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PART 1- DEFINITIONS

Whenever used in this Contract:

1. The term "RIOC" means Roosevelt Island Operating Corporation.

2. The term "Change Order" means a written order signed by RIOC as described in Section 3.

3. The term Contractor shall mean

4. The term "Contract" means and includes:
   a. Standard Form Contract for Services;
   b. Exhibit 1 - Sample Invoice;
   c. General Conditions - Schedule A;
   d. Scope of Services and Additional Terms - Schedule B1;
   e. Contract Sum Breakdown and Retainage - Schedule B2;
   f. Definitions under Articles 15-A and 17-B Regulations - Schedule C.

5. The term "Contract Sum" means the fixed price or not-to-exceed price payable to the Contractor for the Services as provided in paragraph 8 of the Standard Form Contract for Services and Schedule B2, subject to adjustment only by Change Order as provided in Section 3 hereof.

6. The term "Contract Time" means the time for completion of the Services as set forth in paragraph 7 of the Standard Form Contract for Services, subject to extension only by Change Order as provided in Sections 3 and 7 hereof.

7. The term "Indemnitees" means the persons identified as such in Section 13 hereof.

8. The term "Services" means the services specified and the obligations imposed upon the Contractor under this Contract.

PART 2 - CONFLICTING TERMS

In the event of a conflict between the terms of the Contract (including any and all attachments hereto and amendments thereof) and the terms of this Schedule A, the specific terms of this Contract shall control.

PART 3 - CHANGE ORDERS

Changes or extra services, beyond the Services specified under the Contract, and resulting in extensions of the Contract Time, may be authorized only by a written Change Order issued and signed by the President/Chief Executive Officer of RIOC or RIOC's Vice President of Operations, or their designee, and co-signed by the Contractor. The written Change Order shall specify: (a) the change in the Services, (b) the amount of adjustment of the Contract Sum, if applicable, and/or (c) any extension of the Contract Time. Adjustments to the Contract Sum pursuant to this paragraph, shall be made in accordance with the procedures set forth in Schedule B2. The Parties will cooperate to agree on adjustments to the Contract Sum and Contract Time. Parties will cooperate regarding any extension required of the Contract Time.
PART 4 - ORDER TO PROCEED

Delivery to the Contractor of a fully executed copy of this Contract shall constitute authorization to proceed with the Services, unless a different commencement date is otherwise provided. If otherwise provided, RIOC will issue an order to proceed in writing which will set forth the date upon which the Services are to commence. All orders to proceed are subject to the Contractor's compliance with the insurance requirements of Section 14 hereof.

PART 5 - PERFORMANCE

The Contractor shall supervise, direct and perform the Services, using the Contractor's best skill and attention. If Services are to be performed on-site, the Contractor shall be fully responsible for the safety of all persons engaged in the performance of such Services and the public as well as all property that may be affected by the Services.

The Contractor shall keep RIOC informed of the progress and quality of the Services. The Contractor shall attend progress meetings as required by RIOC.

The Contractor shall perform the Services in accordance with all applicable federal, state and local laws, ordinances, codes, rules, regulations, lawful orders and standards.

PART 6 - PROGRESS AND COMPLETION

The Contractor shall at all times during the Contract term remain responsible. The Contractor agrees, if requested by President/Chief Executive Officer of RIOC or his or her designee, to present evidence of its continuing legal authority to do business in New York State, integrity, experience, ability, prior performance, and organizational and financial capacity.

By executing the Contract, the Contractor confirms that the Contract Time is a reasonable period for performing the Services. The Contractor shall proceed expeditiously with adequate work force and shall complete the Services within the Contract Time.

PART 7 - DELAYS, EXTENSIONS OF TIME AND SUSPENSIONS

If the Contractor's Services are delayed by an act of RIOC or of another contractor employed by RIOC or by changes ordered by RIOC in the Services, or by labor disputes, fires, or other causes beyond the Contractor's control, or by delay authorized by RIOC, then the Contract Time shall be extended by Change Order for such reasonable time as RIOC may determine. The Contractor shall not be entitled to any extension of the Contract Time unless claim therefor is presented to RIOC as provided in Section 27.

Extension of the Contract Time as provided in this Section 7 shall be the Contractor's sole and exclusive remedy and compensation for delays, disruptions and hindrances of any kind. The Contractor agrees that it will make no claim against RIOC for increased compensation (other than extension of the Contract Time) or damages on account of any delay, disruption or hindrance due to any cause.

The President/Chief Executive Officer of RIOC, or his or her designee, in his or her sole discretion, reserves the right to suspend any or all activities under this Contract, at any time, when he or she discovers information that calls into questions the responsibility of the Contractor. In the event of such suspension, the Contractor will be given written notice outlining the particulars of such suspension. Upon issuance of such notice, the Contractor must comply with the terms of the suspension order. Contract activity may resume at such time as the President/Chief Executive Officer of RIOC, or his or her designee, issues a written notice authorizing a resumption of performance under the Contract.
PART 8 - COMPTROLLER’S APPROVAL

In accordance with Section 2879-a of the Public Authorities Law, if this contract exceeds $1,000,000, and is not competitively bid, it may be subject to the Comptroller’s approval.

PART 9 - TERMINATION

RIOC may terminate the Contract prospectively upon five (5) business days’ written notice, for convenience or for any other reason whatsoever. In the event that the Contract is terminated, for default or cause, prior to any such termination RIOC shall give the Contractor written notice of the breach and five (5) business days to cure the breach (a “Cure Period”). Notwithstanding the foregoing, if RIOC in its sole discretion determines that a Cure Period would be futile, RIOC may terminate for default or cause without granting a Cure Period. However, if RIOC grants a Cure Period it is solely within RIOC’s discretion to determine whether the breach has been cured. Additionally, RIOC may, upon determining that the Contractor’s performance hereunder will endanger the public health or safety, terminate the Contract immediately. Upon termination for any reason, Contractor shall deliver all Records as defined in Sections 15 and 16 of this Schedule A within five (5) business days of termination.

To the extent this agreement is a “procurement contract” as defined by State Finance Law Sections 139-j and 139-k, by signing this agreement the Contractor certifies and affirms that all disclosures made in accordance with State Finance Law Sections 139-j and 139-k are complete, true and accurate. In the event such certification is found to be intentionally false or intentionally incomplete, RIOC may terminate the agreement by providing written notification to the Contractor in accordance with the terms hereof.

In addition, upon written notice to the Contractor, and a reasonable opportunity to be heard with appropriate RIOC officials or staff, the Contract may be terminated by President/Chief Executive Officer of RIOC, or his or her designee, at the Contractor’s expense where the Contractor is determined to the President/Chief Executive Officer of RIOC, or his or her designee, to be non-responsible. In such event, the President/Chief Executive Officer of RIOC, or his or her designee, may complete the contractual requirements in any manner he or she may deem advisable and pursue available legal or equitable remedies for breach.

PART 10 - PAYMENTS

Payments will be made only upon the receipt by the Vice President of Operations (or his/her designee) and the Finance Department, of a proper invoice submitted by the Contractor and that has been approved by the Vice President of Operations (or his/ her designee), in accordance with Schedule A and Schedule B2. The receipt of final payment electronically or the deposit of final payment by paper check by the Contractor shall constitute a waiver of any claims for payment for services rendered arising from this Contract by the Contractor against RIOC.

Payment for invoices submitted by the Contractor shall only be rendered electronically unless payment by paper check is expressly authorized by RIOC’s President, in his or her sole discretion, due to extenuating circumstances. Such electronic payment shall be made in accordance with ordinary RIOC procedures and practices. The Contractor shall comply with RIOC’s procedures to authorize electronic payments. Contractor acknowledges that it will not receive payment on any invoices submitted under this Contract if it does not comply with RIOC’s electronic payment procedures, except where the RIOC President has expressly authorized payment by paper check as set forth above.

All payments for Work will be subject to the inspection, determination, and approval of Work by the Vice President of Operations (or his/her designee). RIOC may withhold payment, in whole or in part, to the extent reasonably necessary to protect RIOC from loss for which the Contractor is responsible, including loss because of: defective Work not remedied; third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to RIOC is provided by the Contractor; failure of the Contractor to make payments properly to subcontractors for labor, materials or equipment; reasonable evidence that the Work cannot be completed for the Contract Sum; damage to RIOC or another contractor; reasonable evidence that the Work cannot be completed.
within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated
damages for the anticipated delay; or failure to carry out the Work in accordance with the Contract.

**PART 11 - SET-OFF RIGHTS**

RIOC shall have all of its common law, equitable and statutory rights of set-off. These rights shall include, but not
be limited to, RIOC's option to withhold for the purposes of set-off any moneys due to the Contractor under this
contract, or any other contract with RIOC up to any amounts due and owing to RIOC with regard to this contract,
any other contract with RIOC, plus any amounts due and owing to RIOC for any other reason including, without
limitation, tax delinquencies, fee delinquencies or monetary penalties.

**PART 12 - EXECUTORY CLAUSE**

In accordance with Section 41 of the State Finance Law, RIOC shall have no liability under this Contract to the
Contractor or to anyone else beyond funds appropriated and available for this Contract.

**PART 13 - INDEMNIFICATION**

To the fullest extent permitted by law, and in addition to any liability or obligation of the Contractor to RIOC that
may exist under the Contract or by statute or otherwise, the Contractor hereby agrees to hold harmless, indemnify
and defend RIOC, the New York State Urban Development Corporation d/b/a Empire State Development, the
Division of Housing and Community Renewal, the State of New York, the City of New York, and any others listed
in Schedule B1 and in each and every case, their directors, officers, employees, agents, consultants or contractors
(hereinafter, collectively referred to as "Indemnities"), from and against any damages, costs, claims or liabilities
which Indemnities may sustain as a result of any and all liabilities, losses, damages, interests, judgments, liens,
costs and expenses (including without limitation, reasonable counsel fees and disbursements) claims, demands,
suits, actions, or proceedings which may be made or brought against Indemnities in any way arising out of or
relating to the Contract or the Services, including without limitation, the negligent acts or omissions, willful
misconduct or unauthorized acts of the Contractor in the performance of the Services hereunder or of any
subcontractor or other entity hired, obtained, or employed by the Contractor to provide Services in connection with
the Contract. However, the Contractor shall not be obligated to hold harmless, indemnify and defend an
Indemnitee to the extent of the Indemnitee's comparative negligence or willful misconduct. As a condition of
the foregoing obligation, RIOC shall give the Contractor prompt notice of any claim for which indemnification is sought.

Indemnities’ directors, officers, and employees shall not be personally or individually liable to Contractor, and
shall be held harmless, for any actions, losses, damages, claims, liabilities, costs or expenses (including without
limitation, reasonable counsel fees and disbursements) in any way arising out of or relating to the Contract or the
Services performed pursuant to it.

The Contractor agrees that this Section 13 of the General Conditions shall survive the expiration or termination of
the Contract and is so noted in the insurance.

**PART 14 - INSURANCE**

The Contractor shall insure and carry the following insurance, shall require each of its subcontractors to carry the
following insurance, and agrees that the following insurance shall survive the expiration or termination of the
Contract:

*Commercial General Liability Insurance* providing both bodily injury including death and property damage
insurance in a limit of not less than two million dollars ($2,000,000.00) combined single limit basis. Such insurance
is to be written on an occurrence basis and shall name each of the Indemnites as an additional insured.

*Automobile Liability and Property Damage Insurance* in an amount not less than five hundred thousand dollars

**GENERAL CONDITIONS**

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($500,000.00) combined single limit for both bodily injury and property damage;

Professional Liability Insurance is required if the Contractor is providing any type of design work in a limit of not less than two million dollars ($2,000,000.00) and with tail coverage for two (2) years.

The Contractor shall provide Worker's Compensation Insurance and Employer's General Liability Insurance as required under the Worker's Compensation Law.

Certificates of Insurance for all aforementioned coverages shall be provided to RIOC prior to the commencement of Services under the Contract and bear notations evidencing a minimum of 10 day cancellation notice to RIOC. The Contractor's Commercial General Liability Insurance policy shall name RIOC, the New York State Urban Development Corporation d/b/a Empire State Development, the Division of Housing and Community Renewal, the State of New York, the City of New York and any others listed in Schedule B1 as additional insureds.

PART 15 - RECORDS AND ACCOUNTS

Contractor shall maintain accurate books, records, documents, accounts, maintenance manuals, warranties, blueprints, photographs, other materials and all evidence of the Services (hereinafter, collectively, “Records”). Contractor shall also maintain and provide accurate Records that provide an accounting of the specific Services performed in such form as to demonstrate the actual Services rendered to perform this Contract; and shall furnish or make available such Records or other information as may be required to substantiate any report or invoice submitted to RIOC’s Project Manager assigned to supervise the Services, for payment and will also provide a copy to the Finance Department.

The Records must be kept for the balance of the calendar year in which they were made and for six (6) additional years thereafter. The State Comptroller, the Attorney General and any other person or entity authorized to conduct an examination, as well as RIOC, shall have access to the Records during normal business hours at an office available, at a mutually agreeable and reasonable venue within the State of New York, for the term specified above for the purposes of inspection, auditing and copying. RIOC shall take reasonable steps to protect from public disclosure any of the Records which are exempt from disclosure under Section 87 of the Public Officers Law (“Freedom of Information Law or FOIL”) provided that: (i) the Contractor shall timely inform an appropriate RIOC official, in writing, that said records should not be disclosed; and (ii) said records shall be sufficiently identified; and (iii) designation of said records as exempt under FOIL is reasonable. Nothing contained herein shall diminish, or in any way adversely affect, RIOC's right to discovery in any pending or future litigation.

PART 16 - OWNERSHIP OF MATERIALS

The Contractor shall provide all labor, materials and equipment necessary to perform and complete all Services. All machinery and/or replacement parts installed by the Contractor in the performance of Services pursuant to this Contract shall become and remain the exclusive property of RIOC.

Upon completion of the Services or upon termination of this Contract, all Records, products and materials, including software, collected and prepared pursuant to this Contract shall become the exclusive property of RIOC, shall be delivered to RIOC (preliminary, final or otherwise), within five (5) business days of termination and any and all rights of the Contractor to such materials shall immediately be extinguished. RIOC shall have the sole and exclusive right to utilize such materials in any way it chooses.

The Contractor agrees that it shall not use, publish, transfer or license any Services, without the prior written approval of the President/Chief Executive Officer of RIOC. The Contractor shall not use any material in any way which discloses the identity of RIOC without prior written approval from the President/Chief Executive Officer of RIOC.
PART 17 - ASSIGNMENT AND SUBCONTRACTING

The Contractor shall not assign, transfer, subcontract or otherwise dispose of its rights, privileges or responsibilities under the terms of this Contract, without RIOC's prior written consent, which shall be in RIOC's sole discretion. In the event there is no prior written consent from RIOC, such assignment, transfer, subcontract or other disposition shall be void.

PART 18 - CONFLICTS OF INTEREST

The Contractor represents that:

1. No officer, employee, agent or director of RIOC, shall participate in any decision relating to this Contract which affects his personal interest or the interests of any corporation, partnership, or association in which he is directly or indirectly interested; nor shall any officer, agent, director or employee of RIOC have any interest, direct or indirect, in this Contract.

2. The Contractor shall cause, for the benefit of RIOC, every contract with any subcontractor to include the representations contained in subsection (a) of this Section. The Contractor will take such action in enforcing such provisions as RIOC may direct, or, at its option, assign such rights as it may have to RIOC for enforcement by RIOC.

PART 19 - NON-COLLUSIVE BIDDING CERTIFICATION

If this contract was awarded based upon the submission of bids, Contractor affirms, under penalty of perjury, that its bid was arrived at independently and without collusion aimed at restricting competition. Contractor further affirms that, at the time Contractor submitted its bid, an authorized and responsible person executed and delivered to RIOC a non-collusive bidding certification on Contractor's behalf.

PART 20 - AFFIRMATIVE ACTION AND NON-DISCRIMINATION AND NEW YORK STATE BUSINESS ENTERPRISES REQUIREMENTS

1. MINORITY AND WOMEN-OWNED ENTERPRISES (MWBEs)

Pursuant to New York State Executive Law Article 15-A, RIOC recognizes its obligation under the law to promote opportunities for maximum feasible participation of certified minority and women-owned business enterprises and the employment of minority group members and women in the performance of RIOC contracts. The Contractor agrees to be bound by the provisions of Article 15-A and the MWBE Regulations promulgated by the Division of Minority and Women's Business Development of the Department of Economic Development (the "Division"). If any of the terms or provisions of this Contract conflict with applicable law or regulations, such laws and regulations shall supersede these requirements.

It is the policy of RIOC to comply with all federal, State and local law, policy, orders, rules and regulations which prohibit unlawful discrimination because of race, creed, color, national origin, sex, sexual orientation, age, military status, disability, predisposing genetic characteristic, marital status or domestic violence victim status, prior criminal conviction and prior arrest, and to take affirmative action in working with contracting parties to ensure that qualified State certified Minority Business Enterprises, and qualified State certified Women-owned Business Enterprises (MBEs/WBEs), Minority Group Members and women share in the economic opportunities generated by RIOC's participation in projects or initiatives, and/or the use of RIOC funds (from any source, including the United States of America).

RIOC is required to implement the provisions of New York State Executive Law Article 15-A and 5 NYCRR Parts 142-144 ("MWBE Regulations") for all State contracts as defined therein, with a value (1) in excess of $25,000 for labor, services, equipment, materials, or any combination of the foregoing or (2) in excess of
$100,000 for real property renovations and construction. The Contractor shall inform RIOC in writing of the individual designated as the Minority Business Enterprise Liaison responsible for administering the M/WBE and EEO programs.

For the purposes of this Contract, RIOC hereby establishes an overall goal of 30% for M/WBE participation, for New York State-certified minority-owned business enterprise (“MBE”) participation and for New York State-certified women-owned business enterprise (“WBE”) participation (collectively “M/WBE Contract Goals”) based on the current availability of MBEs and WBEs.

The Contractor agrees to use good faith efforts (5 NYCRR Part 142.8) to achieve utilization of MBEs and WBEs equal to 30% of the total value of the Services under the Contract.

Information on the availability of New York State subcontractors and suppliers is available from:

NYS Department of Economic Development
Division for Small Business
One Commerce Plaza
Albany, NY 12245
Phone: (518) 474-7756  Fax: (518) 486-6416
https://ny.newnycontracts.com

The directory of minority and women-owned business enterprises is available from:

NYS Department of Economic Development
Minority and Women's Business Development Division
Phone: (855) 373-4692
mwbecertification@esd.ny.gov

Copies of the directory are also available for inspection at RIOC's main office. A current listing of certified M/WBEs may also be obtained online at https://ny.newnycontracts.com.

