanding its filing, been waived in favor of Subcontractor, shall be a written agreement to that effect signed by all those who, under the contract, have an adverse interest to the Subcontractor's allegation.

9. Licenses and Permits. Contractor shall obtain and keep in force during its performance of any Work or services hereunder, at no cost to Owner, and without affecting the Cost of the Work, all licenses and permits required by the Commonwealth of Pennsylvania or any other governmental

authority for the lawful conduct of Contractor's business. Contractor shall obtain and pay for all required zoning and building permits, approvals and licenses required for the execution of the Work. The Contractor will be reimbursed for all zoning and building permits and fees required for the project by the Owner at direct costs by issuing a Change Order.

10. Reserved

11. Commencement and Completion Time.

11.1 The Contractor will begin Work no later than five (5) calendar days from receipt of written Notice to Proceed, except as prohibited by weather conditions which prevent a satisfactory installation of the Work. All Work shall be substantially completed no later than the schedule completion dates listed on the project schedule submitted with the bid from which date the Contractor is given Notice to Proceed.

11.2 If Contractor fails to complete the Work to Owner's satisfaction by the scheduled completion date (regardless of whether the Work includes alternates), Contractor will pay five-hundred dollars ($500.00) per day as damages for delay for each calendar day for failure to meet the scheduled completion date.

11.3 If Work includes Alternate(s), all Work shall be completed and operational no later than the scheduled completion date.

12. Delays. If Contractor wishes to make any claim for delay, Contractor shall notify Owner in writing of the nature and expected duration of the delay not later than three (3) business days after Contractor becomes aware of the events or circumstances giving rise to the delay, including in such notice all feasible recommendations of Contractor for minimizing the effects of such delay. Such written notice, given within said three (3) business day period, shall be a condition precedent to any claim by Contractor for an extension of the time for Substantial Completion. Furthermore, and notwithstanding anything else in this Contract to the contrary, Contractor's sole rights respecting a delay shall be to obtain, by Change Order, an extension of the date of Substantial Completion, and all other rights to additional compensation or damages are irrevocably waived. The Contractor agrees to make no claim for damages for delay in the performance of this Contract occasioned by any act or failure to act of the Owner or any of its Officers, Directors, Employees, Architects, or other representatives, or because of any injunctions which may be brought against the Owner or its representatives.

13. Progress Payment Reductions. In the event the Owner or the Owner's Representative determines that the Contractor is not reasonably performing the Work, either by failing to reasonably follow the schedule, or by failing to adequately perform the Work (all to be determined by the reasonable judgment of the Owner or the Owner's Representative), the Owner shall have the right to make progress payments at a rate of eighty-five percent (85%) of the amount due the Contractor for each payment until such time as the Owner or the Owner's Representative certifies that the Contractor is in full compliance with the schedule and all other conditions of the Contract for Construction. The Contractor shall have no claim against the Owner or the Owner's Representative, at law or in equity or otherwise, that arises out of the Owner's or the Owner's Representative's actions pursuant to this provision.

14. Final Payment. It is the intention of this subsection that final payment shall not be due to Contractor unless and until, in addition to all other conditions set forth in this Contract, the Project shall have been completed to Owner's satisfaction. The Project shall be deemed completed for purposes of this Contract only when (a) the Project has been completed in accordance with the Drawings and Specifications (as they may have been amended and supplemented with the written approval of the Owner), and in accordance with all applicable statutes, laws and ordinances, and with the rules, regulations and requirements of all regulatory authorities having jurisdiction; (b) the Project is ready for use, occupancy and operation without any further work necessary for the

completion of the same (except for minor "punch list" items which do not interfere with the legal, safe, and functional and comfortable use and occupancy of the Project or any part of the Project and for which a reserve is established in an amount acceptable to Owner in Owner's sole discretion); (c) the Architect shall have certified to the Owner in writing its Certificate of Completion in accordance with these provisions and the Contract Documents; (d) certificates of occupancy and such other certificates, permits, and approvals, required for lawful occupancy of the Project shall have been issued; (e) the Contractor shall have provided and installed all fixtures, equipment and supplies necessary for the operation of the Project to the extent required by the Drawings and Specifications; and (f) the Contractor shall have delivered to the Owner all as-built Drawings and Specifications, operating manuals, warranties and guarantees applicable to the Project. Not later than at completion of the Project and the delivery of the Final Payment due hereunder to the Contractor, the Contractor shall furnish to the Owner a release of liens satisfactory to the Owner from Contractor and all subcontractors and materialmen as the Owner may require indicating that the Project has been constructed and completed free and clear of all liens, encumbrances, and security interests.The making of final payment shall not constitute a waiver of any claims by the Owner arising out of faulty or defective Work appearing after final completion.In the event the Contractor does not achieve final completion within sixty days after the date of Substantial Completion, allowing for approved extensions of the Contract Time, the Contractor shall not be entitled to any further payment, and the Contractor hereby agrees that such failure to complete the Work within the time set forth above shall constitute a waiver of all claims by the Contractor to any money that may be due. This provision shall not operate as a waiver by the Owner of any claims of any nature against the Contractor arising out of the Contract. The Contractor shall deliver to the Owner a certificate stating that all Quality Control standards have been followed in the completion of the Work.

15. Insurance and Bonds. Prior to commencement of any Work under this Contract and until completion and final payment is made for the Work, the Contractor, its Subcontractors and each and every Sub-Subcontractor shall, at its sole expense, maintain the following insurance on its own behalf, with an insurance company or companies having an A.M. Best Rating of A-; Class VII or higher, and furnish to The Philadelphia Parking Authority Certificates of Insurance evidencing same. The term "Contractor" as used in these Insurance Requirements shall mean and include the Contractor, its Subcontractors and Sub-Subcontractors of every tier.

15.1 Workers' Compensation and Employers Liability: to include, where applicable U.S. Longshoremen's and Harbor Workers' Coverage.

(a)Workers' Compensation Coverage: Statutory Requirements.

(b)Employers Liability Limits not less than:

(1)	Bodily Injury by Accident	$500,000.00 Each Accident
(2)	Bodily Injury by Disease	$500,000.00 Each Employee
(3)	Bodily Injury by Disease	$500,000.00 Policy Limit

15.2 Commercial General Liability: including Premises - Operations, Independent Contractors, Products/Completed Operations, Personal Injury, Broad Form Property Damage (including Explosion, Collapse and Underground Coverages), Contractual Liability (including liability for employee injury assumed under a contract and contractual indemnities under this Contract).

(a) Occurrence Form with the following limits:

(1)	General Aggregate	$2,000,000.00
(2)	Products/Completed Operations Aggregate	$1,000,000.00
(3)	Each Occurrence	$1,000,000.00
(4)	Personal and Advertising Injury	$1,000,000.00

(5)	Fire Damage (any one fire)	$ 50,000.00
(6)	Medical Expense (any one person)	$ 5,000.00

(b) Products/Completed Operations Coverage must be maintained for a period of at least two (2) years after final payment.

(c) The General Aggregate Limit must apply on a Per Location Basis.

15.3 Automobile Liability.

(a) Per Accident Combined Single Limit $1,000,000.00

(b) Coverage to include:

(1) All Owned, Hired and Non-Owned Vehicles.
(2) Contractual Liability Coverage (including Liability for Employee Injury assumed under a Contract).

15.4 Commercial Excess / Umbrella Liability.

(a) Occurrence Limit $5,000,000.00

(b) Aggregate Limit (where applicable): $5,000,000.00

(c) Policy Coverage shall be excess of the Commercial General Liability (following form Per Project Limit), Commercial Automobile Liability and Employers Liability Coverages as required by this Contract.

Note:Subcontractors and Sub-subcontractors are required to maintain this insurance with Limits of Liability of $5,000,000 Each Occurrence/Aggregate.

15.5 Environmental/Pollution Liability Insurance.

The Contractor shall purchase and maintain, throughout the life of the Project, insurance protecting against environmental impairment or discharge of hazardous substances into the air, soils or water with minimum acceptable limits of $3,000,000.00 per occurrence. Owner must be named as additional insured as shown in Section 15.9. Claims-made is acceptable.

15.6 Builder's Risk.

(a) The Contractor shall purchase and maintain, throughout the life of the Project, a Builder's "All Risk" Insurance Policy covering the interests of the Owner, the Commonwealth of Pennsylvania, the Architect, Consultants, Contractors and Subcontractors as their interests may appear. This policy shall insure against physical loss or damage to all property incorporated or to be incorporated into the Project and shall cover reasonable compensation for Contractor's or Subcontractor's services and expenses required as a result of such insured loss. Coverage will also be provided for the perils of Earthquake, Flood, Glass Breakage and Steam Boiler Explosion, Mechanical Breakdown and Electrical Arcing. Any policy "Occupancy Clause" will also be deleted. Such insurance will be in an amount equal to the Replacement Cost Value of the Project and will be provided on an "Agreed Amount" (No Coinsurance) Basis. Such insurance shall also cover property to be incorporated into the Project stored off-site and in transit to a maximum limit of $1,000,000.00. Any loss exceeding this amount is the responsibility of the Contractor. The builder's "all-risk" insurance maintained by

the Contractor shall be adjusted solely by Owner (subject to the rights of the Owner) and any settlement payments shall be made solely to Owner for disposition to all insureds, as their interests may appear, subject to the requirements of any applicable mortgagee clause.

(b) The insurance shall include any coverage for Contractor's or Subcontractor's machinery, tools, equipment, trailers, appliances or other personal property owned, rented or used by the Contractor or Subcontractors or anyone employed by them in the performance of the Work. Contractor acknowledges that builder's risk insurance will contain certain exclusions, and it is Contractor's responsibility to evaluate the protection afforded by builder's risk insurance, and to carry its own insurance against losses not covered by builder's risk insurance.

(c) Contractors and Subcontractors are responsible for the policy deductible which will be $5,000.00. (Contractors and Subcontractors will not be responsible for policy deductibles relating to Flood or Earthquake losses).

(d) Owner, the Commonwealth of Pennsylvania, City of Philadelphia, the Architect, Consultants, Contractors and Subcontractors waive all rights against each other and against each of their agents and employees for damages caused by fire or other perils to the extent covered by insurance obtained pursuant to Contractor's "All Risk" Builder's Risk Insurance or any other property insurance applicable to the Work.

(e) Each Contractor and Subcontractor shall require all tiers of Subcontractors to waive their rights of recovery as provided in the previous paragraph against Owner, the Commonwealth of Pennsylvania, City of Philadelphia, the Architect, Consultants, Contractors and other Subcontractors.

15.7 Deductibles or Self Insured Retentions.

None of the policies of insurance required of the Contractor by this Contract shall contain deductibles or self-insured retentions in excess of $25,000.00 without the written permission of the Owner. The Contractor is solely responsible for payment of any policy deductibles, self-insured retentions, and any similar expense or premium.

15.8 Minimum Acceptable Financial Rating of Insurance Companies.

(a) A.M. Best Rating: A- or Higher (Excellent).

(b) A M. Best Financial Size Category: Class VII or Higher.

15.9 Additional Insureds.

Owner, the Commonwealth of Pennsylvania, the City of Philadelphia, the Architect, its sub-consultants, its agents, employees, representatives, officers and directors and such other parties as Owner may designate shall be added as ADDITIONAL INSUREDS on all liability policies, even for claims regarding their sole negligence.

15.10 Contractor's insurance (with the exception of the Workers' Compensation Policy) coverage shall be primary and non-contributory to any other coverage available to Philadelphia Parking Authority, including, without limitation, coverage maintained by Philadelphia Parking Authority wherein Philadelphia Parking Authority is named insured, and that no act of omission shall invalidate the coverage.

15.11 It is agreed that the Contractor's insurance must provide that it will not be canceled,

materially changed or non-renewed without at least thirty (30) days advance notice to The Philadelphia Parking Authority, 701 Market Street, Suite 5400. Philadelphia, PA 19106 by Certified Mail - Return Receipt Requested.

15.12 Waiver of Rights of Recovery and Waiver of Rights of Subrogation (for all policies).

(a) The Contractor waives all rights of recovery against the Owner and all the Additional Insureds for loss or damage covered by any of the insurance maintained or required to be maintained by the Contractor pursuant to this Contract.

(b) The Contractor and its respective insurance carriers hereby waive all rights of subrogation against Owner, and all the Additional Insureds for loss or damage covered by any of the insurance maintained or required to be maintained by the Contractor pursuant to this Contract.

(c) If any of the policies of insurance required under this Contract require an endorsement to provide for the waiver of subrogation set forth in (b) above, then Contractor will cause them to be so endorsed.

15.13 The amount of insurance provided in the aforementioned insurance coverages, shall not be construed to be a limitation of the liability on the part of the Contractor. None of the requirements contained herein as to the types, limits, or Owner's approval of insurance coverage to be maintained by the Contractor are intended to and shall not in any manner, limit, qualify, or quantify the liabilities and obligations assumed by the Contractor under the Contract Documents, any other agreement with the Contractor or otherwise provided by law.

15.14 Any type of insurance or any increase in limits of liability not described above which the Contractor requires for its own protection or on account of statute shall be its own responsibility and at its own expense.

15.15 The carrying of insurance described shall in no way be described as relieving the Contractor of any responsibility or liability under this Contract.

15.16 Certificates.

(a) Prior to the commencement of Work and/or payment, the Contractor shall file Certificates of Insurance with the Owner, which shall be subject to the Owner's approval of adequacy of protection and the satisfactory character of the insurer. Project description and Job Number must be shown on the Certificate of Insurance. If requested, Contractor shall also submit certified copies of all required policies for approval of the Owner as to form and sufficiency of coverage within five (5) days of receipt of the Contract for signature, regardless of when the work will start.

(b) In the event of a failure of Contractor to furnish and maintain said insurance and to furnish satisfactory evidence thereof, the Owner shall have the right (but not the obligation) to take out and maintain the same for all parties on behalf of the Contractor who agrees to furnish all necessary information thereof and to pay the cost thereof to the Owner immediately upon presentation of an invoice.

(c) The Contractor shall require all its subcontractors (of every tier) to meet the same insurance criteria as required of the Contractor. The subcontractor's insurance must name the Owner as additional insured. The Contractor shall maintain each subcontractor's certificate of insurance on file and provide such information to the Owner for review upon request.

(d) Failure of the Contractor, and all its subcontractors, to provide insurance as herein required or failure of Owner to require evidence of insurance or to notify the Contractor, and all its subcontractors, of any breach by the Contractor, and all its subcontractors, of the requirements of this Section shall not be deemed to be a waiver of any of the terms of the Contract Documents, nor shall they be deemed to be a waiver of the obligation of the Contractor, and all its subcontractors, to defend, indemnify, and hold harmless the indemnified parties as required herein. The obligation to procure and maintain any insurance required is a separate responsibility of the Contractor, and all its subcontractors, and independent of the duty to furnish a copy or certificate of such insurance policies.

(e) In no event shall Contractor begin Work until a Certificate of Insurance showing coverage in the aforementioned amounts required for the job is received and approved by the Owner. Any Work performed without having the Certificate of Insurance received and approved by the Owner is at Contractor's own risk.

15.17 Indemnity.

(a) To the fullest extent permitted by law, Contractor, for itself, its successors, assigns, agents and Subcontractors hereby agrees to indemnify, hold harmless and defend the Owner, the Commonwealth of Pennsylvania, the City of Philadelphia and any trustee under a trust indenture with respect to the Project, agents, employees, volunteers, representatives, officers and directors (the "Indemnified Parties") and the Architect and its consultants from and against any liabilities for losses (including those related to business interruption), damages (including special, consequential and incidental), costs, claims, demands, causes of action, liabilities or expenses (including attorneys' fees and expenses) for which the Indemnified Parties may have suffered or be held liable by reason of injury (including death or workers compensation) to any person (including Contractor's employees and volunteers) or damage to any property of whatsoever kind or nature arising out of or in any manner connected with the Work to be performed for the Indemnified Parties (including, but not limited to, work performed under this Contract, Work performed under Change Order, or any such other work performed for or on behalf of the Indemnified Parties, whether performed at the site or not), whether or not due in whole or in part to any act, omission, or negligence of the Indemnified Parties or any of their agents, employees, volunteers, representatives, officers, directors, stockholders, Subcontractors, third parties or parent, subsidiary and affiliate companies, whether known or unknown to Owner or Contractor. It is expressly understood and agreed that the indemnity contained in this paragraph covers claims by Contractor's employees and volunteers, and that, with respect to its obligations to indemnify, defend, and hold harmless, the Contractor waives any immunity it might have under any workmen's compensation laws. It is further expressly agreed that the Contractor assumes the fullest extent of all obligations to indemnify and defend all parties whom the Owner is obligated to indemnify and defend in the Owner's Contract with others, whether or not such obligations may extend beyond those addressed or included In this agreement.

(b) If there are any damages or claims of any kind or nature unsettled when the Contract Work is finished, the final payment by the Owner shall be deferred until all such claims shall have been adjusted or suitable coverage or indemnity acceptable to the Owner is provided by Contractor or Contractor's insurance carrier. The terms and conditions of this Article 15 shall survive termination of this Contract.

(c) The Contractor and the Owner further agree that to the fullest extent permissible

by law, the laws of the state to which the Work is performed and/or services provided shall apply to the Work performed and/or services provided and the application of the Indemnification and Hold Harmless Agreements set forth herein.

(d) The Contractor shall promptly advise Owner in writing of any action, administrative or legal proceeding or investigation as to which this indemnification may apply, and Contractor, at Contractor's expense, shall assume on behalf of the lndemnified Party in question and conduct with due diligence and in good faith the defense thereof with counsel satisfactory to the Indemnified Party; provided, that the Indemnified Party shall have the right to be represented therein by advisory counsel of its own selection and at its own expense; and provided further, that if the defendants in any such action include both Contractor and the Indemnified Party and the Indemnified Party shall have reasonably concluded that there may be legal defenses available to it which are different from or additional to, or inconsistent with, those available to Contractor, the Indemnified Party shall have the right to select separate counsel to participate in the defense of such action on its own behalf at Contractor's expense. In the event of failure by Contractor to fully perform in accordance with these indemnification provisions, the Indemnified Party, at its option, and without relieving Contractor of its obligations hereunder, may so perfom1, but all costs and expenses so incurred by the Indemnified Party in that event shall be immediately reimbursed by Contractor to the Indemnified Party. The obligations of Contractor under this Section shall survive the expiration of this Contract.

(e) The Contractor agrees that, in the event Owner prevails in any legal action or proceedings to enforce its rights to be indemnified, defended and held harmless, Contractor shall be liable for Owner's reasonable attorneys' fees and expenses incurred in connection with any such action or proceedings.

(f) The Contractor shall cause its Subcontractors, or anyone employed directly or indirectly by any of them, to agree to defend, indemnify and hold harmless the Owner on the same terms as those set forth in this Paragraph 15.17.

15.18 Performance Bond and Labor and Material Payment Bond.

(a) Prior to the commencement of Work under this Contract, Contractor will furnish a faithful Performance Bond in an amount equal to one hundred percent (100%) of the Contract Amount and a Labor and Material Payment Bond equal to one hundred percent (100%) of the Contract Amount; said bonds shall be from a surety company satisfactory to the Owner and qualified to do business in Pennsylvania. The surety executing the bonds must be included in the listing of acceptable sureties contained in Treasury Department Circular 570, as most recently revised, and the amount of the bond must not exceed the underwriting risk of such surety set forth in said circular ,or revision thereof.

(b) The Surety executing the bonds shall have a minimum A.M. Best Rating of A-; Class VII or higher.

(c) Should any surety upon such bonds become unsatisfactory to the Owner, Contractor shall promptly furnish such additional security as may be required from time to time to protect the interests of the Owner.

(d) Performance Bond and Labor and Material Bonds shall be executed on Standard AIA Document A312 in accordance with the Terms and Conditions of the Contract Documents. Each set of bonds executed must include a Power of Attorney

evidencing the authority of the Attorney-In-Fact to execute bonds and the latest statement of assets and liabilities with an authorized signature from such surety company.

15.19 Payments to Subcontractors and Suppliers.

Contractor hereby agrees that it will pay for all materials furnished and all services rendered in connection with the Work. Contractor also acknowledges that any person or entity that furnishes materials or renders services in connection with the Work may maintain an action to recover for the costs of said materials or services against the Contractor, as though such person or entity were named in the Contract, if the action is brought within one (1) year after the cause of action occurred.

16. Contract Documents. Contractor acknowledges that the Contract Documents, including the Drawings and Specifications, are adequate and sufficient to provide tor the completion of the Project in accordance with all applicable laws, codes, and professional standards, including all work and services, whether or not fully shown or described, which reasonably may be inferred for such completion, and so as to: (a) enable Contractor to complete construction of the Work described therein for the Contract Sum on or before the dates of Substantial Completion established in the Agreement; and (b) qualify the Project upon Substantial Completion for a Certificate of Occupancy and all other permits and approvals for lawful use and occupancy. Contractor represents that it is familiar with the Project site and has received all information it may need relating to the physical characteristics and conditions thereof. No adjustment to the Contract Sum shall be made for any concealed conditions encountered in the performance of the Work. Contractor shall carefully study and compare the Contract Documents (as the same shall be supplemented, or modified from time to time) with each other and with any information furnished by Owner. If Contractor shall discover, or reasonably should have discovered, any error, fault, incompleteness or inaccuracy in any of the Drawings, Specifications or other Contract Documents, or in any Owner-furnished information, Contractor shall notify or shall be responsible for notifying Owner thereof in writing within five (5) business days after such discovery; no claim by Contractor on account of such matters shall be valid unless so made, and Contractor shall assume the risk of performing Work with the knowledge of (or if Contractor should reasonably have known of) such error, fault, incompleteness or inaccuracy and shall be required to correct such error, fault, incompleteness or inaccuracy at no additional cost to Owner.

17. Drawings.

17.1 All Drawings, Specifications and other documents prepared by the Architect with respect to the Project are and shall remain the property of the Owner, and Owner shall retain all common law, statutory and other reserved rights with respect thereto, including all copyrights and other intellectual property rights. Contractor and its Subcontractors, Suppliers and others performing work on the Project are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect which are appropriate for execution of their respective work. Submittals or distributions necessary to meet official regulatory requirements or for other purposes relating to completion of the Project are not to be construed as a publication in derogation of the Owner's copyright or other reserved rights.

