Appendix D

Project Manual

PUBLIC BID PACKAGE
BID NO. 20-19

PROPOSED
LIGHTING INSTALLATION

AT

6 EAST OREGON AVENUE

PHILADELPHIA, PA 19148

FOR THE

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

PROJECT MANUAL

Divisions 00 through 32

12 November 2020

1700 Market Street, Suite 3110
Philadelphia, PA 19103
(215) 282-7850 (215) 627-3459 FAX

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 / (215) 284-2232 gdehaven@tandmassociates.com
ENGINEER:	Christopher Jensen, PE T&M Associates 1700 Market Street Philadelphia, PA 19103 (215) 282-7850 / (215) 486-4367 cjensen@tandmassociates.com
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 10 7
SEALS PAGE

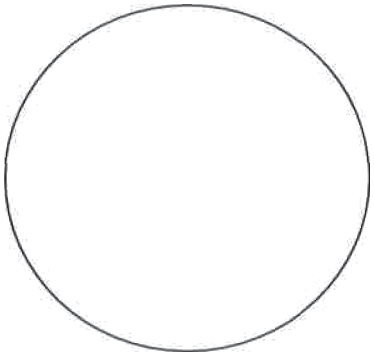
PROJECT MANUAL

PROPOSED
LIGHTING INSTALLATION

AT

6 EAST OREGON AVENUE
PHILADELPHIA, PA 19148

ENGINEER



Signature

Date

SECTION 00 01 10

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END OF SECTION

SECTION 00 01 15
LIST OF DRAWING SHEETS

PLAN SET TITLED: PHILADELPHIA PARKING AUTHORITY PROPOSED PPA IMPOUND LOT 6 OREGON AVENUE, PHILADELPHIA PA 19148, PREPARED BY CHRISTOPHER JENSEN, PE, OF T&M ASSOCIATES, DATED 7/13/2020 AND LAST REVISED 10/21/2020

1	COVER SHEET
2	LEGEND AND NOTES
3	EXISTING CONDITIONS PLAN
4	DEMOLITION AND SITE PLAN
5	SITE LIGHTING PLAN
6	SITE CONSTRUCTION DETAILS
7	SITE LIGHTING DETAILS I
8	SITE LIGHTING DETAILS II
9	ELECTRICAL LIGHTING PLAN, ONE LINE & PANEL SCHEDULE
10	ELECTRICAL NOTES & DETAILS

END OF SECTION

SECTION 01 10 00

SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Bid No. 20-19 Proposed Lighting Installation at 6 East Oregon Avenue, Philadelphia, PA 19148.

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

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

D. Engineer's Name: T &M Associates

E. The Project consists of installing a new lighting system covering the existing surface parking lot.

F. Project Location: 6 East Oregon Avenue, Philadelphia, PA 19148.

1.02 CONTRACT DESCRIPTION

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

H. 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 lighting to include, but not limited to, the following:
   1. Coordination of 120/240V, 400Amp single phase service with PECO.
   2. Installation of Owner-provided site lighting (fixtures, poles).
   3. Installation of new, contractor-provided, light pole foundations.
   4. Installation of new, contractor-provided, branch circuits.
   5. Installation of new, contractor-provided, lighting controls.
   6. Installation of new, contractor-provided, handhole to be installed for an electric feeder to a future structure.

1.04 SCOPE OF WORK

A. Installation of electrical service and site lighting.

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

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

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. Site Lighting fixtures
   2. Site Lighting poles

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 day's 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. 20-19 LIGHTING INSTALLATION AT 6 East Oregon AVENUE, PHILADELPHIA, PA 19148 - 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.

1. 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. Receipt 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 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

1. 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.

2. 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. AII 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. 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 nf 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.

4. CONSTRUCTION PROGRESS SCHEDULE

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

5. 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.

6. 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 shah 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.

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

C. 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: Submlt 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 initiated 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-NOT USED

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.

3.07 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.

3.08 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.

3.09 SUBMITTALS

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

B. Testing and Inspection Agency Qualifications:
- 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.
- Include:
    - Date issued.
    - Project title and number.
    - Name of inspector.
    - Date and time of sampling or inspection.
- Identification of product and specifications section.
- Location in the Project.
- Type of test/inspection.
    - Date of test/inspection.

- Results of test/inspection.

j. Compliance with Contract Documents.
k. When requested by Architect, provide interpretation of results.

- 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.
- Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- 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.

3.10 QUALITY ASSURANCE

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

3.11 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.

3.12 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:

- Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM C1077, and ASTM C1093.
  - Inspection agency: Comply with requirements of ASTM E329.
  - Laboratory Qualifications: Accredited by IAS according to IAS AC89.
  - Laboratory: Authorized to operate in Pennsylvania.
- 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 ‹:. 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. Section 02 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.

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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

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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.

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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.

1. 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

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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.

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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.

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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

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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.

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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

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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.

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

END OF SECTION

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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/C 143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.

P. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

O. ASTM C173/C 173M - 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: Prlme Contractor’s choice of materials that will provide smooth, stain-free final appearance.
   2. Forifi 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/C 150M, 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/C 143M.

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 specified scheduled 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 firestopping 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, anrl other frames and adjacent construction.
      b. Other joints indicated below.
   3. Do not seal the following types of joints.
      a. Intentional weep holes 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 099000
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 Seaters: Same manufacturer as topcoats.

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 topcoats; 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: Sherwln-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

1.1 SUMMARY

A. Section includes building wire and cable; nonmetallic-sheathed cable; direct burial cable; service entrance cable; armored cable; metal clad cable; and wiring connectors and connections.

1.2 REFERENCES

A. International Electrical Testing Association:
   1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

B. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.
   2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

C. Underwriters Laboratories, Inc.:
   1. UL 1277 - Standard for Safety for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

1.3 SYSTEM DESCRIPTION

A. Product Requirements: Provide products as follows:
   1. Solid conductor for feeders and branch circuits 10 AWG and smaller.
   2. Stranded conductors for control circuits.
   3. Conductor not smaller than 12 AWG for power and lighting circuits.
   4. Conductor not smaller than 16 AWG for control circuits.
   5. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.

B. Wiring Methods: Provide the following wiring methods:
   1. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway, armored cable or metal clad cable.
   2. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
   3. Above Accessible Ceilings: Use only building wire, Type THHN/THWN insulation, in raceway, armored cable or metal clad cable.
   4. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway, armored cable or metal clad cable.
   5. Exterior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
   6. Underground Locations: Use only building wire, Type THHN/THWN (XHHW for services) insulation, in raceway.
   7. Cable Tray Locations: Use only Tray cable Type TC.

1.4 DESIGN REQUIREMENTS

A. Conductor sizes are based on copper unless indicated as aluminum or "AL".

B. When aluminum conductor is substituted for copper conductor, size to match circuit requirements, terminations, conductor ampacity and voltage drop.

1.5 SUBMITTALS

A. Product Data: Submit for building wire and each cable assembly type.

B. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.

C. Test Reports: Indicate procedures and values obtained.

1.6 CLOSEOUT SUBMITTALS

A.Project Record Documents: Record actual locations of components and circuits.

1.7 QUALITY ASSURANCE

A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.
B. Maintain one copy of each document on site.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.9 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on Drawings.

1.10 COORDINATION

A. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.
B. Wire and cable routing indicated is approximate unless dimensioned.

PART 2 PRODUCTS

2.1 BUILDING WIRE AND CABLE

A. Product Description: Single or multi- conductor insulated wire.
B. Conductor: Copper.
C. Insulation Voltage Rating: 600 volts.
D. Insulation Temperature Rating: 75 degrees C unless otherwise noted.

2.2 ARMORED OR METAL CLAD CABLE

A. Conductor: Copper.
B. Insulation Voltage Rating: 600 volts.
C. Insulation Temperature Rating: 75 degrees C.
D. Armor Material: Steel except where Aluminum is noted on Drawings.
E. Armor Design: Interlocked metal tape.
F. Jacket: PVC where required.

2.3 TRAY CABLE

A. Product Description: Multiconductor power and control cable NFPA 70 Type TC.
B. Conductor: Copper.
C. Insulation: Flame-retardant cross-linked polyethylene.
D. Overall Jacket: Polyvinyl Chlorine (PVC) in accordance with UL 1277.
E. Insulation Voltage Rating: 600 volts.
F. Insulation Temperature Rating: 90 degrees C.
G. Listings: Finished cable UL listed as Type TC, and sunlight resistant.

2.4 TERMINATIONS

A. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.
B. Lugs for Wires 4 AWG and Larger: Color keyed, compression type copper, with insulating sealing collars.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify interior of building has been protected from weather.
B. Verify mechanical work likely to damage wire and cable has been completed.
C. Verify raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 EXISTING WORK

A. Remove exposed abandoned wire and cable, including abandoned wire and cable above accessible ceiling finishes. Patch surfaces where removed cables pass through building finishes.
B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.
C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.
D. Extend existing circuits using materials and methods compatible with existing electrical installations, or as specified.
E. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

3.4 INSTALLATION

A. Route wire and cable to meet Project conditions.
B. Neatly train and lace wiring inside boxes, equipment, and panelboards.
C. Identify and color code wire and cable. Identify each conductor with its circuit number or other designation indicated.
D. Special Techniques--Building Wire in Raceway:
    1. Pull conductors into raceway at same time.
    2. Install building wire 4 AWG and larger with pulling equipment.
E. Special Techniques - Cable:
    1. Protect exposed cable from damage.
    2. Support cables above accessible ceiling, using spring metal clips or cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.
    3. Use suitable cable fittings and connectors.
F. Special Techniques - Wiring Connections:
    1. Clean conductor surfaces before installing lugs and connectors.
    2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
    3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
    4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
    5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
    6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
    7. Terminate aluminum conductors with tin-plated, aluminum-bodied compression connectors only. Fill with anti-oxidant compound before installing conductor.
    8. Install suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.
G. Install stranded conductors for branch circuits 10 AWG and smaller. Install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.
H. Install terminal lugs on ends of 600-volt wires unless lugs are furnished on connected device, such as circuit breakers.
I. Size lugs in accordance with manufacturer’s recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bars.

J. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-1/2 times normal potential of circuit.

3.5 WIRE COLOR

A. General:
   1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
   2. Black and red for single phase circuits at 120/240 volts.
   3. Black, red, and blue for circuits at 120/208 volts single or three phase-
   4. Orange, brown, and yellow for circuits at 277/480 volts single or three-phase.
   5. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
   6. Black and red for single phase circuits at 120/240 volts.
   7. Black, red, and blue for circuits at 120/208 volts single or three-phase.
   8. Orange, brown, and yellow for circuits at 277/480 volts single or three-phase.

B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Feeder Circuit Conductors: Uniquely color code each phase.

E. Ground Conductors:
   1. For 6 AWG and smaller: Green.
   2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.6 FIELD QUALITY CONTROL

A. Balance single phase branches and feeders in panels to the Engineer's satisfaction.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION

3.

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 33 – Raceway and Boxes for Electrical Systems

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 27 16 – Electrical Cabinets ad Enclosures.

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 Anchot.
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.

1. 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 262716
ELECTRICAL CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Hinged cover enclosures.
   2. Cabinets.
   3. Terminal blocks.
   4. Accessories.

1.2 REFERENCE STANDARDS

A. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
   2. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's standard data for enclosures, cabinets, and terminal blocks.
B. Manufacturer's Instructions: Submit application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials:
   1. Furnish four of each key.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five years' experience.

PART 2 - PRODUCTS

2.1 HINGED COVER ENCLOSURES AND CABINETS

A. Furnish materials in accordance with State DOT standards.
B. Description: NEMA 250, Type 3R stainless steel or aluminum enclosure.
   1. Covers: Continuous hinge, held closed by 3-point handle-operated mechanism.
   2. Furnish interior metal panel for mounting terminal blocks and electrical components.
   3. Enclosure Finish: Unpainted mill finish.

2.2 PLASTIC RACEWAY

A. Description: Plastic channel with snap-on cover.

2.3 CORROSION PROTECTION

A. Description: Foam emitter to provide long term protection against corrosion by airborne contaminants.
   1. For each enclosure, furnish quantity as indicated in manufacturers instructions to protect the enclosure.
B. Description: Plastic cup with breathable membrane to absorb corrosive gasses from the enclosure.
   1. For each enclosure, furnish quantity as indicated in manufacturers instructions to protect the enclosure.

PART 3 - EXECUTION

3.1 DEMOLITION

A. Remove abandoned cabinets and enclosures. Patch surfaces.
B. Maintain access to existing cabinets and enclosures and other installations remaining active and requiring access. Modify installation or provide access panel.

3.2 INSTALLATION

A. Install enclosures and boxes and cabinet fronts plumb.

3.3 CLEANING

A. Clean existing cabinets and enclosures to remain or to be reinstalled.
B. Clean electrical parts to remove conductive and harmful materials.
C. Remove dirt and debris from enclosure.
D. Clean finishes and touch up damage.

END OF SECTION

SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
   2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.
   3. ANSI C80.5 - Aluminum Rigid Conduit - (ARC).

B. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
   2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
   3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
   4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
   5. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
   6. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
   7. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.3 SYSTEM DESCRIPTION

A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

1.4 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.5 SUBMITTALS

A. Product Data: Submit for the following:
   1. Flexible metal conduit.
   2. Liquidtight flexible metal conduit.
   3. Nonmetallic conduit.
   4. Flexible nonmetallic conduit.
   5. Nonmetallic tubing.
   6. Raceway fittings.
   7. Conduit bodies.
   8. Surface raceway.
   9. Wireway.
   10. Pull and junction boxes.
   11. Handholes.

B. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents:
   1. Record actual routing of conduits larger than 2 inch.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

B. Protect PVC conduit from sunlight.

1.8 COORDINATION

A. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 PRODUCTS

2.1 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.
B. Rigid Aluminum Conduit: ANSI C80.5.
C. Intermediate Metal Conduit (IMC): Rigid steel.
D. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

2.2 PVC COATED METAL CONDUIT

A. Product Description: NEMA RN 1; rigid steel conduit with external PVC coating, 40 mil thick.
B. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.3 FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel construction.
B. Fittings: NEMA FB 1.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel construction with PVC jacket.
B. Fittings: NEMA FB 1.

2.5 ELECTRICAL METALLIC TUBING (EMT)

A. Product Description: ANSI C80.3; galvanized tubing.
B. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron compression type.

2.6 NONMETALLIC CONDUIT

A. Product Description: NEMA TC 2; Schedule 40 or 80 PVC as noted on the Drawings.
B. Fittings and Conduit Bodies: NEMA TC 3.

2.7 NONMETALLIC TUBING

A. Product Description: NEMA TC 2.
B. Fittings and Conduit Bodies: NEMA TC 3.

2.8 WIREWAY

A. Product Description: General purpose indoors, raintight outdoors type wireway.
B. Knockouts: Manufacturer's standard.
C. Cover: Screw cover.
D. Connector: Slip-in.
E. Finish: Rust inhibiting primer coating with gray enamel finish.

2.9 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
   2. Concrete Ceiling Boxes: Concrete type.
B. Nonmetallic Outlet Boxes: NEMA OS 2.
C. Cast Boxes: NEMA FB 1, Type FD, aluminum. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.
D. Wall Plates for Finished Areas: As specified on Drawings.
E. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.10 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Hinged Enclosures: As specified in Section 26 27 16.
C. Surface Mounted Cast Metal Box: NEMA 250, Type 4X; flat-flanged, surface mounted junction box:
   1. Material: Cast aluminum.
   2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
D. In-Ground Cast Metal Box: NEMA 250, Type 6, inside flanged, recessed cover box for flush mounting:
   1. Material: Galvanized cast iron.
   2. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.
   3. Cover Legend: "ELECTRIC" or as noted on Drawings.
E. Fiberglass Concrete composite Handholes: Die-molded, glass-fiber concrete composite hand holes:
   1. Cover: Glass-fiber concrete composite, weatherproof cover with nonskid finish.
   2. Cover Legend: "ELECTRIC" or as noted on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 EXISTING WORK

A. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.
B. Remove concealed abandoned raceway to its source.
C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.
D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.
E. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.
F. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.3 INSTALLATION

A. Ground and bond raceway and boxes.
B. Fasten raceway and box supports to structure and finishes.
C. Identify raceway and boxes.
D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.4 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
B. Arrange raceway supports to prevent misalignment during wiring installation.
C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
D. Group related raceway; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional raceways.
E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports
F. Do not attach raceway to ceiling support wires or other piping systems.
G. Construct wireway supports from steel channel.
H. Route exposed raceway parallel and perpendicular to walls.
I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.
J. Route conduit in and under slab from point-to-point.
K. Maximum Size Conduit in Slab Above Grade: 3/4 inch. Do not cross conduits in slab.
L. Maintain clearance between raceway and piping for maintenance purposes.
M. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.

N. Cut conduit square using saw or pipe cutter; de-burr cut ends.
O. Bring conduit to shoulder of fittings; fasten securely.
P. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.
Q. Install conduit hubs to fasten conduit to cast boxes.
R. Install no more than equivalent of three 90 degree bends between boxes except where noted on Drawings. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in metal conduit larger than 2 inch size.
S. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
T. Install fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.
U. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
V. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
W. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.
X. Close ends and unused openings in wireway.

3.5 INSTALLATION - BOXES

A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings.
B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.
C. Orient boxes to accommodate wiring devices oriented as specified on the Drawings.
D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.
H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
I. Install stamped steel bridges to fasten flush mounting outlet box between studs.
J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
K. Install adjustable steel channel fasteners for hung ceiling outlet box.
L. Do not fasten boxes to ceiling support wires or other piping systems.
M. Support boxes independently of conduit.
N. Install gang box where more than one device is mounted together. Do not use sectional box.
O. Install gang box with plaster ring for single device outlets.

3.6 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements.
B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.
C. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.
D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.7 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.
B. Install knockout closures in unused openings in boxes.

3.8 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

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.
1. 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 in6talled 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.

PART2PRODUCTS

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. Canon, a brand of Thomas & Betts Corporation: www.carton.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. 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 flttlng 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 SOE - 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 / Canon 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 SOE, 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 / Canon 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 / Carton 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 will› 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.

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.

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 lincs 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 tug, 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 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, 8, arid 7 washed stone, free of shale, clay, friable material and debris.
   1. Graded in accordance with ASTM C136/C 136M, 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 benchmarks 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 benchmarks, 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.

1. 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 1216
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.

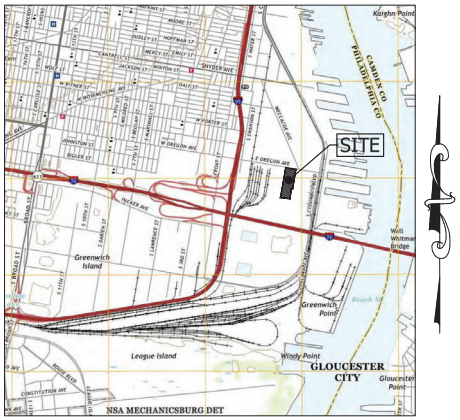
END OF SECTION

Appendix E

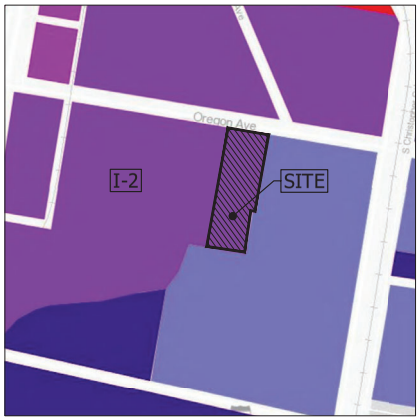
Drawings

PUBLIC BIC PACKAGE - BID NO. 20-19
PHILADELPHIA PARKING AUTHORITY
PROPOSED PPA IMPOUND LOT

6 E OREGON AVENUE, PHILADELPHIA PA 19148



LOCATION MAP
SCALE: 1"=2000'



ZONING MAP
SCALE: 1"=500'

SHEET INDEX	
PLAN SHEET NUMBER	DESCRIPTION
1	COVER SHEET
2	LEGEND AND NOTES
3	EXISTING CONDITIONS PLAN
4	DEMOLITION AND SITE PLAN
5	SITE LIGHTING PLAN
6	SITE CONSTRUCTION DETAILS
7	SITE LIGHTING DETAILS I
8	SITE LIGHTING DETAILS II
9	ELECTRICAL LIGHTING PLAN, ONE LINE & PANEL SCHEDULE
10	ELECTRICAL NOTES & DETAILS

Pennsylvania811

ATTENTION ALL CONTRACTORS: LOCATIONS OF ALL EXISTING UTILITIES SHOWN HEREON HAVE BEEN DEVELOPED FROM UTILITY COMPANY RECORDS AND/OR ABOVE-GROUND INSPECTION OF THE SITE. COMPLETENESS OR ACCURACY OF TYPE, SIZE, DEPTH OR HORIZONTAL LOCATION OF UNDERGROUND FACILITIES OR STRUCTURES CANNOT BE GUARANTEED. PURSUANT TO REQUIREMENTS OF THE PENNSYLVANIA LEGISLATIVE ACT NUMBER 287 OF 1974 AS AMENDED BY ACT 121 OF 2008, CONTRACTORS MUST VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES AND FACILITIES PRIOR TO START OF WORK.
SERIAL NO.:

NO.	BY	DESCRIPTION	DATE
1	DJ	ELECTRICAL PLANS	10/21/20

REVISIONS

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
CHRISTOPHER W. JENSEN
ENGINEER
NO. PE-076484

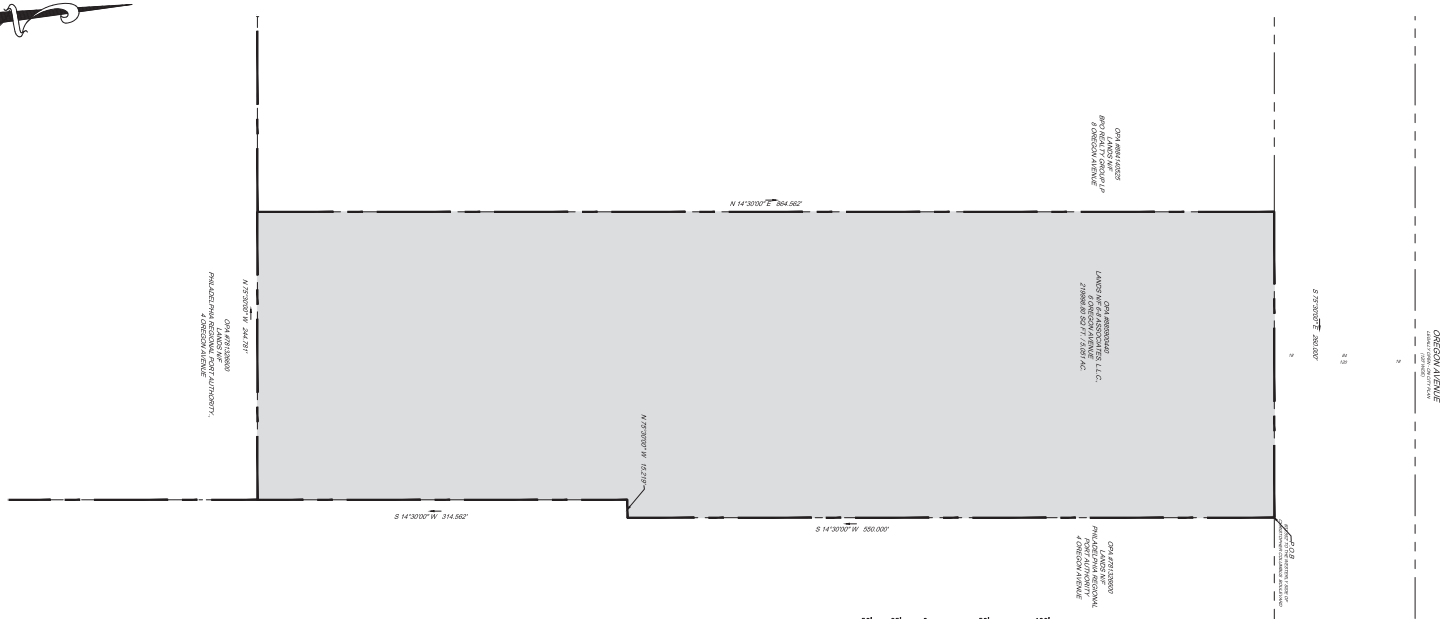
CHRISTOPHER W. JENSEN, P.E.
LICENSED PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA
LICENSE NO. PE076484
07/10/2020
DATE

PHILADELPHIA Parking Authority

PHILADELPHIA PARKING AUTHORITY
PPA IMPOUND LOT
6 E OREGON AVENUE, PHILADELPHIA, PA 19148
COVER SHEET

YOUR GOALS. OUR MISSION.
1700 MARKET STREET
SUITE 3110
PHILADELPHIA, PA 19018
TEL 215-282-7850
FAX 215-627-34.59
www.tandmassociates.com
OFFICES LOCATED IN:
DELAWARE, INDIANA, KENTUCKY, MASSACHUSETTS, MICHIGAN, NEW JERSEY, OHIO AND PENNSYLVANIA.