The directory and any listing of certified M/WBEs should not be construed as an endorsement or recommendation of any particular firm and is for use only as a resource that lists the names of businesses that qualify as M/WBE's under the definition set forth in Schedule C.

In order to maximize participation of Certified M/WBE's as subcontractors and suppliers with respect to this Contract, the Contractor is required to make the following efforts:

a. attend meetings scheduled by RIOC where bidders will be advised of general contract requirements and M/WBE program;

b. advertise, where appropriate, in general circulation media, trade association publications and small business media;

c. notify small, minority and women contractor associations by written solicitation of specific subcontracts;

d. send written notification to Certified M/WBEs that their interest in the Services is solicited;

e. actively and affirmatively solicit bids for contracts and subcontracts from qualified State certified MBEs or WBEs, including solicitations to M/WBE contractor associations;

f. ensure that plans, specifications, request for proposals and other documents used to secure bids will be made available in sufficient time for review by prospective M/WBEs;
g. where feasible, divide the work into smaller portions to enhance participation by M/WBEs and encourage the formation of joint venture and other partnerships among M/WBE contractors to enhance their participation;

h. document and maintain records of bid solicitation, including those to M/WBEs and the results thereof. The Contractor will also maintain records of actions that its subcontractors have taken toward meeting M/WBE contract participation goals; and

i. ensure that progress payments to M/WBEs are made on a timely basis so that undue financial hardship is avoided, and, where appropriate, that bonding and other credit requirements are waived or appropriate alternatives developed to encourage M/WBE participation.

The Contractor shall include a proposed list of subcontractors and suppliers to demonstrate that the goals of this section for participation of M/WBEs will be achieved on the form entitled "Vendor/Contractor's Utilization Form". RIOC will review the submitted utilization plan and advise the Contractor of RIOC's acceptance or issue a notice of deficiency within 30 days of receipt. If a notice of deficiency is issued, the Contractor agrees that it shall respond to the notice of deficiency within seven (7) business days of receipt by submitting to RIOC a written remedy in response to the notice of deficiency. If the written remedy that is submitted is found by RIOC to be inadequate despite good faith efforts having been made by the Contractor, RIOC shall notify the Contractor and may direct the Contractor to submit, within five (5) business days, a request for a partial or total waiver of M/WBE participation goals. Without limiting any other provisions contained in the Contract Documents, RIOC may disqualify a contractor as being non-responsive under the following circumstances:

a. a contractor fails to timely submit a Vendor/Contractor's Utilization Form;
b. a contractor fails to timely submit a written remedy to a notice of deficiency;
c. a contractor fails to timely request a waiver; or
d. RIOC determines that the contractor has failed to document good faith efforts. Such documents shall include, but not necessarily be limited to:
   i. Evidence of outreach to M/WBEs;
   ii. Any responses by M/WBEs to the Contractor's outreach;
   iii. Copies of advertisements for participation by M/WBEs in appropriate general circulation, trade, and minority or women-oriented publications;
   iv. The dates of attendance at a pre-bid, pre-award, or other meetings, if any, schedules by RIOC with M/WBEs; and
   v. Information describing specific steps undertaken by the Contractor to reasonably structure the Contract scope of work to maximize opportunities for M/WBE participation.

The Contractor shall use good faith efforts to utilize any MBE or WBE identified on the Vendor/Contractor's Utilization Form during the performance of the Contract. Requests for a partial or total waiver of established goal requirements made subsequent to the award of the Contract may be made at any time during the term of the Contract to RIOC in writing, but must be made no later than prior to the submission of a request for final payment on the Contract. For guidance on how RIOC will determine a Contractor's "good faith efforts", refer to N.Y. Comp. Codes R. & Regs. Tit. 5, Ch. 1, Pt. 142.8. Joint ventures with Minority and Women-Owned Business Enterprises will be considered toward meeting the goals.

Commencing not more than 30 days after (i) execution of the Contract, or (ii) start of the services, the Contractor shall submit to the RIOC a Contractor's Quarterly or Monthly M/WBE Contractor Compliance & Payment Report of the workforce actually utilized on the project, itemized by ethnic background, gender, and Federal Occupational Categories or other appropriate categories specified by RIOC. Pursuant to Executive Order #162, the Contractor shall also submit a Workforce Utilization Report, and shall require each of its Subcontractors to submit a Workforce Utilization Report, in such form as shall be required by RIOC on MONTHLY or QUARTERLY basis during the term of the Contract. Separate forms shall be completed by the Contractor and any Subcontractors. Contractors and subcontractors are also required to report the gross
wages paid to each of their employees for the work performed by such employees on the Contract. Completed forms should be emailed to Muneshwar.Jagdharry@rioc.ny.gov with a copy to Natalee.Grant-Henriques@rioc.ny.gov.

Accuracy of the information contained in the reporting documentation (Vendor/Contractor Workforce Utilization Report and Contractor's Quarterly M/WBE Contractor Compliance & Payment Report) shall be certified to by an owner or officer of the Contractor.

In accordance with Article 15 of the Executive Law (also known as the Human Rights Law) and all other State and Federal statutory and constitutional non-discrimination provisions, the Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, national origin, age, disability or marital status. Furthermore, in accordance with Section 220-e of the Labor Law, if this is a contract for the construction, alteration or repair of any public building or public work or for the manufacture, sale or distribution of materials, equipment or supplies, and to the extent that this Contract shall be performed within the State of New York, the Contractor agrees that neither it nor its subcontractors shall, by reason of race, creed, color, disability, sex or national origin: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this Contract. If this is a building service contract as defined in Section 230 of the Labor Law, then, in accordance with Section 239 thereof, the Contractor agrees that neither it nor its subcontractors shall, by reason of race, creed, color, national origin, age, sex or disability: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this Contract.

In the event RIOC determines a Contractor to be non-compliant with Article 15-A M/WBE requirements, RIOC will notify said Contractor in writing of the delinquency. The written notice will provide a specified time within which the Contractor may cure any delinquency, as outlined in section 142.12 of Title 5 of the New York Codes, Rules and Regulations. In addition, the notice may propose an action to correct the problem and also provide the contractor an opportunity to propose a suitable, alternative corrective action. In the event that the parties are unable to resolve the dispute, RIOC may refer the matter to the Division of Minority and Women's Business Development for resolution in accordance with section 142.12 of Title 5 of the New York Codes, Rules and Regulations.

RIOC and the Contractor recognize the necessity of correcting the effects of discrimination in public procurement and that the socio-economic benefits and enforcement of the non-discrimination provisions set forth herein are significant but will include items of loss whose amounts will be incapable or very difficult of accurate estimation. As such, in accordance with 5 NYCRR §142.13, the Contractor acknowledges that if it is found by RIOC to have willfully and intentionally failed to use good faith efforts (as defined in N.Y. Comp. Codes R. & Regs. Tit. 5, Ch. 1, Pt. 142.8) in order to comply with the M/WBE participation goals set forth in the Contract, such finding constitutes a material breach of contract and RIOC may withhold payment from the Contractor not as a penalty, but as liquidated damages. Such liquidated damages shall be calculated as ten percent (10%) of the difference between (1) all sums identified for payment to M/WBEs had the Contractor achieved the contractual M/WBE goals and (2) all sums actually paid to M/WBEs for work performed or materials supplied under the Contract. In the event a determination has been made which requires the payment of liquidated damages and such sums have not been withheld by RIOC, the Contractor shall pay such liquidated damages to RIOC within sixty (60) days after they are assessed unless prior to the expiration of such sixtieth day, the Contractor shall file a complaint with the Director of the Division of Minority and Women's Business Development in the Department of Economic Development (the “Director”) pursuant to subdivision 8 of section 313 of the Executive Law in which event the liquidated damages shall be payable if the Director renders a decision in favor of RIOC.

2. SERVISE-DISABLED VETERAN-OWNED BUSINESS ACT REQUIREMENTS

Article 17-B of the New York State Executive Law provides for more meaningful participation in public procurement by certified Service-Disabled Veteran-Owned Businesses (“SDVOB”), thereby further integrating
such businesses into New York State’s economy. RIOC recognizes the need to promote the employment of service-disabled veterans and to ensure that certified service-disabled veteran-owned businesses have opportunities for maximum feasible participation in the performance of RIOC contracts.

In recognition of the service and sacrifices made by service-disabled veterans and in recognition of their economic activity in doing business in New York State, Contractor is expected to consider SDVOBs in the fulfillment of the requirements of the Contract. Such participation may be as subcontractors or suppliers, as protégés, or in other partnering or supporting roles.

For purposes of this procurement, RIOC conducted a comprehensive search and determined that the Contract does not offer sufficient opportunities to set specific goals for participation by SDVOBs as subcontractors, service providers, and suppliers to Contractor. Nevertheless, Contractor is encouraged to make good faith efforts to promote and assist in the participation of SDVOBs on the Contract for the provision of services and materials. The directory of New York State Certified SDVOBs can be viewed at: https://ogs.ny.gov/veterans/

Contractor is encouraged to contact the Office of General Services’ Division of Service-Disabled Veteran’s Business Development at 518-474-2015 or VeteransDevelopment@ogs.ny.gov to discuss methods of maximizing participation by SDVOBs on the Contract.

3. EEO POLICY STATEMENT

a. The Contractor and subcontractors shall undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status. For these purposes, affirmative action shall apply in the areas of recruitment, employment, job assignment, promotion, upgradings, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation.

b. Prior to the award of the Contract, the Contractor shall submit an Equal Employment Opportunity (“EEO”) Policy Statement to RIOC within the time frame established by RIOC.

c. The Contractor's EEO Policy Statement shall contain, but not necessarily be limited to, and the Contractor, as a precondition to entering into a valid and binding Contract, shall, during the performance of the Contract, agree to the following:

i. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, national origin, sex, age, disability, sexual orientation, or marital status, will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination, and shall make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on Contract. Affirmative action pertains to recruitment, employment, job assignment, promotion, upgradings, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation.

ii. The Contractor shall state in all solicitations or advertisements for employees that, in the performance of the Contract, all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status.

iii. At the request of RIOC, the Contractor shall request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union, or representative will not discriminate on the basis of race, creed, color, national origin, sex, age, disability or marital status and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations herein.
iv. The Contractor shall comply with the provisions of the Human Rights Law, all other State and Federal statutory and constitutional non-discrimination provisions. The Contractor and subcontractors shall not discriminate against any employee or applicant for employment because of race, creed (religion), color, sex, national origin, sexual orientation, military status, age, disability, predisposing genetic characteristic, marital status or domestic violence victim status, and shall also follow the requirements of the Human Rights Law with regard to non-discrimination on the basis of prior criminal conviction and prior arrest.

v. The Contractor will include the provisions of subdivisions (a) through (d) immediately above in every subcontract in such a manner that the requirements of the subdivisions will be binding upon each subcontractor as to work in connection with the Contract.

4. PROHIBITION OF CONTRACTS WITH ENTITIES THAT SUPPORT DISCRIMINATION

In accordance with Executive Order No. 177 Regarding Prohibiting Contracts with Entities that Support Discrimination ("EO 177"), the Contractor hereby certifies that it does not have institutional policies or practices that fail to address the harassment and discrimination of individuals on the basis of their age, race, creed, color, national origin, sex, sexual orientation, gender identity, disability, marital status, military status, or other protected status under the Human Rights Law. The Contractor further certifies that it submitted EO 177 Certification to RIOC prior to contract award.

5. NONDISCRIMINATION IN EMPLOYMENT IN THE NORTHERN IRELAND: MACBRIDE FAIR EMPLOYMENT PRINCIPLES

In accordance with Chapter 807 of the Laws of 1992 the Contractor certifies that if it or any individual or legal entity in which the Contractor holds a 10% or greater ownership interest, or any individual or legal entity that holds a 10% or greater ownership interest in the Contractor has business operations in Northern Ireland, such Contractor, shall take lawful steps in good faith to conduct any business operations in Northern Ireland in accordance with the MacBride Fair Employment Principles relating to nondiscrimination in employment and freedom of workplace opportunity regarding such operations in Northern Ireland, and shall permit independent monitoring of their compliance with such Principles.

The Omnibus Procurement Act of 1992, requires that by signing this bid/proposal, Contractors certify that whenever the total bid amount is greater than $1 million:

a. The Contractor has made reasonable efforts to encourage the participation of New York State Business Enterprises as suppliers and subcontractors on this project, and has retained the documentation of these efforts to be provided upon request to RIOC;

b. The Contractor has complied with the Federal Equal Opportunity Act of 1972 (P.L. 92-261), as amended;

c. The Contractor agrees to make reasonable efforts to provide notification to New York State residents of employment opportunities on this project through listing of any such positions with the Job Service Division of the New York State Department of Labor, or providing such notification in such manner as is consistent with existing collective bargaining contracts or agreements. The contractor agrees to document these efforts and to provide said documentation to RIOC upon request;

d. The Contractor acknowledges notice that New York State may seek to obtain offset credits from foreign countries as a result of this Contract and agrees to cooperate with the State in these efforts.

a. Failure to comply with all of the foregoing requirements found in this Section may result in a finding of non-responsiveness, non-responsibility or breach of the Contract, leading to the withholding of funds, suspension or termination of the Contract or such other actions or enforcement proceedings...
as allowed by the Contact and at law.

PART 21 - ENVIRONMENTAL PROTECTION

The Contractor certifies and warrants that all heavy duty vehicles, as defined in New York State Environmental Conservation Law (“ECL”) §19-0323, to be used under this Contract, will comply with the specifications and provisions of ECL §19-0323 and any regulations promulgated pursuant thereto, which requires the use of Best Available Retrofit Technology (“BART”) and Ultra Low Sulfur Diesel (“ULSD”), unless specifically waived by the New York State Department of Environmental Conservation (“DEC”). Qualifications for a waiver under this law will be the responsibility of the Contractor.

PART 22 - MATERIALS AND WORKMANSHIP

The Contractor hereby agrees and guarantees that all Services furnished under the Contract will conform to the terms of this Contract, as to kind, quality, function, design and characteristics of materials and workmanship. The Contractor shall adhere to professional standards and shall reprocess at its expense, all work necessary to correct errors directly caused by malfunction of the Contractor’s machines or mistakes of Contractor’s Personnel. RIOC agrees to cooperate with the Contractor in the performance of the Services hereunder, including without limitation and upon prior consent of RIOC’s designated representative, providing consultant with reasonable and timely access to facilities, data, information, and RIOC personnel.

The Contractor shall promptly correct Services rejected by RIOC, or deemed by RIOC to be defective or failing to conform to the requirements of the Contract. The Contractor shall bear all costs of correcting such Services, including, without limitation, additional testing and inspections.

The Contractor warrants that the Services will be of good quality and new unless otherwise required or permitted by the Contract, and that the Services will be free from defects not inherent in the quality required or permitted and will conform to the requirements of the Contract.

If, within one (1) year after substantial completion, the Services are found to be not in accordance with the Contract requirements, the Contractor shall correct it promptly after receipt of written notice from RIOC.

Nothing contained herein shall be construed to establish a period of limitation with respect to other obligations the Contractor might have under the Contract. Establishment of the time period of one (1) year as provided above relates only to the specific obligation of the Contractor to correct the Services, and has no relationship to the time within which proceedings may be commenced to establish the Contractor’s liability with respect to the Contractor’s obligations.

If the Contractor fails to correct defective or non-conforming Services as required or fails to carry out Services in accordance with the Contract, RIOC, by written order, may order the Contractor to stop the Services, or any portion thereof, until the cause for such order has been eliminated.

If the Contractor defaults or neglects to carry out the Services in accordance with the Contract and fails within five (5) business days after receipt of written notice from RIOC to commence and continue correction of such default or neglect with due diligence and promptness, RIOC may, without prejudice to other remedies RIOC may have, correct such deficiencies and the costs of correcting such deficiencies shall be deducted from payments to the Contractor. If the payments then or thereafter due the Contractor are not sufficient to cover such costs, the Contractor shall pay the difference to RIOC.

PART 23 - PROHIBITION ON PURCHASE OF TROPICAL HARDWOODS

The Contractor certifies and warrants that all wood products to be used under this contract award will be in accordance with, but not limited to, the specifications and provisions of Section 165 of the State Finance Law,
(Use of Tropical Hardwoods) which prohibits purchase and use of tropical hardwoods, unless specifically exempted, by RIOC. Qualification for an exemption under this law will be the responsibility of the Contractor to establish to meet with the approval of RIOC.

In addition, when any portion of this Contract involving the use of woods, whether supply or installation, is to be performed by any subcontractor, the prime Contractor will indicate and certify in the submitted bid proposal that the subcontractor has been informed and is in compliance with specifications and provisions regarding use of tropical hardwoods as detailed in Section 165 of the State Finance Law. Any such use must meet with the approval of RIOC; otherwise, the bid may not be considered responsive. Under bidder certifications, proof of qualification for exemption will be the responsibility of the Contractor to meet with the approval of RIOC.

PART 24 - IRAN DIVESTMENT ACT

By entering into this Agreement, the Contractor certifies in accordance with State Finance Law Section 165-a that it is not on the “Entities Determined to be Non-Responsive Bidders/Offerors pursuant to the New York State Iran Divestment Act of 2012” (“Prohibited Entities List”) posted at:

http://www.ogs.ny.gov/about/regs/docs/ListofEntities.pdf

The Contractor further certifies that it will not utilize on this Contract any subcontractor that is identified on the Prohibited Entities List. Contractor agrees that should it seek to renew or extend this Contract, it must provide the same certification at the time the Contract is renewed or extended. Contractor also agrees that any proposed Assignee of this Contract will be required to certify that it is not on the Prohibited Entities List before the contract assignment will be approved by RIOC.

During the term of the Contract, should RIOC receive information that a person (as defined in State Finance Law Section 165-a) is in violation of the above-referenced certifications, RIOC will review such information and offer the person an opportunity to respond. If the person fails to demonstrate that it has ceased its engagement in the investment activity which is in violation of the Act within 90 days after the determination of such violation, then RIOC shall take such action as may be appropriate and provided for by law, rule, or contract, including, but not limited to, imposing sanctions, seeking compliance, recovering damages, or declaring the Contractor in default.

RIOC reserves the right to reject any bid, request for assignment, renewal or extension for an entity that appears on the Prohibited Entities List prior to the award, assignment, renewal or extension of a contract, and to pursue a responsibility review with respect to any entity that is awarded a contract and appears on the Prohibited Entities List after contract award.