17.2 If any work or materials are required which are obviously necessary to carry out the full intent and meaning of the said specifications although the same may not be either directly or indirectly in the specifications, the Contractor is hereby bound to furnish the same without charge or claim.

17.3 The Contractor shall keep at the site of the work one copy of the Drawings and Specifications signed and identified by the Architect and shall at all times give the Architect and other representatives of the Owner access thereto. Anything shown on the Drawings

and not mentioned in the Specifications, or mentioned in the Specifications and not shown on the Drawings, shall have the same effect as if shown or mentioned respectively in both. In case of any conflict within the construction documents, the Architect shall determine which of the requirements shall govern based upon the most stringent of the requirements, and the Contractor shall perform the work at no additional cost or time to the Owner. Any ambiguity or discrepancy between Drawings and Specifications shall be submitted by the Contractor to the Architect for interpretation whose decision shall be conclusive.

17.4 The general arrangement and location of equipment, the various pipe, duct, and conduit runs, etc., are shown on the Drawings. All dimensions or the scales of the Drawings shall be considered as approximate and shall be checked by each Bidder to his own satisfaction prior to bid. The exact location of all parts of the work shall be governed by existing conditions, and the Contractor shall coordinate and locate all work at the time of installation. Any changes in location from that shown on the Drawings, necessary by existing conditions, shall be made by the Contractor at no increase of the contract sum.

18. Laws and Regulations.

18.1 The Contract Documents, and the Work, are to be governed at all times, and shall comply with all laws, ordinances, rules and regulations applicable to the Work. The provisions of the federal laws include but are not limited to the latest editions and amendments of the Occupational Safety and Health Act.

18.2 All Work shall comply with manufacturer's specifications and instructions, and with requirements of utility companies, insurance underwriters, and the like, in addition to the specific requirements of the Contract Documents. In event of conflict, the more stringent requirements shall govern, as determined by the Owner.

19. Business Taxes and Sales Tax Exemption for Building Machinery and Equipment

19.1 Contractor must be current on all City of Philadelphia business taxes and other fees at all times for the entire duration of the contract. Contractor needs to submit along with each of their payment requests, evidence to prove that they comply with this requirement. Failure to do so may result in withholding of certificate of payment until such item is corrected by Contractor.

19.2 As an agency of the Commonwealth of Pennsylvania, and a local government agency, the Authority is exempt from the payment of state and local sales and use and other taxes on material, equipment or other personal property. Contractor agrees that the fees, prices or rates stated in this Agreement (a) do not include any state or local taxes, surcharges or fees on the Authority in connection with this transaction, and (b) do include all other applicable taxes for which Company is liable. In the event Company's performance under this Agreement creates a tax liability, such taxes, including but not limited to, real estate taxes, school taxes, Use & Occupancy taxes, and sales taxes shall be the sole obligation of Company and Company shall maintain current accounts as to the payment of such taxes and be liable over to the Authority for any taxes assessed against the Authority as a result of Company's performance under this Agreement.

19.3 As a general rule a construction contractor will pay sales or use tax on the purchase price of all property, including materials, equipment, components, and supplies, which it furnishes and installs in the performance of its construction contract. However, when a construction contractor is under contract with a government agency (tax exempt entity) the purchase of certain items, building machinery and equipment, will be tax exempt when the contractor buys the items for the government agency. The contractor will issue an exemption certificate (provided by the Authority's Finance Department) for each supplier, which will allow the contractor to purchase building machinery and equipment without

paying the sales tax up front. Guidance is provided through 72 P.S. § 7201 *et seq.* and 61 Pa. Code § 31.11 – 31.16.

19.4 Building Machinery and Equipment defined:

(a) An item qualifies as building machinery and equipment if it meets the following two-part test:

(1) the item is either generation equipment, distribution equipment, conditioning equipment, storage equipment, or termination equipment; and,
(2) it is used in one of the ten (10) categories listed in Subparagraph 19.4 (c) below.

(b) An item that meets this two-part test is building machinery and equipment, whether or not:

(1) the item constitutes a fixture or is otherwise affixed to the real estate,
(2) damage would be done to the item or its surroundings upon removal; and,
(3) the item is physically located within a real estate structure.

(c) The exemption is limited to generation equipment, distribution equipment, conditioning equipment, storage equipment, or termination equipment used in one of the following categories:

(1) Air conditioning limited to heating, cooling, purification, humidification, dehumidification, and ventilation
(2) Electrical (not including wire, conduit, receptacle and junction boxes)
(3) Plumbing (not including pipes, fittings, pipe supports and hangers)
(4) Communications limited to voice, video, data, and sound
(5) Alarms limited to fire, security, and detection
(6) Control systems limited to energy management, traffic, and parking lot and building access
(7) Medical systems limited to diagnosis and treatment, medical gas, nurse call, and doctor paging
(8) Laboratory system
(9) Cathodic protection system
(10) Furniture, cabinetry, and kitchen equipment

(d) The term "building machinery and equipment" shall include boilers, chillers, air cleaners, humidifiers, fans, switchgear, pumps, telephones, speakers, horns, motion detectors, dampers, actuators, grills, registers, traffic signals, sensors, card access devices, guardrails, medial devices, floor troughs and grates, and laundry equipment, together with integral coverings and enclosures.

(e) The term "building machinery and equipment" shall not include guardrail posts, pipes, fittings, pipe supports and hangers, underground tanks, wire, conduit, receptacle and junction boxes, insulation, ductwork, and covering thereof.

20. Submittals.

20.1 The submission to the Architect of submittals and samples approved by the Contractor and the review of said submittal and samples by the Architect shall not constitute approval of any deviation from the requirements of the Contract Documents unless it is brought to the attention of the Architect that specific changes are being suggested.

20.2 Changes to the Drawings and Specifications by means of submittals become the responsibility of the party initiating such changes.

20.3 The submission to the Architect of submittals and samples approved by the Contractor and the review of said submittals and samples by the Architect shall not imply that any of the requirements of the Contract Documents have been waived or superseded.

20.4 No delay or omission to exercise any right or remedy accruing to Owner or the Architect upon any breach or event of default of the Contractor shall impair any such right or remedy or be construed to be a waiver of any such breach or default; nor be deemed a waiver of any other, prior or subsequent breach or default. Any waiver, permit, consent, or approval on the part of the Architect of any breach or default, or of any provision or condition hereof, must be in writing, signed by the Architect and Owner and shall be effective only to the extent that such writing specifically sets forth.

20.5 The Architect's stamp on the submittal shall not imply approval of quantities, dimensions, fabrication processes, and· techniques of construction, all of which shall remain the responsibility of the Contractor.

20.6 The Architect's stamp on the submittal shall not relieve the Contractor from responsibility for errors or omissions in the submittal, and shall not imply that the Contractor may proceed in error.

21. Correction of Work. Corrective work shall be warranted to be free from defects for a period of two (2) years after the date of final acceptance of the Work as provided in the Contract Documents (subject to extension as hereinafter described) or such longer period of time as may be prescribed by law or in equity, or expiration of the term of any applicable special warranty required by the Contract Documents. Any defect in such Work shall be corrected again by Contractor promptly upon notice of the defect from the Owner. This obligation shall survive final acceptance of the Work under this Contract and termination of this Contract. The Owner does not waive its right to require correction to the Work or to make a claim for breach of Contractor's obligations under the Contract Documents by reason of any failure to notify the Contractor of the need for such correction within a two (2) year period, and Contractor acknowledges that the two (2) year period will commence at the time any corrective Work is completed.

22. Certificates for Payment. The Architect's Certificate for Payment shall also constitute a representation to the Owner that all lien releases and certificates required under the Contract Documents have been furnished to the Architect in proper form and are based on the Architect's observations at the site and all other information available to the Architect. In addition, Owner may require certificates from the Architect or Project Manager, whichever Owner considers appropriate, which will confirm that the certifying party has reviewed construction means, method, techniques, sequences and procedures, and reviewed copies of requisitions received from subcontractors and material suppliers and other data requested by Owner to substantiate Contractor's right to payment. In addition to the matters enumerated in Section 9.5.1 of the General Conditions, the Architect may also withhold a Certificate of Payment in whole or in part for the following additional reasons:

(a) failure to meet the requirements for application for payment or for supporting data;

(b) failure to proceed with any requested changes in the Work as required by the Contract Documents; or

(c) any claims which Owner may have against Contractor under the Contract Documents, to the extent of the amount in dispute under such claim.

23. Owners Right to Stop the Work. Owner may also order Contractor to stop the Work if Contractor fails or refuses to provide a sufficient amount of properly supervised and coordinated labor, materials and equipment so as to be able to complete the Work within the Contract Time, or fails to remove or discharge within twenty (20) days any mechanics lien filed upon Owner's property, or disregards the instructions of the Architect, Owner, or any representative of Owner when based upon the Contract Documents.

24. Final Payment. The making of final payment shall not constitute a waiver of any claims by the Owner arising out of faulty or defective Work appearing after final completion.

25. Deletions. Without waiver or limitation that the terms of this Rider prevail over any inconsistent terms in any other Contract Documents, and solely for purposes of further clarification, the following Sections of the General Conditions of the Contract for Construction, AIA Document A201-2017, are deleted and shall be inapplicable: 2.3.1, 2.3.2, 2.3.3, 2.3.4, 6.1.4, 10.2.8, 10.3.1, 10.3.2, 10.3.3, 10.3.4, 10.3.5, 10.3.6, 13.5, 14.1.1.4, 15.2, 15.3, 15.4 and 15.4.4. It is expressly agreed and understood that other terms of the General Conditions are deleted or modified by the terms of these Supplementary Conditions consistent with the rules of construction set forth in the preamble of these Supplementary Conditions.

26. Materials.

    26.1 The Owner shall not make payments on account of alternate materials which origin and quality have not been approved in writing by the Owner prior to bid opening.

    26.2 Owner shall not make payments on account of materials and equipment which are not incorporated into the Work unless such costs have been specifically approved in writing by Owner. Owner shall have full discretion in granting such approval and shall consider, among other things, whether the items in question are properly stored, insured and protected on the Project site or on an approved off-site storage facility, and whether such items in question are reasonably required to be stored at the time in question by reason of the construction schedule.

27. Certain Reimbursable Costs. If the Contract Documents provide for any reimbursement of costs to Contractor, in no event shall such reimbursement include any costs relating to or arising out of any fault or neglect of Contractor or any subcontractors, sub-subcontractors, suppliers, Architects or any other party (including the employees and agents of any of the foregoing) furnishing work, services or materials as part of the Project pursuant to the Contract Documents, or attributable to the failure of the foregoing parties to fulfill a responsibility to Owner under or pursuant to this Contract, including, without limitation, any costs of correcting nonconforming, defective or damaged work or materials or other costs attributable to the fault or negligence of any of said parties.

28. Remedies. Contractor shall not exercise any right to terminate this Contract or to stop or suspend its Work under this Contract, by reason of an asserted default of Owner, unless such default is material and (if the default is by its nature curable) unless the Owner has been afforded a period of not less than fifteen (15) days to cure the default following written notice. Furthermore, no failure of Owner to make payment to Contractor shall be deemed cause for termination or Work stoppage or suspension by Contractor, if the payment in question is disputed by Owner and if Owner pays to Contractor the amount which is not in dispute.

29. Termination by Owner for Cause. In addition to the provisions of Section 14.2 of the General Conditions, Owner shall also have the right to terminate the Contract if:

    (a) Contractor is adjudged a bankrupt or insolvent, or makes a general assignment for the benefit of Contractor's creditors, or a trustee or receiver is appointed for Contractor or for

any of its property, or files a petition to take advantage of any debtor's act, or to reorganize under bankruptcy or similar laws; or

(b) Contractor disregards the instructions of the Architect or Owner (when such instructions are based on the requirements of the Contract Documents).

(c) To the extent the costs of completing the Work, including compensation for additional professional services and expenses, exceed those costs which would have been payable to Contractor to complete the Work except for Contractor's default, Contractor will pay the difference to Owner, and this obligation for payment shall survive termination of this Contract. Such costs incurred by Owner will be determined by Owner and confined by the Architect. If the unpaid balance of the Contract Sum exceeds the cost of finishing the Work including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by Owner and not expressly waived, such excess shall be retained by Owner.

30. Suspension by Owner For Convenience. In addition to Owner's right to suspend, delay, or interrupt Contractor from any part of Work pursuant to the Contract Documents, Owner may, at any time, at will and without cause, suspend, delay, or interrupt any part of Work or any Subcontract or all Work for any reason whatsoever for such period of time as the Owner may determine by giving seven (7) days' prior written notice to Contractor specifying the part of Work or Subcontract to be suspended, delayed, or interrupted and the effective date of such suspension, delay, or interruption, as the case may be. Contractor shall continue to prosecute the part of Work not suspended, delayed, or interrupted and shall properly protect and secure the part of Work so suspended, delayed, or interrupted, so far as is necessary in Owner's reasonable opinion. If any part of the Work or a Subcontract is so suspended, delayed, or interrupted, Contractor shall be entitled to payment of reasonable standby fees (or at Owner's option, payment for demobilization and subsequent remobilization) and of costs directly associated with protecting and securing the affected Work, provided said costs are authorized in advance by the Architect and Owner. No payment shall be made by Owner, however, to the extent that such Work or Subcontract is, was, or could have been suspended, delayed, or interrupted under the Contract Documents or an equitable adjustment is made or denied under another provision of the Contract Documents. In case of such suspension, delay, or interruption, Owner will issue a Construction Change Directive or authorize a Change Order making any required adjustment to the Date of Substantial Completion and/or the Contract Sum. For the remainder of the Work, the Contract Documents shall remain in full force and effect.

31. Key Personnel.

31.1 Contractor's superintendent as approved by the Owner shall not be removed from this Project until the Project punch list has been completed and the Project accepted by the Owner. Contractor's superintendent shall be assigned solely to this Project and shall not perform any duties or superintendence on any other project the Contractor may have until the completion of the Project

31.2 In addition to the superintendent, the Contractor shall provide a competent Project Manager and Quality Control Manager. If the Owner determines at the Owner's option, at no additional cost to the Owner, that the Superintendent, Project Manager or Quality Control Manager are not performing properly, The Owner may have the Contractor replace such position(s) with a replacement acceptable to the Owner.

32. Dispute Resolution. It is intended by the parties to resolve all disputes by reasonable negotiations, without resort to litigation or arbitration.

32.1 If a dispute should arise regarding the obligations of Owner or Contractor in connection with the Project, the parties will attempt to resolve the dispute in accordance with this

Article. However, unless Owner requires otherwise, and regardless of the size or nature of the dispute, Contractor shall not cease or delay performance of its obligations under this Contract during the existence of the dispute. Likewise, Contractor shall be entitled to payments pursuant to the provisions of the Contract Documents for the portion of the Work, if any, which is undisputed during the existence of the dispute. Should Contractor stop or delay the progress of the Project because of a dispute, Contractor shall be responsible for damages (both direct and consequential) to Owner for any losses suffered as a result of the delay.

32.2 If any dispute, controversy or claim arises out of or relates to this Agreement or its breach, the parties shall endeavor to settle the dispute first through direct discussions.

32.3 If the dispute cannot be resolved through direct discussions, and if the Owner and Contractor so choose, an impartial third party mediator experienced in construction matters may be employed. The mediator shall be given any written statement(s) of the parties and may review the Project and other documents. The mediator shall call a special meeting of Owner and Contractor within ten (10) business days of his/her selection which shall be attended by representatives of Owner and Contractor with authority sufficient to settle the dispute. The cost of the mediation shall be borne equally by Owner and Contractor. No minutes shall be kept and the comments or findings of the mediator shall be non-binding, non-evidentiary in the nature of settlement discussions and without prejudice to the rights of any party. The entire mediation process must be completed in no more than twenty (20) business days after the special meeting referred to above, unless Owner and Contractor extend the mediation period. Upon resolution of any such dispute the parties, if necessary, shall enter into an appropriate amendment to this Contract evidencing such resolution.

32.4 If the foregoing procedures cannot resolve the dispute, the parties shall proceed in accordance with Subparagraphs 32.5 through 32.6 except that all parties waive any right to seek an injunction, temporary restraining order or other relief which would stop or delay the progress of the Project.

32.5 All claims, disputes and other matters in question between Contractor and Owner arising out of, or relating to, this Contract or the breach thereof shall, at the sole election of the Owner, be decided by litigation.

32.6 Agreement shall be governed by, interpreted and enforced in accordance with the laws of the Commonwealth of Pennsylvania (without regard to any conflict of laws provisions) and the decisions of the Pennsylvania courts. The parties hereto irrevocably consent to the exclusive jurisdiction of the First Judicial District of Pennsylvania, being the Philadelphia Court of Common Pleas and waiving any claim or defense that such forum is not convenient or proper. Contractor agrees that the Philadelphia Court of Common Pleas shall have *in personam* jurisdiction over it, and consents to service of process in any manner authorized by Pennsylvania law.

33. Construction Change Directives. For any portion of the cost of a Construction Change Directive which remains in dispute, pending the resolution of such question or dispute, Contractor shall continue to perform hereunder, and Owner shall continue to make payments in accordance with the amounts determined by Owner to be due. No refusal or failure of Owner to honor any Contractor's Application for Payment for the Work that is the subject of dispute shall justify the failure of Contractor to proceed diligently with such Work and/or be deemed a Failure of Payment within the meaning of the General Conditions.

34. Warranty.

34.1 All warranties shall include labor and materials and shall be signed by the manufacturer or Subcontractor as the case may be and countersigned by Contractor. All warranties shall be addressed to Owner and delivered to the Architect upon completion of the Work and before or with the submission of request for Final Payment.

34.2 Contractor shall issue in writing to the Owner as a condition precedent to Final Payment: a "General Warranty" reflecting the terms and conditions of the General Conditions and Paragraph 34 of these Supplementary Conditions for all Work under this Contract.

34.3 Except when a longer warranty time is specifically called for in any of the other Contract Documents or is otherwise provided by law, the General Warranty shall be for two (2) years and shall be in form and content otherwise satisfactory to Owner.

34.4 Warranties shall become effective on the date of final acceptance of the entire Work unless otherwise provided in any Certificate of Substantial Completion approved by the parties in writing.

34.5 In addition to the foregoing stipulations, Contractor shall comply with all other warranties referred to in any portions of the Contract Documents or otherwise provided by law or in equity, and where warranties overlap, the more stringent requirement shall govern.

35. Time Limits and Commencement of Statutory Limitation Period. The time limit on claims set forth in Sections 15.1.2 and 15.1.3 of the General Conditions of the Contract shall apply to all claims made by Owner or Contractor and be subject to the statute of limitations governed by Pennsylvania law. No applicable statute of limitations shall be deemed to have commenced with respect to any portion of the Work which is not in accordance with the requirements of the Contract Documents, which would not be visible or apparent upon conducting a reasonable investigation, and which is not discovered by the Owner until after the date which, but for this Subparagraph 35, would be the date of commencement of the applicable statute of limitations; the applicable statute of limitations instead shall be deemed to have commenced on the date of such discovery by Owner.

36. No Waiver of Contractor's Performance. Contractor agrees that Owner has no obligation to test, inspect or insure the quality of Contractor's Work during the progress of the Work, and that under no circumstances will Owner (or its representatives) be deemed to have waived Contractor's responsibility to complete construction in accordance with the Contract Documents and this Agreement.

37. Environmental Protection. The Contractor shall comply with any and all provisions of Federal and State statutes, rules and regulations dealing with the prevention of environmental pollution and the preservation of public natural resources resulting from Work performed under this Agreement.

38. Hazardous Materials.

38.1 The Contractor shall not cause or permit any "Hazardous Materials" (as defined herein) to be brought upon, kept, or used in or about the Project site except to the extent such Hazardous Materials: (a) are necessary for the prosecution of the Work; (b) are required pursuant to the Contract Documents; and (c) have been approved in writing by Owner. Any Hazardous Materials allowed to be used on the Project site shall be used, stored, and disposed of in compliance with all applicable laws relating to such Hazardous Materials. Any unused or surplus Hazardous Materials. as well as any other Hazardous Materials that have been placed, released, or discharged on the Project Site by the Contractor or any of its employees, agents, suppliers, or subcontractors, shall be removed from the Project site at the earlier of: (a) the completion of the Work requiring the use of such Hazardous Materials; (b) the completion of the Work as a whole; or (c)

within twenty-four (24) hours following the Owner's demand for such removal. Such removal shall be undertaken by the Contractor at its sole cost and expense and shall be performed in accordance with all applicable laws. Any damage to the Work, the Project site, or any adjacent property resulting from the improper use of or any discharge or release of Hazardous Materials shall be remedied by the Contractor at its sole cost and expense and in compliance with all applicable laws and so as to restore the Project site and any other affected properties to their original condition. The Contractor shall immediately notify the Owner of any release or discharge of any Hazardous Materials on the Project site. The Contractor shall provide the Owner with copies of all warning labels on products which the Contractor or any of its subcontractors will be using in connection with the Work, and the Contractor shall be responsible for making any and all disclosures required under applicable "Community Right-to-Know" or similar laws. The Contractor shall immediately notify the Owner of any citations, orders, or warnings issued to or received by the Contractor, or of which the Contractor otherwise becomes aware, which relate to any Hazardous Materials on the Project site. Without limiting any other indemnification provisions pursuant to law or specified in this Contract, the Contractor shall indemnify, defend (at the Contractor's sole cost, and with legal counsel approved by Owner), and hold the Indemnified Parties harmless from and against any and all claims, demands, losses, damages, disbursements, liabilities, obligations, fines, penalties, costs, and expenses for removing or remedying the effect of any Hazardous Materials on, under, from or about the Project site, arising out of or relating to, directly or indirectly, the Contractor's failure to comply with any of the requirements herein. As used herein, the term "Hazardous Materials" means any hazardous or toxic substances, materials, and wastes listed in the United States Department of Transportation Hazardous Materials Table, or listed by the Environmental Protection Agency as hazardous substances, and any substances, materials, or wastes that are or become regulated under federal, state or local law.