DESIGNED BY DFM	DRAWING CVR
CHECKED BY GD	
DRAWN BY MB	SHEET 1 OF 10
DATE 07/13/2020	
SCALE AS NOTED	
PROJ. NO. PHPA00032	



TRACT MAP

SCALE: 1"= 50'

ZONING DATA

CITY OF PHILADELPHIA (39th WARD)

ZONING DISTRICT – HEAVY INDUSTRIAL (I-2)

(AS PROVIDED ON BY THE PHILADELPHIA DISTRICT SURVEYOR PER PLAN REF #1)

MAXIMUM OCCUPIED AREA:	100%
FRONT YARD SET BACK:	0'
SIDE YARD SET BACK:	6' IF USED
REAR YARD SET BACK:	8' IF USED
MAXIMUM BUILDING HEIGHT:	60' IF ABUTTING RESIDENTIAL OR AP-PO DISTRICT; OTHERWISE NO LIMIT

SITE DATA

DOCUMENT ID: 50716168

PROPERTY ADDRESS:
6E OREGON AVENUE
CITY OF PHILADELPHIA
PHILADELPHIA COUNTY, PA

FLOOD ZONE INFORMATION

BY GRAPHIC PLOTTING ONLY, SUBJECT PARCEL AREA IS LOCATED IN ZONE AE OF THE FLOOD INSURANCE RATE MAP, PANEL NO. 192 OF 230, COMMUNITY MAP NO. 42075701921H WHICH BEARS AN EFFECTIVE DATE OF NOVEMBER 18, 2015. NO FIELD SURVEYING WAS PERFORMED TO DETERMINE THIS ZONE AND AN ELEVATION CERTIFICATE MAY BE NEEDED TO VERIFY THIS DETERMINATION OR APPLY FOR A VARIANCE FROM THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

GENERAL NOTES

1. A FIELD SURVEY OF THE SITE WAS PERFORMED IN JUNE 24 2020.
2. THIS SITE IS CURRENTLY ZONED I-2 MEDIUM INDUSTRIAL IN THE CITY OF PHILADELPHIA. FOR COMPLETE ZONING INFORMATION PLEASE REFER TO THE ZONING CODE OF THE THE PHILADELPHIA CODE AS CURRENTLY AMENDED.
3. VERTICAL INFORMATION AS SHOWN HEREON IS BASED ON THE CITY OF PHILADELPHIA VERTICAL DATUM.
4. HORIZONTAL INFORMATION IS BASED ON THE DEED OF RECORD.
5. THIS PLAN WAS PREPARED IN ACCORDANCE WITH INSTRUCTIONS FROM THE CLIENT.
6. THIS PLAN WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT.
7. REFERENCE IS MADE TO PENNSYLVANIA ONE CALL SYSTEM AND ASSIGNED SERIAL NUMBER 20201770751 IN ACCORDANCE WITH PA ACT OF 1974 AS AMENDED BY ACT 121 OF 2008. (800-242-1776).
8. NO ATTEMPT WAS MADE TO LOCATE THE UNDERGROUND UTILITIES WHICH MAY EXIST ON THIS PROPERTY. THIS PLAN DOES NOT CERTIFY TO THE LOCATION, BOTH HORIZONTAL AND VERTICAL OF ANY UNDERGROUND FEATURE OR STRUCTURE WHICH HAS NOT BEEN EXPOSED FOR DIRECT MEASUREMENT. LOCATIONS OF SUBSURFACE CONDITIONS SUCH AS UTILITIES, TANKS, DISPOSAL SYSTEMS,ETC ARE NOT REPRESENTED HEREON.
9. EXCEPT AS SPECIFICALLY STATED OR SHOWN ON THIS PLAT, THIS SURVEY DOES NOT PURPORT TO REFLECT ANY OF THE FOLLOWING WHICH MAY BE APPLICABLE TO THE SUBJECT REAL ESTATE: EASEMENTS, OTHER THAN POSSIBLE EASEMENTS THAT WERE VISIBLE AT THE TIME OF MAKING OF THIS SURVEY; BUILDING SETBACK LINES; RESTRICTIVE COVENANTS; SUBDIVISION RESTRICTIONS; ZONING OR OTHER LAND USE REGULATIONS; AND ANY OTHER FACTS THAT AN ACCURATE TITLE SEARCH MAY DISCLOSE.
10. SURVEYOR HAS MADE NO INVESTIGATION OR INDEPENDENT SEARCH FOR EASEMENTS OR RECORD, ENCUMBRANCES, RESTRICTIVE COVENANTS, OWNERSHIP TITLE EVIDENCE, OR ANY OTHER FACTS THAT AN ACCURATE TITLE SEARCH MAY DISCLOSE.
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LEGEND

MAG NAIL (SET BY OTHERS)	
DRILL HOLE (SET BY OTHERS)	
HUB & TACK (SET BY OTHERS)	
MAG NAIL/RR SPIKE (FND BY OTHERS)	
SIGN	
BOLLARD	
POST	
UTILITY POLE	
LAMP POST	
ELECTRIC METER	
GUY WIRE	
TELEPHONE BOX	
GAS METER	
VALVE	
YARD HYDRANT	
FIRE HYDRANT	
INLET	
INLET TYPE C	
ELECTRIC MANHOLE	
SANITARY MANHOLE	
GAS MANHOLE	
STORM MANHOLE	
S58°09'30"W 421.130'	PARCEL LINE / BEARING
	EASEMENT LINE / BEARING
	RIVER EDGE/ STREAM EDGE
	TREELINE
OE	OVERHEAD ELECTRIC LINE
OT	OVERHEAD TELEPHONE LINE
UC	UNDERGROUND CABLE
UE	UNDERGROUND ELECTRIC
UT	UNDERGROUND TELEPHONE
W	WATER LINE
S	SANITARY SEWER LINE
G	GAS LINE
	STORM SEWER LINE
	GUIDE RAIL
	FENCE LINE
	BUILDING
	RAILROAD TRACKS

Pennsylvania811

ATTENTION ALL CONTRACTORS: LOCATIONS OF ALL EXISTING UTILITIES SHOWN HEREON HAVE BEEN DEVELOPED FROM UTILITY COMPANY RECORDS AND/OR ABOVE-GROUND INSPECTION OF THE SITE. COMPLETENESS OR ACCURACY OF TYPE, SIZE, DEPTH OR HORIZONTAL LOCATION OF UNDERGROUND FACILITIES OR STRUCTURES CANNOT BE GUARANTEED. PURSUANT TO REQUIREMENTS OF PENNSYLVANIA LEGISLATIVE ACT NUMBER 287 OF 1974 AS AMENDED BY ACT 121 OF 2008, CONTRACTORS MUST VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES AND FACILITIES PRIOR TO START OF WORK.
SERIAL NO.:

NO.	BY	DATE
1	DJ	10/21/20

REVISIONS

ELECTRICAL PLANS

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
CHRISTOPHER W. JENSEN
ENGINEER
No. PE-076484
PENNSYLVANIA

CHRISTOPHER W. JENSEN, P.E.
LICENSED PROFESSIONAL ENGINEER
07/10/2020
DATE
COMMONWEALTH OF PENNSYLVANIA
LICENSE NO. PE076484

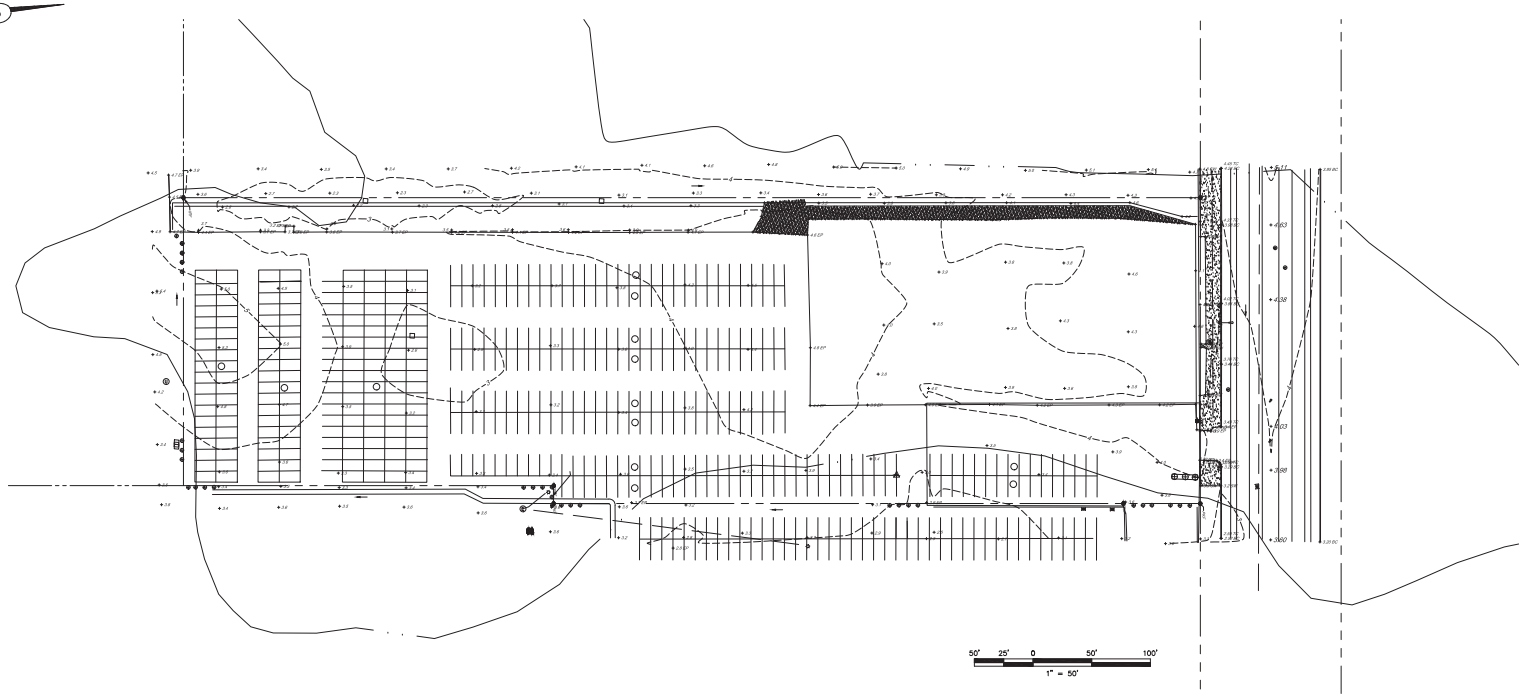
PHILADELPHIA Parking Authority

PHILADELPHIA PARKING AUTHORITY
PPA IMPOUND LOT
6 E OREGON AVENUE, PHILADELPHIA, PA 19148

LEGEND AND NOTES

TAM
YOUR GOALS. OUR MISSION.
1700 MARKET STREET
SUITE 3110
PHILADELPHIA, PA 19018
TEL 215-282-7850
FAX 215-627-3459
www.tandmassociates.com
OFFICES LOCATED IN:
DELAWARE, INDIANA, KENTUCKY,
MASSACHUSETTS, MICHIGAN, NEW JERSEY,
OHIO AND PENNSYLVANIA.

DESIGNED BY: DFM	DRAWING: LEG
CHECKED BY: GD	
DRAWN BY: MB	SHEET: 2 OF 10
DATE: 07/13/2020	
SCALE: AS NOTED	
PROJ. NO.: PHPA00032	



FLOOD ZONE INFORMATION

BY GRAPHIC PLOTTING ONLY, SUBJECT PARCEL AREA IS LOCATED IN ZONE AE OF THE FLOOD INSURANCE RATE MAP, PANEL NO. 192 OF 230, COMMUNITY MAP NO. 4207570192H WHICH BEARS AN EFFECTIVE DATE OF NOVEMBER 18, 2015. NO FIELD SURVEYING WAS PERFORMED TO DETERMINE THIS ZONE AND AN ELEVATION CERTIFICATE MAY BE NEEDED TO VERIFY THIS DETERMINATION OR APPLY FOR A VARIANCE FROM THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

GENERAL NOTES

1. A FIELD SURVEY OF THE SITE WAS PERFORMED IN JUNE 24 2020.
2. THIS SITE IS CURRENTLY ZONED I-2 MEDIUM INDUSTRIAL IN THE CITY OF PHILADELPHIA. FOR COMPLETE ZONING INFORMATION PLEASE REFER TO THE ZONING CODE OF THE THE PHILADELPHIA CODE AS CURRENTLY AMENDED.
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4. HORIZONTAL INFORMATION IS BASED ON THE DEED OF RECORD.
5. THIS PLAN WAS PREPARED IN ACCORDANCE WITH INSTRUCTIONS FROM THE CLIENT.
6. THIS PLAN WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT.
7. REFERENCE IS MADE TO PENNSYLVANIA ONE CALL SYSTEM AND ASSIGNED SERIAL NUMBER 20201770751 IN ACCORDANCE WITH PA ACT OF 1974 AS AMENDED BY ACT 121 OF 2008. (800-242-1776).
8. NO ATTEMPT WAS MADE TO LOCATE THE UNDERGROUND UTILITIES WHICH MAY EXIST ON THIS PROPERTY. THIS PLAN DOES NOT CERTIFY TO THE LOCATION, BOTH HORIZONTAL AND VERTICAL OF ANY UNDERGROUND FEATURE OR STRUCTURE WHICH HAS NOT BEEN EXPOSED FOR DIRECT MEASUREMENT. LOCATIONS OF SUBSURFACE CONDITIONS SUCH AS UTILITIES, TANKS, DISPOSAL SYSTEMS,ETC ARE NOT REPRESENTED HEREON.
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Pennsylvania811

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SERIAL NO.:

NO.	BY	DATE
1	DJ	10/21/20

REVISIONS

ELECTRICAL PLANS

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
CHRISTOPHER W. JENSEN
ENGINEER
NO. PE-074615

CHRISTOPHER W. JENSEN, P.E.
LICENSED PROFESSIONAL ENGINEER
07/10/2020
DATE
COMMONWEALTH OF PENNSYLVANIA
LICENSE NO. PE070644

PHILADELPHIA Parking Authority

PHILADELPHIA PARKING AUTHORITY

PPA IMPOUND LOT

6 E OREGON AVENUE, PHILADELPHIA, PA 19148

EXISTING CONDITIONS PLAN

YOUR GOALS. OUR MISSION.
1700 MARKET STREET
SUITE 2110
PHILADELPHIA, PA 19018
TEL 215-282-7850
FAX 215-627-3459
www.tandmassociates.com

OFFICES LOCATED IN:
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DESIGNED BY: DFM	DRAWING: EXC-TOP
CHECKED BY: GD	
DRAWN BY: MB	SHEET: 3
DATE: 07/13/2020	OF 10
SCALE: AS NOTED	
PROJ. NO.: PHPA00032	