PART 25 - CONFIDENTIALITY

The Contractor agrees that all deliverables, developed in the course of providing the services, are strictly confidential between the Contractor and RIOC, and except as specified herein the Contractor may not reveal or disclose such work product, without permission from RIOC, or unless ordered by a court of competent jurisdiction, governmental authority or administrative agency or required to be disclosed by law, subpoena, or similar process.

PART 26 - LABOR LAW

If this Contract involves the employment of laborers, workmen or mechanics under Articles 8 or 9 of the Labor Law or constitutes a building service contract covered by Article 9 thereof, neither the Contractor's employees nor the employees of its subcontractors may be required or permitted to work more than the number of hours or days set forth therein, except as otherwise provided in the Labor Law and as set forth in prevailing wage and supplement schedules issued by the New York State Labor Department. Furthermore, the Contractor and its subcontractors must pay at least the prevailing wage rate and pay or provide the prevailing supplements, including the premium rates for overtime pay, as determined by the New York State Labor Department in accordance with the Labor Law. Contractor shall submit certified payrolls with each payment application. Where applicable by Labor Law, GENERAL CONDITIONS

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see Schedule B2 of this Contract for the Prevailing Rate Case Number (PRC#) that has been assigned to this project.

PART 27 - CLAIMS AND DISPUTE RESOLUTION

1. The Contractor shall proceed with the Services promptly as instructed or ordered by RIOC. The Contractor shall have no right to suspend all or any part of the Services or refuse to comply with any written instruction, direction or order of RIOC pending resolution of any dispute or for any other reason, provided that RIOC continues to make payments of undisputed amounts as provided in the Contract. Any such suspension or refusal will be a material breach of the Contract. The Contractor may preserve whatever right, if any, the Contractor may have to make claim with respect to any written instruction, order, direction, action or inaction of RIOC or others by giving notice as required by paragraph (b) of this Section 27 and by advising RIOC in writing, prior to proceeding with the Services in question, that the Contractor is proceeding under protest.

2. The Contractor must give written notice to RIOC of any claim by the Contractor for extension of time, extra compensation, price increase or damages of any sort within five (5) business days after the Contractor first learns of the act, omission, occurrence or circumstance on which the claim is based. The purpose of this notice is to give RIOC prompt opportunity (a) to cancel or revise orders or directions, change plans, mitigate or remedy circumstances giving rise to the claim or to take other action that may be desirable; (b) to monitor and verify the facts and circumstances as they occur; and (c) to verify any costs and expenses claimed by the Contractor contemporaneously as they are incurred. Written notice is required whether or not RIOC is aware of the facts and circumstances that constitute the basis of the Contractor's claim, and no action, inaction, or conduct of RIOC or any other person will be regarded as a waiver of such notice requirement except only a statement to that effect signed by RIOC. Failure of the Contractor to give written notice as required shall be deemed conclusively to be a waiver and release of any claim, and such notice shall be a condition precedent to the Contractor's right to make any claim arising out of, under or in connection with the Contract or its performance of the Services. Notice pursuant to this paragraph (b) of Section 27 shall be addressed and sent to RIOC in accordance with Section 36 of these General Conditions. Notice of claim given to any person other than RIOC shall not constitute notice to RIOC.

3. It shall be within RIOC's sole discretion whether to submit to arbitration any dispute, claim or controversy arising out of, or relating to, the Contract or the breach, termination, enforcement, interpretation or validity thereof (including the determination whether work performed under the Contract is within the Scope of Work) and including the determination of the scope or applicability of this arbitration provision (collectively, referred to as "Claims"). If RIOC determines that a Claim shall be submitted to arbitration, such arbitration shall be before the American Arbitration Association ("AAA") in New York County (or another arbitration tribunal of RIOC's choosing) with the parties sharing equally in the costs of the arbitration process and each party bearing their own legal costs and expenses. Further, it shall be in RIOC's sole discretion whether the arbitration shall be before one or three arbitrators. Judgement on an arbitration award may be entered in any court having jurisdiction. This clause shall not preclude parties from seeking provisional remedies in aid of arbitration from a court of competent jurisdiction.

PART 28 - INTERNATIONAL BOYCOTTS

1. In accordance with Section 220-f of the Labor Law and Section 139-h of the State Finance Law and the regulations of the Comptroller of the State of New York promulgated thereunder, where the Contract is for the construction, reconstruction, maintenance and/or repair of public work or for services performed or to be performed in an amount exceeding five thousand dollars, the Contractor hereby promises, asserts and represents that neither the Contractor nor any substantially owned or affiliated person, firm partnership or corporation has participated, is participating or shall participate in an international boycott in violation of the provisions, of the United States Export Administration Act of 1969, as amended, or the United States Export Administration Act of 1979, or the regulations of the United States Department of Commerce promulgated under either act.

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2. RIOC awards this Contract in material reliance upon the promise and representation made by the Contractor in the foregoing paragraph. This Contract shall be rendered void by the State Comptroller if subsequent to the execution of this Contract, the Contractor or such owned or affiliated person, firm, partnership or corporation has been convicted of a violation of the above Acts or Regulations or has been found upon final determination of the United States Commerce Department or any other appropriate agency of the United States to have violated such Acts or Regulations.

3. The Contractor shall notify the State Comptroller of any such conviction or final determination of violation in the manner prescribed by the Comptroller’s regulations after such determination within five (5) days. The Contractor shall deliver a copy of the notice to RIOC.

PART 29 - GRAND JURY, INVESTIGATIONS, TESTIMONY

The Contractor agrees to comply with the provisions of Sections 2876 and 2877 of the Public Authorities Law, and any subsequent amendments. The provisions require that upon the refusal of a person, when called before a grand jury, head of a state department, temporary state commission or other state agency, the organized crime task force in the department of law, head of a city department, or other city agency, which is empowered to compel the attendance of witnesses and examine them under oath, to testify in an investigation concerning any transaction or contract with the state, any political subdivision thereof, a public authority or with any public department, agency or official of the state, any political subdivision thereof, or a public authority, to sign a waiver of immunity against subsequent criminal prosecution or to answer any relevant questions concerning such transaction or contract,

1. such person, and any firm, partnership or corporation of which (s)he is a member, partner, director or officer shall be disqualified from thereafter selling to or submitting bids to or receiving awards from or entering into any contracts with any public authority or public benefit corporation or any official thereof for goods, work or services, for the period of five years after such refusal or until such disqualification shall be removed pursuant to Public Authorities Law Section 2877, and

2. any and all contracts with any public authority or public benefit corporation or official thereof, since the effective date of this law, by such person and by any firm, partnership, or corporation of which he or she is a member, partner, director or officer, may be canceled or terminated, but any monies owing by the public authority or public benefit corporation for goods delivered or work done prior to the cancellation or termination shall be paid.

PART 30 - ILLEGALITY

If this Contract contains any unlawful provision, the same shall be deemed of no effect and shall, upon the application of either party, be deemed stricken from this Contract without affecting the binding force of the remainder.

PART 31 - ENTIRE AGREEMENT

This Contract integrates all agreements, representations and warranties prior to the date hereof, whether oral or written, between the parties, and constitutes the entire Contract between the parties hereto.

PART 32 - GOVERNING LAW

This Contract shall be construed in accordance with the laws of the State of New York.

PART 33 - COUNTERPARTS

This Contract may be executed in any number of counterparts, each of which shall be deemed an original, but all of which shall constitute one and the same instrument.

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PART 34 - MODIFICATIONS

This Contract shall not be modified except by amendment or Change Order in writing dated and signed by all parties hereto.

PART 35 - BINDING EFFECT

This Contract shall be binding upon, extend to, and inure to the benefit of the legal representatives, successors and valid assigns of the respective parties.

PART 36 - NOTICE

Except where otherwise provided, any written notice or communication required or permitted pursuant hereto by either party to the other party shall be in writing and either:

1. delivered by certified mail, postage prepaid, return receipt requested to the parties at their respective addresses set forth at page 1 of this Contract; or
2. provided by fax transmission and confirmed by regular mail, if to RIOC, at (212) 832-4582, and if to the Contractor, at the number supplied by the Contractor to RIOC; or
3. provided by email, if to RIOC, to Assistant Chief Financial Officer at Muneshwar.Jagdharry@rioc.ny.gov with a copy to General Counsel at Jacqueline.Flug@rioc.ny.gov, and if to the Contractor, at the email address supplied by the Contractor to RIOC.

PART 37 - ALL LEGAL PROVISIONS DEEMED INCLUDED

It is the intent and understanding of the parties to this Contract that each and every provision of law required to be inserted in this Contract shall and is inserted herein, and if, through mistake or otherwise, any such provision is not inserted, or is not inserted in correct form, then this Contract shall forthwith upon the application of either party be amended by such insertion so as to comply strictly with the law and without prejudice to the rights of either party hereunder.

PART 38 - COMPLIANCE WITH NEW YORK STATE INFORMATION SECURITY BREACH AND NOTIFICATION ACT

Contractor shall comply with the provisions of the New York State Information Security Breach and Notification Act (General Business Law Section 899-aa; State Technology Law Section 208).
SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Work restrictions.
5. Specification and Drawing conventions.
6. Existing Stacked Stone Wall

B. Related Requirements:

1. Section 015000 “Temporary Facilities and Controls” for limitations and procedures governing temporary use of Owner’s facilities.

1.3 PROJECT INFORMATION

A. Project Identification: FDR Hope Memorial, LG Job # 18206.

B. Owner: RIOC

C. Architect: The Lawrence Group Architects of St. Louis, Inc.

D. NOTE: Project sign is not required.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Renovation of an existing FDR Memorial.

1.5 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated by requirements of this Section.
B. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
      a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
      b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.
   1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, unless otherwise indicated.
   1. Weekend Hours: Not Anticipated.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
   1. Notify Owner not less than two days in advance of proposed utility interruptions.
   2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
   1. Notify Owner not less than two days in advance of proposed disruptive operations.
   2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Restricted Substances: Use of tobacco products and other controlled substances within the existing and new building and anywhere on the entire site is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
   1. Maintain list of approved screened personnel with Owner's representative.

H. Music from any source is prohibited on this project.
1.7 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
   1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
   2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
   1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
   2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
   3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 (Not Used)

PART 3 - EXECUTION

A. Existing stacked stone wall
   a. Along perimeter every twenty feet prior to construction, verify depth of bottom of wall, to determine depth of stacked stone wall below new finished grade. Bottom of wall to be below finished grade. If bottom of wall is not below finished new finished grade local Landscape Architect to determine a solution.

   b. All exposed existing stacked stone wall to be power washed clean as final closeout procedures. Use 100 psi max pressure and verify with local Landscape Architect of acceptable detergent for stone.

END OF SECTION 011000
SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:
   1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
   2. All other Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

   1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
   2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.
   3. The following are not considered substitutions:
      a. Substitutions requested during the bidding period and accepted prior to award of Contract.
      b. Revisions to Contract Documents requested by the Owner or Architect.
      c. Specified options of products and construction methods included in Contract Documents.
      d. Compliance with governing regulations and orders issued by governing authorities.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

   1. Substitution Request Form: Use CSI Form 13.1A, or General Contractor’s equivalent acceptable to Architect.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven calendar days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 10 business days of receipt of request, or five business days of receipt of additional information or documentation, whichever is later.

b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.
1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 business days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   b. Requested substitution provides sustainable design characteristics equal to or better than provided by specified product.
   c. Substitution request is fully documented and properly submitted.
   d. Requested substitution will not adversely affect Contractor's construction schedule.
   e. Requested substitution has received necessary approvals of authorities having jurisdiction.
   f. Requested substitution is compatible with other portions of the Work.
   g. Requested substitution has been coordinated with other portions of the Work.
   h. Requested substitution provides specified warranty.
   i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 calendar days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

   a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
   b. Requested substitution does not require extensive revisions to the Contract Documents.
   c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   d. Requested substitution provides sustainable design characteristics equal to or better than provided by specified product.
   e. Substitution request is fully documented and properly submitted.
   f. Requested substitution will not adversely affect Contractor's construction schedule.
   g. Requested substitution has received necessary approvals of authorities having jurisdiction.
   h. Requested substitution is compatible with other portions of the Work.
i. Requested substitution has been coordinated with other portions of the Work.
j. Requested substitution provides specified warranty.
k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500
SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
B. Related Requirements:
   1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK
A. Architect will issue, through Construction Manager or General Contractor, supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect’s Supplemental Instructions."

1.4 PROPOSAL REQUESTS
A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
   1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
   2. Within 10 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      c. Include costs of labor and supervision directly attributable to the change.
      d. Include an updated Contractor’s construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and
finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

\textbf{e. Quotation Form: Use forms acceptable to Architect.}

\textbf{B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.}

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Include costs of labor and supervision directly attributable to the change.

5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.


\textbf{1.5 ADMINISTRATIVE CHANGE ORDERS}
\begin{itemize}
\item \textbf{A. Allowance Adjustment, if Any:} See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
\item \textbf{B. Unit-Price Adjustment, if Any:} See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.
\end{itemize}

\textbf{1.6 CHANGE ORDER PROCEDURES}
\begin{itemize}
\item \textbf{A.} On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on \textit{AIA Document G701}.
\end{itemize}

\textbf{1.7 CONSTRUCTION CHANGE DIRECTIVE}
\begin{itemize}

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

\item \textbf{B.} Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600
SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
2. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1. The Schedule of Values described herein is in addition to any schedule or bid breakdown submitted with bid.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule and the following:

   a. Application for Payment forms with continuation sheets.
   b. Submittal schedule.
   c. Schedule of Allowances, if any – see drawings.
   d. Schedule of Alternates, if any – see drawings.
   e. CM is responsible for providing and distributing bid forms with line items for “allowances and alternates” if shown on drawings.

2. Submit the schedule of values to Architect at earliest possible date, but no later than seven calendar days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:
   a. Project name and location.
   b. Name of Architect.
   c. Architect's Project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed and consistent with format of AIA Document G703:
   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
      1) Labor.
      2) Materials.
      3) Equipment.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
   a. Additional Documentation: Coordinate with Owner and Architect to provide any documentation or breakdowns required by Owner's financing entities, as may be required for sustainability measurement, or other circumstances.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site.

6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

7. Allowances, if Any: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Purchase Contracts, if Any: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.

9. Overhead Costs: Each item in the Schedule of Values must be complete. Include total cost and proportionate share of general overhead and profit for each line item.

   a. Temporary facilities and other major cost items that are not direct costs of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

10. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.

11. Schedule of Values Revisions: Revise and resubmit the schedule of values before the next Application for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

   1. Comply with additional requirements for Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

   1. Submit draft copy of Application for Payment seven calendar days prior to due date for review by Architect.

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

   1. Entries shall match data on the schedule of values and Contractor’s construction schedule. Use updated schedules if revisions were made.

   2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.

   3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:
   a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
   b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
   c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

G. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment including, but not necessarily limited to, subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application, including work self-performed by General Contractor. Total of lien waivers must total amount requested in previous Applications for Payment to assure that all parties have been properly paid.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
4. Products list (preliminary if not final).
5. Sustainable design action plans, including preliminary project materials cost data.
6. Schedule of unit prices, if any.
7. Submittal schedule (preliminary if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants, suppliers, and fabricators.
12. Initial progress report.
14. Certificates of insurance and insurance policies.
15. Performance and payment bonds.
16. Data needed to acquire Owner's insurance.

J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
3. Administrative actions and submittals that shall precede or coincide with this application include:
   a. Occupancy permits and similar approvals.
   b. Warranties (guarantees) and maintenance agreements.
   c. Test/adjust/balance records.
   d. Maintenance instructions.
   e. Meter readings.
   f. Startup performance reports.
   g. Changeover information related to Owner's occupancy, use, operation, and maintenance.
   h. Final cleaning.
   i. Application for reduction of retainage and consent of surety.
   j. Advice on shifting insurance coverages.
   k. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements, including:
   a. Evidence of completion of items specified for completion after Substantial Completion.
   b. Removal of temporary facilities and services.
   c. Removal of surplus materials, rubbish, and similar elements.
   d. Change of door locks to Owner's access.
   e. Transmittal of required Project construction records to the Owner.
   f. Certified property survey, if applicable.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900
SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. RFIs.
4. Digital project management procedures.
5. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor’s construction schedule.
2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.3 DEFINITIONS

A. BIM: Building Information Modeling.

B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
B. Key Personnel Names: Within 15 business days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, in web-based Project software directory, if any, and in prominent location in built facility. Keep list current at all times.
2. Include contact information and role description for any other special personnel required for coordination of operations and with other contractors.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors, if any, to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

D. Trade Union Jurisdictions: Maintain current information on jurisdictional matters, regulations, actions and pending actions, and administer/supervise performance of work in a manner which will minimize possibility of disputes, conflicts, delays, claims or loses.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Comply with requirements contained within individual specification sections.
2. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
   a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
   b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
   c. Indicate functional and spatial relationships of components of architectural, civil, and electrical systems.
   d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
   e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
   f. Indicate required installation sequences.
   g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Plans: Show architectural elements, sewer elements if shown and electrical work for lighting.

1.7 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
   a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716 or General Contractor's standard form with substantially the same content as AIA Document G716 and acceptable to Architect.

1. Attachments shall be electronic files in PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for approval of Contractor's means and methods.
   d. Requests for coordination information already indicated in the Contract Documents.
   e. Requests for adjustments in the Contract Time or the Contract Sum.
   f. Requests for interpretation of Architect's actions on submittals.
   g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.

3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 working days of receipt of the RFI response.
E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use CSI Log Form 13.2B or General Contractor's standard form or software log that is part of web-based Project software acceptable to Architect. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven calendar days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Use of Architect's Digital Data Files: Digital data files of specific applicable and necessary portions of Architect's BIM model or CAD drawings will be provided by Architect for Contractor's use during construction.

1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
3. Digital Drawing Software Program: Contract Drawings are available in the format used by the Architect in creating them.
4. Contractor shall execute a data licensing agreement in the form of AIA Document C106 Digital Data Licensing Agreement.
   a. Subcontractors, and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of AIA Document C106.
5. The following digital data files will be furnished for each appropriate discipline:
   a. Floor plans.
   b. Reflected ceiling plans.

B. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.
1.9 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 10 working days prior to meeting.

2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three business days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient and appropriate location.