38.2 The Owner shall not be responsible for Hazardous Materials and substances brought to the site by the Contractor unless such materials or substances were required by the Contract Documents and Contractor has complied with its obligations with respect to Hazardous Materials.

39. Small and Small Diverse Business Participation. Contractor covenants and agrees that it will enter into binding contracts with Subcontractors in the amounts set forth below:

	Small Business Designation	Goal
Subcontractor	Minority Owned	10%-15%
	Women Owned	5%-10%
	Disabled Veteran or Veteran Owned	2%-5%

40. Non-Discrimination Covenants. In accordance with Chapter 17-400 of The Philadelphia Code, the Contractor's payment or reimbursement of membership fees or other expenses associated with participation by its employees in an exclusionary private organization, insofar as such participation confers an employment advantage or constitutes or results in discrimination with regard to hiring, tenure of employment, promotions, terms, privileges or conditions of employment on the basis of race, color, sex, sexual orientation, religion, national origin or ancestry, constitutes a default under the Agreement entitling Owner to all rights and remedies provided in the Agreement or otherwise available at law or in equity.

41. MacBride Principles.

41.1 In accordance with Section 17-104 of The Philadelphia Code, the Contractor, by execution of this Agreement, certifies and represents that it currently is and will during the term of the Agreement continue to be, in compliance with the fair employment principles embodied in the MacBride Principles, and the Contractor (including any parent

company, subsidiary, exclusive distributor or company affiliated with the Contractor) does not have, and will not have at any time during the term of the Agreement (including any extension thereof), any investments, licenses, franchises, management agreements or operations in Northern Ireland.

41.2 The Contractor expressly understands and agrees that any false certification or representation in this Paragraph shall constitute a substantial breach of the Agreement entitling the Owner to all rights and remedies provided in the Agreement or otherwise available in law (including, but not limited to, Section 17-104 of The Philadelphia Code) or in equity. In addition, it is understood that false certification or representation is subject to prosecution under 18 PA. Cons. Stat. Ann. § 904.

42. Payment of Minimum Wages. The Contractor hereby covenants and agrees that all times during the construction or performance of Work at the Project, Contractor shall pay no less than the minimum scale of wages prevailing in the construction industry in the Philadelphia area (but in no event less than the minimum wages required by law) for the construction or reconstruction of any Work at the Project, determined in accordance with the wage rates prevailing in that area as determined by the Commonwealth of Pennsylvania Department of Labor. Any violation of the terms and provisions of this Paragraph shall constitute a default under the Agreement entitling the Owner to all rights and remedies provided in the Agreement or otherwise available in law or in equity.

43. Owner's Liability. Any and all liabilities of the Owner and the Indemnified Parties, their successors, heirs and assigns, to the Contractor, its shareholders, partners, agents, employees, successors, heirs and assigns, under or by reason of the Agreement shall be limited to the Owner's interest in the Project.

44. Contractor Integrity Provisions. The Owner has adopted specific contractor integrity provisions covering independent contractors and consultants acting at the direction of or behalf of the Philadelphia Parking Authority. The Owner's Contractor Integrity Provisions outline certain prohibited activities, required disclosures and/or required abstentions in the event a Covered Person possesses an Adverse Interest on a particular Project, as those terms are defined in the Contractor Integrity Provisions. A copy of the Owner's Contractor Integrity Provisions is included in the Project Manual and/or is available upon request from the Owner or the Owner's Representative. Contractor agrees that it shall maintain the highest standards of integrity in the performance of the Agreement and shall take no action in violation of state or federal laws, regulations, or other requirements that govern contracting with the Commonwealth of Pennsylvania or the City of Philadelphia. Contractor further agrees to comply with and to provide the required work and services in accordance with the provisions of the Owner's Contractor Integrity Provisions which is incorporated into the Agreement by reference, as though physically attached. Failure by the Contractor to comply with the provisions of the Owner's Contractor Integrity Provisions may be grounds for possible disciplinary action against the Contractor, including possible termination of existing contracts with the Owner. Contractor acknowledges and accepts the Owner's Contractor Integrity Provisions upon execution of the Agreement.

END OF SECTION

Appendix D

Existing Equipment

Existing Equipment

Schedule "A" HQ and RPP

Quantity		Description
1		Keri Systems Software Package
16		Keri Systems Data Gathering Panels (4 reader)
16		Keri Systems Power Supplies
52		HID proximity card readers
52		GE Ds160 motion detectors
61		GE door contacts
17		Locknetics magnetic locks
35		Adams Rite/HES Electric Strikes
17		Dortronics pneumatic push buttons
14		Altronix lock power supplies
1		Bosch VMS software
5		Bosch Network Storage Devices
1		Bosch NVR Server
2		Bosch PTZ IP dome cameras
68		Bosch fixed IP tamperproof dome cameras
1		Bosch universal keyboard
1		Winstead Triple Bay Rack
5		24 port PoE network switches
3		42inch monitors with mounts

Schedule "B" Remote Sites

Quantity		Description
2		Keri Systems Data Gathering Panels (2 reader)
12		Keri Systems Data Gathering Panels (4 reader)
14		Keri Systems Power Supplies
43		HID proximity card readers
35		Motion detectors
55		Various door contacts
34		Locking Devices
14		Various pneumatic push buttons
8		Altronix lock power supplies

Schedule "C" Ben Franklin Bridge

Quantity		Description
10		Bosch FLEXIDOME IP starlight 6000 VR A3
6		Bosch FLEXIDOME IP starlight 6000 VR A3S
1		Head End Unit: (Located in Operations Trailer)
1		Bosch DIVAR IP 3000, 4x2 TB HDD: Model # DIP-3042-4HD
1		Bosch 27-inch High Performance HD LED Monitor

Schedule "D" AutoPark at Old City

Quantity		Description
2		Bosch Flexidome IP Corner 9000 MP
1		Bosch DIVAR IP 3000 32 IP 16PoE, Video Mgmt. System
1		Bosch 27" Full HD LED Monitor
1		ComNet 26 Port PoE Managed Network Switch

Appendix E

Project Manual

PUBLIC BID PACKAGE
BID NO. 20-07

PROPOSED
VIDEO SURVEILLANCE SYSTEM

AT

4101 NORTH DELAWARE AVENUE
PHILADELPHIA, PA 19137

FOR THE

PHILADELPHIA PARKING AUTHORITY
701 Market Street, Suite 5400
Philadelphia, PA 19106
(215) 683-9600

PROJECT MANUAL

Divisions 00 through 32

26 October 2020

Carlos Raul Rodríguez Architect

1961 Browning Road
Pennsauken, NJ 08110-2941
(856) 663-0606 (856) 663-3216 FAX
crrarch@verizon.net

SECTION 00 01 02
PROJECT DIRECTORY

OWNER:	Philadelphia Parking Authority 701 Market Street, Suite 5400 Philadelphia, PA 19106 (215) 683-9600
PROJECT MANAGER:	Glenn S. DeHaven T&M Associates 1700 Market Street Philadelphia, PA 19103 (215) 282-7850 gdehaven@tandmassociates.com
ARCHITECT	Carlos Raul Rodríguez AIA CID Carlos Raul Rodríguez Architect 1961 Browning Road Pennsauken, NJ 08110-2941 (856) 663-0606 (856) 663-3216 FAX crrarch@verizon.net
CONTRACTOR:	The term Contractor as used herein shall refer to the Prime Contractor and any superintendents, foremen, agents and employees thereof.

END OF SECTION

SECTION 00 01 07
SEALS PAGE

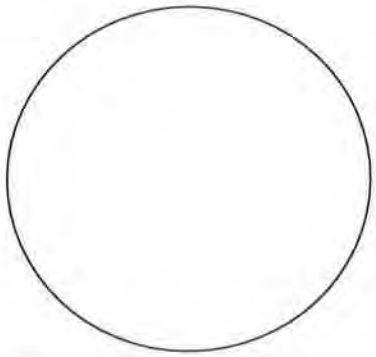
PROJECT MANUAL

PROPOSED
VIDEO SURVEILLANCE SYSTEM

AT

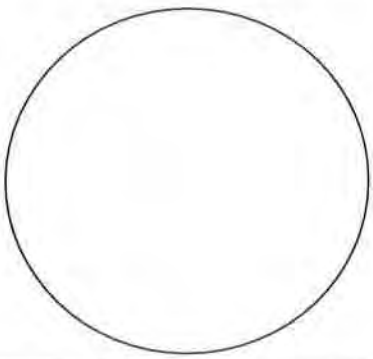
4101 NORTH DELAWARE AVENUE
PHILADELPHIA, PA 19137

ARCHITECT



Signature **Date**

ENGINEER



Signature **Date**

SECTION 00 01 10

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END OF SECTION

SECTION 00 01 15
LIST OF DRAWING SHEETS

CS	ABBREVIATIONS, SYMBOLS LEGEND, SHEET INDEX, CODE ANALYSIS AND LOCATION MAP
C1	SITE DEMOLITION, PARTIAL SITE PLANS AND DETAILS
C2.0	VIDEO SURVEILLANCE CAMERA SCHEDULE AND DETAILS
C2.1	DETAILS
E1	OVERALL SITE CONDUIT PLAN
E2.0	LOT 9 ENLARGED PLANS
E2.1	LOT 9A ENLARGED PLANS
E3	BUILDING 9 FIRST AND SECOND FLOOR CABLE PLANS
E4	BUILDING 10 CABLE PLANS
E5	GUARD SHED AND AUCTIONS TRAILER CABLE PLANS
E6.0	BUILDING 9 AND LOT 9 RISER DIAGRAMS
E6.1	BUILDING 10 AND AUCTIONS TRAILER RISER DIAGRAMS

END OF SECTION

SECTION 01 10 00
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Bid No.20-07 Proposed Video Surveillance System at 4101 Delaware Avenue, Philadelphia, PA 19137.

B. Owner's Name: The Philadelphia Parking Authority.

C. Project Manager: Glenn S. DeHaven, T&M Associates.

D. Architect's Name: Carlos Raul Rodriguez Architect.

E. The Project consists of installing a new digital video surveillance system covering two surface parking lots, two buildings, an office trailer and a guard's shed.

F. Project Location: Lots 9 and 9A at 4101 Delaware Avenue, Philadelphia, PA 19137.

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 52 00 - Agreement Form.

B. The Philadelphia Parking Authority will contract with a single Prime Contractor to provide all labor, materials, equipment and supervision for the Work as shown on the drawings and specifications.

1.03 PROPOSED PROJECT DESCRIPTION

A. The project entails providing all required materials, labor and equipment to install a new digital video surveillance system to include, but not limited to, the following:.

1. Installation of one (1) video IP recording, viewing and management appliance.
2. Installation of one (1) video IP recording storage appliance.
3. Installation of sixty-six (66) indoor and outdoor IP cameras.
4. Installation of four (4) network switches.
5. Installation of ten (10) ethernet extenders.
6. Installation of six (6) single mode fiber connectors.
7. Installation of three (3) patch panels.
8. Installation of various mounting supports as required.
9. Installation of one (1) 27-inch LED monitor.
10. Installation of one (1) wired keyboard.
11. Installation of one (1) wired mouse.
12. Excavations and trench for new electrical service and distribution and communications conduits and wiring.
13. Installation of three (3) new pole standards for new cameras and related concrete bases and foundations.
14. Infill of new electrical trenches complete with new subbase, backfill and asphalt paving.
15. Installation of new underground embedded and surface-mounted electrical conduits, boxes and line voltage conductors for new video surveillance equipment for Alternate No. 2.
16. Installation of new exposed and concealed data cabling services within an existing building.
17. Installation of new data cabling services within conduits in existing trenches.

1.04 SCOPE OF WORK

A. Scope of demolition and removal work is indicated on drawings and specified in Section 02 41 00.

B. Scope of alterations and new work is shown on the drawings and specifications.

C. Scope of electrical work for Alternate No. 2 is shown on the drawings and specifications.

D. Work at all locations can occur simultaneously; as much as practical.

E. Electrical Power: Add new construction.
   1. Installation of all new electrical conduits, supports and wiring required for a complete and approved installation as shown on drawings for Alternate No. 2.

F. Video Surveillance System: Add new construction.

1.05 COORDINATION

A. The Prime Contractor shall be responsible to coordinate, oversee and deliver all required work and procedures specified in this section.

1.06 WORK BY OWNER

A. The Owner reserves the right to remove portions of Work, such as, Trenching and related Work, if it proves to be beneficial for the timely completion of the Project and in the best interest of the Authority.

B. Owner will supply and install the following before commencement of the Work:
   1. Equipment rack.
   2. Uninterrupted power supply.
   3. Desktop computer workstation and variable speed CCTV keyboard for Alternate No. 2.

1.07 OWNER OCCUPANCY

A. Owner intends to occupy all portions of the existing sites and buildings during the entire construction period.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

1.08 CONTRACTOR USE OF SITE

A. Construction Operations: Limited to areas noted on Drawings.
   1. Locate and conduct construction activities in ways that will limit disturbance to site.

B. Arrange use of site to allow:
   1. Owner occupancy.
   2. Work by Others.
   3. Work by Owner.

C. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

D. Existing building spaces may be used for storage and staging of work as directed and approved by the Owner.

E. Existing site areas may be used for storage and staging of work as directed and approved by the Owner.

F. Time Restrictions:
   1. Limit conduct of Work between the hours of 7 am to 6 pm.
   2. Limit conduct of especially noisy, malodorous, and dusty exterior work to the hours of 7 am to 6 pm.
   3. Limit conduct of especially noisy, malodorous, and dusty interior work to the hours of 7 am to 6 pm.
   4. Any Work to be performed at night or weekend other than holiday weekends shall be pre-approved, directed and coordinated with the Owner.

G. Utility Outages and Shutdown:

1. Limit shutdown of utility services to a minimum amount of time required, arranged at least 24 hours in advance with Owner.
2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
3. Prevent accidental disruption of utility services to other facilities.

1.09 WORK SEQUENCE

A. Perform Work in phases during the construction period according to the approved Construction Progress Schedule as specified in Section 01 32 16.

B. The Prime Contractor shall coordinate the construction schedule and operations with Owner and the Project Manager.

1.10 SPECIFICATION SECTIONS AND DRAWINGS APPLICABLE TO CONTRACT NO. BID NO. 20-07 PROPOSED VIDEO SURVEILLANCE SYSTEM AT 4101 DELAWARE AVENUE, PHILADELPHIA, PA 19137 - ELECTRICAL CONSTRUCTION

A. Specifications: All specification sections listed in Section 00 01 10 - Table of Contents are applicable to the Contract.

B. Drawings: All drawings listed in Section 00 01 15 - List of Drawing Sheets are applicable to the Contract.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Section 00 50 00 - Contracting Forms and Supplements: Forms to be used.

B. Section 00 52 00 - Agreement Form: Contract Sum, retainages, payment period, monetary values of unit prices.

C. Document 00 72 00 - General Conditions and Document 00 73 00 - Supplementary Conditions: Additional requirements for progress payments, final payment, changes in the Work.

D. Document 00 73 00 - Supplementary Conditions: Percentage allowances for Prime Contractor's overhead and profit.

E. Section 01 22 00 - Unit Prices: Monetary values of unit prices; Payment and modification procedures relating to unit prices.

F. Section 01 23 00 - Alternates: Monetary values of Bid prices.

1.03 SCHEDULE OF VALUES

A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Submit Schedule of Values in electronic format within 10 days after date of Owner-Contractor Agreement.

E. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.

C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

D. Forms filled out by hand will not be accepted.

E. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

F. Execute certification by signature of authorized officer.

G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

I. Submit four (4) copies of each Application for Payment.

J. Include the following with the application:
   1. Transmittal letter as specified for submittals in Section 01 30 00.
   2. Construction progress schedule, revised and current as specified in Section 01 30 00.
   3. Current construction photographs specified in Section 01 30 00.
   4. Partial release of liens from major subcontractors and vendors.
   5. Affidavits attesting to off-site stored products.
   6. Certified Payroll Reports.
   7. Post-Award Minority Compliance Review Forms

K. When Architect requires substantiating information, submit data justifying dollar amounts in question.

1.05 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Prime Contractor's employ or subcontractors of changes to Contract Documents.

B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Prime Contractor.

C. For other required changes, Architect will issue a document signed by Owner instructing Prime Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

D. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Prime Contractor shall prepare and submit a fixed price quotation within five (5) days.

E. Prime Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 60 00.

F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Prime Contractor's price quotation.
   2. For change requested by Prime Contractor, the amount will be based on the Prime Contractor's request for a Change Order as approved by Architect.
   3. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.
   4. For change ordered by Architect without a quotation from Prime Contractor, the amount will be determined by Architect based on the Prime Contractor's substantiation of costs as specified for Time and Material work.

G. Substantiation of Costs: Provide full information required for evaluation.

1. Provide following data:
   a. Quantities of products, labor, and equipment.
   b. Taxes, insurance, and bonds.
   c. Overhead and profit.
   d. Justification for any change in Contract Time.
   e. Credit for deletions from Contract, similarly documented.
2. Support each claim for additional costs with additional information:
   a. Origin and date of claim.
   b. Dates and times work was performed, and by whom.
   c. Time records and wage rates paid.
   d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

K. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 70 00.
   2. Reciept of all required and approved Closeout Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 22 00
UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. List of unit prices, for use in preparing Bids and Change Order Proposals.

B. Defect assessment and non-payment for rejected work.

1.02 RELATED REQUIREMENTS

A. Document 00 21 13 - Instructions to Bidders: Instructions for preparation of pricing for Unit Prices.

B. Section 00 41 00 - Bid Form: List of Unit Prices.

C. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include complete and full compensation for all required labor, products, tools, equipment, plant fees, transportation, services, incidentals and erection. Application or installation of an item of the Work shall also include costs for overhead and profit.

B. Pricing method shall be as specified in Section 00 41 00 - Bid Form, Item 2.3.

1.04 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.05 MEASUREMENT OF QUANTITIES

A. Take all measurements and compute quantities. Measurements and quantities will be verified by Architect.

B. Assist by providing necessary equipment, workers, and survey personnel as required.

C. Measurement by Area: Measured by square dimension using mean length and width or radius.

D. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

E. Stipulated Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

1.06 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.

B. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected Products.

1.07 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not complying with specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct one of the following remedies:

1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Architect.
2. The defective Work will be partially repaired to the instructions of the Architect, and the unit price will be adjusted to a new unit price at the discretion of Architect.

C. If, in the opinion of Owner, it is not practical to remove and replace the Work, Owner will direct one of the following remedies:
1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Owner.
2. The defective Work will be partially repaired to the instructions of the Owner, and the unit price will be adjusted to a new unit price at the discretion of Owner.

D. The individual specification sections may modify these options or may identify a specific formula or percentage price reduction.

E. The authority of Architect to assess the defect and identify payment adjustment is final.

1.08 SCHEDULE OF UNIT PRICES

A. As specified in Section 00 41 00 - Bid Form, Item 2.3.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 23 00
ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of Alternates.

B. Procedures for pricing Alternates.

1.02 RELATED REQUIREMENTS

A. Section 00 41 00 - Bid Form: Instructions for preparation of pricing for Alternate.

B. Document 00 52 00 - Agreement Form: Incorporating monetary value of accepted Alternates.

1.03 ACCEPTANCE OF ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work to integrate the Work specified for the Alternate.

1.04 SCHEDULE OF ALTERNATES

A. Add Alternate No. 1 - Add to the Scope of Work as shown on the Drawings.
   1. Alternate Item: Replacing Type B cameras with Type C cameras and related Work.
      a. The scope for the Alternate is to provide an option to substitute proposed fixed dome cameras with bullet cameras on designated new and existing poles as indicated on the drawings.
      b. Provide and install all required labor, materials, equipment and related Work for a complete installation as indicated on the drawings.
      c. Deduct costs for the substituted proposed dome cameras to include all required labor, materials, equipment and related Work.
      d. Refer to drawings and specifications for locations and descriptions.

B. Add Alternate No. 2 - Add to the Scope of Work as shown on the Drawings.
   1. Alternate Item: Replacing Type B cameras with Type D cameras and related Work.
      a. The scope for the Alternate is to provide an option to substitute proposed fixed dome cameras with PTZ cameras on designated existing light poles as indicated on the drawings.
      b. Provide and install all required labor, materials, equipment and related Work for a complete installation as indicated on the drawings.
      c. Deduct costs for the substituted proposed fixed cameras to include all required labor, materials, equipment and related Work.
      d. Refer to drawings and specifications for locations and descriptions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.
B. Project Coordination.
C. Preconstruction meeting.
D. Site mobilization meeting.
E. Progress meetings.
F. Construction progress schedule.
G. Progress photographs.
H. Submittals for review, information, and project closeout.
I. Number of copies of submittals.
J. Requests for Interpretation (RFI) procedures.
K. Submittal procedures.
L. Construction Operations Coordination Schedule.

1.02 RELATED REQUIREMENTS

A. Section 00 52 00 - Agreement Form. Dates for applications for payment.
B. Section 00 72 00 - General Conditions.
C. Section 00 73 00 - Supplementary Conditions.
D. Section 01 10 00 - Summary.
E. Section 01 32 16 - Construction Progress Schedule: Form, content, and administration of schedules.
F. Section 01 60 00 - Product Requirements: General product requirements.
G. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.
H. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 REFERENCE STANDARDS

A. AIA G810 - Transmittal Letter; 2001.

1.04 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

1.05 PROJECT COORDINATION

A. The Prime Contractor shall coordinate scheduling and timing of required procedures with other construction activities to avoid conflicts and to ensure the orderly progress of the Work as shown on the Drawings.
B. The Prime Contractor shall coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials.
C. All Subcontractors shall cooperate with the Prime Contractor in allocation of mobilization areas of site; field offices, for vehicular and pedestrian access, traffic, and parking facilities.
D. During construction, the Prime Contractor shall coordinate use of the site and facilities.