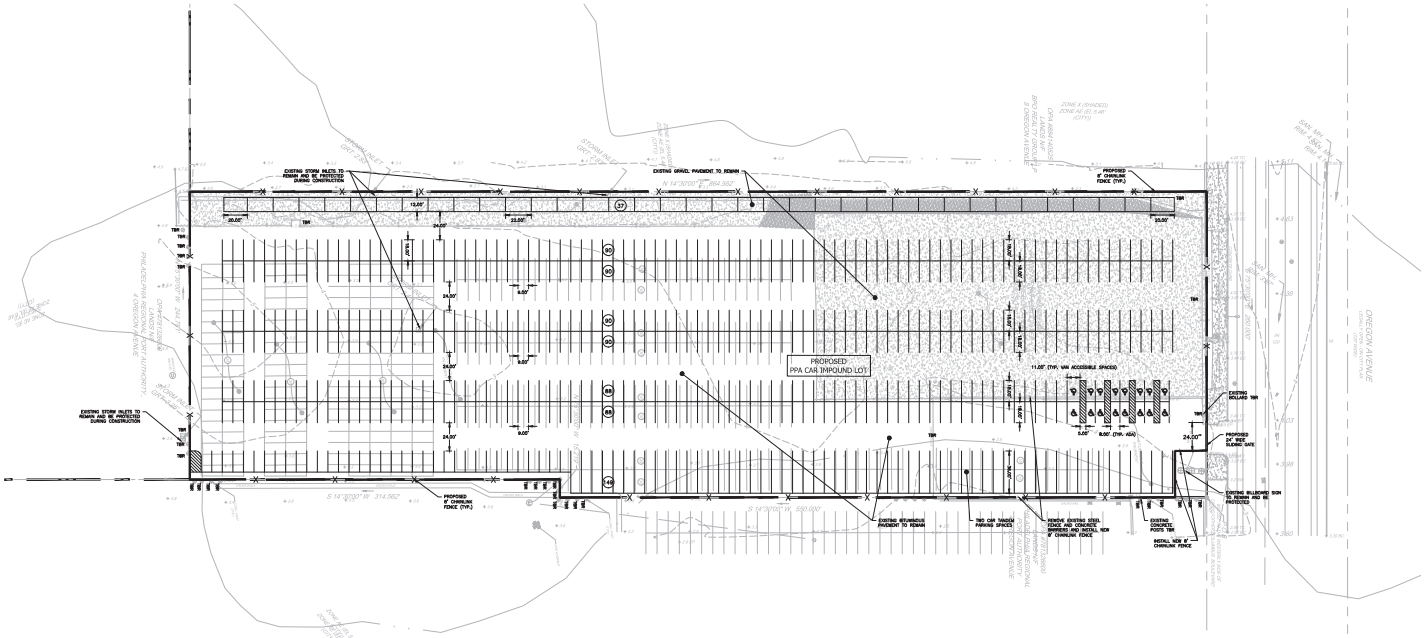

PHOTO OF EXISTING BILLBOARD SIGN
(TO REMAIN & BE PROTECTED)
N.T.S.

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PARKING SPACE TABULTION CHART (1)				
	STANDARD (2)	ADA (3)	VAN ADA (4)	TOTAL
PROPOSED PPA IMPOUND LOT	706	14	2	**722**

NOTES:
(1) MINIMUM ADA SPACES REQUIRED PER CITY OF PHILADELPHIA ZONING CODE SECTION 14-802(5) REQUIRE 15 ADA SPACES (2 VAN ACCESSIBLE SPACES)
(2) REQUIRED SPACE DIMENSIONS: 8.5'X18'. PROPOSED SPACE DIMENSIONS: 9'X18' (TYPICAL)
(3) REQUIRED ADA SPACE DIMENSIONS: 8'X18'. PROPOSED SPACE DIMENSIONS: 8'X18'
(4) REQUIRED ADA VAN ACCESSIBLE SPACE DIMENSIONS: 11'X18'. PROPOSED SPACE DIMENSIONS: 11'X18'

50' 25' 0 50' 100'
1" = 50'

Pennsylvania 811
PENNSYLVANIA ONE CALL SYSTEM INC. PA ACT 287 AS AMENDED BY ACT 121 OF 2008 CALL BEFORE YOU DIG!

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SERIAL NO.:

NO.	BY	REVISIONS	DATE
1	DJ	ELECTRICAL PLANS	10/21/20

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
CHRISTOPHER W. JENSEN
ENGINEER
No. PE-078484

CHRISTOPHER W. JENSEN, P.E.
LICENSED PROFESSIONAL ENGINEER
07/10/2020
DATE
COMMONWEALTH OF PENNSYLVANIA
LICENSE NO. PE078484

PHILADELPHIA Parking Authority

PHILADELPHIA PARKING AUTHORITY
PPA IMPOUND LOT
6 E OREGON AVENUE, PHILADELPHIA, PA 19148

DEMOLITION AND SITE PLAN

YOUR GOALS. OUR MISSION.
1700 MARKET STREET
SUITE 3110
PHILADELPHIA, PA 18018
TEL 215-282-7850
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www.tandmassociates.com
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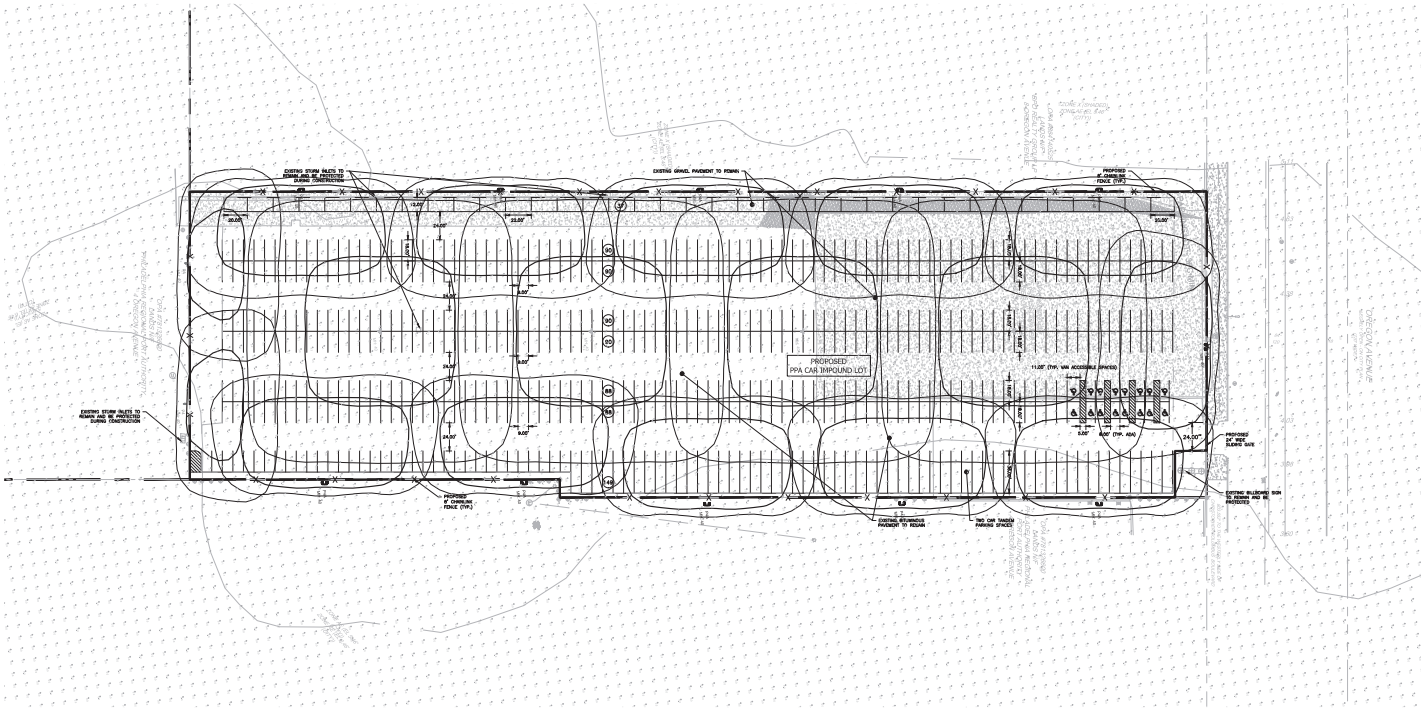
MASSACHUSETTS, MICHIGAN, NEW JERSEY,
OHIO AND PENNSYLVANIA.

DESIGNED BY	DFM
CHECKED BY	GD
DRAWN BY	MB
DATE	07/13/2020
SCALE	AS NOTED
PROJ. NO.	PHPA00032
DRAWING	DEM/STE-1
SHEET	4 OF 10



Luminaire Schedule									
Symbol	Qty	Arrangement	Fixture Type	Fixture Description	Manufacturer	Catalog Number	LLF	Total Watts	Delivered Lumens	Photometric File Name
	2	SINGLE	P4	AREA LIGHT, TYPE 4 WITH INTERNAL HSS, MOUNTED TO 40FT POLE	LSI INDUSTRIES INC.	MRL-LED-65L-SIL-FT-40-70-IL	0.900	592	44741	MRL-LED-65L-SIL-FT-40-70CRI-L.IES
	11	ROTATED OPTICS	P4A	AREA LIGHT, TYPE 4 WITH INTERNAL HSS, 2@180 ON DOUBLE CROSS ARMS MOUNTED TO 40FT POLE	LSI INDUSTRIES INC.	(2) MRL-LED-65L-SIL-FT-40-70-IL	0.900	1184	89482	MRL-LED-65L-SIL-FT-40-70CRI-L.IES
	4	3 @ 90 DEGREES	P5	AREA LIGHT, TYPE 5, 3@90 MOUNTED TO 40FT POLE	LSI INDUSTRIES, INC	(3) MRL-LED-65L-SIL-SW-40-70	0.900	1776	193584	MRL-LED-65L-SIL-SW-40-70CRI.IES

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CalcPts to Zero	Illuminance	Fc	1.42	12.8	0.0	N.A.	N.A.
PARKING LOT - 3FC MIN	Illuminance	Fc	7.14	12.8	3.0	2.38	4.27

50' 25' 0 50' 100'
1" = 50'

NO.	BY	DATE
1	DJ	10/21/20

REVISIONS

ELECTRICAL PLANS

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
CHRISTOPHER W. JENSEN
ENGINEER
No. PE-076484

CHRISTOPHER W. JENSEN, P.E.
LICENSED PROFESSIONAL ENGINEER
07/10/2020
DATE
COMMONWEALTH OF PENNSYLVANIA
LICENSE NO. PE076484

PHILADELPHIA Parking Authority

PHILADELPHIA PARKING AUTHORITY

PPA IMPOUND LOT

6 E OREGON AVENUE, PHILADELPHIA, PA 19148

LIGHTING PLAN

YOUR GOALS. OUR MISSION.
1700 MARKET STREET
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PHILADELPHIA, PA 19018
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OHIO AND PENNSYLVANIA

DESIGNED BY: DFM	DRAWING: LTE-1
CHECKED BY: GD	
DRAWN BY: MB	SHEET: 5 OF 10
DATE: 07/13/2020	
SCALE: AS NOTED	
PROJ. NO.: PHPA00032	

Pennsylvania811

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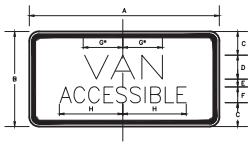


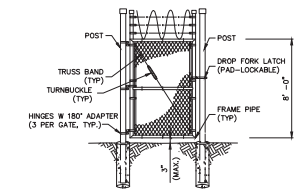
COLOR: LEGEND — GREEN (REFLECTORIZED)
BACKGROUND — WHITE (REFLECTORIZED)
* REDUCE LETTER SPACING 50%

SIGN SIZE	DIMENSIONS							
	A	B	C	D	E	F	G	H
12x6	12	6	1 1/2	1 1/2	1/2	1	2 1/2	4

SIGN SIZE	SERIES LINES		MARGIN	BORDER	BLANK STD.
	L	S			
12x6	D	D	3/8	3/8	B5-1206

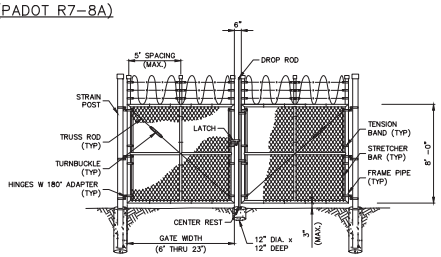
VAN ACCESSIBLE SIGN (PADOT R7-8A)

N.T.S.



WALK GATE

4' WIDE X 8' HIGH



DOUBLE GATE

GATE MATERIAL			
GATE FRAME WIDTH	STRAIN POST	CONCRETE BASE	
	ROUND PIPE I.D.	DEPTH	DIA.
FEET	INCHES	INCHES	INCHES
3 THRU 6	3	36	12
>6 THRU 13	3.5	42	12
>13 THRU 18	6.0	48	18
>18 THRU 23	8.0	48	24

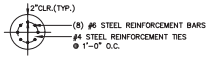
GATE MATERIAL			
GATE FRAME WIDTH		FRAME PIPE	BRACE PIPE
WIDTH	HEIGHT	I.D.	I.D.
FEET		INCHES	INCHES
3 THRU 8	3 THRU 6	1.25	1.25
>8 THRU 23	6	1.50	1.25
>8 THRU 23	>6 THRU 12	1.50	1.50

NOTES:

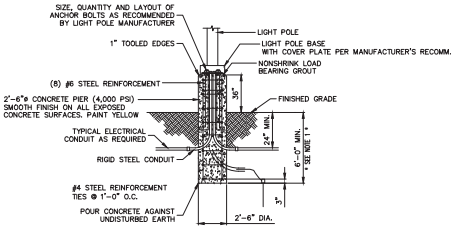
1. SEE FENCE (CHAIN LINK) DETAIL FOR ADDITIONAL NOTES AND SPECIFICATIONS.
2. GATE HINGE SHALL ALLOW GATES TO OPEN 180 DEGREES.
4. GATE SHALL CONTAIN THREE (3) HORIZONTAL RAILS (TOP, BOTTOM AND MIDDLE) SPACED APPROXIMATELY FOUR FEET (4') APART.
5. GATE SHALL HAVE A DROP ROD/FORK LATCH WHICH IS CAPABLE OF BEING LOCKED BY A PAD LOCK.
6. CHAIN-LINK FENCE FABRIC, POSTS, RAILS, TIES, BANDS, BARS, RODS, AND OTHER FITTING AND HARDWARE SHALL CONFORM TO AASHTO M 181.