1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, if any, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Discuss items of significance that could affect progress, including the following:

   a. Responsibilities and personnel assignments.
   b. Tentative construction schedule.
   c. Phasing, if any.
   d. Critical work sequencing and long lead items.
   e. Designation of key personnel and their duties.
   f. Lines of communications.
   g. Use of web-based Project software, if applicable.
   h. Procedures for processing field decisions and Change Orders.
   i. Procedures for RFI’s.
   j. Procedures for testing and inspecting.
   k. Procedures for processing Applications for Payment.
   l. Distribution of the Contract Documents.
   m. Submittal procedures.
   n. Sustainable design requirements.
   o. Preparation of Record Documents.
   p. Use of the premises, including site and any existing improvements.
   q. Work restrictions.
   r. Working hours.
   s. Owner’s occupancy requirements.
   t. Responsibility for temporary facilities and controls.
   u. Procedures for moisture and mold control.
   v. Procedures for disruptions and shutdowns.
   w. Construction waste management and recycling.
   x. Parking availability.
   y. Office, work, and storage areas.
   z. Equipment deliveries and priorities.
   aa. First aid.
   cc. Progress cleaning.
3. Minutes: General Contractor will record and distribute meeting minutes.

C. Sustainable Design Requirements Coordination Conference: If project is pursuing sustainable design credentials or otherwise requiring tracking of sustainable performance, a Sustainable Design Coordinator will be designated and will schedule and conduct a sustainable design coordination conference before starting construction, at a time convenient to Owner Architect, and Contractor.

1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, if any, Architect, and their consultants; Contractor and its superintendent and sustainable design coordinator; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Discuss items of significance that could affect meeting sustainable design requirements, including the following:

   a. Sustainable design Project checklist.
   b. General requirements for sustainable design-related procurement and documentation.
   c. Project closeout requirements and sustainable design certification procedures.
   d. Role of sustainable design coordinator.
   e. Construction waste management.
   f. Construction operations and sustainable design requirements and restrictions.

3. Minutes: Sustainable Design Coordinator will record and distribute meeting minutes.

D. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Sustainable design requirements.
   i. Review of mockups.
   j. Possible conflicts.
   k. Compatibility requirements.
   l. Time schedules.
   m. Weather limitations.
   n. Manufacturer's written instructions.
   o. Warranty requirements.
   q. Acceptability of substrates.
r. Temporary facilities and controls.
s. Space and access limitations.
t. Regulations of authorities having jurisdiction.
u. Testing and inspecting requirements.
v. Installation procedures.
w. Coordination with other work.
x. Required performance results.
y. Protection of adjacent work.
z. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

E. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 calendar days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.

2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, if any, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

   a. Preparation of Record Documents.
   b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
   c. Procedures for completing and archiving digital data.
   d. Submittal of written warranties.
   e. Requirements for completing sustainable design documentation as applicable.
   f. Requirements for preparing operations and maintenance data.
   g. Requirements for delivery of material samples, attic stock, and spare parts.
   h. Requirements for demonstration and training.
   i. Preparation of Contractor's punch list.
   j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
   k. Submittal procedures.
   l. Coordination of separate contracts.
   m. Owner's partial occupancy requirements.
   n. Installation of Owner's furniture, fixtures, and equipment.
   o. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

F. Progress Meetings: Conduct progress meetings at regular intervals.
1. Coordinate dates of meetings with preparation of payment requests.

2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of component conflicts.
4) Status of submittals.
5) Status of sustainable design documentation.
6) Deliveries.
7) Off-site fabrication.
8) Access.
9) Site use.
10) Temporary facilities and controls.
11) Progress cleaning.
12) Quality and work standards.
13) Status of correction of deficient items.
14) Field observations.
15) Status of RFIs.
16) Status of Proposal Requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

4. Minutes: General Contractor will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

G. Coordination Meetings: Conduct Project coordination meetings at intervals appropriate to stage of construction. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

   a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

   b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

   c. Review present and future needs of each contractor present, including the following:

      1) Interface requirements.
      2) Sequence of operations.
      3) Resolution of component conflicts.
      4) Status of submittals.
      5) Deliveries.
      6) Off-site fabrication.
      7) Access.
      8) Site use.
      9) Temporary facilities and controls.
     10) Work hours.
     11) Hazards and risks.
     12) Progress cleaning.
     13) Quality and work standards.
     14) Status of RFIs.
     15) Proposal Requests.
     16) Change Orders.
     17) Pending changes.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100
SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's Construction Schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Unusual event reports.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for submitting the Schedule of Values.
2. Section 013233 "Photographic Documentation" for submitting construction photographs.
3. Section 013300 "Submittal Procedures" for submitting schedules and reports.
4. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.
   1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
   2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
   3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
   1. PDF file.

B. Startup construction schedule.
   1. Submittal of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
   1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
   2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
   4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.

F. Construction Schedule Updating Reports: Submit with Applications for Payment.

G. Daily Construction Reports: Submit at monthly intervals, unless otherwise indicated in Owner-Contractor Agreement.

H. Material Location Reports: Submit at monthly intervals corresponding to application for payment.

I. Site Condition Reports: Submit at time of discovery of differing conditions.
J. Unusual Event Reports: Submit at time of unusual event.

K. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts, if any.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures, including commissioning activities, if any.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

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

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL


B. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules and which is acceptable to Architect and Owner.

C. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion and Owner Occupancy.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

D. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 calendar days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 calendar days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
4. Startup and Testing Time: Include no fewer than 10 business days for startup and testing.
5. Commissioning Time: If commissioning time is specified or otherwise required for Work, include no fewer than 15 business days for commissioning.
6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
7. Punch List and Final Completion: Include not more than 30 calendar days for completion of punch list items and final completion.

E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract, if Any: Include a separate activity for each contract.
3. Work by Owner, if Any: Include a separate activity for each portion of the Work performed by Owner.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date communicated in writing by product procurement entity. Delivery dates indicated stipulate the earliest possible delivery date.
5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date communicated in writing by Owner. Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:
   a. Coordination with existing construction.
   b. Limitations of continued occupancies, as applicable.
   c. Uninterruptible services.
   d. Partial occupancy before Substantial Completion, if any.
   e. Use-of-premises restrictions.
   f. Provisions for future construction, if any.
   g. Seasonal variations.
   h. Environmental control.
7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
   a. Subcontract awards.
   b. Submittals.
   c. Purchases.
d. Mockups.
e. Fabrication.
f. Sample testing.
g. Deliveries.
h. Installation.
i. Tests and inspections.
j. Adjusting.
k. Curing.
l. Building flush-out.
m. Startup and placement into final use and operation.
n. Commissioning, as applicable.

8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

a. Structural completion.
b. Temporary enclosure and space conditioning.
c. Permanent space enclosure.
d. Completion of mechanical installation.
e. Completion of electrical installation.
f. Substantial Completion.

F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

1. Include any other intermediate milestones, such as temporary enclosure and space conditioning, completion of each phase, partial Owner occupancy, or other milestones requested by Owner or Architect.

G. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.

H. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and the Contract Time.

I. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.
J. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

K. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 STARTUP CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven calendar days of date established for commencement of the Work.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 60 calendar days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.9 CPM SCHEDULE REQUIREMENTS

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 calendar days of date established for the Notice to Proceed. Outline significant construction activities for the first 60 calendar days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 calendar days after date established for the Notice to Proceed.

   a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.

3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.
D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
   a. Preparation and processing of submittals.
   b. Mobilization and demobilization.
   c. Purchase of materials.
   d. Delivery.
   e. Fabrication.
   f. Utility interruptions.
   g. Installation.
   h. Work by Owner that may affect or be affected by Contractor's activities.
   i. Testing and inspection.
   j. Commissioning.
   k. Punch list and final completion.
   l. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.

3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.

4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
   a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, sustainable design documentation as applicable, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
   a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
   b. Total cost assigned to activities shall equal the total Contract Sum.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
   1. Contractor or subcontractor and the Work or activity.
   2. Description of activity.
   3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
5. Changes in the critical path.
6. Changes in total float or slack time.

H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
   a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
   b. Submit value summary printouts one week before each regularly scheduled progress meeting.

1.10 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
8. Accidents.
9. Meetings and significant decisions.
10. Unusual events.
11. Stoppages, delays, shortages, and losses.
12. Meter readings and similar recordings.
14. Orders and requests of authorities having jurisdiction.
15. Change Orders received and implemented.
16. Construction Change Directives received and implemented.
17. Services connected and disconnected.
18. Equipment or system tests and startups.
19. Partial completions and occupancies.
20. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

1. Submit unusual event reports directly to Owner within one business day of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200
SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for the following:
      1. Preconstruction photographs.
      2. Periodic construction photographs.
      3. Final completion construction photographs.
   B. Related Requirements:
      1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
      2. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
      3. Section 024119 "Selective Demolition" for photographic documentation before selective demolition operations commence.

1.3 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For photographer.
   B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
   C. Digital Photographs: Submit image files within three business days of taking photographs.
      1. Submit photos by uploading to web-based project software site. If such site is not available, submit directly to Architect on thumb-drive or via email. Include copy of key plan indicating each photograph's location and direction.
      2. Identification: Provide the following information with each image description in web-based project software site or in file metadata tag, as appropriate:
         a. Name of Project.
         b. Name and contact information for photographer.
         c. Name of Architect.
         d. Name of Contractor.
         e. Date photograph was taken.
         f. Description of location, vantage point, and direction.
         g. Unique sequential identifier keyed to accompanying key plan.
1.4 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years or an individual employee of the General Contractor acceptable to Architect.

1.5 FORMATS AND MEDIA

A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.

B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

C. Metadata: Record accurate date and time and GPS location data from camera.

D. File Names: Name media files with date, Project area, and sequential numbering suffix.

1.6 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs with maximum depth of field and in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Preconstruction Photographs: Before starting construction, including excavation if applicable, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.

1. Flag construction limits before taking construction photographs.

2. Review with Architect and take appropriate number of photographs, but no fewer than 20, to show existing conditions adjacent to property before starting the Work.

3. Review with Architect and take appropriate number of photographs, but no fewer than 20, of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.

4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

C. Periodic Construction Photographs: Review with Architect and take appropriate number of photographs, but no fewer than 20, monthly coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

D. Final Completion Construction Photographs: Review with Architect and take appropriate number of photographs, but no fewer than 20 after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

E. Additional Photographs: Architect may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
1. Three business days' notice will be given, where feasible.
2. In emergency situations, take additional photographs within 24 hours of request.
3. Circumstances that could require additional photographs include, but are not limited to, the following:
   a. Special events planned at Project site.
   b. Immediate follow-up when on-site events result in construction damage or losses.
   c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
   d. Substantial Completion of a major phase or component of the Work.
   e. Extra record photographs at time of final acceptance.
   f. Owner's request for special publicity photographs.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Submittal schedule requirements.
   2. Administrative and procedural requirements for submittals.

B. Related Requirements:
   1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
   2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
   3. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
   4. Section 013233 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and final completion construction photographs.
   5. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
   6. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
   7. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
   8. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
   9. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
C. Project Closeout and Maintenance Material Submittals: Refer to Section 017700 "Closeout Procedures" for requirements.

1.4 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 calendar days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
   a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:
   a. Scheduled date for first submittal.
   b. Specification Section number and title.
   c. Submittal Category: Action; informational.
   d. Name of subcontractor.
   e. Description of the Work covered.
   f. Scheduled date for Architect's final release or approval.
   g. Scheduled dates for purchasing.
   h. Scheduled date of fabrication.
   i. Scheduled dates for installation.
   j. Activity or event number.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
4. Name of Construction Manager, if applicable.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
9. Category and type of submittal.
10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Paper Submittals: Not accepted.

E. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1. Submittals for Web-Based Project Software: For projects utilizing web-based project software, prepare submittals as PDF files, or other format indicated by Project software website.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections. Generally, submit submittals electronically, except for samples, color charts or other items requiring physical submittals. Review submittal schedule with Architect to verify acceptable format (electronic or physical) for each submittal.

1. Email: Prepare submittals as PDF package, and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.

   a. Web-Based Project Software: For projects utilizing web-based project software, prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.


2. Sustainability Data: Comply with requirements of individual Sections and with requirements of sustainability program coordinator, if applicable.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. Resubmittal Review: Allow 15 business days for review of each resubmittal.

4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 business days for initial review of each submittal.

a. All submittals, including those requiring review by Architect's consultants, are to be transmitted through the Architect. Direct transmittal to Architect's consultant is not allowed, unless agreed to by Architect in advance of transmitting submittal. When so agreed, provide duplicate copy of transmittal to Architect. Submittal will be returned to Architect before being returned to Contractor.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.

2. Note date and content of revision in label or title block and clearly indicate extent of revision.

3. Resubmit submittals until they are marked "Reviewed" or "Reviewed as Noted (Resubmission is Not Required)".

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final submittals with mark indicating "Reviewed" or "Reviewed as Noted (Resubmission is Not Required)" indicating action taken by Architect.

1.7 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's written recommendations for use, installation, and maintenance of product.
   b. Manufacturer's catalog cuts.
   c. Manufacturer's product specifications.
   d. Standard color charts.
   e. Statement of compliance with specified referenced standards.
   f. Testing by recognized testing agency.
   g. Application of testing agency labels and seals.
   h. Notation of coordination requirements.
   i. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:
   a. Wiring diagrams that show factory-installed wiring.
   b. Printed performance curves.
   c. Operational range diagrams.
   d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
   e. Standard equipment operation and maintenance manuals.

5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.


B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Electronic digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals, except as follows:
   a. Architect will furnish Contractor one set of the following digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
      a) Floor plans.
      b) Reflected ceiling plans.

2) Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings will only be available in the format used by the Architect in their preparation.

3) Contractor shall execute a data licensing agreement in the form of AIA Document C106 Digital Data Licensing Agreement.

2. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Dimensions, including notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Fabrication and installation drawings.
h. Roughing-in and setting diagrams.
i. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
j. Shop manufacturing instructions.
k. Templates and patterns.
l. Design calculations.
m. Seal and signature of professional engineer if specified.

3. Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets formatted to at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).

4. Submit Shop Drawings in PDF electronic file format.

C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials and for a comparison of these characteristics between submittal and actual item as delivered and installed.

1. Refer to Section 014000 “Quality Requirements” for requirements for mockups.
2. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
3. Identification: Permanently attach label on unexposed side of Samples that includes the following:
   a. Project name and submittal number.
   b. Generic description of Sample.
   c. Product name and name of manufacturer.
   d. Sample source.
   e. Number and title of applicable Specification Section.
   f. Specification paragraph number and generic name of each item.

4. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics, and identification information for record.
   a. Web-Based Project Software: For projects utilizing web-based project software, prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.

5. Paper Transmittal: Include paper transmittal, in addition to digital transmittal described above, with physical samples and including complete submittal information indicated.

6. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

7. Samples for Initial Selection: Submit manufacturer’s color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
FDR HOPE MEMORIAL 18206
NEW YORK, NEW YORK

a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

8. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in PDF electronic file format.

E. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

G. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections as well as list of applicable codes and regulations and calculations. Include list of assumptions, performance and
design criteria and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

H. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.

   a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.

2. Installer Certificates: Submit written statements on manufacturer’s letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

3. Manufacturer Certificates: Submit written statements on manufacturer’s letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

4. Material Certificates: Submit written statements on manufacturer’s letterhead certifying that material complies with requirements in the Contract Documents.

5. Product Certificates: Submit written statements on manufacturer’s letterhead certifying that product complies with requirements in the Contract Documents.


7. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

I. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
a. Name of evaluation organization.
b. Date of evaluation.
c. Time period when report is in effect.
d. Product and manufacturers' names.
e. Description of product.
f. Test procedures and results.
g. Limitations of use.

1.8 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.9 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp or valid indication in web-based Project software acceptable to Architect. Include project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 ARCHITECT'S REVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it as described in paragraphs above and as follows:

1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action.
2. Paper Submittals: Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
3. Submittals by Web-Based Project Software: For projects utilizing project web-based software, Architect will indicate, on Project software website, the appropriate action.
4. Action:
   
a. Final Unrestricted Release: When the Architect marks a submittal "Reviewed," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.

b. Final-But-Restricted Release: When the Architect marks a submittal "Reviewed as Noted," the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.

c. Returned for Resubmittal: When the Architect marks a submittal "Not In compliance, Revise and Resubmit," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.

   1) Do not use, or allow others to use, submittals marked "Not In Compliance, Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect will return without review or discard submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300
SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. GC to provide and inspect proof rolling/proctor testing.

2. GC to provide testing and inspect specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.

C. Related Requirements:

1. Sections in all other Divisions for specific test and inspection requirements.

1.3 DEFINITIONS

A. Experienced: When used with an entity or individual, “experienced” unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
E. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST’s National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

I. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.4 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.5 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 INFORMATIONAL SUBMITTALS


B. Qualification Data: For Contractor's quality-control personnel.
C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

F. Reports: Prepare and submit certified written reports and documents as specified.

G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.7 REGULATORY REQUIREMENTS

A. Copies of Regulations: Obtain copies of all regulations applicable to project and make available for reference by parties who have a reasonable need.

1.8 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, telephone number, and email address of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer’s Technical Representative’s Field Reports: Prepare written information documenting manufacturer’s technical representative’s tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative’s Reports: Prepare written information documenting manufacturer’s factory-authorized service representative’s tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

1.9 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of
the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:
   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
   d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
   e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
   f. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, if applicable, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.10 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner’s responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Payment for these services will be made directly by Owner.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor with no change to the contract sum.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Engage a qualified testing agency to perform quality-control services.
   a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority, if any, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, Commissioning Authority, if applicable, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Associated Contractor Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents, including any Testing and Installation Action Plans. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, Commissioning Authority, if any, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified testing agency or special inspector as applicable and as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect, Commissioning Authority, as applicable, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Commissioning Authority, if applicable, with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and, if applicable, Commissioning Authority's reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000
1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contrac

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Abbreviations and acronyms not included in this list shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States." The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.