E. The Prime Contractor shall coordinate procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

F. The Prime Contractor shall coordinate the use of temporary utilities and construction facilities.

G. The Prime Contractor shall coordinate field engineering and layout the work.

H. The Prime Contractor shall make the following types of submittals to the Architect:
   1. Requests for Interpretation.
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Correction Punch List and Final Correction Punch List for Substantial Completion.
   10. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Notice to Proceed.

B. Attendance Required:
   1. Owner.
   2. Project Manager.
   3. Architect.
   4. Prime Contractor.

C. Agenda:
   1. Project coordination procedures.
   2. Execution of Owner-Prime Contractor Agreement.
   3. Submission of executed bonds and insurance certificates.
   4. Distribution of Contract Documents.
   5. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   6. Designation of personnel representing the parties to Contract, Subcontractors and Architect.
   7. Procedures for processing Requests for Interpretations (RFIs).
   8. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   9. Scheduling.

D. The Prime Contractor shall record minutes and distribute copies within three 3 days after meeting to participants, with e-mailed copies to Architect, Owner, participants, and those affected by decisions made.

3.02 SITE MOBILIZATION MEETING

A. The Project Manager shall schedule a meeting at the Project site prior to Prime Contractor occupancy.

B. Attendance Required:
   1. Prime Contractor.
   2. Owner.
   3. Project Manager.

4. Architect.
5. All Prime Contractors and their Superintendents.
6. Major subcontractors.
7. Owner's Equipment Vendor.

C. Agenda:
1. Use of premises by Owner and Prime Contractor.
2. Owner's requirements and partial occupancy prior to completion.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by Owner.
5. Survey and equipment layout.
6. Security and housekeeping procedures.
7. Schedules.
8. Application for payment procedures.
9. Procedures for testing.
10. Procedures for maintaining record documents.
11. Requirements for start-up of equipment.
12. Inspection and acceptance of equipment put into service during construction period.

D. The Prime Contractor shall record minutes and distribute copies within three (3) days after meeting to participants, with e-mailed copies to Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

A. The Prime Contractor shall schedule and administer meetings throughout progress of the Work at maximum bi-weekly intervals.

B. The Prime Contractor shall make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:
1. Prime Contractor.
2. Owner.
3. Project Manager.
4. Architect.
5. Major subcontractors.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Review of RFIs, RFI Log and status of responses.
8. Review of Proposal Requests.
9. Status of Change Orders.
10. Review of Applications for Payment.
11. Maintenance of progress schedule.
12. Corrective measures to regain projected schedules.
13. Planned progress during succeeding work period.
14. Coordination of projected progress.
15. Maintenance of quality and work standards.
16. Effect of proposed changes on progress schedule and coordination.
17. Pending claims and disputes.
18. Other business relating to work.

E. The Prime Contractor shall record minutes and distribute copies within three (3) days after meeting to participants, with e-mailed copies to Architect, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE

A. Refer to Section 01 32 16 - Construction Progress Schedule for specific requirements and procedures.

3.05 PROGRESS PHOTOGRAPHS

A. Submit photographs with each application for payment, taken not more than three (3) days prior to submission of application for payment.

B. Photography Type: Digital; electronic files.

C. Provide photographs of construction throughout progress of Work produced by any photographer, acceptable to Architect.

D. In addition to periodic, recurring views, take photographs of each of the following events:
   1. Demolition of existing items scheduled to be removed.
   2. Completion of site clearing.
   3. Excavations in progress.
   4. Subsurface work.
   5. Finished pavings.
   6. Foundations in progress and upon completion.
   7. Completion of each phase of work.
   8. Final completion, minimum of ten (10) photos.

E. Take photographs as evidence of existing project conditions as follows:
   1. Interior views: As required.
   2. Exterior views: As required.

F. Views:
   1. Provide non-aerial exterior photographs from four cardinal views at each specified time, until Date of Substantial Completion.
   2. Consult with Architect for instructions on interior views required.

G. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
   1. Delivery Medium: On photo CD.
   2. File Naming: Include project identification, date and time of view, and view identification.
   3. Photo CD(s): Provide two (2) , with files organized in separate folders by submittal date.

3.06 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Procedure: Submit immediately on discovery of the need for interpretation of the Contract Documents; or whenever possible without causing a delay to the project, request clarifications at the next appropriate project progress meeting with the response entered into meeting minutes.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.

1. Prepare a separate RFI for each specific item.
   a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
   b. Do not forward requests which solely require internal coordination between subcontractors.
   c. Prepare in a format and with content acceptable to Architect.
2. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
      d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   2. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   3. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
      a. The Owner reserves the right to assess the Prime Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. Owner's, Architect's, and Prime Contractor's names.
   3. Discrete and consecutive RFI number, and descriptive subject/title.
   4. Issue date, and requested reply date.
   5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
   6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
   7. Prime Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. Hard-Copy RFIs:
   1. Identify each page of attachments with the RFI number and sequential page number.

H. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
   1. Attachments shall be electronic files in PDF format.

I. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project organized by the RFI number and submitted at progress meetings as follows:.

1. Official Project name and number.
2. Name and address of Prime Contractor.
3. Name and address of Architect.
4. Name and address of Owner.
5. RFI number including RFIs that were dropped.
6. RFI description.
7. Date the RFI was submitted.
8. Date Architect's response was sent.
9. Identification of related Field Order, Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
10. Indicate current status of every RFI. Update log promptly and on a regular basis.
11. Highlight items requiring priority or expedited response.

J. Review Time: Architect will respond and return RFIs to Prime Contractor within seven (7) calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
   2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
   3. Upon receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three (3) days if the Prime Contractor disagrees with response.
   4. The following RFIs will be returned without action:
      a. Requests for approval of submittals.
      b. Requests for approval of substitutions.
      c. Requests for coordination information already indicated in the Contract Documents.
      d. Requests for adjustments in the Contract Time or the Contract Sum.
      e. Requests for interpretation of Architect's actions on submittals.
      f. Incomplete RFIs or RFIs with numerous errors.

K. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project.
   1. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for the Prime Contractor to submit a Change Proposal according to Section 01 20 00.
   2. If in Prime Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Architect and Owner.
   3. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
   4. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.

3.07 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below.

3.08 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

3.09 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Final Correction Punch List for Substantial Completion.

B. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. All outstanding Certified Payroll Reports.
   6. Affidavit of Release of Liens Forms.
   7. Other documentation as indicated.

C. Submit for Owner's benefit during and after project completion.

3.10 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents for Review: Submit electronic documents in Portable Document Format (PDF) to the Architect; a hard copy or an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Hard-Copy Documents for Review:
   1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit the number of copies that Prime Contractor requires, plus two (2) copies that will be retained by Architect.
   2. Larger Sheets, Not Larger Than 22 x 34 Inches: Submit the number of opaque reproductions that Prime Contractor requires, plus two (2) copies that will be retained by Architect.

C. Documents for Information: Submit two (2) copies.

D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. Retained samples will not be returned to Prime Contractor unless specifically so stated.

3.11 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Use a separate transmittal for each item.
   2. Transmit each submittal with a copy of any of the following approved forms:
      a. Form AIA G810.
      b. Form USACE Eng Form 4025.
      c. Form CSI/CSC Form 12.1A.
      d. Prime Contractor's form, subject to prior approval by Architect.

3. Sequentially identify each item. For revised submittals use original number and a sequential alphabetical suffix.
4. Provide Project Name, Prime Contractor, subcontractor or supplier, pertinent drawing and detail number, and specification section number and article/paragraph, as appropriate on each copy.
5. Apply Prime Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
   a. Submittals from sources other than the Prime Contractor, or without Prime Contractor's stamp will not be acknowledged, reviewed, or returned.
6. Send submittals in electronic format via email to Architect.
7. Deliver submittals to Architect at business address.
8. Schedule submittals to expedite the Project, and coordinate submission of related items.
   a. For each submittal for review, allow ten (10) days excluding delivery time to and from the Prime Contractor.
   b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional five (5) days.
9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
10. Provide space for Prime Contractor and Architect review stamps.
11. When revised for resubmission, identify all changes made since previous submission.
12. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
13. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
14. Submittals not requested will be recognized, and will be returned "Not Reviewed",

B. Product Data Procedures:
   1. Submit only information required by individual specification sections.
   2. Collect required information into a single submittal.
   3. Submit concurrently with related shop drawing submittal.
   4. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
   2. Do not reproduce Contract Documents to create shop drawings.
   3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
   1. Transmit related items together as single package.
   2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

END OF SECTION

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type showing critical path.

1.02 RELATED SECTIONS

A. Section 01 10 00 - Summary: Work sequence, occupancy, and owner-furnished items.

B. Section 01 30 00 - Administrative Requirements: Meetings and submittal requirements.

C. Section 01 70 00 - Execution and Closeout Requirements.

1.03 REFERENCE STANDARDS

A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.

B. M-H (CPM) - CPM in Construction Management - Project Management with CPM; O'Brien; 2006.

1.04 SUBMITTALS

A. Within five (5) days after date established in Notice to Proceed, submit preliminary schedule .

B. If preliminary schedule requires revision after review, submit revised schedule within five (5) days.

C. Within three (3) days after joint review, submit complete schedule.

D. Submit updated schedule with each Application for Payment.

E. Submit the number of opaque reproductions that Prime Contractor requires, plus two (2) copies that will be retained by Architect.

F. Submit under transmittal letter form specified in Section 01 30 00 - Administrative Requirements.

1.05 QUALITY ASSURANCE

A. Prime Contractor's Administrative Personnel: one (1) years minimum experience in using and monitoring CPM schedules on comparable projects.

1.06 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Diagram Sheet Size: Maximum 11 x 17 inches and legible.

C. Scale and Spacing: To allow for notations and revisions.

1.07 COORDINATION

A. Prime Contractor shall coordinate preparation and processing of schedules and any required reports with performance of construction activities and with scheduling and reporting of separate Subcontractors.

B. Prime Contractor shall coordinate the Construction Progress Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests and any other required schedule and report.

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

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number. Provide additional breakdown as required.

C. Identify work of separate Subcontractors and other logically grouped activities.

D. Include conferences and meetings in schedule.

E. Coordinate content with schedule of values specified in Section 01 20 00 - Price and Payment Procedures.

F. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Architect at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within five (5) days.

3.05 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Update diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect including the effects of changes on schedules of separate Subcontractors.

3.06 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Prime Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.
B. Quality assurance.
C. References and standards.
D. Testing and inspection services.
E. Control of installation.
F. Tolerances.
G. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Document 00 72 00 - General Conditions: Inspections and approvals required by public authorities.
B. Document 00 73 00 - Supplementary Conditions.
C. Section 01 30 00 - Administrative Requirements: Submittal procedures.
D. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

A. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2014.
B. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2013.
C. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing; 2014a.
D. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2013.
E. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2010.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Testing and Inspection Agency Qualifications:
    1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time specialist and responsible officer.
C. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
D. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Prime Contractor.
    1. Include:
        a. Date issued.
        b. Project title and number.
        c. Name of inspector.
        d. Date and time of sampling or inspection.
        e. Identification of product and specifications section.
        f. Location in the Project.
        g. Type of test/inspection.
        h. Date of test/inspection.

i. Results of test/inspection.
j. Compliance with Contract Documents.
k. When requested by Architect, provide interpretation of results.

2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

E. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Prime Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

F. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications:
1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time specialist and responsible officer.
2. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

1.06 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.07 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform other specified testing and inspection.

B. As indicated in individual specifications sections, Prime Contractor or Manufacturer shall employ and pay for services of an independent Testing and Inspection Agency to perform specified testing and inspection.

C. Employment of agency in no way relieves Prime Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

D. Prime Contractor/Manufacturer Employed Agency:

1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM C1077, and ASTM C1093.
2. Inspection agency: Comply with requirements of ASTM E329.
3. Laboratory Qualifications: Accredited by IAS according to IAS AC89.
4. Laboratory: Authorized to operate in Pennsylvania.
5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.03 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.

B. Testing/Inspection Agency Duties:
   1. Test samples of mixes submitted by Prime Contractor.
   2. Provide qualified personnel at site. Cooperate with Architect and Prime Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified standards.
   4. Perform specified testing and inspections of equipment in accordance with specified standards.
   5. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   6. Ascertain compliance of materials and equipment with requirements of Contract Documents.
   7. Promptly notify Architect and Prime Contractor of observed irregularities or non-compliance of Work or products.
   8. Perform additional tests and inspections required by Architect.
   9. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Prime Contractor.
   4. Agency has no authority to stop the Work.

D. Prime Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Deliver to Testing/Inspection Agency at designated location, documentation of all equipment proposed to be installed that require testing and inspection, along with copies of all applicable required permits.
   3. Cooperate with Testing/Inspection Agency personnel and provide access to the Work.
   4. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   5. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   6. Schedule with Architect, Owner, Authority having Jurisdiction and Testing/Inspection Agency all required testing/inspection services as specified in individual specifications sections.
   7. Employ services of an independent Testing/Inspection Agency and pay for additional samples, tests, and inspections required by Prime Contractor beyond specified requirements.

E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

F. Re-testing required because of non-compliance with specified requirements shall be paid for by Prime Contractor.

3.04 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

C. The authority of Architect to assess the defect, determine an appropriate remedy and identify payment adjustment is final.

END OF SECTION

SECTION 01 41 00
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY OF REFERENCE STANDARDS

A. The Prime Contractor and all of its Subcontractors are responsible for compliance with all applicable local, state, and federal laws, codes, ordinances and requirements including those of, but not limited to OSHA, local and state building codes.

B. The Prime Contractor is responsible for obtaining and paying for all zoning and building permits and fees required by the City of Philadelphia and the State of Pennsylvania. The Prime Contractor will be reimbursed for all zoning and building permits and fees required for the project by the Owner at direct costs by issuing a Change Order.

C. Regulatory requirements applicable to this project are the following:
   1. Zoning Code: City of Philadelphia.
   2. All work shall comply with current effective editions of the various applicable Subcodes of the 2010 Philadelphia Building Construction and Occupancy Code (BCOC).

D. 29 CFR 1910 - Occupational Safety and Health Standards; current edition.

E. Penn DOT Publication 408 - Specifications; latest edition.

F. Erosion and Sedimentation Control Regulations: PA Department of Environmental Protection (PA DEP) 25 PA Code Section 102.4.

G. Stormwater Regulations: City of Philadelphia Code, Section 14-704(3).

H. Special Inspections Program: City of Philadelphia.

1.02 RELATED REQUIREMENTS

A. Section 01 40 00 - Quality Requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 45 33
CODE-REQUIRED SPECIAL INSPECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Code-required special inspections.

B. Testing services incidental to special inspections.

C. Submittals.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures.

B. Section 01 40 00 - Quality Requirements.

1.03 ABBREVIATIONS AND ACRONYMS

A. AHJ: Authority having jurisdiction.

B. IAS: International Accreditation Service, Inc.

C. NIST: National Institute of Standards and Technology.

1.04 DEFINITIONS

A. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.

B. National Institute of Standards and Technology (NIST).

C. Special Inspection:
   1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved contract documents and the referenced standards.
   2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Prime Contractor for the purposes of quality assurance and contract administration.

1.05 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

B. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.

C. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing; 2014a.

D. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2013.

E. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency shall:
   1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

3. Submit certification that Special Inspection Agency is acceptable to AHJ.

C. Special Inspection Reports: After each special inspection, Special Inspector shall promptly submit two copies of report; one to Architect and one to the AHJ.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of Special Inspector.
      d. Date and time of special inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of special inspection.
      h. Date of special inspection.
      i. Results of special inspection.
      j. Conformance with Contract Documents.
   2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.

1.07 SPECIAL INSPECTION AGENCY

A. Owner or Architect will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.

B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.

C. Employment of agency in no way relieves Prime Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.08 TESTING AND INSPECTION AGENCIES

A. Owner or Architect may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.

B. Employment of agency in no way relieves Prime Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.09 QUALITY ASSURANCE

A. Special Inspection Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
   2. Approved by the City of Philadelphia.

B. Testing Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
   2. Approved by the City of Philadelphia.

C. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
   1. Continuous Special Inspection: Special Inspection Agency shall be present in the area where the work is being performed and observe the work at all times the work is in progress.

2. Periodic Special Inspection: Special Inspection Agency shall be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

3.02 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

A. Reinforcing Steel, Including Prestressing of Tendons and Placement: Verify compliance with approved contract documents and ACI 318, Sections 3.5 and 7.1 through 7.7; periodic.

B. Reinforcing Steel Welding: Verify compliance with AWS D1.4/D1.4M and ACI 318, Section 3.5.2; periodic.

C. Design Mix: Verify plastic concrete complies with the design mix in approved contract documents and with ACI 318, Chapter 4 and 5.2; periodic.

D. Specified Curing Temperature and Techniques: Verify compliance with approved contract documents and ACI 318, Sections 5.11 through 5.13; periodic.

E. Concrete Strength in Situ: Verify concrete strength complies with approved contract documents and ACI 318, Section 6.2, for the following.

F. Formwork Shape, Location and Dimensions: Verify compliance with approved contract documents and ACI 318, Section 6.1.1; periodic.

3.03 SPECIAL INSPECTIONS FOR SOILS

A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
   1. Design bearing capacity of material below shallow foundations; periodic.
   2. Design depth of excavations and suitability of material at bottom of excavations; periodic.
   3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
   4. Subgrade, prior to placement of compacted fill; periodic.

B. Testing: Classify and test excavated material; periodic.

3.04 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

A. Special Inspection Agency shall:
   1. Verify samples submitted by Prime Contractor comply with the referenced standards and the approved contract documents.
   2. Provide qualified personnel at site. Cooperate with Architect and Prime Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified reference standards.
   4. Ascertain compliance of materials and products with requirements of Contract Documents.
   5. Promptly notify Architect and Prime Contractor of observed irregularities or non-conformance of work or products.
   6. Perform additional tests and inspections required by Architect.
   7. Attend preconstruction meetings and progress meetings.
   8. Submit reports of all tests or inspections specified.

B. Limits on Special Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the work.
   3. Agency may not assume any duties of Prime Contractor.
   4. Agency has no authority to stop the work.

C. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.

D. Re-testing required because of non-conformance to specified requirements shall be paid for by Prime Contractor.

3.05 TESTING AGENCY DUTIES AND RESPONSIBILITIES

A. Testing Agency Duties:
   1. Test samples submitted by Prime Contractor.
   2. Provide qualified personnel at site. Cooperate with Architect and Prime Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified standards.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   5. Promptly notify Architect and Prime Contractor of observed irregularities or non-conformance of work or products.
   6. Perform additional tests and inspections required by Architect.
   7. Submit reports of all tests or inspections specified.

B. Limits on Testing or Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the work.
   3. Agency may not assume any duties of Prime Contractor.
   4. Agency has no authority to stop the work.

C. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.

D. Re-testing required because of non-conformance to specified requirements shall be paid for by Prime Contractor.

3.06 CONTRACTOR DUTIES AND RESPONSIBILITIES

A. Prime Contractor Responsibilities, General:
   1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
   2. Cooperate with agency and laboratory personnel; provide access to the work.
   3. Provide incidental labor and facilities:
      a. To provide access to work to be tested or inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
      c. To facilitate tests or inspections.
      d. To provide storage and curing of test samples.
   4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
   5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Prime Contractor beyond specified requirements.

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary sanitary facilities.

C. Temporary Controls: Barriers, enclosures, and fencing.

D. Security requirements.

E. Vehicular access and parking.

F. Waste removal facilities and services.

G. Field offices.

1.02 RELATED REQUIREMENTS

A. Document 00 72 00 - General Conditions of the Contract.

B. Document 00 73 00 - Supplementary Conditions.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

1.04 COORDINATION

A. The Prime Contractor shall be responsible to coordinate, oversee and deliver all required work and procedures of all Subcontractors specified in this section.

B. See Section 01 10 00 for occupancy-related requirements.

1.05 TEMPORARY UTILITIES

A. Owner will provide the following:
   1. Electrical power, consisting of connection to existing facilities.
   2. Water supply, consisting of connection to existing facilities.

B. Provide and pay for all electrical power, lighting, and water required for construction purposes.

C. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.06 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Use of existing facilities located at the facility is permitted.

C. Maintain daily in clean and sanitary condition.

D. At end of construction, return facilities to same or better condition as originally found.

1.07 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way .

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

D. Traffic Controls: As required by the Owner.

1.08 FENCING

A. Construction: Prime Contractor's option at no additional cost to the Owner.

B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.09 SECURITY PROGRAM - SEE SECTION 01 35 53

A. Within five (5) days after date established in Notice to Proceed, submit a preliminary security program to the Project Manager for review and approval.

B. Provide physical security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

C. Coordinate with Owner's security program.

1.10 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Owner.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Provide means of removing mud from vehicle wheels before entering streets.

E. Existing on-site roads may be used for construction traffic.

F. Existing parking areas determined by the Owner may be used for construction parking.

G. Do not allow vehicle parking on existing pavement.

1.11 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site as required.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers or locate as directed by the Owner.

D. Locate containers holding flammable material in areas approved by the authorities having jurisdiction.

1.12 FIELD OFFICES

A. Field offices shall not be required.

B. Owner will provide space for Project Meetings within the facility.

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition.

D. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 57 13
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prevention of erosion due to construction activities.

B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.

C. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Prime Contractor.

1.02 RELATED REQUIREMENTS

A. Section02 41 00 - Demolition.

B. Section 31 23 16 - Excavation.

C. Section 31 23 16.13 - Trenching.

D. Section 31 23 23 - Fill.

E. Section 32 11 23 - Aggregate Base Courses: Temporary and permanent roadways.

1.03 REFERENCE STANDARDS

A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus; 2014.

B. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 1999a (Reapproved 2014).

C. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2011.

D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a.

E. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile; 2012.

F. ASTM D4873 - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples; 2002 (Reapproved 2009).

G. FHWA FLP-94-005 - Best Management Practices for Erosion and Sediment Control; 1995.

1.04 PERFORMANCE REQUIREMENTS

A. Comply with all requirements of Philadelphia Water Department for erosion and sedimentation control .

B. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
   1. Obtain and pay for permits and provide security required by authority having jurisdiction.
   2. Owner will withhold payment to Prime Contractor equivalent to all fines resulting from non-compliance with applicable regulations.

C. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

D. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
   1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.

2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 10 years.

E. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
   1. Control movement of sediment and soil from temporary stockpiles of soil.
   2. Prevent development of ruts due to equipment and vehicular traffic.
   3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

F. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
   1. Prevent windblown soil from leaving the project site.
   2. Prevent tracking of mud onto public roads outside site.
   3. Prevent mud and sediment from flowing onto sidewalks and pavements.
   4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

G. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
   2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.

H. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.

I. Open Water: Prevent standing water that could become stagnant.

J. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.

PART 2 PRODUCTS

2.01 MATERIALS

A. Mulch: Use one of the following:
   1. Straw or hay.
   2. Erosion control matting or netting.

B. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
   1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
   2. Permittivity: 0.05 sec^-1, minimum, when tested in accordance with ASTM D4491.

3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
4. Tensile Strength: 100 lb-f, minimum, in cross-machine direction; 124 lb-f, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
6. Tear Strength: 55 lb-f, minimum, when tested in accordance with ASTM D4533.
7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.

C. Silt Fence Posts: One of the following, minimum 5 feet long:
1. Steel U- or T-section, with minimum mass of 1.33 lb per linear foot.
2. Hardwood, 2 by 2 inches in cross section.

D. Curb inlet protection socks filled with filtration media.

E. Gravel: See Section 32 11 23 for aggregate.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION

A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

3.03 SCOPE OF PREVENTIVE MEASURES

A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.

B. Linear Sediment Barriers: Made of silt fences.
1. Provide linear sediment barriers:
   a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
2. Space sediment barriers with the following maximum slope length upslope from barrier:
   a. As detailed on drawings.

C. Storm Drain Curb Inlet Sediment Trap: Curb inlet protection socks filled with filtration media.

D. Storm Drain Drop Inlet Sediment Traps: Curb inlet protection socks filled with filtration media .

E. Soil Stockpiles: Protect using one of the following measures:
1. Cover with polyethylene film, secured by placing soil on outer edges.
2. Curb inlet protection socks filled with filtration media.

3.04 INSTALLATION

A. Silt Fences:
1. Store and handle fabric in accordance with ASTM D4873.
2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground.
4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground.
5. Install with top of fabric at nominal height and embedment as specified.
6. Embed bottom of fabric in a trench on the upslope side of fence, with 6 inches of fabric laid flat on bottom of trench facing upslope; backfill trench and compact.
7. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.

8. Fasten fabric to wood posts using one of the following:
   a. Four nails per post with 3/4 inch diameter flat or button head, 1 inch long, and 14 gage, 0.083 inch shank diameter.
   b. Five staples per post with at least 17 gage, 0.0453 inch wire, 3/4 inch crown width and 1/2 inch long legs.
9. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.
10. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.

B. Curb and Drop Inlet Silt Sock Sediment Traps:
   1. Store and handle silt socks in accordance with manufacturer's recommendations.
   2. Fasten protection silt socks in accordance with manufacturer's recommendations.
   3. Wherever runoff will flow around end of barrier or over the top, provide additional barriers as required.

C. Mulching Over Small and Medium Areas:
   1. Dry Straw and Hay: Apply 4 to 6 inches depth.
   2. Erosion Control Matting: Comply with manufacturer's instructions.

3.05 MAINTENANCE

A. Inspect preventive measures daily, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.

B. Repair deficiencies immediately.

C. Silt Fences:
   1. Promptly replace fabric that deteriorates unless need for fence has passed.
   2. Remove silt deposits that exceed one-third of the height of the fence.
   3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

D. Curb and Drop Inlet Silt Sock Sediment Traps:
   1. Promptly replace silt socks that have deteriorated unless need for silt socks has passed.

E. Soil Stockpiles:
   1. Replace and secure polyethylene film that failed unless need for cover has passed.
   2. Promptly replace curb inlet protection silt sock that fell apart or otherwise deteriorated unless need for trap has passed.

F. Clean out temporary sediment control structures as required and relocate soil on site.

G. Place sediment in appropriate locations on site; do not remove from site.

3.06 CLEAN UP

A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Architect.

END OF SECTION

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations.

F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Document 00 21 13 - Instructions to Bidders: Product options and substitution procedures prior to bid date.

B. Document 00 43 36 - List of Subcontractors and Material Suppliers.

C. Section 01 25 00 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

D. Section 01 40 00 - Quality Requirements: Product quality monitoring.

E. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 REFERENCE STANDARDS

A. 16 CFR 260.13 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; Recycled Content; Current Edition.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within ten (10) days after date of Notice to Proceed.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.05 QUALITY ASSURANCE

A. Recycled Content: Determine percentage of post-consumer and pre-consumer (post-industrial) content separately, using the guidelines contained in 16 CFR 260.13.
   1. Previously used, reused, refurbished, and salvaged products are not considered recycled.
   2. Acceptable Evidence:
      a. For percentage of recycled content, information from manufacturer.

b. For cost, Prime Contractor's cost data.

B. Reused Products: Materials and equipment previously used in this or other construction, salvaged and refurbished as specified.
   1. Acceptable Evidence: Information about the origin or source, from Prime Contractor or supplier.

C. Sustainably Harvested Wood: Solid wood, wood chips, and wood fiber certified or labeled by an organization accredited by one of the following:
   1. American Forest Foundation, The American Tree Farm System; refer to http://www.treefarmsystem.org.
   2. The Forest Stewardship Council, The Principles for Natural Forest Management; for Canada visit http://www.fsccanada.org, for the USA visit http://www.fscus.org.
   3. Acceptable Evidence: Copies of invoices bearing the certifying organization's certification numbers.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Prime Contractor; remove from site.

D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.
   1. See drawings for list of items required to be salvaged for reuse and relocation.
   2. If reuse of other existing materials or equipment is desired, submit substitution request.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:
   1. Made outside the United States, its territories, Canada, or Mexico.
   2. Made using or containing CFC's or HCFC's.
   3. Made of wood from newly cut old growth timber.
   4. Containing lead, cadmium, or asbestos.

C. Where other criteria are met, Prime Contractor shall give preference to products that:
   1. Are extracted, harvested, and/or manufactured closer to the location of the project.
   2. Have longer documented life span under normal use.
   3. Result in less construction waste. See Section 01 74 19
   4. Are made of recycled materials.
   5. If made of wood, are made of sustainably harvested wood, wood chips, or wood fiber.

D. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.

E. Cord and Plug: Provide minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

D. Products Specified by Naming One or More Manufacturers with a Provision for Equal Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver and place in location as directed; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 25 00 - Substitution Procedures.

B. Instructions to Bidders specifies time restrictions for submitting requests for substitutions during the bidding period and the documents required. Comply with requirements specified in Section 00 21 13.

C. Substitutions may be considered when a product becomes unavailable through no fault of the Prime Contractor.

D. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

E. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

F. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

G. Substitution Submittal Procedure (after contract award):
   1. Submit proposed substitution request electronically as indicated in Section 01 30 00. Limit each request to one proposed substitution.
   2. When electronic submittals are not effective, submit three (3) hard copies of request for substitution for consideration. Limit each request to one proposed substitution.
   3. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
   4. The Architect will notify Prime Contractor in writing of decision to accept or reject request.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Provide protection of stored materials and products against theft, casualty, or deterioration.

B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
   1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor areas.

C. Store and protect products in accordance with manufacturers' instructions.

D. Store with seals and labels intact and legible.

E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

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

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

H. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

I. Comply with manufacturer's warranty conditions, if any.

J. Do not store products directly on the ground.

K. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

L. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

M. Prevent contact with material that may cause corrosion, discoloration, or staining.

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

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

END OF SECTION

SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Pre-installation meetings.

D. Cutting and patching.

E. Cleaning and protection.

F. Starting of systems and equipment.

G. Demonstration and instruction of Owner personnel.

H. Closeout procedures, including Prime Contractor's Correction Punch List, except payment procedures.

I. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 01 30 00 - Administrative Requirements: Submittals procedures.

C. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.

D. Section 01 50 00 - Temporary Facilities and Controls.

E. Section 01 60 00 - Product Requirements.

F. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties .

G. Section 02 41 00 - Demolition.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Prime Contractor.
   6. Include in request:
      a. Identification of Project.
      b. Location and description of affected work.
      c. Necessity for cutting or alteration.
      d. Description of proposed work and products to be used.
      e. Alternatives to cutting and patching.
      f. Effect on work of Owner or separate Contractor.
      g. Written permission of affected separate Contractor.
      h. Date and time work will be executed.

C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

A. For demolition work, employ a firm specializing in the type of work required.

1.06 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
   2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Minimize amount of bare soil exposed at one time.
   2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
   3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
   4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

F. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
   1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 6 pm to 7 am.

G. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

H. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

I. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.07 COORDINATION

A. See Section 01 10 00 for occupancy-related requirements.

B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

C. Notify affected utility companies and comply with their requirements.

D. Verify that utility requirements and characteristics of new operating equipment are compatible with site utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

E. Coordinate space requirements, supports, and installation of electrical work that are indicated diagrammatically on Drawings. Follow routing shown for conduits, as closely as practicable; place runs parallel with lines of site features. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect three (3) days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute electronic copies within five (5) days after meeting to participants, with one (1) copy to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Prime Contractor shall locate and protect survey control and reference points.

D. Control datum for survey is that indicated on drawings.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

H. Utilize recognized engineering survey practices.

I. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.

J. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

K. Periodically verify layouts by same means.

L. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.

C. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   3. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

D. Services (Including but not limited to Electrical): Remove, relocate, and extend existing systems to accommodate new construction.

1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
   b. See Section 01 10 00 for other limitations on outages and required notifications.
   c. Provide temporary connections as required to maintain existing systems in service.
4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

E. Protect existing work to remain.
   1. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   2. Repair adjacent construction and finishes damaged during removal work.

F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
   1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
   2. Where a change of plane of 1/2 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.

G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

H. Refinish existing surfaces as indicated:
   1. Where existing surfaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
   2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

J. Do not begin new construction in alterations areas before demolition is complete.

K. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.

6. Repair new work damaged by subsequent work.
7. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

F. Restore work with new products in accordance with requirements of Contract Documents.

G. Fit work tight to pipes, sleeves, conduit, and other penetrations through surfaces.

H. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

C. Collect and remove waste materials, debris, and trash/rubbish from site daily and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

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

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect and Owner seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper operation and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable Prime Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

3.11 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of products to Owner's personnel two (2) weeks prior to date of Substantial Completion.

B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

F. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

3.12 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.13 FINAL CLEANING

A. The Prime Contractor shall be responsible to execute items within this subsection.

B. Execute final cleaning prior to final project assessment.
   1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.

C. Use cleaning materials that are nonhazardous.

D. Remove all labels that are not permanent. Do not paint or otherwise cover labels or nameplates on electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Clean debris from area drains.

G. Clean site and sweep paved areas.

H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

I. Clean Owner-occupied areas of work.

3.14 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

B. Each Prime Contractor shall make submittals that are required by governing or other authorities.
   1. Provide copies to Architect and Owner.

C. Accompany Project Manager and Architect on preliminary inspection to determine items to be listed for completion or correction in the Prime Contractor's Correction Punch List for Prime Contractor's Notice of Substantial Completion.

D. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

E. Submit written certification containing Prime Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

F. Owner will occupy portions of the building as specified in Section 01 10 00.

G. Owner will occupy portions of the site as specified in Section 01 10 00.

H. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Prime Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

I. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

J. Accompany Project Coordinator on Prime Contractor's preliminary final inspection.

K. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

L. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.15 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than two (2) years from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Document 00 72 00 - General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.

B. Document 00 73 00 - Supplementary Conditions.

C. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

D. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.

E. Individual Product Sections: Specific requirements for operation and maintenance data.

F. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   2. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

1.04 COORDINATION

A. The Prime Contractor shall be responsible to coordinate, oversee and deliver all required work and procedures of all Prime Contractors specified in this section.

B. See Section 01 10 00 for occupancy-related requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.

5. Reviewed shop drawings, product data, and samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish grade.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Field changes of dimension and detail.
4. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
1. Description of unit or system, and component parts.
2. Identify function, normal operating characteristics, and limiting conditions.
3. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Include color coded wiring diagrams as installed.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Include manufacturer's printed operation and maintenance instructions.

G. Include sequence of operation by controls manufacturer.

H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

I. Provide control diagrams by controls manufacturer as installed.

J. Provide list of original manufacturer's spare parts and recommended quantities to be maintained in storage.

K. Additional Requirements: As specified in individual product specification sections.

3.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Prime Contractor and subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

J. Arrangement of Contents: Organize each volume in parts as follows:
   1. Project Directory.
   2. Table of Contents, of all volumes, and of this volume.
   3. Operation and Maintenance Data: Arranged by system, then by product category.
      a. Source data.
      b. Product data, shop drawings, and other submittals.
      c. Operation and maintenance data.
      d. Field quality control data.
      e. Original warranties and bonds.
   4. Project Record Documents, except for Project Manual.
   5. Warranties and Bonds.
   6. Photographs.

3.05 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Utility outages and shutdowns.

B. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.

C. Section 01 10 00 - Summary: Sequencing and phasing requirements.

D. Section 01 10 00 - Summary: Description of items to be removed by Prime Contractor.

E. Section 01 10 00 - Summary: Description of items to be salvaged or removed for re-use by Contractor.

F. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

G. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points and existing construction to remain.

H. Section 31 22 00 - Grading: Topsoil removal.

I. Section 31 22 00 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

J. Section 31 23 23 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

PART 2 PRODUCTS

2.01 MATERIALS (NOT USED)

A. Fill Material: As specified in Section 31 23 23 - Fill.

PART 3 EXECUTION

3.01 SCOPE

A. Remove existing pavings, base course and soils as required to accomplish new work.
   1. Prime Contractor is responsible for the removal and disposal of all removed pavings.
   2. Coordination for this work is the responsibility of the Prime Contractor.

B. Excavate and trench for new electrical conduits and wiring.

C. Excavate or new light pole bases.

D. Provide penetrations in existing masonry and concrete walls for new electrical conduits.

E. Provide penetrations in existing concrete floor decks for new electrical conduits.

F. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 22 00.

G. Perform demolition work according to the approved Construction Progress Schedule.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with other requirements specified in Section 01 70 00.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

1. Obtain required permits.
2. Use of explosives is not permitted.
3. Provide, erect, and maintain temporary barriers and security devices.
4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
6. Do not close or obstruct roadways or sidewalks without permit.
7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
   a. Refer to drawings indicating areas noted with "Restricted Area / Keep Clear" prohibiting any use or access of such areas.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Protect existing structures and other elements that are not to be removed.
   1. Stop work immediately if adjacent structures or other elements appear to be in danger.

E. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

F. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

G. Perform demolition in a manner that maximizes salvage and recycling of materials.
   1. Dismantle existing construction and separate materials.
   2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

H. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed conduits, equipment and supports of disconnected and abandoned utilities.

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.

2. Report discrepancies to Architect before disturbing existing installation.
3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from other areas that are still occupied.
   1. Provide, erect, and maintain temporary barriers as specified in Section 01 50 00.

C. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove items indicated on drawings.

D. Services (Including but not limited to Electrical and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. See Section 01 10 00 for other limitations on outages and required notifications.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned conduits and equipment; remove back to source of supply where possible, otherwise cap stub and tag with identification.

E. Protect existing work to remain.
   1. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   2. Repair adjacent construction and finishes damaged during removal work.
   3. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork.

B. Concrete reinforcement.

C. Miscellaneous concrete elements, including light pole bases.

D. Concrete curing.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Bollards for casting into concrete.

B. Section 32 13 13 - Concrete Paving: Sidewalks and curbs.

C. Section 32 31 19 - Decorative Metal Fences and Gates:

1.03 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

C. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

E. ACI 305R - Hot Weather Concreting; 2010.

F. ACI 306R - Cold Weather Concreting; 2010.

G. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).

H. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

I. ACI 347R - Guide to Formwork for Concrete; 2014.

J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

K. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.

L. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.

M. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

N. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.

O. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.

P. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

Q. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2014.

R. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

S. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2014.

T. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

U. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

V. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.

W. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2014.

X. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

C. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.

D. Test Reports: Submit report for each test or series of tests specified.

E. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.

B. Form Materials: Prime Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Facing for Exposed Finish Concrete: Prime Contractor's choice of materials that will provide smooth, stain-free final appearance.
   2. Form Coating: Release agent that will not adversely affect concrete.
   3. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Type: Deformed billet-steel bars.
   2. Finish: Unfinished, unless otherwise indicated.

B. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.

B. Fine and Coarse Aggregates: ASTM C33/C33M.

C. Lightweight Aggregate: ASTM C330/C330M.

D. Fly Ash: ASTM C618, Class C or F.

E. Calcined Pozzolan: ASTM C618, Class N.

F. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.

G. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260/C260M.

C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.

D. Accelerating Admixture: ASTM C494/C494M Type C.

2.05 ACCESSORY MATERIALS

A. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Grout: Comply with ASTM C1107/C1107M.
   2. Minimum Compressive Strength at 48 Hours, ASTM C109/C109M: 2,000 pounds per square inch.

2.06 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience, as specified in ACI 301.

C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

D. Normal Weight Concrete:
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
   2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
   3. Calcined Pozzolan Content: Maximum 10 percent of cementitious materials by weight.
   4. Silica Fume Content: Maximum 5 percent of cementitious materials by weight.
   5. Water-Cement Ratio: Maximum 50 percent by weight.
   6. Total Air Content: 5 percent, determined in accordance with ASTM C173/C173M.
   7. Maximum Slump: 4 inches.
   8. Maximum Aggregate Size: 3/4 inch.

2.07 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that light pole base excavations are dry without standing water.

C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

D. Coordinate placement of embedded items with other work.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Notify Architect not less than 24 hours prior to commencement of placement operations.

C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

D. Ensure reinforcement and embedded parts will not be disturbed during concrete placement.

E. Place concrete continuously without construction (cold) joints.

3.05 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/8 inch or more in height. Provide finish as follows:

1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.

3.06 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

1. Normal concrete: Not less than seven days.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

3.07 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

E. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 75 cu yd or less of each class of concrete placed.

F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.08 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Prime Contractor within 24 hours of test.

B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Prime Contractor when defective concrete is identified.

D. The costs of corrective work shall be borne by Prime Contractor when defective concrete is identified.

E. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.09 PROTECTION

A. Do not permit traffic over unprotected concrete surface until fully cured.

B. Do not install other work onto concrete surface until fully cured.

3.10 SCHEDULE

A. Refer to drawings for locations.

END OF SECTION

SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

A. Section 26 05 34 - Conduit.

1.03 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.

B. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

C. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

D. UL (FRD) - Fire Resistance Directory; current edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance ratings, and limitations.

C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the specifiedscheduled fire ratings when tested in accordance with ASTM E814.
   1. Listing in the current-year classification or certification books of UL or FM will be considered as constituting an acceptable test report.
   2. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

1.06 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

PART 2 PRODUCTS

2.01 MATERIALS

A. Manufacturers: Products of equal quality and performance from any of the following manufacturers are approved for use.
   1. 3M Fire Protection Products: www.3m.com/firestop.
   2. Hilti, Inc: www.us.hilti.com/#sle.
   3. Specified Technologies, Inc.: www.stifirestop.com.
   4. Tremco Commercial Sealants & Waterproofing; TREMstop Acrylic: www.tremcosealants.com/#sle..
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Firestopping Materials: Any materials meeting requirements.

C. Mold and Mildew Resistance: Provide firestoppping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.

D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

E. Fire Ratings: Refer to drawings for required systems and ratings.

2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
   1. Listing by UL or FM in their certification directory will be considered evidence of successful testing.

2.03 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

A. Penetrations Through Floors or Walls By:
   1. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 2 Hour Construction: UL System C-AJ-1090; Specified Technologies Inc. SSP Firestop Putty.
      b. 2 Hour Construction: Basis of Design: Specified Technologies Inc. LC Endothermic Firestop Sealant.

B. Penetrations Through Floors By:
   1. Electrical Cables Not In Conduit:
      a. 2 Hour Construction: Basis of Design: Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.

C. Penetrations Through Walls By:
   1. Electrical Cables Not In Conduit:
      a. 2 Hour Construction: Basis of Design: Specified Technologies Inc.; EZ-Path Series 44 Fire-Rated Pathway.

2.04 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.
   1. Fire Ratings: Use any system listed by UL or FM ortested in accordance with ASTM E814 that has F Rating equal to fire rating of penetrated assembly and T Rating Equal to F Rating and that meets all other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by authorities having jurisdiction.

C. Install labeling required by code.

3.04 FIELD QUALITY CONTROL

A. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 23 05 33.16 - Boxes for Electrical Systems.

B. Section 32 12 16 - Asphalt Paving.

1.03 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2006 (Reapproved 2011).

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

D. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).

E. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.

F. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2002 (Reapproved 2013).

G. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.
   6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a two (2) year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
   1. Dow Chemical Company: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
   2. Pecora Corporation: www.pecora.com/#sle.
   3. Sika Corporation: www.usa-sika.com/#sle.
   4. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
   1. Dow Chemical Company: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
   2. Pecora Corporation: www.pecora.com/#sle.
   3. Sika Corporation: www.usa-sika.com/#sle.
   4. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Wall expansion and control joints.
      b. Joints between door, window, and other frames and adjacent construction.
      c. Joints between different exposed materials.
      d. Openings below ledge angles in masonry.
      e. Other joints indicated below.
   2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
      a. Joints between door, window, and other frames and adjacent construction.
      b. Other joints indicated below.
   3. Do not seal the following types of joints.
      a. Intentional weepholes in masonry.
      b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
      c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
      d. Joints where installation of sealant is specified in another section.
      e. Joints between suspended panel ceilings/grid and walls.

2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.04 NONSAG JOINT SEALANTS

A. Type S-1 - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 50 percent, minimum.

2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
4. Color: Match adjacent finished surfaces.
5. Cure Type: Single-component, neutral moisture curing.
6. Service Temperature Range: Minus 20 to 180 degrees F.