GATE (CHAIN LINK)

NOT TO SCALE



PLAN VIEW



NOTE:

1. DEPTH OF FOUNDATION SHALL BE A MINIMUM OF 6'-0" BELOW FINISHED GRADE WHERE NORMAL CONDITIONS ARE PRESENT OR PER MANUFACTURER'S RECOMMENDATION (WHICHEVER IS GREATER).
2. CONTRACTOR SHALL DETERMINE EXACT LOCATION AND DEPTH OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
3. LIGHT POLES WILL BE LOCATED IN COORDINATION WITH CLIENT AND CITY APPROVAL.

LIGHT POLE FOUNDATION DETAIL

N.T.S.

Pennsylvania 811

PENNSYLVANIA ONE CALL SYSTEM, INC. — IT'S THE LAW — CALL BEFORE YOU DIG!

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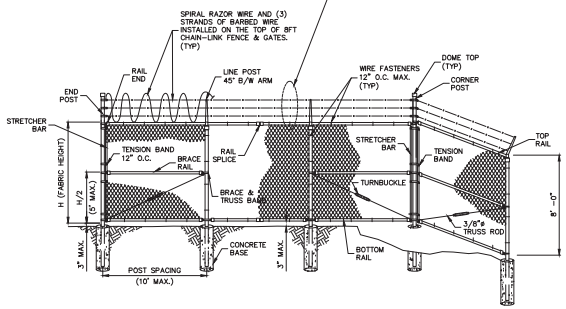


CONCRETE BASE		
FABRIC HEIGHT H	DEPTH	DIA.
FEET	INCHES	
>6 THRU 10	60	18
END/CORNER POSTS	60	24
* ALL POSTS 3 IN. CLEARANCE FROM BOTTOM OF CONCRETE BASE		

ROLL-FORMED STEEL			
PART	SIZE	THICKNESS	WEIGHT
	INCHES	GAGE	LB./FT.
TOP & BRACE RAILS	1.250 x 1.625	14	2.08
LINE POST (H = 3FT – 6FT)	1.875 x 1.625	12	2.75
LINE POST (H = >6FT – 8FT)	1.875 x 1.625	11	3.36
LINE POST (H = >8FT – 12FT)	2.250 x 1.625	11	4.02
END, CORNER & LINE BRACE POSTS	3.50 x 3.50	10	7.59

ROUND PIPE			
NOMINAL I.D.	O.D.	WALL THICK.	WEIGHT
INCHES			LB./FT.
1.25	1.660	0.140	2.27
1.50	1.900	0.145	2.72
2.00	2.375	0.154	3.65
2.50	2.875	0.203	5.79
3.00	3.500	0.216	7.58
3.50	4.000	0.226	9.11
4.00	4.500	0.237	10.79
5.00	5.563	0.258	14.62
6.00	6.625	0.280	18.97
8.00	8.625	0.322	28.55

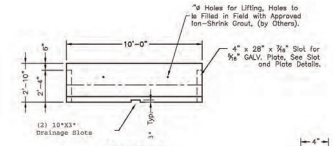
FENCE MATERIAL						
FABRIC HEIGHT	END, CORNER & LINE BRACE POSTS		LINE POSTS		TOP & BRACE RAILS	
H	ROUND PIPE I.D.	ROLL-FORMED STEEL	ROUND PIPE I.D.	ROLL-FORMED STEEL	ROUND PIPE I.D.	ROLL-FORMED STEEL
FEET	INCHES		INCHES		INCHES	
3 THRU 6	2.5	3.5 x 3.5	1.5	1.875 x 1.625	1.25	1.25 x 1.625
>6 THRU 8	2.5	3.5 x 3.5	2.0	1.875 x 1.625	1.25	1.25 x 1.625
>8 THRU 12	2.5	3.5 x 3.5	2.0	1.875 x 1.625	1.25	1.25 x 1.625

NOTES:

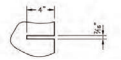
1. H (HEIGHT OF FABRIC) SHALL BE AS SHOWN ON THE PLANS – 8FT.
2. CHAIN LINK FENCE SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M 181.
3. CHAIN LINK FABRIC SHALL BE 1 1/4" MESH NO. 9 GAGE GALVANIZED SECURELY FASTENED TO LINE POSTS, RAILS, BRACES, AND STRETCHER BARS SPACED AS SHOWN HEREON. WIRE FASTENERS AND TIE CLIPS SHALL BE NO. 11 GAGE (W&M) ALUMINUM WIRE, AND HOG RINGS SHALL BE NO. 9 GAGE, ALL IN CONFORMANCE WITH ASTM F 626.
4. ATTACH FABRIC TO ALL FENCE AND GATE STRUCTURES AT 12" INTERVALS VERTICALLY AND AT 12" HORIZONTALLY.
5. STEEL POSTS, RAILS, AND GATE FRAMES SHALL CONFORM TO AASHTO M 181 TYPE 1, GRADE 1 OR GRADE 2.
6. TENSION WIRE SHALL BE CONTINUOUS BETWEEN END OR CORNER POST AND LINE BRACE POST. A TURNBUCKLE OR OTHER APPROVED TIGHTENING DEVICE SHALL BE USED FOR EACH CONTINUOUS SPAN OF TENSION WIRE.
7. TENSION WIRE SHALL BE AS SPECIFIED IN AASHTO M 181.
8. CONCRETE FOOTINGS SHALL HAVE TOPS CROWNED AT GROUND LEVEL AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000PSI AT 28 DAYS. ALL CONCRETE SHALL HAVE A MAXIMUM WATER/CEMENT (W/C) RATIO OF 0.40 AND SHALL HAVE ±6% ENTRAINED AIR.
9. CHAIN LINK FABRIC SHALL BE KNUCKLED AT THE TOP AND BOTTOM SELVAGES.
10. BRACE RAIL WILL NOT BE REQUIRED FOR 36", 42" OR 48" FABRIC HEIGHTS. BRACE RAIL FOR FENCE WITH ROLL-FORMED STEEL ELEMENTS IS 12" BELOW THE TOP RAIL.
11. FENCE MAY BE CONSTRUCTED WITH EITHER ROUND PIPE OR ROLL-FORMED STEEL COMPONENTS.
12. FINISH (MESH, POSTS, AND RAIL): GALVANIZED.

FENCE – CHAIN LINK

NOT TO SCALE



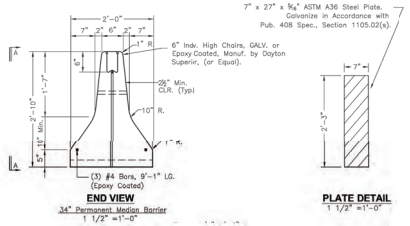
PROFILE A-A



SLOT DETAIL

3" = 1'-0"

Notes:
1. Class AA Concrete fc = 3750 P.S.I. Minimum Strength @ 28 Days
2. Steel Reinforcement - ASTM A-615, Grade 60
3. All Material in accordance with Publication 408 Section 714



END VIEW

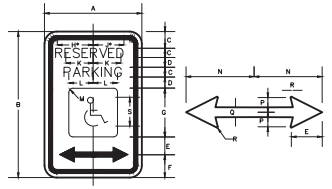
34" Permanent Median Barrier
1 1/2" =1'-0"

PLATE DETAIL

1 1/2" =1'-0"

CONCRETE BARRIER

NOT TO SCALE

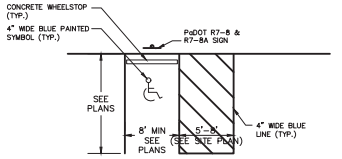


COLOR: LEGEND AND BORDER — GREEN (NON-REFLECTORIZED)
BACKGROUND — WHITE (NON-REFLECTORIZED)
SYMBOL — WHITE (NON-REFLECTORIZED)
BACKGROUND — BLUE (NON-REFLECTORIZED)

SIGN SIZE	DIMENSIONS																		
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	MARGIN	BORDER
12x18	12	18	2	1	1/2	2	1/2	9	1/8	3	4	1/4	3	1/2	3	7/8	7/8	4	3/8	3/8

RESERVED PARKING SIGN (R7-8)

N.T.S.



VAN ACCESSIBLE HANDICAP PARKING SPACE LAYOUT

N.T.S.

NO.	BY	DATE	REVISIONS
1	DJ	10/21/20	ELECTRICAL PLANS

COMMONWEALTH OF PENNSYLVANIA — REGISTERED PROFESSIONAL — CHRISTOPHER W. JENSEN — ENGINEER — NO. PE-070464 — COMMONWEALTH OF PENNSYLVANIA

CHRISTOPHER W. JENSEN, P.E.
LICENSED PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA
LICENSE NO. PE070464
07/10/2020
DATE

PHILADELPHIA Parking Authority

PHILADELPHIA PARKING AUTHORITY
PPA IMPOUND LOT
6 E OREGON AVENUE, PHILADELPHIA, PA 19148
SITE CONSTRUCTION DETAILS

T&M ASSOCIATES
YOUR GOALS. OUR MISSION.
1700 MARKET STREET
SUITE 3110
PHILADELPHIA, PA 18018
TEL 215-282-7850
FAX 215-627-3459
www.tandmassociates.com
OFFICES LOCATED IN
DELAWARE, INDIANA, KENTUCKY, MASSACHUSETTS, MICHIGAN, NEW JERSEY, OHIO AND PENNSYLVANIA

DESIGNED BY	DFM
CHECKED BY	GD
DRAWN BY	MB
DATE	07/13/2020
SCALE	AS NOTED
PROJ. NO.	PHPA00030
DRAWING	DET-1
SHEET	6 OF 10

Luminoso LED LIGHTING

Project	
Type	
Model	
Date	

EFC2 Series LED Wall Pack

Specification Features

- Sealed die-casting profile for outdoor applications.
- Casting thermally conducts LED heat to optimize performance and long life.
- Suitable for applications requiring 3G testing prescribed by ANSI C136.31.
- Light engines are available in standard 4000 K and 5000 K (70 CRI) configurations.
- Scalable Lumen Packages from 3,700 to 18,000 Lumens.
- Tempered UV coated flat lens provide outstanding performance, uniformity and glare control.
- Universal 120-277 or 347-480 VAC input voltage.
- Greater than 0.9 power factor, less than 20% harmonic distortion, and is suitable for operation in -40°C to 45°C ambient environments.
- Estimated 50,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations.

ACCESSORIES

Photocell
No. PC-L-120-277V
LED, Photocell is field installed or pre-installed in factory by requesting.

PIR Sensor, 120-277V
LED, Sensor can be pre-installed in factory or field installed

Emergency Battery Backup
LED, Sensor can be pre-installed in factory or field installed
Only available for 27W-45W 70W-90W *

ORDER INFORMATION

EXAMPLE: EFC2-45W-Y-30K-3M-14-BZ

Series	Wattage	Voltage	CCT	Optics	Mount	Photocell	Motion Sensor	Emergency*	Finish
EFC2	27W 45W 70W 90W 135W	Y = 120-277V HV = 347-480V (27W NOT available)	40K = 4000K 50K = 5000K	3M	14 = Direct Mount	Blank=None PC=120-277V	Blank = None MS = Motion Sensor	Blank = None EB = Emergency Battery Back-up**	BK=Black BZ=Bronze SV=Silver WH=White

Enter configuration:

** Special Order

06.29.2019 Luminosoled.com

W TYPE LED LIGHTING
NOT TO SCALE

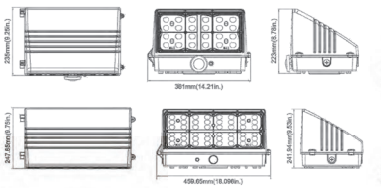
Luminoso

EFC2 Series

PERFORMANCE DATA

WATTS	VOLTAGE	CRI	LUMENS 4000K	EFFICACY 4000K	LUMENS 5000K	EFFIC.CY 500K
27W	120-277VAC	70	3,700	137lm/W	3,750	139lm/W
45W	120-277/ 347-480VAC	70	6,000	133lm/W	6,100	136lm/W
70W	120-277/ 347-480VAC	70	9,400	134lm/W	9,450	135lm/W
90W	120-277/ 347-480VAC	70	12,200	136lm/W	12,300	137lm/W
135W	120-277/ 347-480VAC	70	18,000	133lm/W	18,000	133lm/W

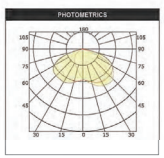
DIMENSIONS



Net Weight:
27W: 6.667lb
45W: 6.688lb
70W: 7.143lb

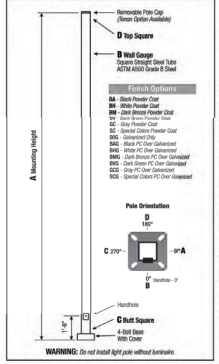
Net Weight
90W: 10.721lb
135W: 11.195lb

PHOTOMETRICS



06.29.2019 Luminosoled.com

SSS Square Straight Steel Pole No Arm — 4-Bolt Base



Pole
Pole shaft shall be weldable-grade, cold-rolled, commercial quality carbon steel tubing conforming to ASTM A500 Grade B. Options include 11 gauge and 7 gauge. All welds shall conform to AWS D1.2 using E70T6-S electrodes.