8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
12. AGA - American Gas Association; wwwagara.org.
16. AIA - American Institute of Architects (The); www.aia.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
49. CDA - Copper Development Association; www.copper.org.
51. CEA - Canadian Electricity Association; www.electricity.ca.
52. CEA - Consumer Electronics Association; www.cea.org.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
65. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
66. CSI - Construction Specifications Institute (The); www.csinet.org.
68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
69. CWCC - Composite Wood Council; (See CPA).
71. DHI - Door and Hardware Institute; www.dhi.org.
72. ECA - Electronic Components Association; (See ECIA).
73. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
<table>
<thead>
<tr>
<th>Reference</th>
<th>Organization</th>
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<tbody>
<tr>
<td>75.</td>
<td>EIA - Electronic Industries Alliance; (See TIA).</td>
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<tr>
<td>78.</td>
<td>ESD - ESD Association; (Electrostatic Discharge Association); <a href="http://www.esda.org">www.esda.org</a>.</td>
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<tr>
<td>79.</td>
<td>ESTA - Entertainment Services and Technology Association; (See PLASA).</td>
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<td>80.</td>
<td>ETL - Intertek (See Intertek); <a href="http://www.intertek.com">www.intertek.com</a>.</td>
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<tr>
<td>82.</td>
<td>FCI - Fluid Controls Institute; <a href="http://www.fluidcontrols">www.fluidcontrols</a> institute.org.</td>
</tr>
<tr>
<td>83.</td>
<td>FIBA - Federation Internationale de Basketball; (The International Basketball Federation); <a href="http://www.fiba.com">www.fiba.com</a>.</td>
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<td>84.</td>
<td>FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); <a href="http://www.fivb.org">www.fivb.org</a>.</td>
</tr>
<tr>
<td>86.</td>
<td>FM Global - FM Global; (Formerly: FMG - FM Global); <a href="http://www.fmglobal.com">www.fmglobal.com</a>.</td>
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<tr>
<td>90.</td>
<td>GA - Gypsum Association; <a href="http://www.gypsum.org">www.gypsum.org</a>.</td>
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<tr>
<td>92.</td>
<td>GS - Green Seal; <a href="http://www.greenseal.org">www.greenseal.org</a>.</td>
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<td>94.</td>
<td>HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).</td>
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<td>95.</td>
<td>HMMA - Hollow Metal Manufacturers Association; (See NAAMM).</td>
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<td>96.</td>
<td>HPVA - Hardwood Plywood &amp; Veneer Association; www hpva.org.</td>
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<td>100.</td>
<td>IAS - International Approval Services; (See CSA).</td>
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<tr>
<td>101.</td>
<td>ICBO - International Conference of Building Officials; (See ICC).</td>
</tr>
<tr>
<td>103.</td>
<td>ICEA - Insulated Cable Engineers Association, Inc.; <a href="http://www.icea.net">www.icea.net</a>.</td>
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<td>104.</td>
<td>IPCA - International Cast Polymer Alliance; <a href="http://www.icpa-hq.org">www.icpa-hq.org</a>.</td>
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<tr>
<td>105.</td>
<td>ICRI - International Concrete Repair Institute, Inc.; <a href="http://www.icri.org">www.icri.org</a>.</td>
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<tr>
<td>107.</td>
<td>IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); <a href="http://www.ieee.org">www.ieee.org</a>.</td>
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<tr>
<td>109.</td>
<td>IESNA - Illuminating Engineering Society of North America; (See IES).</td>
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<tr>
<td>110.</td>
<td>IEST - Institute of Environmental Sciences and Technology; <a href="http://www.iest.org">www.iest.org</a>.</td>
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<tr>
<td>111.</td>
<td>IGMA - Insulating Glass Manufacturers Alliance; <a href="http://www.igmaonline.org">www.igmaonline.org</a>.</td>
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<td>114.</td>
<td>Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); <a href="http://www.intertek.com">www.intertek.com</a>.</td>
</tr>
<tr>
<td>115.</td>
<td>ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); <a href="http://www.isa.org">www.isa.org</a>.</td>
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<tr>
<td>116.</td>
<td>ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).</td>
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<td>117.</td>
<td>ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); <a href="http://www.isfanow.org">www.isfanow.org</a>.</td>
</tr>
<tr>
<td>119.</td>
<td>ISSFA - International Solid Surface Fabricators Association; (See ISFA).</td>
</tr>
<tr>
<td>120.</td>
<td>ITU - International Telecommunication Union; <a href="http://www.itu.int/home">www.itu.int/home</a>.</td>
</tr>
<tr>
<td>121.</td>
<td>KCMA - Kitchen Cabinet Manufacturers Association; <a href="http://www.kcma.org">www.kcma.org</a>.</td>
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</table>
122. LMA - Laminating Materials Association; (See CPA).
125. MCA - Metal Construction Association; www.metalconstruction.org.
134. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
139. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
140. NCMA - National Concrete Masonry Association; www.ncma.org.
142. NECA - National Electrical Contractors Association; www.necanet.org.
144. NEMA - National Electrical Manufacturers Association; www.nema.org.
146. NFHS - National Federation of State High School Associations; www.nfhs.org.
148. NFPA - NFPA International; (See NFPA).
151. NLGA - National Lumber Grades Authority; www.nlga.org.
152. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
154. NRCA - National Roofing Contractors Association; www.nrca.net.
159. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
161. PCI - Precast/Prestressed Concrete Institute; www pci.org.
162. PDI - Plumbing & Drainage Institute; www.pdionline.org.
163. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
168. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
169. SDI - Steel Deck Institute; www.sdi.org.
170. SDI - Steel Door Institute; www.steeldoor.org.
171. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the
following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following
list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservice.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200
SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1. All temporary facilities are subject to Owner’s approval.

B. Related Requirements:

1. Section 011000 ”Summary” for work restrictions and limitations on utility interruptions.
2. Division 31 “Earth Moving” for disposal of ground water at Project site.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.

C. Water Service: Pay water-service use charges for water used by all entities for construction operations.

D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

D. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.


1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL
   A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

3.2 INSTALLATION, GENERAL
   A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
   1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
   B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION
   A. General: Install temporary service or connect to existing service.
   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
   B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
   C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
   D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
   1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
   E. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
   1. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
   2. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

   1. Install electric power service underground.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment and one land-based telephone line(s) for each field office.

   1. At each telephone, post a list of important telephone numbers.

      a. Police and fire departments.
      b. Ambulance service.
      c. Contractor's home office.
      d. Contractor's emergency after-hours telephone number.
      e. Architect's office.
      f. Engineers' offices.
      g. Owner's office.
      h. Principal subcontractors' field and home offices.

I. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:

   1. Processor: Intel Core i5 or i7.
   2. Memory: 4 gigabyte.
   4. Display: 24-inch (610-mm) LCD monitor with 256-Mb dedicated video RAM.
   5. Full-size keyboard and mouse.
   8. Productivity Software:

      a. Microsoft Office Professional, 2010 or higher, including Word, Excel, and Outlook.
      b. Adobe Reader 11.0 or higher.
      c. WinZip 7.0 or higher.

   9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
   10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 1.0 Mbps upload and 15 Mbps download speeds at each computer.
   11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide heated and cooled trailers for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to "Earth Moving" section.
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Parking is permitted only in specific areas agreed upon in writing by Owner.

F. Loading and Unloading: Delivery and/or construction vehicles are not permitted to remain in Owner’s delivery area after unloading. Coordinate with Owner for extended deliveries and use of loading facilities to prevent interruption of Owner’s operations.

G. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

H. Project Signs: Not required.
I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section "Site Clearing."

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

G. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control.
procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

H. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates. Fence to protect entire site area.

I. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

J. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
   1. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
   2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
   3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 “Closeout Procedures.”

END OF SECTION 015000
SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 012100 "Allowances," if any, for products selected under an allowance.
2. Section 012300 "Alternates," if any, for products selected under an alternate.
3. Section 012500 "Substitution Procedures" for requests for substitutions.
4. Section 014200 "References" for applicable industry standards for products specified.
5. Other Sections for specific requirements for warranties on products and installations specified to be warranted and for certifications and other commitments and agreements for continuing services to Owner.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's specific product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability,
visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

C. Subject to Compliance with Requirements: Where the phrase “Subject to compliance with requirements” introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications. Submit a comparable product request, if applicable.

1.4 ACTION SUBMITTALS

A. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in “Comparable Products” Article.
2. Architect’s Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 10 days of receipt of request, or five days of receipt of additional information or documentation, whichever is later.

a. Form of Architect’s Approval of Submittal: As specified in Section 013300 “Submittal Procedures.”
b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 “Submittal Procedures.” Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous. Identify locations of labels on shop drawings or other submittals.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:

   a. Name of product and manufacturer.
   b. Model and serial number.
   c. Capacity.
   d. Speed.
   e. Ratings.

3. See individual identification sections in Divisions 21, 22, 23, and 26 for additional identification requirements.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

D. PRODUCT WARRANTIES

E. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on
product warranties do not relieve Contractor of obligations under requirements of the Contract
Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a
particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide
specific rights for Owner.

F. Special Warranties: Prepare a written document that contains appropriate terms and
identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and
properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a
written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for
submitting special warranties.

G. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

1.7 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting failed or damaged warranted construction,
remove and replace construction that has been damaged as a result of such failure or must be
removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected
by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated
warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or
rebuild the Work to an acceptable condition complying with requirements of the Contract
Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work
regardless of whether the Owner has benefited from use of the Work through a portion of its
anticipated useful service life.

D. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied
warranties and shall not limit the duties, obligations, rights, and remedies otherwise available
under the law. Expressed warranty periods shall not be interpreted as limitations on the time in
which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit
selection to products with warranties not in conflict with requirements of the Contract
Documents.

E. Where the Contract Documents require a special warranty, or similar commitment on the Work
or part of the Work, the Owner reserves the right to refuse to accept the Work, until the
Contractor presents evidence that entities required to countersign such commitments are willing
to do so.

PART 2 - PRODUCTS
2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
7. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
   a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   a. Sole product may be indicated by the phrase: "Subject to compliance with requirements, provide the following: ..."

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   a. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source. When the Contractor has the option of selecting between two or more products, the product selected shall be compatible with products previously selected.
   b. Sole manufacturer/source may be indicated by the phrase: "Subject to compliance with requirements, provide products by the following: ..."

3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated as prescribed in Section 012500 Substitution Procedures."
4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

a. Non-limited list of products is indicated by the phrase: "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following: ..."

5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor’s convenience will be considered unless otherwise indicated as prescribed in Section 012500 Substitution Procedures.

a. Limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, provide products by one of the following: ..."

6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

a. Non-limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following: ...

7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.

C. Visual Matching Specification: Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect’s sample. Architect’s decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.
2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.

2. Evidence that proposed product provides specified warranty.

3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

4. Samples, if requested.

B. Submittal Requirements: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000
SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

2. Installation of the Work.
3. Cutting and patching.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 013300 "Submittal Procedures" for submitting surveys.
3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
4. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.
5. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

A. Cutting and Patching Conference: Conduct conference at Project site.
1. Prior to submitting cutting and patching plan, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:

   a. Contractor's superintendent.
   b. Trade supervisor responsible for cutting operations.
   c. Trade supervisor(s) responsible for patching of each type of substrate.
   d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affecting by cutting and patching operations.

2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

   1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
   2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
   3. Products: List products to be used for patching and firms or entities that will perform patching work.
   4. Dates: Indicate when cutting and patching will be performed.
   5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

   a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.6 QUALITY ASSURANCE

A. General Contractor is responsible for coordinating and conducting the Work to assure minimum interference with Owner's ongoing operations. Review and coordinate the construction schedule with the Owner to establish critical completion dates, specific construction area limits, times of construction activities, and phased activities.

B. Codes and Regulations: All Work of this contract must comply with all local, state and national codes, laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

C. Performance of Completed Work: The Contract Documents indicate the intended occupancy and utilization of the building and its individual systems and facilities. Compliance with all
governing regulations is intended and is required for the Work and for the Owner's occupancy and utilization.

D. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

   a. Primary operational systems and equipment.
   b. Fire separation assemblies.
   c. Air or smoke barriers.
   d. Fire-suppression systems.
   e. Plumbing piping systems.
   f. Mechanical systems piping and ducts.
   g. Control systems.
   h. Communication systems.
   i. Fire-detection and-alarm systems.
   j. Conveying systems.
   k. Electrical wiring systems.
   l. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

   a. Water, moisture, or vapor barriers.
   b. Membranes and flashings.
   c. Exterior curtain-wall construction.
   d. Sprayed fire-resistive material.
   e. Equipment supports.
   f. Piping, ductwork, vessels, and equipment.
   g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.
PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.
   1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
   1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
   2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
   1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
   2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
   3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
   1. Description of the Work.
   2. List of detrimental conditions, including substrates.
   3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than three days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission.

C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 “Project Management and Coordination.”

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager or GC promptly.

B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Construction Manager or GC.
3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect or Construction Manager or GC. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect and Construction Manager or GC before proceeding.

2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.

3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
   2. Allow for building movement, including thermal expansion and contraction.
   3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Repair or remove and replace damaged, defective, or nonconforming Work.
   1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."

Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
   a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
   b. Restore damaged pipe covering to its original condition.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
   a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.


2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).

3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

   a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.
END OF SECTION 017300
SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 013233 "Photographic Documentation" for requirements for final completion construction photographic documentation.
2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
4. Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.
5. Other Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at final completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.
C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS
A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES
A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
   3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
      a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
   5. Submit testing, adjusting, and balancing records.
   6. Submit sustainable design submittals, if any, not previously submitted.
   7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
   1. Advise Owner of pending insurance changeover requirements.
   2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
   3. Complete startup and testing of systems and equipment.
   4. Perform preventive maintenance on equipment used prior to Substantial Completion.
   5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in utility services.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touch up painting.
10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

E. Following inspection, the Date of Substantial Completion shall be established as the date upon which the Owner accepts the Work, or portion of the Work covered by that particular Certificate of Substantial Completion, as completed sufficiently enough to permit Owner to occupy and utilize the Work for its intended purpose.

1. If Punch List items interfere with Owner occupancy and use of the Work for its intended purposes, the Work will not be accepted as substantially complete.
2. If Punch List items, regardless of their impact on the Owner's use of the Work, cannot or will not be completed within 30 calendar days of the date proposed for Substantial Completion, the Work will not be accepted as substantially complete.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
   a. Include a final summary statement delineating any changes to the Contract Sum.
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.
5. Submit final completion photographic documentation.

B. Inspection: Submit a written request for final inspection to determine acceptance prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements.
Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A, or General Contractor’s form acceptable to Architect.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor and according to room numbers used on Architectural drawings.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
   a. Project name.
   b. Date.
   c. Name of Architect.
   d. Name of Contractor.
   e. Page number.

4. Submit list of incomplete items in the following format:

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner’s rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual. Retain “Warranties in Paper Form” Paragraph below if required by Owner.

D. Warranties:

   a. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the
product or installation, including the name of the product and the name, address, and telephone number of Installer.

b. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

2. Warranty Electronic File: In addition to paper form, provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

   a. Submit on digital media acceptable to Architect.

E. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

   1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

   1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

      a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

      b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

      c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.

      d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, if any, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.

p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
q. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in other Division 01 Sections. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.

   a. Do not paint over “UL” and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory manuals.
2. Emergency manuals.
3. Systems and equipment operation manuals, including schedule of post construction maintenance services provided as part of this Work.
4. Systems and equipment maintenance manuals.
5. Product maintenance manuals.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Other Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
B. Format: Submit operation and maintenance manuals in the following format:

1. Submit on digital media acceptable to Architect and Owner. Enable reviewer comments on draft submittals.
2. Submit three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

D. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
   b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components
of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.


5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Name and contact information for Commissioning Authority, if any.
8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
9. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to
ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:

1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.8 EMERGENCY MANUALS

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
5. Power failure.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

E. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.
1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

D. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers’ maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
   a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies. Include schedule for post-construction maintenance services provided as part of this Work.

2. Maintenance and Service Record: Include manufacturers’ forms for recording maintenance.

G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers’ maintenance documentation and local sources of maintenance materials and related services.

H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

J. Drawings: Prepare drawings supplementing manufacturers’ printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of maintenance manuals.

1.11 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer’s name.
3. Color, pattern, and texture.
5. Reordering information for specially manufactured products.
E. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823
SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:

1. Section 017700 "Closeout Procedures" for general closeout procedures.
2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Other Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of record Drawings as follows:
   a. Initial Submittal:
      1) Submit one paper-copy set of marked-up record prints.
      2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
   b. Final Submittal:
      1) Submit one paper-copy set and one complete set PDF electronic files of marked-up record prints.
      2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

1.4 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an acceptable drawing technique.
   c. Record data as soon as possible after obtaining it.
   d. Record and check the markup before enclosing concealed installations.
   e. Cross-reference record prints to corresponding photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations relative to first floor.
   d. Locations and depths of underground utilities.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Duct size and routing.
   i. Locations of concealed internal utilities.
   j. Changes made by Change Order or Construction Change Directive.
   k. Changes made following Architect's written orders.
   l. Details not on the original Contract Drawings.
   m. Field records for variable and concealed conditions.
   n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

2. Record Digital Data Files:
   a. Format: Annotated PDF electronic file with comment function enabled.
   b. Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.

3. Identification: As follows:
   a. Project name.
   b. Date.
   c. Designation "PROJECT RECORD DRAWINGS."
   d. Name of Architect.
   e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.

5. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file.

1.6 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

C. Format: Submit record Product Data as **annotated PDF electronic file**.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as **PDF electronic file**.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

**PART 2 - PRODUCTS**

**PART 3 - EXECUTION**

END OF SECTION 017839
SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes administrative and procedural requirements for instructing Owner's personnel,
      including the following:
      1. Instruction in operation and maintenance of systems, subsystems, and equipment.
      2. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS
   A. Instruction Program: Submit outline of instructional program for demonstration and training,
      including a list of training modules and a schedule of proposed dates, times, length of
      instruction time, and instructors' names for each training module. Include learning objective and
      outline for each training module.
      1. Indicate proposed training modules using manufacturer-produced demonstration and
         training video recordings for systems, equipment, and products in lieu of video recording
         of live instructional module.
   B. Qualification Data: For facilitator and instructor.
   C. Attendance Record: For each training module, submit list of participants and length of
      instruction time.
   D. Evaluations: For each participant and for each training module, submit results and
      documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS
   A. Manufacturer-Produced Demonstration and Training Video Recordings: Submit two copies
      within seven days of end of each training module.
      1. Identification: On each copy, provide an applied label with the following information:
         a. Name of Project.
         b. Name of Architect.
         c. Name of Contractor.
2. Paper Transcript: Provide one paper transcript with each copy of each demonstration and training video. Prepare and bind in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.

   a. In addition to paper transcripts, provide a digital transcript prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.

B. At completion of training, submit complete training manuals for Owner's use prepared in same paper and PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.7 INSTRUCTION PROGRAM
A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   - System, subsystem, and equipment descriptions.
   - Performance and design criteria if Contractor is delegated design responsibility.
   - Operating standards.
   - Regulatory requirements.
   - Equipment function.
   - Operating characteristics.
   - Limiting conditions.
   - Performance curves.

2. Documentation: Review the following items in detail:
   - Emergency manuals.
   - Systems and equipment operation manuals.
   - Systems and equipment maintenance manuals.
   - Product maintenance manuals.
   - Project Record Documents.
   - Identification systems.
   - Warranties and bonds.
   - Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:
   - Instructions on meaning of warnings, trouble indications, and error messages.
   - Instructions on stopping.
   - Shutdown instructions for each type of emergency.
   - Operating instructions for conditions outside of normal operating limits.
   - Sequences for electric or electronic systems.
   - Special operating instructions and procedures.