B. Type S-2 - Butyl Sealant: Solvent-based; ASTM C1311; single component, nonsag; not expected to withstand continuous water immersion or traffic.
1. Hardness Range: 10 to 30, Shore A, when tested in accordance with ASTM C661.
2. Color: Match adjacent finished surfaces.
3. Service Temperature Range: Minus 13 to 180 degrees F.

2.05 SELF-LEVELING SEALANTS

A. Type S-3 - Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
3. Color: Gray.
4. Service Temperature Range: Minus 40 to 180 degrees F.

2.06 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
3. Open Cell: 40 to 50 percent larger in diameter than joint width.
4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface slightly recessed, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

3.05 CLEANING

A. Clean adjacent soiled surfaces.

3.06 PROTECTION

A. Protect sealants until cured.

3.07 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

3.08 SCHEDULE

A. Required Exterior Joints for Which No Other Sealant Type is indicated: Type S-1.

B. Wiring Boxes in Asphalt Paving: Self-leveling polyurethane sealant. Type S-2.

C. Exterior Joints Between Electrical Equipment and Concrete Work as required: Type S-1.

D. Any Work Requiring Butyl Type Sealants: Type S-2.

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish all exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Exposed surfaces of concrete light pole bases.
   2. Exposed surfaces of steel fabrications.

D. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Exposed conduits.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

1.03 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.

C. SSPC (PM1) - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings; Fourth Edition.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of all products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").

C. Product Data: Provide data on all finishing products, including VOC content.

D. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Paint and Coatings: 1 gallon of each color; store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of color selections: Sherwin-Williams Company.

B. Paint: Products of equal quality and performance from any of the following manufacturers are approved for use. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
   1. Sherwin-Williams Company: www.sherwin-williams.com.
   2. Duron, Inc: www.duron.com/#sle.
   3. Glidden Professional, a product of PPG Architectural Coatings: www.gliddenprofessional.com.
   4. Benjamin Moore & Co: www.benjaminmoore.com/#sle.

C. Primer Sealers: Same manufacturer as top coats.

D. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
   1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   3. Supply each coating material in quantity required to complete entire project's work from a single production run.
   4. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

1. Concrete: Same as top coats.
2. Steel, Uncoated: Anti-Corrosive Alkyd Primer for Metal.
3. Steel -- Shop Primer: Interior/Exterior Quick Dry Alkyd Primer for Metal.
4. Galvanized Steel: Cementious primer.

C. Volatile Organic Compound (VOC) Content:
1. Provide coatings that comply with the most stringent requirements specified in the following:
   a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
   b. Architectural coatings VOC limits of State in which the project is located.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

D. Flammability: Comply with applicable code for surface burning characteristics.

E. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

F. Colors: As indicated in Color Schedule and Drawings.
1. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.03 PAINT SYSTEMS - EXTERIOR

A. Paint CE-OP-2L - Masonry/Concrete, Opaque, Latex, 2 Coat:
1. Semi-gloss: One coat of latex enamel.
2. Application: Painted exterior masonry/concrete exposed to view or as indicated on the drawings.

B. Paint ME-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
1. One coat of latex primer.
2. Semi-gloss: Two coats of latex enamel.
3. Applications: Exterior metal fabrications exposed to view or as indicated on the drawings.

C. Paint ME-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
2. Semi-gloss: Two coats of latex enamel.
3. Applications:
   a. Exterior metal fabrications exposed to view or as indicated on the drawings.

D. Paint MgE-OP-3L - Galvanized Metals, Latex, 3 Coat:
1. One coat galvanize primer.
2. Semi-gloss: Two coats of latex enamel; .
3. Applications:
   a. Exterior metal fabrications exposed to view or as indicated on the drawings.

2.04 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of coatings until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing coatings that exhibit surface defects.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

F. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

G. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-SP 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).

H. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

I. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance.

E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

F. Sand metal surfaces lightly between coats to achieve required finish.

G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.

B. Owner will provide field inspection.

3.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

A. Protect finished coatings until completion of project.

B. Touch-up damaged coatings after Substantial Completion.

3.07 SCHEDULE - COLORS

A. Refer to drawings for locations.
   1. P-1: Sherwin-Williams; Confident Yellow #SW 6911.
   2. P-2: Sherwin-Williams; Tricorn Black #SW 6258.
   3. P-3: Sherwin-Williams; Network Gray #SW 7073.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor wire.
B. Nonmetallic-sheathed cable.
C. Wiring connectors.
D. Electrical tape.
E. Heat shrink tubing.
F. Oxide inhibiting compound.
G. Wire pulling lubricant.
H. Cable ties.
I. Firestop sleeves.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
C. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.
D. Section 31 23 23 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).
D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
F. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF); 2007.
G. NEMA WC 70 - Nonshielded Power Cable 2000 V or Less for the Distribution of Electrical Energy; 2009.
H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
I. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
J. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
K. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
L. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
M. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
N. UL 719 - Nonmetallic-Sheathed Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
   3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Nonmetallic-sheathed cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. For 12 and 24volt camera circuits.

D. Underground feeder and branch-circuit cable is not permitted.

E. Service entrance cable is not permitted.

F. Armored cable is not permitted.

G. Metal-clad cable is not permitted.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductors for Grounding and Bonding: Also comply with Section 26 05 26.

H. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.

I. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
   2. Control Circuits: 14 AWG.

J. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

K. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
      a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
   3. Color Code:
      a. Equipment Ground, All Systems: Green.
      b. Isolated Ground, All Systems: Green with yellow stripe.
      c. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:
   1. Copper Building Wire:
      a. Cerro Wire LLC: www.cerrowire.com/#sle.
      b. Encore Wire Corporation: www.encorewire.com/#sle.
      c. Southwire Company: www.southwire.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:
   1. Feeders and Branch Circuits:
      a. Size 10 AWG and Smaller: Solid or stranded.
      b. Size 8 AWG and Larger: Stranded.
   2. Control Circuits: Per manufacturer's instructions

D. Insulation Voltage Rating: 600 V.

E. Insulation:
   1. Copper Building Wire: Type THHN/THWN, except as indicated below.
      a. Installed Underground: Type THHN/THWN.

2.04 NONMETALLIC-SHEATHED CABLE

A. Description: NFPA 70, Type NM multiple-conductor cable listed and labeled as complying with UL 719, Type NM-B.

B. Conductor Stranding:
   1. Size 10 AWG and Smaller: Solid or stranded.
   2. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 05 26.

C. Wiring Connectors for Splices and Taps:
   1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.

D. Wiring Connectors for Terminations:
   1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.

E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

H. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

2.06 ACCESSORIES

A. Electrical Tape:
   1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
   2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.

C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.

D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

E. Cable Ties: Material and tensile strength rating suitable for application.
   1. Heavy Duty Nylon - with-in enclosures.

a. Self-locking
b. Black Nylon 6.6- UV resistant
c. U.L. Listed, Type 21, and tested to U.L. Standard 62275 for Cable Management Systems.
d. UL Labeled as suitable for outdoor use.

2. Type 316 Stainless Steel - Exposed to weather.
   a. self-locking cable ties
   b. Type 316 austenitic chromium-nickel stainless
3. Manufacturers:
   a. Burndy LLC: www.burndy.com.
   b. 3M: WWW.3M.com
   c. Nelco: WWW.nelcoproducts
   d. Substitutions: See Section 01 60 00 - Product Requirements.

F. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated without specific routing, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   5. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install nonmetallic-sheathed cable (Type NM-B) in accordance with NECA 121.

E. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.

4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
   1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
   2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.

G. Terminate cables using suitable fittings.

H. Install conductors with a minimum of 12 inches of slack at each outlet.

I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

J. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

K. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.

L. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

M. Insulate ends of spare conductors using vinyl insulating electrical tape.

N. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

O. Identify conductors and cables in accordance with Section 26 05 53.

P. Install firestopping to preserve fire resistance rating of fire rated building elements as required.

Q. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
   1. Includes oxide inhibiting compound.

B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

C. Section 28 23 00 - Video Surveillance. Additional grounding and bonding requirements.

1.03 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

C. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding System Resistance:
   1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
   2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
   3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.

E. Grounding Electrode System:
   1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
      a. Provide continuous grounding electrode conductors without splice or joint.
      b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
   2. Ground Rod Electrode(s):
      a. Provide single electrode unless otherwise indicated or required.
      b. Space electrodes not less than 10 feet from each other and any other ground electrode.
   3. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.

F. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
   2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
   3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
   4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
   5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
   6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
   7. Provide bonding for metal building frame.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
   1. Provide products listed, classified, and labeled as suitable for the purpose intended.

2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
   1. Use insulated copper conductors unless otherwise indicated.
      a. Exceptions:
         1) Use bare copper conductors where installed underground in direct contact with earth.
         2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
   1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
   2. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
   3. Manufacturers - Mechanical and Compression Connectors:
      a. Advanced Lightning Technology (ALT): www.altfab.com.
      b. Burndy LLC: www.burndy.com.
      c. Harger Lightning & Grounding: www.harger.com.
      d. Thomas & Betts Corporation: www.tnb.com.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

D. Ground Rod Electrodes:
   1. Comply with NEMA GR 1.
   2. Material: Copper-bonded (copper-clad) steel.
   3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.
   4. Manufacturers:
      a. Advanced Lightning Technology (ALT): www.altfab.com.
      b. Erico International Corporation: www.erico.com.
      c. Galvan Industries, Inc: www.galvanelectrical.com.
      d. Harger Lightning & Grounding: www.harger.com.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as shown on the drawings.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
   1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.

D. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.

2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

E. Identify grounding and bonding system components in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

C. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 26 05 33.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

C. Section 26 05 33.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems and post-installed concrete and masonry anchors.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel.
   2. Conduit Clamps: Bolted type unless otherwise indicated.
   3. Manufacturers:
      a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com.
      b. Erico International Corporation: www.erico.com.
      c. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com.
      d. Thomas & Betts Corporation: www.tnb.com.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
   1. Manufacturers:
      a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com.
      b. Erico International Corporation: www.erico.com.
      c. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com.

d. Thomas & Betts Corporation: www.tnb.com.
e. Substitutions: See Section 01 60 00 - Product Requirements.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Comply with MFMA-4.
2. Channel Material:
a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel or Stainless Steel.
3. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.
4. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
5. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com.
b. Thomas & Betts Corporation: www.tnb.com.
c. Unistrut, a brand of Atkore International Inc: www.unistrut.com.
d. Substitutions: See Section 01 60 00 - Product Requirements.

E. Hanger Rods: Threaded Stainless Steel steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch diameter.
b. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch diameter.
c. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch diameter.
d. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
e. Outlet Boxes: 1/4 inch diameter.

F. Anchors and Fasteners:
1. Material:
a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
b. Outdoor and Damp or Wet Indoor Locations: Use Stainless Steel.
2. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
3. Concrete: Use Resin Bonded Anchor.
4. Solid or Grout-Filled Masonry: Use Resin Bonded Anchor.
5. Steel: Use beam clamps or machine bolts.
6. Sheet Metal: Use sheet metal screws.
7. Wood: Use wood screws.
8. Plastic and lead anchors are not permitted.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

E. Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
2. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
3. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

F. Conduit Support and Attachment: Also comply with Section 26 05 33.13.

G. Box Support and Attachment: Also comply with Section 26 05 33.16.

H. Secure fasteners according to manufacturer's recommended torque settings.

I. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. Inspect support and attachment components for damage and defects.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).
B. Intermediate metal conduit (IMC).
C. Flexible metal conduit (FMC).
D. Electrical metallic tubing (EMT).
E. Rigid polyvinyl chloride (PVC) conduit.
F. Conduit fittings.
G. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.
B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
D. Section 27 10 00 - Structured Cabling for Voice and Data: Additional requirements for communications systems conduits.
E. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.
F. Section 31 23 23 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.
B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.
C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.
D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.
G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.
I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2015.
J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
K. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
L. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
M. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
N. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
O. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

P. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

C. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Exterior, Direct-Buried: Use rigid PVC conduit.
   2. Exterior, Embedded Within Concrete: Use rigid PVC conduit.
   3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.

D. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit.

E. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

F. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

G. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.

H. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

I. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

J. Exposed, Exterior: Use galvanized steel rigid metal conduit.

K. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit.

L. Corrosive Locations Above Ground: Use galvanized steel rigid metal conduit.

M. Fished in Existing interior Walls, Where Necessary: Use flexible metal conduit.

2.02 CONDUIT REQUIREMENTS

A. Communications Systems Conduits: Also comply with Section 27 10 00.

B. Fittings for Grounding and Bonding: Also comply with Section 26 05 26.

C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 1/2 inch (16 mm) trade size.
   2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
   3. Control Circuits: 1/2 inch (16 mm) trade size.
   4. Underground, Exterior: 3/4 inch (21 mm) trade size.

F. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Allied Tube & Conduit: www.alliedeg.com/#sle.
   2. Republic Conduit: www.republic-conduit.com/#sle.
   3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
      b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
      c. Thomas & Betts Corporation: www.tnb.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.
   4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

A. Manufacturers:
   1. Allied Tube & Conduit: www.alliedeg.com/#sle.

2. Republic Conduit: www.republic-conduit.com/#sle.
3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
c. Thomas & Betts Corporation: www.tnb.com/#sle.
d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 FLEXIBLE METAL CONDUIT (FMC)

A. Manufacturers:
1. AFC Cable Systems, Inc: www.afcweb.com.
2. Electri-Flex Company: www.electriflex.com.
3. International Metal Hose: www.metalhose.com.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
c. Thomas & Betts Corporation: www.tnb.com/#sle.
d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.

2.06 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
1. Allied Tube & Conduit: www.alliedeg.com.
2. Republic Conduit: www.republic-conduit.com/#sle.
3. Wheatland Tube Company: www.wheatland.com.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
c. Thomas & Betts Corporation: www.tnb.com/#sle.
d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

3. Material: Use steel or malleable iron.
   a. Do not use die cast zinc fittings.
4. Connectors and Couplings: Use compression (gland) type.
   a. Do not use indenter type connectors and couplings.
   b. Do not use set-screw type connectors and couplings.

2.07 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Manufacturers:
   1. Cantex Inc: www.cantexinc.com/#sle.
   2. Carlon, a brand of Thomas & Betts Corporation: www.carlon.com/#sle.
   3. JM Eagle: www.jmeagle.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

C. Fittings:
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.08 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.

D. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.

E. Sealing Systems for Exterior Wall Penetrations: See Section 07 90 05 - Joint Sealers.

F. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install intermediate metal conduit (IMC) in accordance with NECA 101.

E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

F. Conduit Routing:
   1. Unless dimensioned, conduit routing indicated is diagrammatic.
   2. When conduit destination is indicated without specific routing, determine exact routing required.

3. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
4. Arrange conduit to maintain adequate headroom, clearances, and access.
5. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
6. Arrange conduit to provide no more than 150 feet between pull points.
7. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
8. Group parallel conduits in the same area together on a common rack.

G. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
3. Use conduit strap to support single surface-mounted conduit.
   a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
4. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
5. Use of wire for support of conduits is not permitted.
6. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.

H. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
5. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
6. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

I. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.

J. Underground Installation:
1. Provide trenching and backfilling in accordance with Section 31 23 16.13.
2. Minimum Cover, Unless Otherwise Indicated or Required:
   a. Underground, Exterior: 24 inches.

3. Provide underground warning tape in accordance with Section 26 05 53 along entire conduit length.

K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
   1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
   2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
   3. Where conduits are subject to earth movement by settlement or frost.

L. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
   1. Where conduits pass from outdoors into conditioned interior spaces.

M. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

N. Provide grounding and bonding in accordance with Section 26 05 26.

O. Identify conduits in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 05 33.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

C. Underground boxes/enclosures.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 33.13 - Conduit for Electrical Systems:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

E. Section 27 10 00 - Structured Cabling for Voice and Data: Additional requirements for communications systems outlet boxes.

F. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

G. Section 31 23 23 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. SCTE 77 - Specification for Underground Enclosure Integrity; 2013.

H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

J. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, floor boxes, and underground boxes/enclosures.

C. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
   4. Use suitable concrete type boxes where flush-mounted in concrete.
   5. Use suitable masonry type boxes where flush-mounted in masonry walls.
   6. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
   7. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.

8. Manufacturers:
   a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
   b. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com/#sle.
   c. Thomas & Betts Corporation: www.tnb.com/#sle.
   d. Gross Automation / Carlon Products: www.grossautomation.com..
   e. Substitutions: See Section 01 60 00 - Product Requirements.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
   a. Indoor Clean, Dry Locations: Type 1, painted steel.
   b. Outdoor Locations: Type 3R, painted steel or as indicated on drawings.
3. Junction and Pull Boxes Larger Than 100 cubic inches:
   a. Provide screw-cover enclosures unless otherwise indicated.
4. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
5. Manufacturers:
   a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com.
   b. Hubbell Incorporated; Wiegmann Products: www.hubbell-wiegmann.com.
   c. Gross Automation / Carlon Products: www.grossautomation.com..
   d. Substitutions: See Section 01 60 00 - Product Requirements.

D. Underground Boxes/Enclosures:
1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
2. Size: As indicated on drawings.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
4. Provide logo on cover to indicate type of service.
5. Applications:
   a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 8 load rating.
   b. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 22 load rating.
   c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
6. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
   a. Manufacturers:
      1) Highline Products, a subsidiary of MacLean Power Systems: www.highlineproducts.com.
      2) Hubbell Incorporated; Quazite Products: www.hubbellpowersystems.com.
      3) Oldcastle Precast, Inc: www.oldcastleprecast.com.
      4) Gross Automation / Carlon Products: www.grossautomation.com..
      5) Substitutions: See Section 01 60 00 - Product Requirements.
   b. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

E. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

F. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

G. Box Locations:
   1. Unless dimensioned, box locations indicated are approximate.
   2. Locate boxes as required for devices installed under other sections or by others.
      a. Communications Systems Outlets: Comply with Section 27 10 00.
   3. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 05 33.13.
   4. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
      a. Concealed above accessible suspended ceilings.
      b. Within joists in areas with no ceiling.
      c. Electrical rooms.
      d. Mechanical equipment rooms.

H. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
   3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.

I. Install boxes plumb and level.

J. Underground Boxes/Enclosures:
   1. Install enclosure on gravel base, minimum 6 inches deep.
   2. Flush-mount enclosures located in concrete or paved areas.
   3. Provide cast-in-place concrete collar constructed in accordance with Section 03 30 00, minimum 10 inches wide by 12 inches deep, around enclosures that are not located in concrete areas.
   4. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

K. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

L. Close unused box openings.

M. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

N. Provide grounding and bonding in accordance with Section 26 05 26.

O. Identify boxes in accordance with Section 26 05 53.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Underground warning tape.

1.02 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

B. Section 27 10 00 - Structured Cabling for Voice and Data: Identification for communications cabling and devices.

C. Section 28 23 00 - Video Surveillance System: Camera identification requirements.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.07 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification method as indicated below to identify new work.
      a. Panelboards:
         1) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.

B. Identification for Conductors and Cables:
   1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
   2. Identification for Communications Conductors and Cables: Comply with Section 27 10 00.

3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
   a. At each source and load connection.
   b. Within boxes when more than one circuit is present.
4. Use underground warning tape to identify direct buried conduit.

C. Identification for Raceways:
1. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify conduits at each end. Identify purpose and termination location.
2. Use underground warning tape to identify underground raceways.

D. Identification for Boxes:
1. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
   a. For exposed boxes, provide identification on inside face of cover.

E. Identification for Devices:
1. Identification for Communications Devices: Comply with Section 27 10 00.

F. Identification for Video Surveillance System Equipment:
1. Use identification label to identify routers, switches, patch panels, power supplies and cameras.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Labels:
1. Manufacturers:
   a. Brady Corporation: www.bradyid.com.
   b. Brother International Corporation: www.brother-usa.com/#sle.
   c. Panduit Corp: www.panduit.com/#sle.
   d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
   a. Use only for indoor locations.
3. Text: Use machine-printed text. Do not use handwritten text unless otherwise indicated.

B. Format for Equipment Identification:
1. Minimum Size: 0.375 inches by 2.5 inches.
2. Legend:
   a. Information as indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
   a. Equipment Designation: 1/4 inch.
   b. Other Information: 1/4 inch.
5. Color:
   a. Equipment: Black text on white background.

2.03 WIRE AND CABLE MARKERS

A. Manufacturers:
1. Brady Corporation: www.bradyid.com.
2. HellermannTyton: www.hellermanntyton.com.
3. Panduit Corp: www.panduit.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

D. Legend: Power source and circuit number or other designation indicated.

E. Text: Use machine-printed text, all capitalized unless otherwise indicated.

F. Minimum Text Height: 1/8 inch.

G. Color: Black text on white background unless otherwise indicated.

2.04 UNDERGROUND WARNING TAPE

A. Manufacturers:
1. Brady Corporation: www.bradyid.com.
2. Brimar Industries, Inc: www.brimar.com/#sle.
3. Seton Identification Products: www.seton.com.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

C. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.

D. Legend: Type of service, continuously repeated over full length of tape.

E. Color:
1. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
1. Surface-Mounted Equipment: Enclosure front.
2. Flush-Mounted Equipment: Enclosure front.
3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
4. Elevated Equipment: Legible from the floor or working platform.
5. Interior Components: Legible from the point of access.
6. Conduits: Legible from the floor.
7. Boxes: Inside face of cover.
8. Conductors and Cables: Legible from the point of access.
9. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

E. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.

F. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 26 56 13
LIGHTING POLES AND STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Poles and accessories.

1.02 RELATED REQUIREMENTS

A. Section 26 05 29 - Hangers and Supports for Electrical Systems.

B. Section 26 05 37 - Boxes.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 51 13 - Luminaires and Drivers: Requirements for LED drivers.