Base Style
4-Bolt Steel Plate Base Flange of fabricated hot rolled carbon steel conforming to ASTM A36 or equivalent (36 ksi minimum yield) with 2-piece Base Cover and attaching hardware.

Anchorage
Anchorage Kit will include four (4) L-shaped Steel Anchor Bolts conforming to AASHTO M314-90 Grade 55, Ten inched (10") of threaded end will be galvanized per ASTM A153. Kits will contain eight (8) Hex Nuts, four Hi Lock Washers, and eight (8) Flat Washers (all components Galvanized Steel). A paper bolt circle template will be provided.

Handhole
Reinforced, 2" x 5" Handhole with cover, stainless steel screw and backbar. A grounding provision incorporating a tapped 1/2"-13NC hole will be provided.

Base Cover
Square ABS plastic Base Covers are standard on all SSS poles specified in BA-Black, BM-Dark Bronze and BH-White. SSS poles specified in all other colors will be manufactured of metal materials. Custom specification of SSS square metal style Base Covers in BA, BM and BH powder coated finishes is available.

Vibration Damper
If determined necessary by Hapco an internal, factory installed, Field Made Vibration Damper will be provided. Customer specification of the damper is available.

EPA Notes: *Effective Projected Area (EPA) in square feet. EPA's calculated using wind velocity (mph) indicated in accordance with ANSI A58.1-2012. EPA is only a 25 user design life. Maximum EPA is based on the luminaire weight shown. Increased luminaire weight may reduce the maximum EPA. If weight is exceeded, or if other design fits or code is required, please consult the factory.*

Power Performance hapco pole products
800-368-7721 • www.hapco.com

Mounting Options

Side Drill Mount
Includes removable pole cap.
NOTE: A luminaire drilling template must be supplied at time of order.

D190 D290 D215 D390 D400

D000 – No Drilling
DDUS – Custom Drilling*
*Specify Number and Orientation

Tenon Mount
For Tenon Mount applications specify both tenon diameter and length.

T204 - 2-3/8" O.D. x 4"
T304 - 2-7/8" O.D. x 4"
T306 - 3-1/2" O.D. x 6"
T406 - 4" O.D. x 6"
T435 – Custom Tenon**
**Specify O.D. and Height

Electrical Box Options*

PA - 30° Up, "D"
PB - 30° Up, "B"
PC - 30° Up, "A"
PD - 30° Up, "C"
PE - 30° Up, "D"
PF - 30° Up, "B"
PG - 30° Up, "A"
PH - 30° Up, "C"
FI - 24" Up, "D"
FK - 24" Up, "A"
FL - 24" Up, "C"
FZ - Custom**

*GFI Receptacle *Options Available (Specify in Accessories)
**Specify Height and Orientation

Assembly	Height	Gauge	Butt Sz.	Base Style	Finish	Mounting Options	Electrical Box	Accessories/Options
SSS	39	D	6	4				

A Mtg. Ht.	B Wall Gauge	C Butt Sz.	Total Lbs. Weight	Maximum EPA 90	100	110	120	130	140	Catalog Number
39	7	6	200	8.2	4.2	3.1	0.6	-	-	SSS39D6-4-**

G Butt Sz.	D Top Sz.	F Mast Cen. Dist.	G Base Sz.	H Bolt Proj.	I Bolt Size
6	6	11 - 13	12.5	4.875	1 x 36 x 4 (dimensions in inches)

Accessory/Options*

(*=4 – Threaded 1/2" Coupling)
c34 - Threaded 3/4" Coupling**
c10 - Threaded 1" Coupling**
pHH - Extra Handhole**
gF1 - Duplex GFI Receptacle (HH) with Cover
gF2 - Duplex GFI (HH) with In-Use Cover
LAB - Loose Anchor Bolts
PC - Loss Pole Cap
TAB - Pre-shipped Anchor Bolts
VIA - Vibration Damper
*Add all that apply (Example: DPL-LAB-VDH)
**Specify Location

Customer Name:
Project: Location: Quantity:
Notes:

STEEL POLE
NOT TO SCALE

Catalog # :	Project :
Prepared By :	Date :

Mirada Large - MRL Outdoor LED Area Light

The MRL is a Specification grade LED Area light solution, designed for retrofit as well as for new construction. It is ideal for a wide variety of spec grade applications where high performance & aesthetics are critical. MRL will meet most lighting requirements for Automotive Dealerships, Big Box Retail applications or any site requiring high lumen output of controlled, uniform light levels.

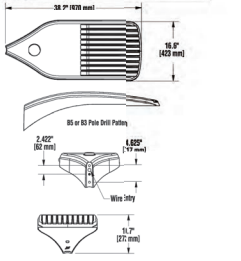
Features & Specifications

Optical System
- State-of-the-Art one piece silicone optic sheet delivers industry leading optical control with an integrated gasket to provide IP66 rated sealed optical chamber in 1 component.
- Proprietary silicone refractor optics provide exceptional coverage and uniformity in IES Types 2, 3, 5W, FT and FTA.
- Silicone optical material does not yellow or crack with age and provides a typical light transmittance of 93%.
- Zero uplight.
- Available in 5000K, 4000K, 3000K, and 2700K color temperatures per ANSI C78.377.
- Minimum CRI of 70. Optional 90 CRI available, consult factory for lead time.
- Integral Louver (IL) option available for improved back-light control without sacrificing street side performance. See page 5 for more details.

Electrical
- High-performance driver features over-voltage, under-voltage, short-circuit and over temperature protection.
- 0-10V dimming (10% - 100%) standard.
- Standard Universal Voltage (120-277 Vac) Input 50/60 H; or optional High Voltage (347-480 Vac).
- L90 Calculated Life: >100k Hours (See Lumen Maintenance on Page 2)
- Total harmonic distortion: <20%
- Operating temperature: -40°C to +50°C (-40°F to +122°F), 65L lumen package rated to +40°C.
- Power factor: >.90
- Input power stays constant over life.
- Field replaceable surge protection device meets a minimum Category C Low operation (per ANSI/IEEE C62.41.2).
- High-efficacy LEDs mounted to metal-core circuit board to maximize heat dissipation
- Components are fully encased in potting material for moisture resistance. Driver complies with FCC standards. Driver and key electronic components can easily be accessed.

Dimmable · Bluetooth · IP66 · ARRA Ready Compliant · cULus Listed · Made in the USA · RoHS Compliant · Title 24 2013 · kia · DLC · DLC Premium

Product Dimensions



Specifications and dimensions subject to change without notice.

LSI Industries Inc. 10000 Alliance Rd. Cincinnati, OH 45242 • www.lsi-industries.com • (513) 372-3200 • LSI Industries Inc. All Rights Reserved.

Mirada Large - MRL Outdoor LED Area Light

Features & Specifications (Cont.)

Construction
- Rugged die-cast aluminum housing, optical frame, and driver access cover.
- Designed to mount to round or square poles without need for pole adapters.
- Luminaire is proudly manufactured in the U.S. of U.S. and importer parts.
- Fixtures are finished with LSI's DuraGrip® polyester powder coat finishing process. The DuraGrip finish withstands extreme weather changes without cracking or peeling. Other standard LSI finishes available. Consult factory.
- Shipping weight: 60 lbs in carton.

Controls

Wireless Controls System

To make this fixture AirLink ready, simply order one of the following options:

a. The integrated Wireless Lighting Controller: ALSC or VLSCH (see ordering guide) as the controls option, or

b. Integrated Wireless Controller option (above) with integrated motion sensor: ALSCS (ordering guide for mounting heights or

c. The 7-Pin Photoelectric Control Receptacle: CR7P as the controls option; and either the 5-Pin or 7-Pin Twist Lock Controller: ALSC UNV TLS or ALSC UNV TLT as an accessory

To see how the components of AirLink system work together, reference the diagram in the controls section of this specsheet. For more information on our AirLink products, visit our website: www.lsi-airlink.com/airlink-synapse/

Stand-Alone Controls

a. Integral Passive Infrared Bluetooth™ Motion/PhotocellSensor (IMSBT)
- Switches luminaire light levels based on motion and daylight (see the controls section for more details)
- Fixtures operate independently and can be commissioned via iOS or Android configuration app

b. 7-pin ANSI C136.41-2013 photocontrol receptacle (CR7P)
- Available for twist lock photocontrols or wireless control modules

Installation
- A single fastener secures the hinged door, underneath th housing and provides quick & easy access to the electrical compartment for installing/ servicing.
- Included terminal block accepts up to 12 ga. wire.
- Utilizes both B3 and B5 drill patterns for easy fastening of LSI products. (See drawing on page 1)

Warranty
- LSI LED Fixtures carry a 5-year warranty.

Listings
- Listed to UL 1598 and UL 8750.
- RoHS Compliant.
- State of California Title 24 Compliant; with IMSBT, ALSC or ALSCH Options.
- DesignLights Consortium® (DLC) qualified product. Not if versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.
- American Recovery and Reinvestment Act Funding Compliant.
- IDA compliant; with 3000K color temperature selection.
- Suitable for wet locations.
- IP66 rated Luminaire. IP66 rated optical chamber.
- 3G rated for ANSI C136.31 high vibration applications

Performance

ELECTRICAL DATA*

Lumens	120V	208V	240V	277V	347V	480V
40L	2.44A	1.41A	1.23A	1.06A	0.84A	0.61A
50L	3.37A	1.94A	1.68A	1.46A	1.16A	0.84A
65L	4.93A	2.85A	2.47A	2.14A	1.71A	1.23A

*Electrical data at 25C (77F). Actual voltage may differ by +/-10%.

RECOMMENDED LUMEN MAINTENANCE[1]

Ambient Temperature C	Lumen Multiplier 0 hrs.[2]	25K hrs.[3]	50K hrs.[3]	75K hrs.[3]	100K hrs.[3]
0°C - 40C	100%	100%	97%	94%	92%

1 - Lumen maintenance values at 25°C are calculated per TM-21 based on LM-80 data and in-situ luminaire testing.
2 - In accordance with IESNA TM-21-11, Projected Values represent interpolated value based on time durations that are within six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing (DUT) i.e. the packaged LED chip).
3 – In accordance with IESNA TM-21-11, Calculated Values represent time durations that exceed six times NA LM-80-08 total test duration (in hours) for the device under testing (DUT) i.e. the packaged LED chip).

LUMINAIRE EPA CHART - MRL

Tilt Degree	0°	20°	40°	Tilt Degree	0°	20°	40°
Single	0.8	2.2	2.9	180°	2.0	3.8	4.5
D180°	1.6	2.2	2.9	TW120°	2.0	3.0	6.0
D90°	1.2	3.0	3.7	Q90°	2.0	3.8	4.5

LSI Industries Inc. 10000 Alliance Rd. Cincinnati, OH 45242 • www.lsi-industries.com • (513) 372-3200 • LSI Industries Inc. All Rights Reserved. 1/16/20

P TYPE LIGHTING
NOT TO SCALE

Pennsylvania811 — PENNSYLVANIA ONE CALL SYSTEM, INC. — CALL BEFORE YOU DIG

ATTENTION ALL CONTRACTORS: LOCATIONS OF ALL EXISTING UTILITIES SHOWN HEREON HAVE BEEN DEVELOPED FROM UTILITY COMPANY RECORDS AND/OR ABOVE-GROUND INSPECTION OF THE SITE. COMPLETENESS OR ACCURACY OF TYPE, SIZE, DEPTH OR HORIZONTAL LOCATION OF UNDERGROUND FACILITIES OR STRUCTURES CANNOT BE GUARANTEED. PURSUANT TO REQUIREMENTS OF THE PENNSYLVANIA LEGISLATIVE ACT NUMBER 287 OF 1974 AS AMENDED BY ACT 121 OF 2008, CONTRACTORS MUST VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES AND FACILITIES PRIOR TO START OF WORK.
SERIAL NO.:

NO.	REVISIONS	BY	DATE
1	ELECTRICAL PLANS	DJ	10/21/20

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL CHRISTOPHER W. JENSEN ENGINEER NO. PE-078486

CHRISTOPHER W. JENSEN, P.E.
LICENSED PROFESSIONAL ENGINEER

COMMONWEALTH OF PENNSYLVANIA
LICENSE NO. PE078484

07/10/2020
DATE

PHILADELPHIA Parking Authority

PHILADELPHIA PARKING AUTHORITY
PPA IMPOUND LOT
6 E OREGON AVENUE, PHILADELPHIA, PA 19148

LIGHTING DETAILS I

YOUR GOALS. OUR MISSION.
1700 MARKET STREET
SUITE 3110
PHILADELPHIA, PA 19018
TEL 215-282-7850
FAX 215-627-34.59
www.tandmassociates.com
OFFICES LOCATED IN:
DELAWARE, INDIANA, KENTUCKY, MASSACHUSETTS, MICHIGAN, NEW JERSEY, OHIO AND PENNSYLVANIA.