4. Operations: Include the following, as applicable:
   - Startup procedures.
   - Equipment or system break-in procedures.
   - Routine and normal operating instructions.
   - Regulation and control procedures.
   - Control sequences.
   - Safety procedures.
   - Instructions on stopping.
   - Normal shutdown instructions.
   - Operating procedures for emergencies.
   - Operating procedures for system, subsystem, or equipment failure.
   - Seasonal and weekend operating instructions.
   - Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.

7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning.
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.

8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

1.8 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

1.9 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner’s personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Owner will furnish Contractor with names and positions of participants.
C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral, written or demonstration performance-based test.

F. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900
PART 1 GENERAL

1.1 SUMMARY

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

B. All of the contract documents, including General and Supplementary Conditions and Division I General Requirements, apply to the work of this Section.

1.2 SECTION INCLUDES

A. The Work of this Section includes all labor, equipment, and materials necessary to remove existing asphalt pavement with its base, beyond proposed sawcut line.

1.  The work will include vertical adjustment of existing lightpole with footing (refer to a separate document).

1.3 RELATED SECTIONS

A. Section 321401 – Granite Unit Pavers

B. Section 321541 - Stabilized Decomposed Granite

1.4 SUBMITTALS

A. The Contractor shall submit for approval to Roosevelt Island Operating Corporation, all working drawings and schedules of materials and methods proposed to follow in the execution of the Work under this item.

B. Photographs or videotape, sufficiently detailed, of existing conditions of project site that might be misconstrued as damage, caused by debris, or construction material removal.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. Milling and removal equipment.

1. Use power-driven, self-propelled milling and removal equipment that is the size and shape that allows traffic to pass safely through areas adjacent to the work. Also use equipment that is:

a. Designed to mill and remove existing asphalt paving
b. Equipped with grade slope controls operating from a stringline or ski and based on mechanical or sonic operation

c. Furnished with lighting system for night work, as necessary

d. Provided with conveyors capable of side, rear, or front loading to transfer the removed material from the roadway to a truck

B. Dust control

1. Provide power brooms, vacuum sweepers, power blowers, or other means to remove loose debris or dust. Do not allow dust control to restrict visibility of passing traffic or to disrupt adjacent property owners.

PART 3 EXECUTION

3.1 PAVEMENT REMOVAL OPERATION

A. Follow the Plans to remove the designated areas and depths, as required. Ensure the following requirements are met:

1. Schedule the construction operation. Use removal methods that will produce a uniform finished subgrade surface and cross slopes.

2. Provide positive drainage to prevent water accumulation in area of removals.

3. Remove dust, residue, and loose material from the excavated areas. Do not allow traffic on the excavated surface.

3.2 TRENCH EXCAVATION

A. Where trench excavation within the Project surface is required, the Contractor shall excavate as shown on the drawings

B. Excavated material shall be removed in and hauled off site and disposed of in a proper legal. Contractor shall be careful not to disturb or damage any pavement that is to remain.

3.3 PROTECTION OF EXISTING UTILITIES

A. Exercise care not to disturb and/or damage any encountered utility surface structures and buried lines.

B. Note that survey may not show all surface utilities, and does not show any buried subsurface lines, conduits or other utility existing elements.
C. The Contractor shall be responsible for any damaged utility elements, and will repair or replace such elements at his own cost.

END OF SECTION
SECTION 033053 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents:
   1. Drawings and general provisions of the Subcontract apply to this Section.
   2. Review these documents for coordination with additional requirements and information that apply to work under this Section.

B. Section Includes:
   1. Concrete reinforcement and accessories.
   3. Concrete electrical foundations/footings, sculpture foundation, foundations for site benches and furnishings.

C. Related Sections:
   1. Division 01 Section "General Requirements."

1.2 REFERENCES

A. General:
   1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
   2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
   3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.

B. American Concrete Institute (ACI):
   1. ACI 211.1 Proportions for Normal, Heavyweight and Mass Concrete
   2. ACI 305 Recommended Practices for Hot Weather Concreting
   3. ACI 306 Recommended Practices for Cold Weather Concreting
   4. ACI 308 Curing Concrete
   5. ACI 309 Consolidation of Concrete
   6. ACI 318 Building Code Requirements for Reinforced Concrete

C. ASTM International:
   1. ASTM C31 Making and Curing Concrete Test Specimens in the Field
   2. ASTM C33 Concrete Aggregates
   3. ASTM C94 Ready Mix Concrete
   4. ASTM C143 Test Method for Slump of Portland Cement Concrete
   5. ASTM C150 Portland Cement
   6. ASTM C156 Test Method for Water Retention by Concrete Curing Materials
   7. ASTM C171 Sheet Materials for Curing Concrete
   8. ASTM C172 Sampling of Freshly Mixed Concrete
   9. ASTM C260 Air Entrainment Admixtures for Concrete
   10. ASTM C309 Liquid Membrane - Forming Compounds for Curing Concrete
11. ASTM C494 Chemical Admixtures for Concrete

D. American Institute of Steel Construction (AISC) Code of Standard Practice

### 1.3 SUBMITTALS

A. Submit under provisions of Divisions 01 Section "General Requirements" and "Special Procedures."

B. Submit certification that all facilities of the ready-mix plant comply with the requirements of ASTM C94.

C. Material Certificates.
   1. Cementitious materials, including fly ash.
   2. Aggregates, including gradation and combined gradation.
   3. Admixtures. Where more than one admixture is proposed, include statement from admixture manufacturer indicating that admixtures proposed for use are compatible, such that desirable effects of each admixture will be realized.

D. Product Data: Provide data form proprietary materials, including admixtures curing materials, and finish materials.

E. Submit ticket to Testing Laboratory for each batch of concrete delivered, bearing the following information. Refer to "Field Quality Control" Article of this Section.

F. Mix identification.

G. Weights of cementitious materials, aggregates, water and admixtures, and aggregate size.

H. Samples: As requested by Testing Laboratory.

I. Submit test reports from the independent testing agency.

### 1.4 QUALITY ASSURANCE

A. Quality assurance and inspection shall be in accordance with Division 01 Section "Special Procedures".

B. Concrete Mix Design: Refer to recommendations of ACI 211.1

C. Certificates of Compliance: Acceptability of the following materials will be based upon documentation furnished by the manufacturer identifying each batch of material and certifying compliance with the requirements specified:
   1. Portland cement.
   2. Fly ash.
   3. Chemical admixtures.

D. Certified laboratory test reports: Before delivery of materials, certified copies of the reports of all tests required in referenced publications or otherwise specified here shall be submitted. Certified test reports are required for the following:
   1. Portland Cement.
   2. Aggregates.
PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Form Ties: Snap-off metal, cone ends.

B. Form release agent: Non staining with no petroleum solvents; Nox-Crete Company “Nox-Crete Form Coating”, Industrial Synthetics Corporation “Synthex”, or equal.

2.2 REINFORCING STEEL

A. Reinforcing Steel: ASTM A615 (unless otherwise noted on the drawings), of the yield grade specified on the drawings; deformed plain billet steel bars.
1. Recycled content shall be a minimum of 75% recycled post-consumer steel.

2.3 CONCRETE MATERIALS

A. Cementitious materials and aggregates for exposed concrete shall be from same source throughout the work.

B. Cementitious Material: An intimate blend of Portland cement and fly ash. Cementitious material shall include 15 percent minimum to a maximum of 25% fly ash by weight unless the strength is specified to be achieved in 7 or 14 days.
2. Fly Ash: ASTM C618, Class F with the following Modified ASTM requirements:
   a. Loss of Ignition (L.O.I.): maximum 1%.
   b. Sulfur Trioxide (SO3) shall not exceed 3% by weight.
   c. Water requirement maximum: 100% control.

C. Aggregate for Standard Weight Concrete: ASTM C33, except as modified herein.
1. Coarse Aggregates: Cleanness Value of not less than 75 when tested as per CMM-Test Method No. California 227.
2. Coarse Aggregate for Shrinkage Controlled Concrete: Lonestar or Hanson Clayton, or Sechelt, B.C. (as supplied by Hanson).

D. Water: Mixing water shall be clean, potable and free from deleterious material.

E. Admixtures:
   1. General:
      a. Admixtures containing more than 0.05 percent chloride ions are not permitted.
      b. Where mix contains more than one admixture, all admixtures shall be supplied by one manufacturer. Manufacturer shall certify that admixtures are compatible such that desirable effects of each admixture will be realized.
      c. Liquid admixtures shall be considered part of the total water.
F. Water Reducing Admixture: ASTM C494, Type A. Provide in all concrete at necessary dosage to facilitate placement.

G. Mid to High Range Water Reducing Admixture: ASTM C494, Type F; polycarboxylate formulation. Provide in mid-range or high-range dosage as necessary for placement at the maximum water to cement ratio specified.

2.4 ACCESSORIES

A. Curing Compounds: ASTM C309, [Type I, clear or translucent without dye.] [Type 1-D, clear or translucent with fugitive dye] or Type 2, white pigmented] and which will not discolor concrete or affect bonding of other finishes applied thereover, and which restricts loss of water to not more than 0.500 grams per square centimeter of surface when tested per ASTM C156, “Test Method for Water Retention by Concrete Curing Materials.”

B. Burlap Sheet: AASHTO M182, class 3 or 4.

C. Rock Base: Clean, hard and durable gravel or crushed rock.

D. Sand Cover: Uniformly graded, clean sand free from excessive fines, organic materials or other deleterious substances.

E. Embedded Reglets and Dovetail Anchor Slots: 18 gauge galvanized steel.

2.5 CONCRETE MIX

A. Schedule of Concrete Class:

<table>
<thead>
<tr>
<th>Mix ID/Use</th>
<th>Aggregate Size</th>
<th>Slump (inches)</th>
<th>Min. Strength (psi)</th>
<th>Other Req’ts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mix E Miscellaneous concrete for curbs, pads, etc.</td>
<td>Size 57 (1&quot;)</td>
<td>3-5</td>
<td>3,500</td>
<td></td>
</tr>
</tbody>
</table>

B. Aggregate: Coarse aggregate size number in accordance with ASTM C33 for normal-weight aggregate. Coarse aggregate size in accordance with ASTM C330 for lightweight aggregates.

C. Slump: Minimum-maximum slump at point of placement in inches when tested in accordance with ASTM C143.

D. Strength: Minimum compressive strength in psi after 14 days, tested in accordance with ASTM C39.

E. Proposed mix shall produce concrete to strengths specified with adequate workability and proper consistency to permit concrete to be worked into forms and around reinforcement without excessive segregation or bleeding.

F. Add air entraining agent to normal weight concrete mix for work exposed to exterior.
3.1 EXAMINATION
   A. Verify site conditions under provisions of Division 01 Section "General Requirements".
   B. Verify requirements for concrete cover over reinforcement.
   C. Verify that anchor bolts, embedded plates, reinforcement, sleeves and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.2 FORMWORK ERECTION
   A. Verify lines, levels, and measurement before proceeding with formwork.
   B. Hand trim sides and bottom of earth forms; remove loose dirt.

3.3 REINFORCEMENT & EMBEDDED ITEMS
   A. Place, support, and secure reinforcement and embedded items against displacement.
   B. Location and sizes of reinforcing shall be as shown on site details drawings.

3.4 PLACING CONCRETE
   A. No concrete shall be placed until all subgrade, formwork, reinforcing steel, embedded items and surfaces against which concrete is to be placed have been completed. The rate of delivery, haul time, missing time and hopper capacity shall be such that all mixed concrete delivered shall be placed in forms within 90 minutes from the time of the introduction of cement and water into the mixer. No water shall be added after transit mixer leaves the batching plant.
   B. All surfaces of forms and embedded items shall be free of grout before placing concrete.
   C. When ambient temperature is expected to exceed 80°F during placing or finishing operations, steps shall be taken in accordance with ACI 305, "Recommended Practices for Hot Weather Concreting", to reduce concrete temperature and water evaporation by proper attention to the ingredients, production methods, handling, placing, protection and curing. The Subcontractor shall submit a detailed hot weather concreting procedure to the A/E for approval at least two business days before concrete placement is planned.

3.5 CURING AND PROTECTION
   A. Wheeling, working and walking on concrete shall be avoided for at least 24 hours after casting. Protect concrete from sun and rain. Do not permit concrete to become dry during curing period. Concrete shall not be subjected to any loads until concrete is completely cured, and until concrete has attained its 28 day strength.
   B. Protect concrete during and after curing from damage during subsequent construction operations.
C. Cover traffic areas with plywood or other suitable means for as long as necessary to protect concrete from damage.

D. Concrete in forms shall be kept moist until removal. Immediately upon removal of forms, an approved sprayed-on curing compound shall be applied to the concrete surfaces in strict compliance with the manufacturer’s recommendations. Curing shall be maintained for [7].

3.6 FIELD QUALITY CONTROL

A. Inspection and Testing will be performed under provisions of Division 1.

B. Testing Laboratory will:
   1. Collect and review tickets for each batch of concrete delivered. Annotate water or admixtures added subsequent to batching.
   2. Special Inspect concrete placement, as required by CBC Section 1701.5, Item 1, for conformance with the Contract Documents.
   3. Slump: ASTM C143; one test at point of placement at start of each day's pour; additional tests when concrete consistency appears to have changed.
   4. Compressive Strength: Test concrete for compressive strength in accordance with CBC Section 1905.6 and ASTM C39. Conform to testing frequency of CBC 1905.6.1. Take 4 specimens per sample, test one at seven days, two at 28 days, and retain one specimen.
   5. Temperature: ASTM C1064; one test hourly. Take additional tests where warranted by weather conditions or delays in delivery.
   6. Air Content: ASTM C173; for mixes with more than 3 percent air, take one test hourly at point of placement.

C. The Subcontractor shall pay Testing Laboratory for investigating of low-strength compressive test results in accordance with CBC Section 1905.6.4.

END OF SECTION
SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DDC General Conditions, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:
1. Section 260523 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2 and 3 control cables.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Alpha Wire.
2. Belden Inc.
4. General Cable Technologies Corporation.
5. Southwire Incorporated.
6. Or Approved Equal

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THW-2, Type THHN-2-THWN-2, Type XHHW-2, Type UF, Type USE and Type SO.

D. VFC Cable:
   1. Comply with UL 1277, UL 1685, and NYC Electrical Code for Type TC-ER cable.
   2. Type TC-ER with oversized crosslinked polyethylene insulation, spiral-wrapped foil plus 85 percent coverage braided shields and insulated full-size ground wire and sunlight- and oil-resistant outer PVC jacket.
   3. Comply with UL requirements for cables in Classes I and II, Division 2 hazardous location applications.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   1. AFC Cable Systems, Inc.
   2. Gardner Bender.
   4. Ideal Industries, Inc.
   5. Ilsco; a branch of Bardes Corporation.
   6. NSi Industries LLC.
   7. O-Z/Gedney; a brand of the EGS Electrical Group.
   8. 3M; Electrical Markets Division.
   10. Or Approved Equal

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NYC Electrical Code, by a qualified testing agency, and marked for intended location and application.

B. Comply with NYC Electrical Code.
PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, except VFC cable, which shall be extra flexible stranded.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls and ceilings of House Watch. Install exposed areas in all other areas.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation.

D. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

G. EMT for use on Upper Floors, above Apparatus Floor

3.3 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.
3.4 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test feeder conductors for compliance with requirements.


3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

   a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
   
   b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
   
   c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

B. Test and Inspection Reports: Prepare a written report to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes grounding and bonding systems and equipment.
   B. Section includes grounding and bonding systems and equipment, plus the following special applications:
      1. Underground distribution grounding.
      2. Ground bonding common with lightning protection system.
      3. Foundation steel electrodes.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS
   A. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
      1. Ground rods.
   B. Qualification Data: For testing agency and testing agency's field supervisor.
   C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS
   A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
      1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.
   1. Testing Agency’s Field Supervisor: Certified by NETA to supervise on-site testing.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:
   4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
   5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
   6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
   7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
2.3 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
   1. Bury at least 24 inches below grade.
   2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.

C. Conductor Terminations and Connections:
   1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
   2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
   3. Connections to Ground Rods at Test Wells: Bolted connectors.

3.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, nonshrink grout.
C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches from the foundation.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.

C. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.4 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 260543 "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches deep, with cover.

1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

F. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

G. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 10 feet long. If reinforcing is in multiple pieces, connect together by the usual steel tie wires or exothermic welding to create the required length.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
D. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.

2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, individual ground rods. Make tests at ground rods before any conductors are connected.

   a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.

   b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

E. Grounding system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

G. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526
SECTION 260533

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Metal conduits, tubing, and fittings.
   2. Nonmetal conduits, tubing, and fittings.
   3. Metal wireways and auxiliary gutters.
   4. Nonmetal wireways and auxiliary gutters.
   5. Boxes, enclosures, and cabinets.
   6. Handholes and boxes for exterior underground cabling.

B. Related Requirements:
   1. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

C. Samples: For wireways and for each color and texture specified, 12 inches long.
1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.

B. Qualification Data: For professional engineer.

C. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

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

1. AFC Cable Systems, Inc.
2. Allflex Inc.
3. Allied Tube & Conduit; a Tyco International Ltd. Co.
4. Anamet Electrical, Inc.; Anaconda Metal Hose.
5. Electri-Flex Co.
7. Maverick Tube Corporation.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. ARC: Comply with ANSI C80.5 and UL 6A.

E. IMC: Comply with ANSI C80.6 and UL 1242.

F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040 inch, minimum.

G. EMT: Comply with ANSI C80.3 and UL 797.

H. FMC: Comply with UL 1; aluminum.

I. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

J. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:
   a. Material: Steel.
   b. Type: compression.
3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
   K. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. ENT: Comply with NEMA TC 13 and UL 1653.
C. LFNC: Comply with UL 1660.
D. Rigid HDPE: Comply with UL 651A.
E. Continuous HDPE: Comply with UL 651B.
F. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.
G. RTRC: Comply with UL 1684A and NEMA TC 14.
H. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
I. Fittings for LFNC: Comply with UL 514B.
J. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
K. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, [Type 4] unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Wireway Covers: Flanged-and-gasketed type unless otherwise indicated.

D. Finish: Manufacturer's standard enamel finish.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Nonmetallic Device Boxes: Comply with NEMA OS 2 and UL 514C.

E. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

G. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

H. Gangable boxes are prohibited.

I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 4 with continuous-hinge cover with flush latch unless otherwise indicated.

   1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
   3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

2.5 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:
1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymeric resin, and reinforced with steel, fiberglass, or a combination of the two.