1.03 UNIT PRICES

A. See Section 01 22 00 - Unit Prices, for additional unit price requirements.

B. Exterior Poles:
   1. Basis of Measurement: Each.
   2. Basis of Payment: Includes accessories.

1.04 REFERENCE STANDARDS

A. AASHTO LTS - Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals; American Association of State Highway and Transportation Officials; 6th Edition, with 2015 Interim Revisions.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2006.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate and verify existing pole locations and mounting conditions.
   2. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on pole construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, weight, effective projected area (EPA) capacity, and installed accessories; include model number nomenclature clearly marked with all proposed features.
   1. Poles: Include information on maximum supported effective projected area (EPA) and weight for the design wind speed.

C. Certificates for Poles and Accessories: Manufacturer's documentation that products are suitable for the luminaires and cameras to be installed and comply with designated structural design criteria.

D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

E. Project Record Documents: Record actual connections and locations of pole foundations and any pull or junction boxes.

1.07 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide minimum five year manufacturer warranty for all poles, including accessories.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: LSI Industries; Make/Model: Universal Replacement Poles - Round Tapered, #RPTV-I-S11G-30-BRZ-GA.

B. Other Acceptable Manufacturers: Products of equal quality and performance from any of the following manufacturers are approved for use.
   1. LSI Industries: www.lsi-industries.com.
   2. Hubbell Incorporated: www.hubbelllighting.com.
   3. Kenall Manufacturing: www.kenall.com.
   4. Acuity Brands Lighting: www.acuitybrands.com.
   5. Hapco Pole Products: www.hapco.com.

2.02 POLES

A. All Poles:
   1. Provide poles and associated support components suitable for the camera(s) and associated supports and accessories to be installed.
   2. Structural Design Criteria:
      a. Comply with AASHTO LTS.
      b. Wind Load: Include effective projected area (EPA) of camera(s) and associated supports and accessories to be installed.
         1) Design Wind Speed: 120 miles per hour, with gust factor of 1.3.
      c. Dead Load: Include weight of proposed camera(s) and associated supports and accessories.
      d. Include structural calculations demonstrating compliance with submittals.
   3. Material: Steel, unless otherwise indicated.
   4. Shape: Round tapered, unless otherwise indicated.
   5. Finish: Match other adjacent poles, unless otherwise indicated.
   6. Pole Height: Thirty (30) feet.
   7. Mounting Height: Three (3) feet, unless otherwise indicated.
   8. Mounting: Install on new concrete footings, unless otherwise indicated.
   9. Unless otherwise indicated, provide with the following features/accessories:
      a. Top cap.
      b. Handhole.

c. Anchor bolts with leveling nuts or leveling shims.
d. Anchor base cover.
e. Provision for pole-mounted weatherproof GFI receptacle where indicated.

B. Metal Poles: Provide ground lug, accessible from handhole.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that all wiring and cabling installation is completed, tested, and ready for connection to cameras.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of cameras.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install poles plumb and square and aligned with building lines and with adjacent structures.

F. Install accessories furnished with each type of camera.

G. Bond products and metal accessories to branch circuit equipment grounding conductor.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Repair or replace damaged or defective products. Repair or replace any unacceptable product as determined by Architect.

3.05 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

3.07 PROTECTION

A. Protect installed poles from subsequent construction operations.

3.08 SCHEDULE

A. Refer to the Pole Schedule on the drawings.

END OF SECTION

SECTION 27 10 00
STRUCTURED CABLING FOR VOICE AND DATA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Communications system design requirements.
B. Communications pathways.
C. Copper cable and terminations.
D. Communications equipment room fittings.
E. Communications grounding and bonding.
F. Communications identification.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
B. Section 26 05 33.13 - Conduit for Electrical Systems.
C. Section 26 05 53 - Identification for Electrical Systems: Identification products.
D. Section 28 23 00 - Video Surveillance.

1.03 REFERENCE STANDARDS

A. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment; Electronic Industries Alliance/Electrical Components Association; Revision E, 2005.
B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
C. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set; 2015.
D. TIA-568.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards; 2009c, with Addendum (2016).
E. TIA-569 - Telecommunications Pathways and Spaces; 2015d, with Addendum (2016).
F. TIA-570 - Residential Telecommunications Infrastructure Standard; 2012c.
G. TIA-606 - Administration Standard for Telecommunications Infrastructure; 2017c.
H. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; 2015c, with Addendum (2017).
I. TIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards; Rev C, 2009 (with Addenda; 2014).
J. TIA-569-C - Commercial Building Standard for Telecommunications Pathways and Spaces; Rev C, 2012 (with Addenda; 2013).
K. TIA-570-C - Residential Telecommunications Infrastructure Standard; Rev C, 2012.
L. TIA-606-B - Administration Standard for the Telecommunications Infrastructure; Rev B, 2012.
M. TIA-607-B - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; Rev B, 2012 (with Addenda; 2013).
N. UL 444 - Communications Cables; Current Edition, Including All Revisions.
O. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.

2. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Coordinate with Owner for Communications Service Provider to provide service.

C. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Communications Service Provider representative.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

C. Shop drawings shall be required if proposed Work deviates from drawings.

D. Evidence of qualifications for installer.

E. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing, and intended test date; submit at least 60 days prior to intended test date.

F. Field Test Reports.

G. Project Record Documents: Record actual routing and locations for all cabling and terminations.

H. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of project record documents.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
2. Supervisors and installers factory certified by manufacturers of products to be installed.

B. Installer Qualifications: A company having at least three (3) years experience in the installation and testing of the type of system specified.

C. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Keep stored products clean and dry.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a two (2) years period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cabling and Equipment: Basis of Design: Belden Inc.

B. Other Acceptable Manufacturers: Products of equal quality and performance from any of the following manufacturers are approved for use.
1. 3M Communications Technologies: solutions.3m.com.
2. Siemon Company: www.siemon.com.
3. Belden Inc.: www.belden.com.
4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SYSTEM DESIGN

A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
   1. Comply with TIA-568 (SET) (cabling) and TIA-569 (pathways) (commercial standards).
   2. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
   3. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.

B. System Description:
   1. Cameras: Copper, CAT 6 UTP.

C. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to exterior cameras, functioning as point of presence to external service provider.
   1. Locate main distribution frame as indicated on the drawings.
   2. Capacity: As required to terminate all cables required by design criteria plus minimum 25 percent spare space.

D. Intermediate Distribution Frames (IDF): Support structures for terminating horizontal cables that extend to telecommunications outlets.
   1. Locate intermediate distribution frames as indicated on the drawings.

E. Backbone Cabling: Cabling, pathways, and terminal hardware connecting intermediate distribution frames (IDF's) with main distribution frame (MDF), wired in star topology with main distribution frame at center hub of star.

F. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.03 PATHWAYS

A. Conduit: As specified in Section 26 05 33.13; provide pull cords in all conduit.

B. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

2.04 COPPER CABLE AND TERMINATIONS

A. Copper Horizontal Cable: Basis of Design: Belden Inc.: #OSP6U.
   1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568.2 and listed and labeled as complying with UL 444.
   2. Cable Type - Data: TIA-568-C.2 Category 6 UTP (unshielded twisted pair); 24 AWG, gel-filled.
   3. Cable Capacity: 4-pair.
   4. Cable Applications:
      a. General Purpose Applications: Use listed NFPA 70 Type CM/CMG general purpose cable, Type CMR riser cable, or Type CMP plenum cable.
   5. Cable Jacket Color - Data Cable: Blue.

B. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.

C. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
   1. Performance: 500 mating cycles.
   2. Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.

D. Copper Patch Cords:
   1. Description: Factory-fabricated 4-pair cable assemblies with 8-position modular connectors terminated at each end.
   2. Patch Cords for Patch Panels:
      a. Quantity: One for each pair of patch panel ports.
      b. Length: 3 feet.

2.05 COMMUNICATIONS EQUIPMENT ROOM FITTINGS

A. Copper Cross-Connection Equipment:
   1. Patch Panels for Copper Cabling: Sized to fit EIA/ECA-310 standard 19 inch wide equipment racks; 0.09 inch thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
      a. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
      b. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
      c. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
      d. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606-B.
      e. Provide incoming cable strain relief and routing guides on back of panel.

B. Equipment Frames, Racks and Cabinets:

2.06 GROUNDING AND BONDING COMPONENTS

A. Comply with TIA-607.

B. Comply with Section 26 05 26.

2.07 IDENTIFICATION PRODUCTS

A. Comply with TIA-606.

B. Comply with TIA-606-B.

C. Comply with Section 26 05 53.

2.08 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Factory test cables according to TIA-568 (SET).

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with latest editions and addenda of TIA-570, TIA-607, NFPA 70, and SYSTEM DESIGN as specified in PART 2.

B. Comply with Communication Service Provider requirements.

C. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

3.02 INSTALLATION OF PATHWAYS

A. Conduit, in Addition to Requirements of Section 26 05 33.13:
   1. Arrange conduit to provide no more than the equivalent of two 90 degree bend(s) between pull points.
   2. Conduit Bends: Inside radius not less than 10 times conduit internal diameter.
   3. Arrange conduit to provide no more than 100 feet between pull points.
   4. Minimum Cover - Underground Service Entrance: Comply with NFPA 70 and Communications Service Provider requirements.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

A. Cabling:
   1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
   2. Do not over-cinch or crush cables.
   3. Do not exceed manufacturer's recommended cable pull tension.
   4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.

B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
   1. At Distribution Frames: 120 inches.
   2. At Outlets - Copper: 12 inches.

C. Copper Cabling:
   1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
   2. For 4-pair cables in conduit, do not exceed 25 pounds pull tension.
   3. Use T568A wiring configuration.

D. Identification:
   1. Use wire and cable markers to identify cables at each end.
   2. Use identification labels to identify cross-connection equipment, equipment racks, and cabinets.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Comply with inspection and testing requirements of specified installation standards.

C. Visual Inspection:
   1. Inspect cable jackets for certification markings.
   2. Inspect cable terminations for color coded labels of proper type.
   3. Inspect outlet plates and patch panels for complete labels.

D. Testing - Copper Cabling and Associated Equipment:
   1. Category 5e and Above Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay.

E. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

END OF SECTION

SECTION 28 20 00
VIDEO SURVEILLANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Video surveillance system requirements.
B. Video recording and viewing equipment.
C. Video recording and storage equipment.
D. Cameras.
E. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
C. Section 26 05 33.13 - Conduit for Electrical Systems.
D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.
E. Section 26 56 13 - Lighting Poles and Standards: Pole Mounting requirements.
F. Section 27 10 00 - Structured Cabling for Voice and Data: Data cables for IP video surveillance system network connections.

1.03 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; current edition.
B. IEEE 802.3 - Standard Information Technology--Telecommunications and Information Exchange Between Systems--Specific Requirements Part 3: CSMA/CD Access Method and Physical Layer Specifications; 2014.
C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
D. NECA 303 - Standard for Installing Closed-Circuit Television (CCTV) Systems; 2005.
E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of cameras with structural members, piping, equipment, luminaires, and other potential conflicts installed under other sections or by others.
   2. Coordinate the work with other installers to provide power for cameras and equipment at required locations.
   3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
B. Preinstallation Meetings:
   1. Conduct meeting with Owner's representative to review camera and equipment locations and camera field of view objectives.
   2. Conduct meeting with Owner's representative and other related equipment manufacturers to discuss video surveillance system interface requirements.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Include plan views indicating locations of system components and proposed size, type, and routing of conduits and/or cables. Include elevations and details of proposed

equipment arrangements. Include system interconnection schematic diagrams. Include requirements for interface with other systems.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets for each system component. Include ratings, configurations, standard wiring diagrams, dimensions, finishes, service condition requirements, and installed features.

D. Evidence of qualifications for installer.

E. Field quality control test reports.

F. Project Record Documents: Record actual locations of system components and installed wiring arrangements and routing.

G. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

H. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Comply with the following:
   1. NFPA 70.
   2. Applicable TIA/EIA standards.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five (5) years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum five (5) years documented experience with video surveillance systems of similar size, type, and complexity and providing contract maintenance service as a regular part of their business; manufacturer certified.
   1. Contract maintenance office located within 50 miles of project site.

D. Maintenance Contractor Qualifications: Same entity as installer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions and NECA 303.

B. Store products in manufacturer's unopened packaging, keep dry and protect from damage until ready for installation.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Prime Contractor agrees to correct defective work for complete system within two (2) year period from Date of Substantial Completion.

C. Provide three (3) year manufacturer warranty covering repair or replacement due to all defective materials from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Video Surveillance System: Basis of Design: Bosch Security Systems, Inc.

B. Other Acceptable Manufacturers: Products of equal quality and performance from any of the following manufacturers are approved for use.

1. Bosch Security Systems: www.boschsecurity.us.
2. Honeywell International, Inc: www.honeywellvideo.com.
3. Pelco, a brand of Schneider Electric: www.pelco.com.
4. Communication Networks: www.comnet.net.
5. Substitutions: See Section 01 60 00 - Product Requirements..

C. Source Limitations: Where possible, furnish system components and accessories produced by a single manufacturer and obtained from a single supplier.

2.02 VIDEO SURVEILLANCE SYSTEM

A. Provide new video surveillance system consisting of all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. System Description: IP system with connection to network (IP) cameras.
   1. Video Storage Capacity: Suitable for storing video from all cameras for thirty (30) days.
   2. System Battery Backup: UPS not required; Owner to provide.
   3. Surge Protection:
      a. Provide surge protection for exterior cameras.
      b. Provide equipment power surge protection where electrical distribution system surge protection is not provided.

C. Video Recording and Viewing Equipment Required: One (1).
   1. See article "VIDEO RECORDING AND VIEWING EQUIPMENT" below for product descriptions.
   2. Digital Video Management Appliance:
      a. Location: Building 9, Second Floor, Room 210A.
      b. Mouse and keyboard.
      c. Monitor(s): One (1).
      d. Speakers (where not integral with monitor).
      e. Microphone: One (1).

D. Video Recording Storage Required: One (1).
   1. See article "VIDEO RECORDING STORAGE EQUIPMENT" below for product descriptions.
   2. Digital Video Recording Management Appliance:
      a. Location: Building 9, Second Floor, Room 210A.

E. Cameras Required: Sixty-six (66).
   1. See article "CAMERAS" below for product descriptions.
   2. Camera Types: A, B, C and D.
      a. Locations: As indicated on the drawings.
      b. Camera Type: Indoor/outdoor fixed dome camera, outdoor fixed dome camera, outdoor bullet camera and outdoor pan/tilt/zoom (PTZ) camera.
      c. Lens Type: Furnished with camera.
      d. Mounting: Pole and surface mount.
      e. Alarm Inputs: Essential Video Analytics.

F. Communications Equipment Required:
   1. Provide components as indicated or as required for system network connections.
   2. Network Switches Required: Four (4).
      a. Provide network switches as indicated or as required for communication connections between video surveillance system devices.
      b. Basis of Design: Communication Networks: Commercial Grade Managed Ethernet Switch; #CWGE26FX2TX24MSPOE.
      c. Description: Twenty-four (24) Port Gigabit Ethernet Managed Switch with PoE.

d. The module shall support transmission utilizing Category 5 cable or better, multimode, or single-mode fiber.
e. The module shall support IEEE 802.3 protocol using Auto-negotiating and Auto-MDI/MDI-X features.
f. The module shall feature twenty-four (24) 10/100/1000TX RJ-45 ports with PoE, two (2) dedicated Gigabit SFP ports, and two (2) Gigabit Combo ports.
g. The switch shall have a 400 Watt PoE power budget. The module shall be capable of supporting IEEE 802.3at 30 Watt PoE at any RJ-45 port with a fully internal power supply. Each port may provide up to 30 Watt of power, not to exceed 400 Watt for the total power consumption of all powered devices connected to the switch.
h. The module shall require no in-field electrical or optical adjustments or in-line attenuators to ease installation.
i. The module shall provide power, link speed, and fiber port status indicating LED's for monitoring proper system operation.
j. The module shall provide automatic re-settable solid-state current limiters on each module to reduce the chance of a single point failure of the system.
k. The module shall provide a serial connection for local management of the device.
l. The module shall have a five (5) year warranty to reduce system life cycle cost in an event of a module failure.

3. Network Transmission Extenders Required: Eight (8) Channels.
   a. Provide network transmission extenders as required for network connections to system components.
   b. Basis of Design: Communication Networks: Ethernet-over-Copper Extenders; "CopperLine" #CLFE1EOU, #CLFE4EOU & #CLFE8EOU.
      1) One (1) Channel: Eight (8).
      2) Four (4) Channel: One (1).
      3) Eight (8) Channel: One (1).
      4) Functions: Transmit individual Ethernet data channels with Pass-through PoE over standard unshielded twisted pair (UTP).

G. Mountings Requirements: See Video Surveillance Camera Schedule on drawings for locations.
1. Type ISM-1 - Indoor Surface Mount: Typical interior installation for a vertical or horizontal surface.
   a. Basis of Design: Bosch Security Systems, Inc.; furnished with camera. Provide conduit attachment adapter.
2. Type ICM-1 - Indoor In-Ceiling Mount Assembly:
   a. Basis of Design: Bosch Security Systems, Inc.
      1) In-Ceiling Housing Mount; Model: #NDA-FMT-DOME.
      2) In-Ceiling Support Kit; Model: #VGA-IC-SP.
3. Type IPM-1 - Indoor Pendant Wall Mount Assembly:
   a. Basis of Design: Bosch Security Systems, Inc.
      1) Surface Mount Box; Model: #NDA-U-PSMB.
      2) Pendant Wall Mount; Model: #NDA-U-WMT.
      3) Pendant Interface Plate; .Model: #NDA-5030-PIP.
4. Type OPM-1 - Outdoor Pole Mount : Required for Alternate #1.
   a. Basis of Design: Bosch Security Systems, Inc.; Pole Mount Adapter; Model: #LTC-9213/01.
5. Type OPPM-1 - Outdoor Pendant Pole Mount Assembly:
   a. Basis of Design: Bosch Security Systems, Inc.
      1) Pole Mount Adapter; Model: #NDA-U-PMAS.
      2) Surface Mount Box; Model: #NDA-U-PSMB.
      3) Pendant Wall Mount; Model: #NDA-U-WMT.
      4) Pendant Interface Plate with Weather Shield; .Model: #NDA-8000-PIPW.

6. Type OPPM-2 - Outdoor Pendant Pole Mount Assembly: Required for Alternate #2.
   a. Basis of Design: Bosch Security Systems, Inc.
      1) Pole Mount Adapter; Model: #VG4-A-9541.
      2) Pendant Arm; Model: #VG4-A-PA0.
7. Type OPWM-1 - Outdoor Pendant Wall Mount Assembly:
   a. Basis of Design: Bosch Security Systems, Inc.
      1) Pendant Wall Mount; Model: #NDA-U-WMT.
      2) Pendant Interface Plate with Weather Shield; .Model: #NDA-8000-PIPW.

H. Power Requirements:
   1. Uninterrupted Power Supply (UPS) not required; Owner to provide.
   2. Power Surge Protection: Basis of Design: DITEK Corporation; Model: #DTK-RM12NETS and #DTK-RM16NETS

I. Provide products listed, classified, and labeled as suitable for the purpose intended.

J. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B, consumer application.

2.03 VIDEO RECORDING AND VIEWING EQUIPMENT

A. Provide video recording and viewing equipment compatible with cameras to be connected.

B. Video Management Appliance:
   1. Basis of Design: Basis of Design: Bosch Security Systems, Inc.; DIVAR IP 7000, RAID-5 64 TB HDD; Model: #DIP-7288-8HD.
   2. The IP Video Management Appliance shall manage all IP and digital video, audio, and security data transmitted across an IP network.
   3. The IP Video Management Appliance shall be an all-in-one recording, viewing and management solution for network surveillance systems of up to 256 channels.
   4. The IP Video Management Appliance shall be a pre-configured and pre-installed IP video management solution with up to 64 TB (8 x 8 TB) storage capacity.
   5. The IP Video Management Appliance shall offer front-swappable SATA-II hard drives providing 96 TB of gross storage capacity.
   6. The IP Video Management Appliance shall offer enterprise rated hard drives in a fault tolerant RAID-5 configuration.
   7. The IP Video Management Appliance shall offer 8 GB system memory.
   8. The IP Video Management Appliance shall seamlessly combine IP cameras and encoders, provide system-wide event and alarm management, system health monitoring, user and priority management.
   9. The IP Video Management Appliance shall run a Video Streaming Gateway to allow third-party camera integration.
   10. The IP Video Management Appliance shall allow remote video monitoring via a desktop application, Web browser, or iOS-based mobile device.
   11. Form Factor:
      a. 2HU rack mount.
   12. Electrical:
      a. Power Supply: 339.0 W (100/240 VAC)
      b. Energy Efficiency: Energy Star compliant power supply
   13. Environmental:
      a. Operating Temperature: +50°F to +95°F
      b. Non-operating Temperature: -40°F to +158°F
      c. Operating Relative Humidity: 8 to 90%, non-condensing
      d. Non-operating Relative Humidity: 5 to 95%, non-condensing

C. Software:

1. The IP Video Management Appliance shall come pre-installed and pre-configured with all necessary software.
2. Video Management System:
   a. Basis of Design: Bosch Security Systems, Inc.
   b. Integrated within the Video Management Appliance.