DESIGNED BY	DFM
CHECKED BY	GD
DRAWN BY	MB
DATE	07/13/2020
SCALE	AS NOTED
PROJ. NO.	PHPA00032
DRAWING	LTE-2
SHEET	7 OF 10

HUBBELL Outdoor Lighting

DATE: | LOCATION:
TYPE: | PROJECT:
CATALOG #:

RATIO Flood

MEDIUM AND LARGE

RATIO

RELATED PRODUCTS

RATIO Family · RFL1 · RFL2 · RFL3

BROCHURE · CATALOG PAGE · INSTALL INSTRUCTIONS

FEATURES

- Medium and Large LED flood with a variety of NEMA distributions for lighting applications such as area safety/security, accent, flag pole columns, or signs
- Part of the Ratio flood series, this luminaire was designed in cohesion with the site/area products to provide a sleek and timeless look
- Features a dense optical array, providing reduced pixelation and increased visual comfort without compromising performance
- Applications include safety/security, accent, flag pole, columns and signs

IP66 · DLC · DLC PREMIUM

CONTROL TECHNOLOGY

SiteSync · NX DISTRIBUTED INTELLIGENCE

SPECIFICATIONS

CONSTRUCTION
- Corrosion resistant, rugged die-cast aluminum housing with powder coatpaint finish
- High impact UV stabilized acrylic outer lens protects LEDs and allows for cleaning and debris removal
- Internal venting fins create optimal heat dissipation and allow all water to drain from the face of the luminaire
- Visor, louver and vandal Lens options
- Easy maintenance access to electrical components with removal of four screws from back of fixture housing
- Lens hardware is internal to the fixture allowing for uniform pressure on the gasket for an optimal water tight seal

OPTICS
- 176 or 360 midpower LEDs
- Stock Versions: 4000K and 5000K CCT
- Variety of NEMA distributions: - N (3x3), M (4x4), and W (6x6). Stock version Wide (6x6) only
- Entire optical aperture illuminates to create a larger luminous surface area resulting in a low glare appearance without sacrificing optical performance

CONTROLS
- Photo control, occupancy sensor and wireless available for complete on/off dimming control

CONTROLS (CONTINUED)
- 7-pin ANSI C136.41–2013 photocontrol receptacle option available for twist lock photocontrols or wireless control modules (control accessories sold separately)
- 0–10V dimming leads available for use with control devices (provided by others), must specify lead length
- 0–10V dimming driver standard, continuous dimming option to have leads pulled out for easy connection
- SiteSync™ wireless control system is available via 7-pin and can be ordered separately. See ordering information and details at: www.hubbelllighting.com/sitesync

INSTALLATION
- Interchangeable knuckle and trunnion mounting options
- Knuckle arm fitter option available for 2-⅜" CD tenon. 180 degrees of adjustability (with no options). 4 degree adjustable increments
- Trunnion option available for surface and crossarm mounting using (1) ¾" or (2) ½" size through bolts

ELECTRICAL
- 120–480V operation, 50/60Hz
- Driver IP66 and RoHS compliant driver
- Ambient operating temperature -40°C to 40°C. (265W configuration rated for 25°C)

ELECTRICAL (CONTINUED)
- 7-pin module can limit backwards rotation of the luminaire
- Drivers have 90% power factor and less than 20% THD
- LED drivers have output power over-voltage, over-current protection and short circuit protection with auto recovery
- 10kA surge protector optional

CERTIFICATIONS
- Fixture is IP66 rated
- Listed to UL1598 for use in wet locations
- DLC® (DesignLights Consortium Qualified, with some Premium Qualified configurations. Please refer to the DLC website for specific product qualifications at www.designlights.org

WARRANTY
- 5 year limited warranty
- See HLI Standard Warranty for additional information

KEY DATA	
Lumen Range	12,000–30,000
Wattage Range	124–266
Efficacy Range (LPW)	116–125
Reported Life (Hours)	L70>191,000
Weights lbs. (kg)	16.0–25.7 (7.2–11.66)

HUBBELL Lighting

HUBBELL Outdoor Lighting

DATE: | LOCATION:
TYPE: | PROJECT:
CATALOG #:

RATIO Flood

MEDIUM AND LARGE

STOCK ORDERING INFORMATION

Catalog Number	Mounting	Distribution	Wattage	Voltage	CCT	Lumens	LPW	Weight lbs. (KG)	Finish
RFL4-120-5K-K	Knuckle	Wide	124	120–277V	5000K	14746	122	16.0 (7.26)	Bronze
RFL4-120-4K-K	Knuckle	Wide	124	120–277V	4000K	15119	125	16.0 (7.26)	Bronze
RFL4-120-5K-T	Trunnion	Wide	124	120–277V	5000K	14746	122	16.0 (7.26)	Bronze
RFL4-120-4K-T	Trunnion	Wide	124	120–277V	4000K	15119	125	16.0 (7.26)	Bronze
RFL5-265-5K-K	Knuckle	Wide	266	120–277V	5000K	29362	116	25.7 (11.66)	Bronze
RFL5-265-4K-K	Knuckle	Wide	266	120–277V	4000K	30106	119	25.7 (11.66)	Bronze
RFL5-265-5K-T	Trunnion	Wide	266	120–277V	5000K	29362	116	25.7 (11.66)	Bronze
RFL5-265-4K-T	Trunnion	Wide	266	120–277V	4000K	30106	119	25.7 (11.66)	Bronze
RFL-TRN-XX[1]	Trunnion Accessory Kit								

1 Specify finish color to match fixture

ORDERING GUIDE

Example: RFL4-176L-95-3K7-M-UNV-K-GYS

CATALOG #

Model	
RFL4	Ratio Flood Size 4
RFL5	Ratio Flood Size 5

# LEDs Wattage	
176L-95	176 LEDs-12000lm
176L-120	176 LEDs-15000lm
360L-130	360 LEDs-18000lm
360L-190	360 LEDs-25000lm
360L-265	360 LEDs-30000lm

CCT/CRI	
3K7	3000K, 70 CRI
4K7	4000K, 70 CRI
5K7	5000K, 70 CRI

Distribution	
N	Narrow, 2x2
M	Medium Flood, 4x4
W	Wide Flood, 6x6

Voltage	
UNV	Universal 120–277
120	120V
208	208V
240	240V
277	277V
347	347V
480	480V

Mounting	
K	Knuckle
T	Trunnion

Color	
GYS	Light gray smooth
DB	Dark bronze textured
BL	Black textured
GT	Graphite textured
PS	Platinum silver smooth
WH	White textured
CC	Custom color

Control Options	
PC	Button style photocontrol
CD	Continuous dimmable

Options	
SP	Surge Protector
F	Fusing

Control Options	
NX Standalone	
NXSP14F[1]	NX, PIR BT Occ. Sensor, Daylight Harvesting, up to 14' mounting height
NXSP30F[1]	NX, PIR BT Occ. Sensor, Daylight Harvesting, 14'–30' mounting height
NX Networked – Wireless	
NXSPW14F[1]	NX Wireless, PIR, BT Occupancy Sensor, Daylight Harvesting, up to 12' mounting height
NXSPW30F[1]	NX Wireless, PIR, BT Occupancy Sensor, Daylight Harvesting, 14'–30' mounting height
NXWE[1]	NX Wireless Enabled
Third-Party Control Options	
SCP-_F[1]	Programmable occupancy sensor
7PR[1,2]	7-Pin twist lock receptacle
7PR-SC[1,2]	7-Pin receptacle with shorting cap
7PR-MD-F[1,2]	Low voltage sensor for 7PR
7PR-TL[1,2]	7-Pin PCR with photo control

1 Option available with kunckle mounting
2 Limits backwards rotation based on module height

HUBBELL Lighting

F TYPE LIGHTING

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PENNSYLVANIA ONE CALL SYSTEM, INC. — STOP - CALL BEFORE YOU DIG

ATTENTION ALL CONTRACTORS: LOCATIONS OF ALL EXISTING UTILITIES SHOWN HEREON HAVE BEEN DEVELOPED FROM UTILITY COMPANY RECORDS AND/OR ABOVE-GROUND INSPECTION OF THE SITE. COMPLETENESS OR ACCURACY OF TYPE, SIZE, DEPTH OR HORIZONTAL LOCATION OF UNDERGROUND FACILITIES OR STRUCTURES CANNOT BE GUARANTEED. PURSUANT TO REQUIREMENTS OF PENNSYLVANIA LEGISLATIVE ACT NUMBER 287 OF 1974 AS AMENDED BY ACT 121 OF 2008, CONTRACTORS MUST VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES AND FACILITIES PRIOR TO START OF WORK.
SERIAL NO.:

NO.	BY	REVISIONS	DATE
1	DJ	ELECTRICAL PLANS	10/21/20

CHRISTOPHER W. JENSEN, P.E.
LICENSED PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA
LICENSE NO. PE076464
07/10/2020
DATE

COMMONWEALTH OF PENNSYLVANIA — REGISTERED PROFESSIONAL CHRISTOPHER W. JENSEN ENGINEER NO. PE-076464

PHILADELPHIA Parking Authority

PHILADELPHIA PARKING AUTHORITY

PPA IMPOUND LOT

6 E OREGON AVENUE, PHILADELPHIA, PA 19148

LIGHTING DETAILS II

T AND M

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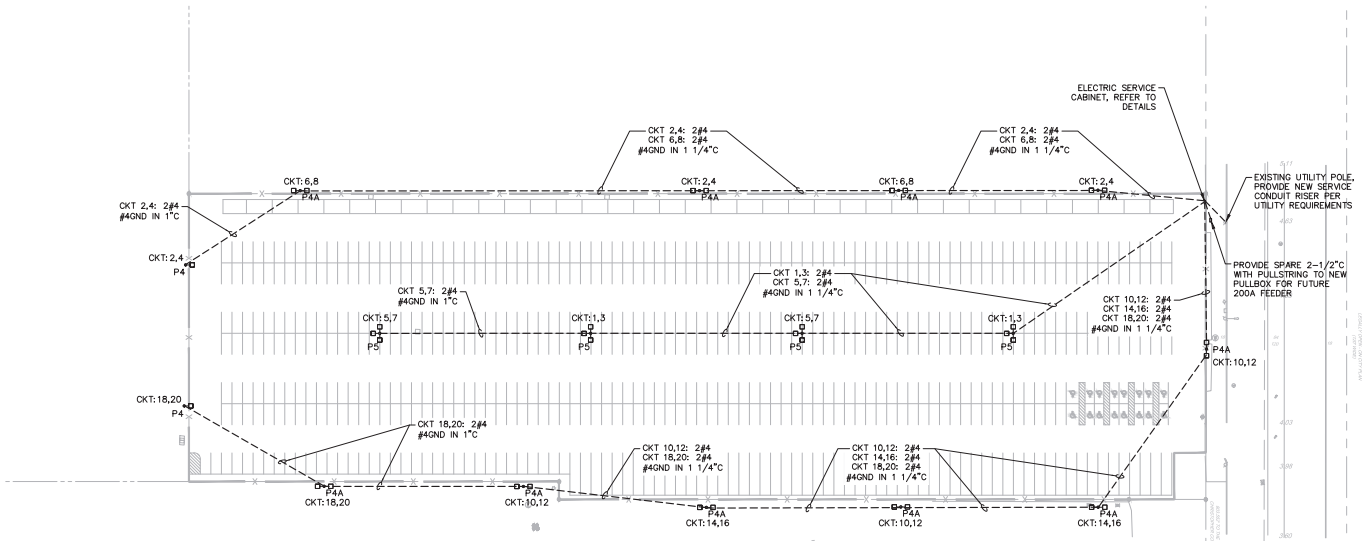
1700 MARKET STREET
SUITE 3110
PHILADELPHIA, PA 18018
TEL 215-282-7850
FAX 215-627-3459
www.tandmassociates.com

OFFICES LOCATED IN:
DELAWARE, INDIANA, KENTUCKY, MASSACHUSETTS, MICHIGAN, NEW JERSEY, OHIO AND PENNSYLVANIA

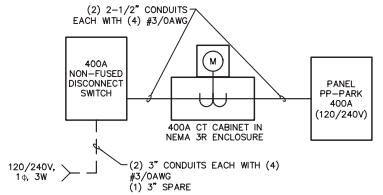
DESIGNED BY	DFM	DRAWING	LTE-3
CHECKED BY	GD		
DRAWN BY	MB	SHEET	8 OF 10
DATE	07/13/2020		
SCALE	AS NOTED		
PROJ. NO.	PHPA00032		



LOCATION ENCLOSURE — 22 KAIC — MFG.: SQUARE "D" CO. MOUNT: SURFACE

PANEL PP-PARK 120/240 VOLTS — 1 PHASE — 3 WIRE — 400 AMP MAINS 400A MAIN

CKT. NO.	SERVES	WIRE & CONDUIT	TRIP POLE	LOAD KVA	LOAD KVA	TRIP POLE	WIRE & CONDUIT	SERVES	CKT. NO.
1	(2) P5 FIXTURES	SEE SITE PLAN	20/2	3.55	2.96	20/2	SEE SITE PLAN	(2) P4A & (1) P4 FIXTURES	2
3									4
5	(2) P5 FIXTURES	SEE SITE PLAN	20/2	3.55	2.37	20/2	SEE SITE PLAN	(2) P4A FIXTURES	6
7									8
9	(FUTURE BUILDING)	SEE SITE PLAN	200/2	–	3.55	20/2	SEE SITE PLAN	(3) P4A FIXTURES	10
11									12
13	TIME CLOCKS	2#12, #12G	20/1	0.01	2.37	20/2	SEE SITE PLAN	(2) P4A FIXTURES	14
15	SPARE	–	20/1	–					16
17	SPARE	–	20/2	–	1.78	20/2	SEE SITE PLAN	(1) P4A & (1) P4 FIXTURES	18
19									20
21	SPACE							SPACE	22
23	SPACE							SPACE	24
25	SPACE							SPACE	26
27	SPACE							SPACE	28
29	SPACE							SPACE	30
				7.11	13.03		20.14 KVA = 84 A		