1. Standard: Comply with SCTE 77.
2. Configuration: Designed for flush burial with integral closed bottom unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering, "ELECTRIC.".
6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

C. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of hot-dip galvanized-steel diamond plate.

1. Standard: Comply with SCTE 77.
2. Color of Frame and Cover: Gray.
3. Configuration: Designed for flush burial with integral closed bottom unless otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC.".
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

2.6 SOURCE QUALITY CONTROL FOR UNDERGROUND ENClosures

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

1. Tests of materials shall be performed by an independent testing agency.
2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.
3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
   1. Exposed Conduit: GRC.
   2. Concealed Conduit, Aboveground.
   4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:
   1. Damp or Wet Locations: IMC.
   2. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4.


D. Raceway Fittings: Compatible with raceways and suitable for use and location.
   1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
   2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
   4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

F. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

G. Install surface raceways only where indicated on Drawings.

H. Do not install nonmetallic conduit where ambient temperature exceeds [120 deg F].

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches of enclosures to which attached.

I. Raceways Embedded in Slabs:
   1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
   2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
   3. Arrange raceways to keep a minimum of 1 inch of concrete cover in all directions.
   4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
   5. Change from ENT to RNC before rising above floor.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

P. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
Q. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

R. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

S. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

T. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

U. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

V. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

W. Locate boxes so that cover or plate will not span different building finishes.

X. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
Y. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

Z. Set metal floor boxes level and flush with finished floor surface.

AA. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches in nominal diameter.

2. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as required.

3. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.

4. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.

5. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install handholes with bottom below frost line, below grade.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.
F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533
SECTION 260553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
5. Warning labels and signs.

1.3 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.


D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:
   1. Black letters on an orange field.
   2. Legend: Indicate voltage.

C. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch-wide black stripes on 10-inch centers diagonally over orange background that extends full length of raceway or duct and is 12 inches wide. Stop stripes at legends.

G. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

H. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS
A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
B. Colors for Cables Carrying Circuits at 600 V and Less:
   1. Black letters on an orange field
   2. Legend: Indicate voltage and system or service type.
C. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.
E. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS
A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
C. Self-Adhesive, Self-Laminating Polyester Labels: Write-on, 3-mil- thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.
D. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.
E. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.
F. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.
G. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Self-Adhesive, Self-Laminating Polyester Labels: Write-on, 3-mil- thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.

C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.

D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.

E. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around conductor it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

F. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

G. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Labels for Tags: Self-adhesive label, machine-printed with permanent, waterproof, black ink recommended by printer manufacturer, sized for attachment to tag.

2.5 FLOOR MARKING TAPE

A. 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.6 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

2.7 WARNING LABELS AND SIGNS


B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 10 by 14 inches.

2.8 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.

2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.

G. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

I. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
   1. Outdoors: UV-stabilized nylon.
   2. In Spaces Handling Environmental Air: Plenum rated.

J. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench [or concrete envelope] exceeds 16 inches overall.
K. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch wide black stripes on 10-inch centers over orange background that extends full length of raceway or duct and is 12 inches wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch high black letters on 20-inch centers. Stop stripes at legends. Apply to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
2. Wall surfaces directly external to raceways concealed within wall.
3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

B. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Snap-around labels. Install labels at 10-foot maximum intervals.

C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A, and 120V to ground: Identify with self-adhesive vinyl label. Install labels at 10-foot maximum intervals.

D. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded feeder conductors.
   a. Color shall be factory applied[ or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
   b. Colors for 208/120-V Circuits:
      1) Phase A: Black.
      2) Phase B: Red.
      3) Phase C: Blue.
   c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

E. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.

G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
   1. Limit use of underground-line warning tape to direct-buried cables.
   2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

H. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

I. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
   1. Labeling Instructions:
      a. Indoor Equipment: Adhesive film label. Unless otherwise indicated, provide a single line of text with 1/2-inch high letters on 1-1/2-inch high label; where two lines of text are required, use labels 2 inches high.
      b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
      c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
      d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
   2. Equipment to Be Labeled:
      a. Enclosures and electrical cabinets.
      b. Access doors and panels for concealed electrical items.
PART 1 – GENERAL SPECIFICATION

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to the Work of this Section.

1.2 SUMMARY

A. This Section includes architectural lighting fixtures.

B. Related Work Specified Elsewhere

1. Related sections of electrical work.
2. Air terminal units and air distribution accessories for air handling lighting fixtures.
3. Lighting fixtures other than architectural lighting fixtures.

1.3 SUBMITTALS

A. Shop Drawings

1. Submit shop drawings showing details of all conditions, size and arrangement of parts, adjacent construction and other pertinent data. Clearly indicate the drawing number of fixture details used as reference in the development of the shop drawings. Indicate finished dimensions and required clearances, metal thicknesses and gauges, material finishes, electrical and mechanical connections, fasteners, weld locations, joint locations, relationship to ceiling supports and provisions for the work of others. For fixtures specified as "continuous runs", provide scale drawings showing fixture and lamp layout for the actual length of run. Catalog cuts lacking sufficient detail to indicate compliance with contract document will not be acceptable.

2. Provide listing on shop drawing containing the fixture type, manufacturer's catalog number, applied voltage, and lamp and ballast types. Manufacturer's catalog cuts may be submitted in lieu of shop drawings only if they contain sufficient detail and information to indicate compliance with the Contract Documents.

3. Coordinate lighting fixture shop drawings with details of the architectural, structural, electrical, mechanical and other related work to assure a perfect & efficient installation.

4. Indicate variations from the general arrangement and details shown on the Contract Documents required suiting actual conditions at the site.

5. For air handling fixtures, submit CFM and total pressure data for end slots and side slots used for return air and/or supply air for review by mechanical engineer.

6. Shop drawing shall be submitted in reproducible form for all lighting fixtures and shall be received no later than sixty days after award of Contract.

B. Photometric Data
1. When indicated on the fixture schedule or elsewhere, submit complete photometric data for the fixture, including optical performance rendered by independent testing laboratory developed according to methods of the Illuminating Engineering Society of North America (I.E.S.) as follows:

   a. For Down and Semi-Down Lights Used for General Illumination

      1) Coefficients of utilization.

      2) Visual comfort probability data (fluorescent only for 100 footcandles), rooms with reflectances of 80% (ceiling), 50% (walls), and 20% (floor), including a 20 ft. x 20 ft. room with 10 ft. ceiling and luminaires lengthwise.

      3) Candlepower data, presented graphically and numerically, in 5 deg. increments (5 deg., 10 deg., 15 deg., etc.) for vertical planes. Data developed for up and down hemispheres in a singular azimuthally plane for fixtures with axially symmetric distributions and in 22-1/2 deg. increments for as many quadrants as required to completely describing fixtures with quadrilaterally symmetric, bilaterally symmetric and asymmetric distributions.

      4) Zonal lumens stated numerically in 10 deg. increments (5 deg., 15 deg., etc.).

   b. For Area and Roadway Luminaires: Isocandela charts, coefficients of utilization and IES roadway distribution classification.

2. Submit photometric data for any fixture offered in substitution for a specified fixture. Submission shall include above information plus I.E.S. formatted electronic photometric file.

C. Samples

1. Submit for review one (1) working sample (complete with plug and cord for standard 120 volt service) of each fixture where sample requirement is noted on the fixture schedule, complete with specified lamp(s), ready for hanging and energizing. Samples are not returnable or included in quantities listed for the Project. Where a fixture sample is submitted or requested, do not fabricate that fixture type until sample is reviewed and accepted.

2. Submit samples of lenses, louvers or diffusers as requested.

3. Submit sample for any fixture offered in substitution for a specified fixture, according to guidelines listed in item 1 above.

4. Two weeks from date received shall be allowed for thorough examination of the samples by the lighting consultant.

D. Guarantees

1. Provide a written guarantee stating that each architectural lighting fixture including finishes, light sources (if it is part of the fixture), and all component parts, shall be free from defects in materials or workmanship. Upon notification of such defects, within the guarantee period, provide the necessary repairs or replacements at the convenience of the Owner without any additional cost.

   A. For Light fixtures (without LED light sources provided) guarantee shall be one (1) year from date of final acceptance.
B. For Light fixtures with integrated LED light sources provided shall have five (5) years
guarantee from date of final acceptance.

C. Ballasts shall be guaranteed for two (2) years.

2. Provide a written guarantee for ten (10) years stating that Alzak parabolic cones will be guar-
anteed against discoloration. Upon notification of such premature discoloration defects,
within the guarantee period, provide the necessary replacements at the convenience of the
Owner without any additional cost.

3. Acrylic plastic lenses and diffusers shall remain free of dimensional instability, discoloration,
embitterment, or loss of light transmittance for a minimum of fifteen (15) years.

E. Maintenance Manual: Submit two copies of a bound maintenance manual, describing the materi-
als, tools required, replacement parts identification list and procedures for cleaning and maintain-
ing each type of architectural lighting fixture. Include manufacturer's data describing the materi-
als and finishes used in the work.

1.4 QUALITY ASSURANCE

A. Manufacturers: Manufacturers listed in the fixture schedule shall be assumed capable of supply-
ing the listed fixtures unless exceptions are set forth in their quotations. Any such exceptions
shall immediately be brought to the attention of the Contractor, the Architect and the Lighting
Consultant. Manufacturers not listed must be pre-qualified to bid as follows:

1. Experience: Manufacturer(s) shall have not less than five years experience in design and
manufacture of lighting fixtures of the type and quality shown. Pre-qualification submissions
must include a list of completed projects and dated catalog pages or drawings indicating
length of experience.

2. Samples: Manufacturer(s) shall also submit a sample of each fixture upon lighting designer's
request for review. Samples shall be sufficiently detailed and operational to allow evaluation
of compliance with the salient features of the specification. Preliminary design or shop draw-
ings shall not be accepted in place of samples.

3. The Architect and the Lighting Consultant shall be the sole judges in determining whether the
prototype sample complies with the specifications, and shall reserve the right to disqualify
any bidders.

B. Standards

1. Except as modified by governing codes and by the Contract Documents, comply with the ap-
licable provisions and recommendations of the following:
   i. AEIC - Association of Edison Illuminating Companies
   ii. IES - Illuminating Engineering Society
   iii. UL - Underwriters Laboratories
   iv. ANSI - American National Standards Institute
   v. ASME - American Society of Mechanical Engineers
   vi. ASTM - American Society for Testing Materials
   vii. NEMA - National Electrical Manufacturers Association
   viii. NESC - National Electrical Safety Code
   ix. NECA - National Electrical Contractors Association
   x. NEC - National Electrical Code 2008
2. Listing: Provide fixtures manufactured and listed in strict accordance with the appropriate requirements of the National Electric Code as verified by Underwriter's Laboratories, Inc., or other testing agency acceptable to local authorities having jurisdiction. Provide listings for each fixture type, and the appropriate label or labels affixed to each fixture in a position concealed from normal view.

1.5 PRODUCT HANDLING

A. Deliver architectural lighting fixtures, components and assemblies in fully sealed protective cartons and identified as to contents. Protect fixtures from damage from any source. Provide removable protection as required.

B. Instructions: Each lighting fixture shall be packaged with complete instructions and illustrations indicating installation method.

C. Store materials in accordance with manufacturer's instructions, properly protected from weather and construction activities.

1.6 EXTRA STOCK

A. Furnish to the Owner and store at the site where directed, extra stock of each type of lighting fixture type and lamp type installed in the Project in quantities as required by Owner, packaged in manufacturer's unopened cartons and identified as to contents by fixture type.

B. Furnish items above with an appropriate quantity of each exposed trim, fastener, bracket and other items as required for a complete installation.

1.7 DECORATIVE CUSTOM FIXTURE

A. Decorative custom fixture manufacturers listed in the fixture schedule shall be assumed capable of supplying the detailed fixtures. Manufacturers not listed must be pre-qualified based on their Experience. Manufacturers not listed in the fixture schedule shall also submit a sample of each fixture upon lighting designer's request for review.

B. The Architect and the Lighting Consultant shall be the sole judges in determining whether the prototype sample complies with the specifications, and shall reserve the right to disqualify any bidders.

C. Furnish to the Owner and store extra stock at the site where directed of certain type of lighting fixture type and lamp type installed in the Project. The fixture type and quantities as required by Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Standard with the manufacturer and complying with requirements of referenced standards.
2.2 FIXTURE FABRICATION, GENERAL

A. Provide architectural lighting fixtures completely factory assembled, wired and equipped with necessary sockets, ballasts, wiring, shielding, reflectors, channels, lenses, brackets, fasteners and other parts necessary to complete the fixture installation.

B. Sheet Metal Work: Sheet metal work shall be free from tool marks and dents, and shall have accurate angles bent as sharp as is compatible with the gauge and material of the required metal. All intersections and joints shall be formed true, of adequate strength and structural rigidity to prevent any distortion after assembly. Return or clean edges free of all burrs or sharp spots.

C. Castings: Provide cast or extruded metal fixtures parts, of ample weight and thickness that are close grained, smoothly finished and buffed, rigid and free from imperfections, sand pits, blemishes, scales, rust or discolorations. Provide for tolerance of shrinkage of the metal castings so as to allow the finished castings to accurately fit in their designated locations.

D. Hinged door closure frames shall operate smoothly without binding. Fabricate frames to allow lamp installation and/or removal without the use of tools. Hinge mechanism shall be designed to preclude accidental falling of hinged door closure frames during re-lamping operations and while secured in the operating position.

E. Weld exposed metal at joints, fill with compatible weld material, grind smooth and make free from light leaks. Construct fixtures with the minimum number of joints. Fabricate unexposed joints utilizing welding, brazing, screwing or bolting. Soldered joints are unacceptable. Do not utilize self-tapping methods or rivets for fastening parts, which require removal to gain access to electrical components requiring service or replacement, or for fastening any electrical components or their supports. Gasket incandescent fixtures with overlapping trim. Weld ballast support studs, socket saddle studs and reflector support studs to fixture body. Ventilate ballast compartments and firmly secure ballasts to conducting metal surface.

F. Light leaks between ceiling trims of recessed lighting equipment and the ceilings will not be allowed. If fixtures are used in partially transparent ceilings, light leaks above the ceiling line will not be allowed. Interior light reflecting surfaces shall have reflectance of not less than 85% for white surfaces, 83% for specular surfaces and 75% for specular diffusing surfaces.

G. Provide yokes, brackets and supplementary supporting members needed to mount lighting fixtures to carrier channels or other suitable ceiling members.

H. Temperature: All fixtures and ballasts must operate within the temperature limits of their design and as specified by Underwriters' Laboratories, Inc. in the applications and mounting conditions specified herein.

2.3 FIXTURE FABRICATION, SPECIFIC ITEMS

A. Enclosures: Fabricate fixture enclosures with minimum 20 ga. thick cold rolled sheet steel. Enclosures may be constructed of other metals, provided they are equivalent in mechanical strength and acceptable for the purpose. Fabricate lighting fixtures with vitreous porcelain enamel finish from minimum 20 ga. enameling steel.

B. Housings: Fabricate housings so that all electrical components are easily accessible and replaceable without removing fixtures from their mountings, or altering adjacent construction. Provide recess & semi-recess fixtures using bottom re-lamping unless otherwise noted.
C. Mounting Frames and Rings: If required for installation in specified ceiling system, provide each recessed and semi-recessed fixture with a mounting frame or ring compatible with the ceiling system in which they are to be installed. Frames and rings shall be one piece or constructed with electrically welded butt joints, and of sufficient size and strength to sustain the weight of the fixture. Ceiling opening frames shall either be manufactured of non-ferrous metal or be suitably rust proofed after fabrication.

D. Fasteners and Hardware: For steel and aluminum fixtures, all screws, bolts, nuts and other fastening and latching hardware shall be cadmium or equivalent plated. For stainless steel fixtures, all hardware shall be stainless steel. For bronze fixtures, all hardware shall be stainless steel or bronze. Where exposed in the finish work, fasteners shall be of color and finish, matching base metal and finish.

E. Lamp Sockets: Provide lamp sockets in lighting fixtures suitable for the specified lamps and set so that lamps are positioned in optically correct relation to all lighting fixture components. If adjustable socket positions are provided, preset socket in factory for lamp specified. If different socket positions are specified for same fixture, preset sockets for each type, and mark cartons accordingly.

F. Adjustable Angle Fixtures: Provide each lighting fixture, which has a beam angle adjustment with a reliable angle-locking device. Fixture re-lamping shall not disturb preset focus.

G. Oval Beam Fixtures: Each lighting fixture which has a lamp with an oval shape beam pattern shall contain lamp orientation locking devices to insure that beam orientation is not disturbed during future lamp replacement or cleaning.

H. Spread Lens Fixtures: Each light fixture, which has a spread lens, shall contain lens orientation locking devices to insure that lens orientation is not disturbed during future lamp replacement or cleaning.

I. Outdoor Fixtures: Fixtures for use outdoors or in areas designated as damp locations shall be suitably gasketed to prevent the entrance of moisture. Provide approved wire mesh screens for ventilation openings.

2.4 FIXTURE FINISHES

A. General: As shown for the respective units and matching the Architect’s samples. Remove scratches, abrasions, dents, die markings and other defects prior to finishing operations. Perform this work in addition to finish treatment specified. Unless otherwise noted, colors and finishes shall be as selected by the Architect and Lighting Consultant.

B. Shop Finishes

1. Ferrous Metals: Except for stainless steel, give ferrous metal surfaces a five stage phosphate treatment or other acceptable base bonding treatment before final painting and after fabrication.

2. Anodized Aluminum Surfaces: Finish interior aluminum trims with an anodized coating of not less than 7 mg. per sq. in. of a color and surface finish as selected by the Architect and Lighting Consultant. Finish exterior aluminum and aluminum trims with an anodized coating of not less than 35 mg. per sq. in. of a color and surface finish as selected by the Architect and Lighting Consultant.
3. Porcelain Enamel Surfaces: Apply porcelain finishes smoothly. Finish shall be not less than 7.5 mm thick of non-yellowing, white, vitreous porcelain enamel with a reflectance of not less than 85% except as noted otherwise.

4. Unpainted non-reflecting surfaces shall receive a mechanically applied satin finish and shall be coated with a baked-on clear lacquer to preserve the surface. Where aluminum surfaces are treated with an anodic process, the clear lacquer coating may be omitted.

C. Field Painting

1. Painted Surfaces: Synthetic enamel, with acrylic, alkyd, epoxy, polyester or polyurethane base, light stabilized, baked-on at 350 deg. F. minimum, catalytically or photo chemically polymerized after application.