D. Monitors:
1. Basis of Design: Bosch Security Systems, Inc.; Bosch 27-inch High Performance HD LED Monitor, Model: #UML-274-90.
2. Unless otherwise indicated, monitors to be provided by Contractor as part of work of this section.
3. Monitor: 27 inch; High Performance HD color LED.
   a. Mounting: Desk stand.
   b. Resolution: Up to 1920 x 1080.
   c. Video Inputs/Outputs: VGA, DVI, HDMI, CVBS, RGB and S-video.
   d. Audio Inputs/Outputs: RCA, Phone and Speaker.
   e. Weight: Maximum fifteen (15) pounds.
   f. Electrical:
      1) Rated Voltage: 120/230 VAC, 50/60 Hz
      2) Voltage Range: 100-240 VAC, 50/50 Hz
      3) Frequency:
         (a) Horizontal: 60-73 KHz
         (b) Vertical: 47-63 Hz
      4) Power at Rated Voltage:
         (a) On: 50 W
         (b) Active Off: 0.5 W
4. Keyboard and Mouse:
   a. Microsoft compatible.
   b. Connection: Hard wired.
5. Environmental:
   a. Operating Temperature: 32° to 122°F
   b. Storage Temperature: 32° to 122°F
   c. Humidity: Maximum 0% to 90% relative

2.04 VIDEO RECORDING AND STORAGE EQUIPMENT

A. Provide video recording and storage equipment compatible with cameras to be connected.

B. Video Management Appliance:
1. Basis of Design: Basis of Design: Bosch Security Systems, Inc.; DIVAR IP 6000, 64 TB HDD; Model: #DIP-6188-8HD.
2. The IP Video Management Appliance shall manage all IP and digital video, audio, and security data transmitted across an IP network.
3. The IP Video Management Appliance shall be an all-in-one recording, viewing and management solution for network surveillance systems of up to 128 channels.
4. The IP Video Management Appliance shall be a pre-configured and pre-installed IP video management solution with up to 8 TB (4 x 2 TB) storage capacity.
5. The IP Video Management Appliance shall offer front-swappable SATA-II hard drives providing 8 TB of gross storage capacity.
6. The IP Video Management Appliance shall offer enterprise rated hard drives in a fault tolerant RAID-5 configuration.
7. The IP Video Management Appliance shall offer 8 GB system memory.
8. The IP Video Management Appliance shall seamlessly combine IP cameras and encoders, provide system-wide event and alarm management, system health monitoring, user and priority management.

9. The IP Video Management Appliance shall run a Video Streaming Gateway to allow third-party camera integration.
10. The IP Video Management Appliance shall allow remote video monitoring via a desktop application, Web browser, or iOS-based mobile device.
11. Form Factor:
    a. 2HU rack mount.
12. Electrical:
    a. Power Supply: 273.0 W (100/240 VAC)
    b. Energy Efficiency: Energy Star compliant power supply
13. Environmental:
    a. Operating Temperature: +50°F to +95°F
    b. Non-operating Temperature: -40°F to +158°F
    c. Operating Relative Humidity: 8 to 90%, non-condensing
    d. Non-operating Relative Humidity: 5 to 95%, non-condensing

2.05 CAMERAS

A. Provide cameras and associated accessories suitable for operation under the service conditions at the installed location. Provide additional components (e.g. enclosures, heaters, blowers, etc.) as required.

B. Where not factory-installed, provide additional components (e.g. lenses, mounting accessories, etc.) as necessary for complete installation.

C. Network (IP) Cameras:
   1. Signal-to-Noise Ratio: Not less than 50 dB.
   2. Provide the following standard features:
      a. Automatic electronic shutter.
      b. Automatic gain control.
      c. Automatic white balance.
      d. Web-based interface for remote viewing and setup.
      e. Password protected security access.
   3. Type A - Network (IP) Indoor Fixed Dome Camera:
      a. Basis of Design: Bosch Security Systems, Inc.; FLEXIDOME IP outdoor 4000i, Model: #NDE-4502-AL.
      b. Camera Identification Number: Refer to the Video Surveillance Camera Schedule shown on drawings.
      c. Camera Type: True day/night with IR cut filter.
      d. Image Sensor: 1/2.9 inch CMOS.
      e. Resolution: Up to 1080p (1920 x 1080).
      f. Frame Rate: Up to 30 frames per second (fps) at all available resolutions..
      g. Minimum Illumination: 0.12 lux color, 0.02 lux black and white.
      h. Lens: 3-10 mm varifocal; auto iris, motorized focus and zoom; f1.3.
      i. Video Streaming: Supports two simultaneous video streams using H.264 and H.264/MJPEG compression .
      j. Power: Power over Ethernet (IEEE 802.3af).
      k. Features:
         1) Supports alarm input/output.
         2) Supports bidirectional audio.
         3) Camera tampering detection.
         4) Video motion detection capability.
      l. Accessories:
         1) Surface Mount Box.
         2) Indoor In-Ceiling Mount Assembly.
   4. Type B - Network (IP) Outdoor Fixed Dome Camera:

a. Basis of Design: Bosch Security Systems, Inc.; FLEXIDOME starlight 8000i, Model: #NDE-8503-R.
b. Camera Identification Number: Refer to the Video Surveillance Camera Schedule shown on drawings.
c. Camera Type: Day/night.
d. Image Sensor: 1/1.8 inch CMOS.
e. Resolution: Up to 6.0 megapixel (3264 x 1840).
f. Frame Rate: Up to 30 frames per second (fps) at all available resolutions..
g. Minimum Illumination: 0.040 lux color, 0.0059 lux black and white.
h. Lens: 3.9-10 mm varifocal; auto iris, motorized focus and zoom; f1.5 to f2.7.
i. Video Streaming: Supports two simultaneous video streams using H.264 and H.264/MJPEG compression .
j. Power: Power over Ethernet (IEEE 802.3af).
k. Features:
    1) Supports alarm input/output.
    2) Supports bidirectional audio.
    3) Camera tampering detection.
    4) Video motion detection capability.
l. Accessories:
    1) Outdoor Pendant Pole Mount Assembly.
    2) Outdoor Pendant Wall Mount Assembly.

5. Type C - Network (IP) Outdoor Fixed Bullet Camera: Required for Alternate #1.
    a. Basis of Design: Bosch Security Systems, Inc.; Bullet 5MP; Model: #NBE-5503-AL.
    b. Camera Identification Number: Refer to the Video Surveillance Camera Schedule shown on drawings.
    c. Camera Type: True day/night with IR cut filter.
    d. Image Sensor: 1/2.9 inch CMOS.
    e. Resolution: Up to 5 megapixel (3072 x 1728).
    f. Frame Rate: Up to 30 frames per second (fps) at all available resolutions..
    g. Minimum Illumination: 0.369 lux color, 0.035 lux black and white.
    h. Lens: 2.7-12 mm varifocal; auto iris, manual focus and zoom; f1.3.
    i. Video Streaming: Supports two simultaneous video streams using H.264 and H.264/MJPEG compression .
    j. Power: Power over Ethernet (IEEE 802.3af).
    k. Features:
        1) Supports alarm input/output.
        2) Supports bidirectional audio.
        3) Camera tampering detection.
        4) Video motion detection capability.
    l. Accessories:
        1) Outdoor Pole Mount for Alternate #1.
6. Type D - Network (IP) Outdoor PTZ (Pan/Tilt/Zoom) Camera: Required for Alternate #2.
    a. Basis of Design: Bosch Security Systems, Inc.; AUTODOME IP starlight 7000i, Model: #NDP-7512-Z30.
    b. Camera Identification Number: Refer to the Video Surveillance Camera Schedule shown on drawings.
    c. Camera Type: Day/night.
    d. Image Sensor: 1/2.8 inch CMOS.
    e. Resolution: Up to 1080p (1920 x 1080).
    f. Frame Rate: Up to 30 frames per second (fps) at all available resolutions..
    g. Minimum Illumination: 0.0077 lux color, 0.0008 lux black and white.
    h. Lens: 4.3-129 mm varifocal; auto iris, manual focus and zoom; f1.6 to f4.7.

i. Video Streaming: Supports two simultaneous video streams using H.264 and H.264/MJPEG compression .
j. Power: High Power over Ethernet (IEEE 802.3af and IEEE 802.3at).
   1) Basis of Design: Bosch Security Systems, Inc.; High PoE Midspan Model #NPD-6001B
k. Features:
   1) Supports alarm input/output.
   2) Supports bidirectional audio.
   3) Camera tampering detection.
   4) Video motion detection capability.
l. Accessories:
   1) Outdoor Pendant Pole Mount Assembly for Alternate #2.

D. Camera Enclosures and Mounting Brackets:
   1. Where not factory-installed, provide accessory camera enclosures suitable for operation under the service conditions at the installed location.
   2. Where not factory-installed, provide accessory camera mounting brackets necessary for installation.

2.06 ACCESSORIES

A. Provide components as indicated or as required for connection of video surveillance system to devices and other systems indicated.

B. Provide cables as indicated or as required for connections between system components.
   1. Data Cables for IP Network Connections: Unshielded twisted pair (UTP), Category 6, complying with Section 27 10 00.

C. Provide accessory racks/cabinets as indicated or as required for equipment mounting.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that ratings and configurations of system components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive system components.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to system where applicable.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install video surveillance system in accordance with NECA 1 (general workmanship) and NECA 303.

B. Install products in accordance with manufacturer's instructions.

C. Provide required support and attachment in accordance with Section 26 05 29.

D. Wiring Method: Unless otherwise indicated, use wiring in conduit.
   1. Use suitable listed cables in wet locations, including underground raceways.
   2. Use suitable listed cables for vertical riser applications.
   3. Conduit: Comply with Section 26 05 33.13.

E. Provide grounding and bonding in accordance with Section 26 05 26.

F. Identify system wiring and components in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Prepare and start system in accordance with manufacturer's instructions.

C. Adjust cameras to provide desired field of view and produce suitable images under all service lighting conditions.

D. Program system parameters according to requirements of Owner.

E. Test for proper interface with other systems.

F. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.04 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.

C. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of four hours of training.
   3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed system.
   4. Location: At project site and PPA Headquarters.

3.06 PROTECTION

A. Protect installed system components from subsequent construction operations.

END OF SECTION

SECTION 31 23 16
EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for footings.

B. Trenching for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring. General requirements for dewatering of excavations and water control.

B. Section 21 05 53 - Identification for Fire Suppression Piping and Equipment: Underground warning tapes at underground fire suppression lines.

C. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Underground warning tapes at underground plumbing lines.

D. Section 23 05 53 - Identification for HVAC Piping and Equipment: Underground warning tapes at underground HVAC lines.

E. Section 26 05 53 - Identification for Electrical Systems: Underground warning tapes at underground electrical lines.

F. Section 31 22 00 - Grading: Soil removal from surface of site.

G. Section 31 23 16.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

H. Section 31 23 23 - Fill: Fill materials, backfilling, and compacting.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

PART 2 PRODUCTS

2.01 MATERIALS

A. Underground Warning Tapes:
   1. See Section for 21 05 53 underground warning tapes at underground fire suppression lines.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

B. Verify proposed excavations with Architect is as indicated on drawings prior to commencing work.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

D. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Architect.

3.03 EXCAVATING

A. Excavate to accommodate new structures and construction operations.
   1. Cut utility trenches wide enough to allow inspection of installed utilities.
   2. Hand trim excavations. Remove loose matter.

B. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut utility trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 23 23.

G. Provide temporary means and methods, as required, to remove all water from excavations until directed by Architect. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

H. Prevent surface water from draining into excavation.

I. Remove excavated material that is unsuitable for re-use from site.

J. Stockpile excavated material to be re-used in area designated on site by the Architect.

K. Remove excess excavated material from site.

3.04 SUBGRADE PREPARATION

A. See Section 31 23 23 for subgrade preparation at general excavations.

B. See Section 31 23 16.13 for subgrade preparation at utility trenches.

3.05 FILLING AND BACKFILLING

A. Do not fill or backfill until all debris, water, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from excavation.

B. Install underground warning tape at buried utilities according to Section 26 05 53.

C. See Section 31 23 23 for fill, backfill, and compaction requirements at general excavations.

D. See Section 31 23 16.13 for fill, backfill, and compaction requirements at utility trenches.

3.06 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Provide for visual inspection of load-bearing excavated surfaces by Architect before placement of foundations.

3.07 PROTECTION

A. Divert surface flow from rains or water discharges from the excavation.

B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Keep excavations free of standing water and completely free of water during concrete placement.

END OF SECTION

SECTION 31 23 16.13
TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backfilling and compacting for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Section 31 23 16 - Excavation: Foundation excavating.

B. Section 31 23 23 - Fill: Backfilling at utility trenches.

1.03 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

1.04 REFERENCE STANDARDS

A. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.

B. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

C. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

D. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

E. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on actual materials used.

D. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where directed by Architect.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill: 2A Recycled Concrete; Conforming to State of Pennsylvania DOT Standard.
   1. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.

B. Granular Fill: AASHTO #57; Coarse aggregate, open-graded, self-compacting aggregate blend of 5, 6, and 7 washed stone, free of shale, clay, friable material and debris.
   1. Graded in accordance with ASTM C136/C136M, within the following limits:
      a. 1 inch sieve: 95 percent passing.

C. Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter.
   1. Grade in accordance with ASTM D2487 Group Symbol SW.

2.02 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable, woven.

2.03 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Retain the services of a utility locator to mark-out utilities.

D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Architect.

3.03 TRENCHING

A. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Saw cut trenches wide enough to allow inspection of installed utilities.

C. Hand trim excavations. Remove loose matter.

D. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

E. Remove excavated material that is unsuitable for re-use from site.

F. Stockpile excavated material to be re-used in area designated on site by the Architect.

G. Stockpile excavated material to be re-used in area designated on site in accordance with Section 31 22 00.

H. Remove excess excavated material from site.

I. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

J. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect.

3.04 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with granular fill.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.05 BACKFILLING

A. Fill up to subgrade elevations unless otherwise indicated.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. General Fill: Place and compact materials in equal continuous layers not exceeding six (6) inches compacted depth.

F. Granular Fill: Place and compact materials in equal continuous layers not exceeding six (6) inches compacted depth.

G. Soil Fill: Place and compact material in equal continuous layers not exceeding six (6) inches compacted depth.

H. Install underground warning tapes as indicated on the drawings and specified in Section 26 05 53.

I. Correct areas that are over-excavated.
   1. Other areas: Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.

J. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under paving and similar construction: 92 percent of maximum dry density.
   2. At other locations: 95 percent of maximum dry density.

K. Reshape and re-compact fills subjected to vehicular traffic.

3.06 BEDDING AND FILL AT SPECIFIC LOCATIONS

A. Conduits:
   1. Bedding: Use sand.
   2. Cover with general fill.
   3. Fill up to subgrade elevation.
   4. Compact in maximum six (6) inch lifts to 92 percent of maximum dry density.

3.07 TOLERANCES

A. Top Surface of General Backfilling: Plus or minus one (1) inch from required elevations.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus one-half (1/2) inch from required elevations.

3.08 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556 or ASTM D6938.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.09 CLEANING

A. Remove unused stockpiled materials upon completion, leave area in a clean and neat condition.

END OF SECTION

SECTION 31 23 23
FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for footings, paving, and site structures.

B. Backfilling and compacting for utilities outside the building to utility main connections.

C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

A. Section 01 57 13 - Temporary Erosion and Sediment Control: Slope protection and erosion control.

B. Section 31 22 00 - Grading: Removal and handling of soil to be re-used.

C. Section 31 22 00 - Grading: Site grading.

D. Section 31 23 16 - Excavation: Removal and handling of soil to be re-used.

E. Section 31 23 16.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

1.03 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

1.04 REFERENCE STANDARDS

A. Penn DOT Publication 408 - Specifications: latest edition.

B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.

C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

E. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

F. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on actual materials used.

D. Compaction Density Test Reports.

1.06 QUALITY ASSURANCE

A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where directed by Architect.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill: 2A Recycled Concrete; Conforming to State of Pennsylvania DOT Standard.
   1. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.

B. Granular Fill: AASHTO #57; Coarse aggregate, open-graded, self-compacting aggregate blend of 5, 6, and 7 washed stone; free of shale, clay, friable material and debris.
   1. Graded in accordance with ASTM C136/C136M, within the following limits:
      a. 1 inch sieve: 95 percent passing.

C. Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter.
   1. Grade in accordance with ASTM D2487 Group Symbol SW.

2.02 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable, woven.

2.03 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that intended elevations for the work are as indicated.

B. Identify required lines, levels, contours, and datum locations.

C. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

A. Scarify subgrade surface to a depth of 6 inches to identify soft spots.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

A. Fill up to subgrade elevations unless otherwise indicated.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. General Fill: Place and compact materials in equal continuous layers not exceeding six (6) inches compacted depth.

F. Granular Fill: Place and compact materials in equal continuous layers not exceeding six (6) inches compacted depth.

G. Soil Fill: Place and compact material in equal continuous layers not exceeding six (6) inches compacted depth.

H. Correct areas that are over-excavated.
   1. Load-bearing foundation surfaces: Fill with concrete.
   2. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.

I. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under paving and similar construction: 92 percent of maximum dry density.
   2. At other locations: 95 percent of maximum dry density.

J. Reshape and re-compact fills subjected to vehicular traffic.

K. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 FILL AT SPECIFIC LOCATIONS

A. At Footings:
   1. Use granular fill.
   2. Fill up to subgrade elevation.
   3. Compact each lift to 90 percent of maximum dry density.

B. Over Buried Conduits in Trenches:
   1. Bedding: Use sand.
   2. Cover with general fill.
   3. Fill up to subgrade elevation.
   4. Compact in maximum six (6) inch lifts to 92 percent of maximum dry density.

3.05 TOLERANCES

A. Top Surface of General Filling: Plus or minus one (1) inch from required elevations.

B. Top Surface of Filling Under Paved Areas: Plus or minus one-half (1/2) inch from required elevations.

3.06 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556 or ASTM D6938.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Proof roll compacted fill at surfaces that will be under pavers and paving.

3.07 CLEANING

A. Remove unused stockpiled materials upon completion, leave area in a clean and neat condition.

END OF SECTION

SECTION 32 11 23
AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

1.02 RELATED REQUIREMENTS

A. Section 31 23 16.13 - Trenching: Compacted fill over utility trenches under base course.

B. Section 31 23 23 - Fill: Compacted fill under base course.

C. Section 32 12 16 - Asphalt Paving: Finish and binder asphalt courses.

D. Section 32 13 13 - Concrete Paving: Finish concrete surface course.

1.03 REFERENCE STANDARDS

A. Penn DOT Publication 408 - Specifications: latest edition.

B. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

C. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

D. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

E. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Aggregate Composition Test Reports: Results of laboratory tests on actual materials used.

D. Compaction Density Test Reports.

1.05 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When aggregate materials need to be stored on site, locate where indicated on drawings.

C. Aggregate Storage, General:
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 MATERIALS

A. General Fill: 2A Recycled Concrete; Conforming to State of Pennsylvania DOT Standard.
   1. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.

B. Where aggregate materials are specified using ASTM D2487 classification, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that intended elevations for the work are as indicated.

B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

C. Proof roll all subgrades under observation of the Architect/Engineer.

D. Remove all unsuitable materials and replace with compacted aggregate as directed by Architect/Engineer.

3.03 INSTALLATION

A. Spread aggregate over prepared substrate to a total compacted thickness as indicated on the drawings.

B. Place aggregate in maximum six (6) inch layers and roller compact to specified density.

C. Level and contour surfaces to elevations and gradients indicated.

D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Flatness: Maximum variation of one-half (1/2) inch measured with 10 foot straight edge.

B. Variation From Design Elevation: Within one-half (1/2) inch.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted aggregate base course in accordance with ASTM D1556 or ASTM D6938.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Proof roll compacted aggregate at surfaces that will be under paving.

3.06 CLEANING

A. Remove unused stockpiled materials upon completion, leave area in a clean and neat condition.

END OF SECTION

SECTION 32 12 16
ASPHALT PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Double course bituminous concrete paving.

B. Surface sealer.

1.02 RELATED REQUIREMENTS

A. Section 31 23 23 - Fill: Compacted subgrade for paving.

B. Section 32 11 23 - Aggregate Base Courses: Aggregate base course.

1.03 REFERENCE STANDARDS

A. Penn DOT Publication 408 - Specifications: latest edition.

B. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types; 1997.

C. AI MS-19 - A Basic Asphalt Emulsion Manual; Fourth Edition.

D. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction; 2009a.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with State of Pennsylvania DOT.

B. Mixing Plant: Complying with Conform to State of Pennsylvania DOT.

C. Obtain materials from same source throughout.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for paving work on public property.

1.06 FIELD CONDITIONS

A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

B. Place bitumen mixture when temperature is not more than 15 F degrees below bitumen supplier's bill of lading and not more than maximum specified temperature.

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Cement: In accordance with State of Pennsylvania Highways standards.

B. Aggregate for Base Course: In accordance with State of Pennsylvania Highways standards.

C. Aggregate for Wearing Course: In accordance with State of Pennsylvania Highways standards.

D. Primer: Homogeneous, medium curing, liquid asphalt.

E. Tack Coat: Homogeneous, medium curing, liquid asphalt.

F. Seal Coat: AI MS-19, sand type.

2.02 ASPHALT PAVING MIXES AND MIX DESIGN

A. Base Course: As indicated on the drawings.

B. Wearing Course: As indicated on the drawings.

2.03 SOURCE QUALITY CONTROL

A. Test mix design and samples in accordance with AI MS-2.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that compacted subgrade and granular base is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 BASE COURSE

A. See Section 32 11 23.

3.03 PREPARATION - PRIMER

A. Apply primer in accordance with manufacturer's instructions.

B. Apply primer on aggregate base or subbase at uniform rate of 1/3 gal/sq yd.

C. Use clean sand to blot excess primer.

3.04 PREPARATION - TACK COAT

A. Apply tack coat in accordance with manufacturer's instructions.

B. Apply tack coat on asphalt or concrete surfaces over subgrade surface at uniform rate of 1/3 gal/sq yd.

C. Coat surfaces of manhole and city stormwater inlet frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.05 PLACING ASPHALT PAVEMENT - DOUBLE COURSE

A. Place asphalt binder course within 24 hours of applying primer or tack coat.

B. Place binder course to 2 1/2 inch compacted thickness.

C. Place wearing course within two hours of placing and compacting binder course.

D. Place wearing course to 2 1/2 inch compacted thickness.

E. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

F. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.06 SEAL COAT

A. Apply seal coat to surface course in accordance with AI MS-19.

3.07 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Compacted Thickness: Within 1/4 inch of specified or indicated thickness.

C. Variation from True Elevation: Within 1/4 inch.

3.08 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for quality control.

3.09 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury for two (2) days or until surface temperature is less than 140 degrees F.

3.10 SCHEDULE

A. Pavement at Trench Locations.

END OF SECTION

Appendix F

Drawings for Installation at

4101 North Delaware Avenue

(attached as separate document)