ELECTRICAL ONE LINE DIAGRAM
NOT TO SCALE

LIGHT FIXTURE SCHEDULE					
Fixture Type	Fixture Description	Manufacturer	Catalog Number	Total Watts	Photometric File Name
P4	AREA LIGHT, TYPE 4 WITH INTERNAL HSS, MOUNTED TO 40FT POLE	LSI INDUSTRIES INC.	MRL-LED-6SL-SIL-FT-40-70-IL	592	MRL-LED-6SL-SIL-FT-40-70CRI-IL.IES
P4A	AREA LIGHT, TYPE 4 WITH INTERNAL HSS, 2@180 ON DOUBLE CROSS ARMS MOUNTED TO 40FT POLE	LSI INDUSTRIES INC.	(2) MRL-LED-6SL-SIL-FT-40-70-IL	1184	MRL-LED-6SL-SIL-FT-40-70CRI-IL.IES
P5	AREA LIGHT, TYPE 5,3@90 MOUNTED TO 40FT POLE	LSI INDUSTRIES, INC	(3) MRL-LED-6SL-SIL-5W-40-70	1776	MRL-LED-6SL-SIL-5W-40-70CRI.IES

50' 25' 0 50' 100'
1" = 50'

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SERIAL NO.:

NO.	BY	ELECTRICAL PLANS REVISIONS	DATE
1	DJ		10/21/20

COMMONWEALTH OF PENNSYLVANIA — REGISTERED PROFESSIONAL — CHRISTOPHER W. JENSEN — ENGINEER — NO. PE-076484

CHRISTOPHER W. JENSEN, P.E.
LICENSED PROFESSIONAL ENGINEER
07/10/2020
DATE
COMMONWEALTH OF PENNSYLVANIA
LICENSE NO. PE076484

PHILADELPHIA Parking Authority

PHILADELPHIA PARKING AUTHORITY
PPA IMPOUND LOT
6 E OREGON AVENUE, PHILADELPHIA, PA 19148

ELECTRICAL LIGHTING PLAN, ONE LINE AND PANEL SCHEDULE

YOUR GOALS. OUR MISSION.
1700 MARKET STREET
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PHILADELPHIA, PA 18018
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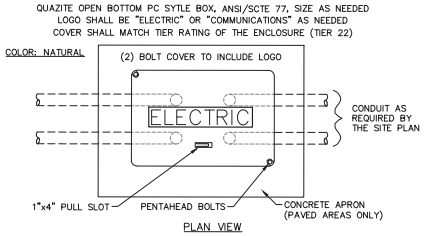
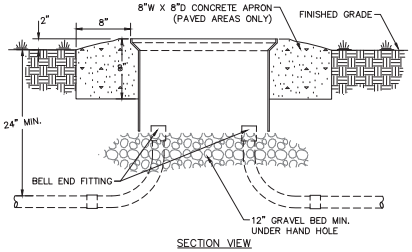
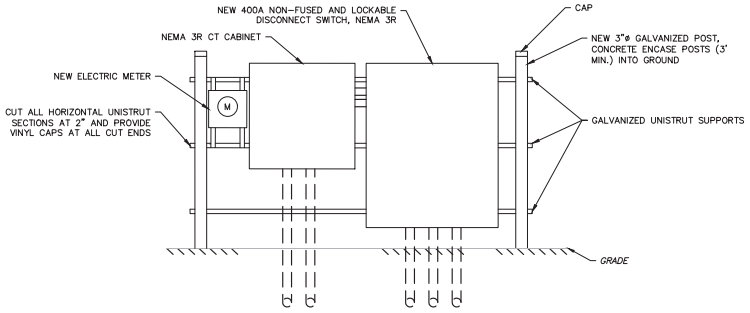
DRAWN BY	MB
DATE	07/13/2020
SCALE	AS NOTED
PROJ. NO.	PHPA00032
DRAWING	EL-1
SHEET	9 OF 10





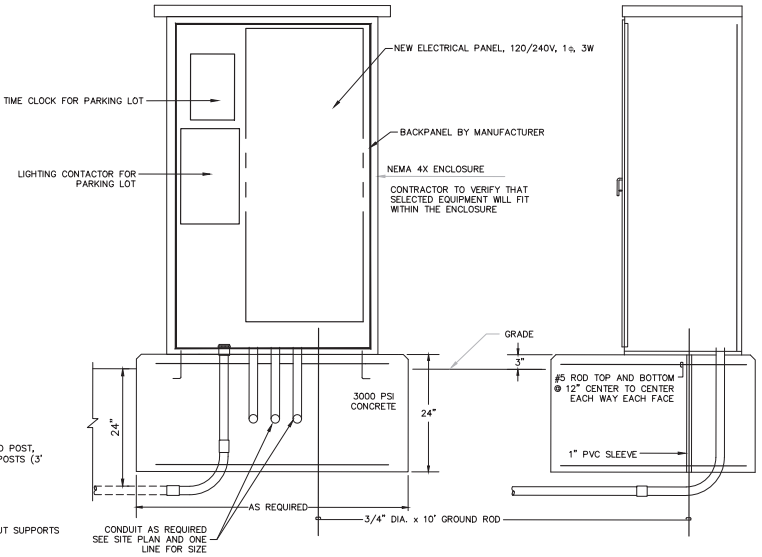
PULLBOX DETAIL

NOT TO SCALE



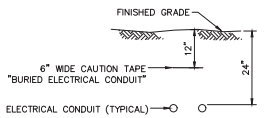
ELECTRIC SERVICE EQUIPMENT

SCALE: NONE



ELECTRIC SERVICE CABINET

SCALE: NONE



UNENCASED CONDUIT BURIAL DETAIL

NOT TO SCALE

ELECTRICAL CONSTRUCTION NOTES

1. THE ELECTRICAL WORK ON THIS PROJECT SHALL BE PERFORMED IN ACCORDANCE WITH REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE.
2. ALL CONDUIT RUNS ARE DIAGRAMATICALLY SHOWN ON THE DRAWINGS. THE FINAL ROUTING OF CONDUITS SHALL BE DETERMINED BY THE ELECTRICAL CONTRACTOR AND APPROVED BY THE ENGINEER. CONDUIT SHALL BE INSTALLED IN A MANNER TO PREVENT CONFLICTS WITH EQUIPMENT AND STRUCTURAL CONDITIONS. EXPOSED CONDUITS SHALL BE INSTALLED PARALLEL TO BEAMS AND WALLS. CONDUIT SHALL BE TERMINATED SO AS TO PERMIT NEAT CONNECTIONS TO EQUIPMENT.
3. WIRE SIZES SHOWN ON PLANS MAY BE OVERSIZED TO ACCOMMODATE VOLTAGE DROP. CONTRACTOR MAY ELECT TO TAP DOWN WIRE SIZE AT SOURCE AND/OR APPLIANCE IN A LISTED MANNER COMPLIANT WITH THE CODE.
4. CONTRACTOR SHALL PROVIDE APPURTENANCES AS REQUIRED (TRANSFORMERS, RELAYS, ETC.) TO PROVIDE THE PROPER POWER SUPPLY FOR ANY VOLTAGES REQUIRED FOR A COMPLETE INSTALLATION. ANY VOLTAGE SUPPLIES REQUIRED BY THE SUBMITTED EQUIPMENT, FOR POWER OR CONTROLS, SHALL BE INCLUDED.
5. THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL A COMPLETE GROUNDING SYSTEM IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. ELECTRICAL WIRE RACEWAYS, APPARATUS AND PANEL ENCLOSURES AND OTHER NON-CURRENT CARRYING METAL PARTS SHALL BE MECHANICALLY JOINED TO FORM A CONTINUOUS CONDUCTING METALLIC PATH AND ASSURE ELECTRICAL CONTINUITY OF THE GROUNDING CIRCUITS. THE STRANDED COPPER BONDING JUMPER CABLES AND/OR GROUND WIRES SHALL BE INSTALLED WHERE REQUIRED. THE SURFACE WHERE GROUNDING CONNECTIONS ARE TO BE MADE SHALL BE CLEAN AND DRY. STEEL SURFACES SHALL BE GROUND OR FILED TO REMOVE ALL SCALE, RUST, GREASE AND DIRT. COPPER AND GALVANIZED STEEL SHALL BE CLEANED WITH EMERY CLOTH TO REMOVE OXIDE BEFORE MAKING CONNECTIONS.
   5.1. MOTOR AND POWER DISTRIBUTION EQUIPMENT SHALL BE EFFECTIVELY GROUNDED USING A GROUND CONDUCTOR.
   5.2. CONTROL AND INSTRUMENTATION EQUIPMENT SHALL BE EFFECTIVELY GROUNDED USING A GROUND CONDUCTOR, METALLIC RACEWAY, OR A COMBINATION OF THE TWO.
6. THE TYPE CONDUIT SHALL BE AS FOLLOWS UNLESS OTHERWISE NOTED:

APPLICATION	TYPE
OUTDOOR BELOW GRADE LOCATIONS	SCH. 40 PVC
OUTDOOR BELOW PAVED AREAS	RMC
ELECTRIC SERVICE	SCH. 80 PVC

7. THE POWER AND CONTROL WIRING SHALL BE STRANDED COPPER CONDUCTOR WITH THWN INSULATION RATED 600 VOLTS. SERVICE WIRING SHALL BE AS POWER WIRING BUT HAVE "XHHW" TYPE INSULATION. MINIMUM SIZE OF POWER WIRING SHALL BE #12 AWG. CONTROL WIRING SHALL BE #14 AWG.
8. THE ELECTRICAL APPARATUS SUCH AS SWITCHES, RECEPTACLES, CONTROL DEVICES, PANELS, ETC., ARE SHOWN IN THEIR APPROXIMATE LOCATION. ACTUAL LOCATION OF THESE APPARATUS SHALL BE DETERMINED BY CHECKING JOB SITE AND OTHER TRADE DRAWINGS. FINAL LOCATION SHALL BE APPROVED BY THE ENGINEER. SWITCHES AND DISCONNECTS MOUNTING HEIGHT SHALL BE 4'-6" MIN. ABOVE FINISHED FLOOR OR GRADE UNLESS OTHERWISE NOTED.
9. A 1/8" NYLON PULL CORD SHALL BE PULLED INTO ALL CONDUITS NOT CONTAINING WIRES.
10. ALL FIELD WIRING TERMINATIONS SHALL BE MADE AT TERMINALS LOCATED IN THE INDIVIDUAL COMPARTMENTS OR ENCLOSURES. USE OF WIRE NUTS OR DIRECT WIRING WILL NOT BE ACCEPTED. ALL TERMINATION POINTS MUST BE IDENTIFIED IN THE SHOP DRAWINGS AND PERMANENTLY / CLEARLY MARKED IN ACCORDANCE WITH THE SPECIFICATION REQUIREMENTS. TERMINATOR MATERIALS SHALL BE SIZED FOR THE INSTALLED CONDUCTORS.
11. ALL DEVICES AND APPARATUS FURNISHED SHALL BE NEW AND SHALL BE UL LISTED. ALL DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH UL LISTING.
12. THE WIRING DIAGRAMS, QUANTITY AND SIZE OF WIRES AND CONDUIT REPRESENT A SUGGESTED ARRANGEMENT BASED UPON SELECTED STANDARD COMPONENTS OF ELECTRICAL EQUIPMENT. MODIFICATIONS ACCEPTABLE TO THE ENGINEER MAY BE MADE BY THE CONTRACTOR TO ACCOMMODATE EQUIPMENT ACTUALLY PURCHASED. THE BASIC SEQUENCE AND METHOD OF CONTROL MUST BE MAINTAINED AS INDICATED ON THE DRAWINGS AND/OR SPECIFICATION.
13. ALL CIRCUIT BREAKERS FOR MOTOR-OPERATED EQUIPMENT SHALL BE EQUIPPED WITH LOCK-OUT / TAG-OUT ACCESSORY.

Pennsylvania 811

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NO.	BY	REVISIONS	DATE
1	DJ	ELECTRICAL PLANS	10/22/20

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL CHRISTOPHER W. JENSEN ENGINEER NO. PE-078484

CHRISTOPHER W. JENSEN, P.E.
LICENSED PROFESSIONAL ENGINEER
07/13/2020
DATE
COMMONWEALTH OF PENNSYLVANIA
LICENSE NO. PE078484

PHILADELPHIA Parking Authority

PHILADELPHIA PARKING AUTHORITY
PPA IMPOUND LOT
6 E OREGON AVENUE, PHILADELPHIA, PA 19148
ELECTRICAL NOTES AND DETAILS

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DESIGNED BY	DFM
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DATE	07/13/2020
SCALE	AS NOTED
PROJ. NO.	PHPA00032
DRAWING	EL-2
SHEET	10 OF 10