2. White Finishes: Minimum of 85% reflectance.

2.5 LED FIXTURES

A. General: LED luminaries are an electromechanical system that includes the essential light-emitting source, provisions for heat transfer, electrical control, optical conditioning, mechanical support, protection, as well as aesthetic design elements. LEDs themselves are expected to have long life, all of the other components, adhesives, and materials must be equally long-lived. The LED Luminaire manufacturer shall be responsible for providing tight control on the LED luminaries’ system components and operating conditions to provide optimum performance.

B. Properly measured, Luminaire Efficacy combines both the light source system efficacy and luminaire efficiency, allowing for a true comparison of a luminaire regardless of the light source. The Luminaire efficacy is the preferred metric for LED fixtures. The Luminaire efficacy shall measures the net light output from the luminaire divided by power into the system, accounting for driver, optical, and thermal losses. The LED luminary manufacturer shall list the luminary’s efficacy, not the LED sources efficacy.

C. Life of the LED Light source

1. Life is the length of time during which a LED Light source, LED Module or LED Luminaire provides more than claimed percentage x of the initial luminous flux, under standard conditions. The LED luminary’s Life shall always be published as combination of life at claimed lumen maintenance and failure fraction, Fy applying at the time of reaching the claimed percentage of the initial luminous flux (Lx). The LED Luminaire manufacturer shall always state the life of the LED source as:

   a. Light Loss - Usually either L90 or L70 (L50 for decorative luminaires) – no. of hours
   b. Physical Failures - LED Life F10 – no. of hours

2. Example: If the rated life of a product is 50,000 hours, this means light loss of L70 and physical failures of Fx (where x is the percentage no. of failures) at the rated life of 50,000 hours. (Note: it should be assumed that the manufacturer has tested to a maximum of 6000 hrs and extrapolated beyond that – unless they explicitly state differently.)

D. Optical performance

The LEDs are directional light sources and the use of reflectors, lenses and diffusers, or a combination there of. The LED Luminaire manufacturer shall always states the efficiency of the optical system and overall efficiency value of the lamp or luminaire.
E. Thermal Management
The interface between an LED and heat-sink called PCB is a thermal resistance value that represents the capability of the soaking away heat from the LED, this may well impact on the LED lumen output performance and ultimately the life, lumen maintenance and/or catastrophic failure of the LED. Lumnaires mechanical components shall have IPxx rating to suit the application, heatsinking shall not become compromised with time and or lack of maintenance, vibration resistance, specifically. The heat-sink shall be appropriately secured to the LED source, and bonding mechanisms are suitable for the life of the lamp or luminaire.

Electrical overstress can cause of catastrophic failure of LEDs. The provided LEDs shall contain an on board Transient Voltage Suppression chip (TVS) to minimize damage at installation or power-up.

F. LED Light Source

1. The LED die (or chip) is contained in a suitable package allowing simplified electrical connection or assembly.

2. LED Module: The LED source with mechanical and optical components making a replaceable item for use in luminaries.

3. LED Luminaire: The complete lighting fixture system consisting of all elements including; LED source, Heat sinks, optical components, drivers, housing, etc.

The Luminaries manufacturer shall indicate the basis of life projections and list LM-80 data available for the proposed LED Module or calculates lifetime data based upon the LM-80 data to ensuring the LED Module or Luminaire could be reliable.

The Luminaries manufacturer shall define Life as the length of time it takes an LED Module or LED Luminaire to reach (depending on the application) 90% or 70% of its initial light output (L90 or L70). For decorative lighting applications, it is recommended to define useful life as the length of time it takes to reach 50% of its initial output. Lifetime (Lx) shall be published in combination with the failure fraction, (Fx.)

4. Color Rendering Index (CRI) for the LED
The preferred measure of CRI is Ra14 (as the additional test colors compared to Ra8) will give a more accurate representation of the LEDs ability to reproduce colors.

5. LED Measured Output: The power factor should be clearly stated in all cases. Total luminaries power including drivers should be measured under standard conditions and expressed in Watts. The initial luminous flux shall be measured after thermal stabilization of the LED luminaire. The measured data for the luminaire should be presented for an ambient temperature of 25°C. (15°C for Exterior luminaires). This shall be done using relative photometry in a temperature controlled cabinet.

6. Lumen depreciation
The lumen depreciation rate shall be judged by the light output at 25% of rated life (with a maximum duration of 6000 h) compared to the initial output. The depreciation classification is:
- Light output > 90% of initial Cat 1
- Light output > 80% of initial Cat 2
- Light output > 70% of initial Cat 3
Light Loss Maintenance Factor (LLMF) shall be indicated as the light lost at rated life.
7. Color Temperature
The initial color point (x & y) of the LED and the color temperature derived from it or bin class related to C78.377-2008 where color temperature values are recommended as 2700K, 3000K, 3500K, 4000K, 5000K, 6500K. Refer to lighting fixture specifications for selected luminaries’ LED source’s color temperatures.

8. Color Maintenance
The color shift is judged by the color point shift at 6,000 hours compared to the initial color point (x & y) of the luminaire.

9. Color Temperature Tolerance
Tolerance (categories) on nominal x & y values shall be measured for both initial and at 25% of rated life (with a maximum duration of 6000 h)
- All measured x & y’s within a 1-step ellipse
- All measured x & y’s within a 3-step ellipse
- All measured x & y’s within a 5-step ellipse
Tolerances beyond a 4-step ellipse are unacceptable for general illumination purposes.

10. Color Rendering Index for the Luminaire
The initial Color Rendering Index (CRI) of a luminaire shall be measured. A second measurement is made after a total operation time of 25% of rated life (with a maximum duration of 6000 h). The measured CRI values shall not have decreased by more than 3 points from the rated CRI value for initial CRI values and 5 points from the rated CRI value for maintained CRI values. The preferred measure of CRI is Ra14.

11. Intensity Distribution (Photometric data)
The manufacturer should state the format in which the photometric data is supplied.

12. Relative Photometry
Relative Photometry (format) requires the LED package flux to be quoted. Relative photometry should be conducted according to EN13032-1 (2004) Light and lighting - Measurement and presentation of photometric data of lamps and luminaires - Part 1: Measurement and file format

13. Absolute Photometry
Photometry does not require the use of a separate lumen output for the light source. Absolute photometry of LED luminaires should be conducted according to IES LM-79-08 Photometric Measurements of Solid-State Lighting Products.

G. LED Evaluation
1. The Luminaire manufacturer shall perform several performance tests to ensure the operation of the LED Luminaire is optimized, stabilized, etc.
   - Temperature cycling shock test
   - Supply voltage switching test
   - Thermal Endurance Test

2. The Luminaire manufacturer shall provide data required for performance evaluation, specification, etc.
   - Initial Luminaire Lumen Output L100
   - Light Output Depreciation Category (1, 2 or 3)
   - Luminaire life L(x) (where x is the percentage of L100 at the declared life)
   - Failure Fraction F(x) (where x is the percentage of failures at L(x) )
   - Color Temperature Category both at initial and 25% of rated life (max duration of 6000 h)
2.6 FLUORESCENT LIGHTING FIXTURES

A. General Construction and Materials: Conform to UL 1570 except for damp and wet locations conform to UL 57. Housing end plates, socket bridges, reflectors, wiring channels and ballast covers shall be die formed of not less than 20 ga. cold-rolled steel unless otherwise specified.

B. Lamp holders shall be heavy white thermoset urea plastic with definite locking feature and silver-plated contacts for proper lamp operation and life. Outdoor lamp holders shall be neoprene gasketed and compression type. Sockets with open circuit voltage over 300 volts shall be safety type and designed to open supply circuit on lamp removal.

C. Construct fixtures so that ballast may be serviced or replaced without removal of fixture housing.

2.7 FLUORESCENT BALLASTS

A. General: Use single-lamp, two-lamp or three-lamp ballasts in each fluorescent fixture as scheduled or shown. Fluorescent lighting fixture ballasts (except single reactor type) shall be equipped with an internal, automatic resetting thermal protector adjacent to the coils, and on-time non-resetting thermal device to protect the capacitor. Provide identical ballasts within each fixture type. Ballasts within the same luminaire shall be from the same manufacturer.

1. Ballast shall operate at a frequency greater than 20 khz without any discernible flicker.
2. Ballast shall operate at a minimum power factor of 95% and a lamp current crest factor not to exceed 1.7.
3. Ballast shall have input current total harmonic distortion not to exceed 10% THD of the fundamental harmonic (60 Hz).
4. Ballast shall have a minimum BF of .96 unless otherwise indicated in the specifications.
5. Ballast shall maintain constant light output over operating ranges of 108-132 volts on a 120-volt circuit and 250-305 volts on a 277-volt circuit. The universal input voltage ballasts will operate satisfactorily between 108 and 305 on 50 or 60 HZ supply.
6. Ballast will be capable of starting the standard lamps at zero degrees F.
7. Ballast shall be UL listed; Class P; sound rating A and contain non-PCB material.
8. Ballast shall comply with FCC part 18 Non-Consumer Equipment for EMI and RFI
10. Ballast shall tolerate sustained open circuit and short circuit output conditions without damage.
11. Ballast shall be a dedicated ballast to operate a specific lamp, i.e., T-8 ballast specifically for a T-8 lamp; multi-lamp ballast (same ballast operating a T-8, T-10 and T-12 lamp) will not be acceptable.
12. Ballasts shall be encapsulated to ensure maximum thermal and structural integrity.
13. Ballasts shall be warranted for five years from date of manufacture against defects in material and workmanship including replacement.
14. Manufacturer shall have been manufacturing electronic ballasts for at least fifteen years in USA.
15. Ballasts shall be manufactured in an ISO 9002 certified facility.
16. Ballasts for T5 and CFL lamps shall incorporate auto resetting lamp shutdown circuitry for end of lamp life protection thereby allowing for re-lamping without the need to cycle power.

17. Program Rapid start ballasts will be used when the lamps are to be frequently turned on/off. Otherwise ballasts shall provide instant starting sequence consistent with ANSI standard C82.11-1993.

18. Multiple lamp ballasts shall be connected to maintain full light output on surviving lamps if one or more lamps fail.

19. Ballasts intended for use outdoors or in low temperature environments shall be electronic type and have the lowest temperature rating available in standard manufacture for its particular type but not higher than 0 deg. F.

2.8 HALOGEN LIGHTING FIXTURES

A. Incandescent light source shall not be used.

B. Tungsten Halogen: The lighting fixtures utilizing tungsten halogen sources shall be designed and constructed so that lamp seal temperatures do not exceed 350 deg. C. at an ambient temperature of 25 deg. C. when tested in accordance with UL Standard No. 57 and shall maintain an operating bulb wall temperature of approximately 600 deg. C. and not less than 250 deg. C.

C. Aluminum reflectors shall be Alzak (finish as selected) or as authorized, and not less than 0.057 in. thick unless otherwise specified.

D. Lamp holders shall be UL listed, and heavy-duty type constructed of high-grade porcelain. Provide medium base sockets for lamps up to and including 250 watts and mogul based sockets from 300 watts up to 1500 watts (rated for 1500 watts, 600 volt service) unless specified otherwise.

E. Lead wires for fixtures utilizing tungsten halogen sources shall be rated for not less than 200 deg. C. operation, unless temperature warrants rating of 250 deg. C.

F. Temperature on reflectors shall not exceed 205 deg. C. at any point.

G. Junction Boxes: All fixtures supplied for recessing in suspended ceilings shall be supplied with pre-wired junction boxes.

2.9 LAMP HOLDERS

A. Incandescent: Porcelain body, nickel-plated brass screw-shell, pre-lubricated with silicone compound.

B. Fluorescent: White urea plastic body, silver-plated phosphor bronze contacts.

C. High Intensity Discharge: Porcelain Body, nickel-plated brass screw-shell, pre-lubricated with silicone compound, spring-loaded silver-plated phosphor bronze contacts.

2.10 LAMPS

A. Accepted light source manufactures listed below. The same manufacturer shall supply all lamps of a given type, unless otherwise specified.
   - General Electric
   - Philips
   - Osram Sylvania
   - Nichia (for LED sources)
   - Cree (for LED sources)
B. If a specific manufacturer is noted in the schedule, only that manufacturer shall be acceptable.

C. Provide lamps for all lighting fixtures (furnished as part of the electric work).

D. Tungsten halogen lamps shall not be operated, other than for initial testing, prior to final inspection.

2.11 REFLECTORS

A. Aluminum reflectors shall be finished specular, semi-specular or diffuse as required and shall meet or exceed Alzak specifications. A minimum requirement of reflector finishes for interior and exterior service shall be as follows:

<table>
<thead>
<tr>
<th>Description of Service</th>
<th>Min. Weight of Coating Mg. Per Sq. In.</th>
<th>Min. Reflectance Specular %</th>
<th>Min. Reflectance Diffuse %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal interior commercial service.</td>
<td>5.0</td>
<td>83</td>
<td>75</td>
</tr>
<tr>
<td>General interior industrial and exterior work reflector protected by glass covering.</td>
<td>7.5</td>
<td>82</td>
<td>73</td>
</tr>
<tr>
<td>Exterior industrial and commercial reflector not protected.</td>
<td>10.0</td>
<td>78</td>
<td>75</td>
</tr>
<tr>
<td>Exterior marine service reflector not protected.</td>
<td>13.0</td>
<td>78</td>
<td>65</td>
</tr>
</tbody>
</table>

2.12 LENSES

A. Plastic for lenses and diffusers shall be formed of colorless 100% virgin acrylic as manufactured by Rohm & Haas, DuPont or approved equal. The quality of the raw material must exceed IES, SPI and NEMA Specifications by at least 100%, which, as a minimum standard, shall not exceed a yellowness factor of 3 after 2,000 hrs. of exposure in the Fadeometer or as tested by an independent test laboratory. Acrylic plastic lenses and diffusers shall be properly cast, molded or extruded as specified, and shall remain free of dimensional instability, discoloration, embrittlement, or loss of light transmittance for a minimum of 15 years.

B. Glass used for lenses, refractors and diffusers in halogen lighting fixtures shall be tempered for high impact and heat resistance; the glass shall be crystal clear in quality with a transmittance of not less than 88%. For exterior fixtures use tempered Borosilicate glass tempered Corning No. 7740 or approved equal. For fixtures directly exposed to the elements and aimed above the horizontal with a radiant energy of 4.16 watts per sq. in., or greater, use Vycor glass.

C. Where optical lenses are used, they shall be free from spherical and chromatic aberrations and other imperfections, which may hinder the functional performance of the lenses.

D. All lenses, louvers or other light diffusing elements shall be removable, but positively held so that hinging or other normal motion will not cause them to drop out.
2.13 LUMINOUS CEILINGS & LIGHT BOXES

A. Vinyl plastic diffusers shall be formed of colorless 100% virgin acrylic as manufactured by New-Matt, Barrisol or approved equal. The quality of the raw material must exceed IES, SPI and NEMA Specifications by at least 100%, which, as a minimum standard, shall not exceed a yellowness factor of 3 after 2,000 hrs. of exposure in the Fadeometer or as tested by an independent test laboratory.

B. Acrylic plastic diffusers shall be properly stretched as specified, and shall remain free of dimensional instability, discoloration, embitterment, or loss of light transmittance for a minimum of 15 years.

C. All luminous ceiling components including the light fixture and diffuser’s structural frames shall have matt white finish.

D. The luminous ceiling shall not have light fixture image or socket shadows, nor shadows caused by any other device within rendered on the diffuser. Appropriate testing and mockup shall be provided to confirm the system.

E. Manufacturers shall submit a sample of the luminous ceiling components including the light fixture and diffuser’s structural for lighting designer’s review.

F. The Architect and the Lighting Consultant shall be the sole judges in determining whether the luminous ceiling sample complies with the specifications, and shall reserve the right to disqualify any bidders.

G. Light fixtures within the Luminous ceiling shall be run for 100 hours, fully tested and operational with the specified control system, free of flickering and defect prior to closing of the luminous ceiling. Prior to removal of scaffolding the installation shall be run for 100 hours to verify ventilation is adequate. Installation shall be reviewed and approved by the architect & lighting designer before removal of scaffolding. Illumination shall be flicker free.

H. Luminous ceilings shall be constructed with appropriate static or mechanical ventilation necessary to maintain manufacturer’s recommended operating temperatures of light fixture components within the installation ie. lamps, LED modules, ballasts, drivers, power supplies, etc.

I. Light boxes & Luminous ceilings require future maintenance access. The frequency is variable upon the components within the system. It shall be noted future access may require scaffolding and or genie lifts, removal of diffusers, etc. to access the devices within the system.

J. All components within the system shall be maintained at the same time to limit frequency of access required.
PART 3 - EXECUTION

3.1 CONDITION OF SURFACES

A. Examine the substrates, adjoining construction and the conditions under which the Work is to be installed. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with the referenced standards and in strict conformance with the manufacturer’s written instructions and recommendations, unless otherwise shown or specified.

B. Coordinate the work of this Section with the work of other Trades as required for a complete installation.

C. The architectural reflected ceiling plans indicate the proper locations of lighting fixtures. Do not scale electrical drawings for exact location of the lighting fixtures. Verify dimensions in field.

D. Install fixtures, finishing plates, reflectors, reflector cones, baffles, aperture plates, light controlling elements for air handling fixtures, decorative items and visible trim for recessed fixtures only after all plastering, ceiling tile work, and general cleanup work is finished. Do not install items not scheduled to be field painted until after painting is complete.

E. Install each fixture properly, plumb, true, in alignment and free of distortion.

F. Provide hangers, rods, mounting brackets, miscellaneous framing, supporting or attaching devices, frames and other components or equipment as required for a complete installation, and as required to properly support imposed loads including fixture weight. Secure lighting fixtures to supports. Support all lighting fixtures independently of ductwork, piping, ceiling supports or other items occurring within the ceiling.

G. Support surface mounted fixtures greater than 2 feet in length at a second point in addition to the outlet box fixture stud.

H. Where a fixture or its hanger canopy is applied to a surface mounted outlet box, a finishing ring shall be utilized to conceal the outlet box.

I. Align continuous rows of lighting fixtures rigidly, for true in-line appearance.

J. Pendant Fixtures: Install pendant lighting fixtures plumb and at a height above the finished floor as shown. Provide individually mounted pendant fixtures longer than two feet with a minimum of two stem hangers. Use ball aligners and canopies on pendant fixtures unless otherwise noted.

K. Mechanical Rooms: Lighting fixture locations in mechanical and electrical equipment rooms are approximate. Coordinate mounting height and location of lighting fixtures to clear mechanical, electrical and plumbing equipment and to adequately illuminate meters, gauges and equipment.

L. Splices in internal wiring shall be made with approved insulated "wire nut" type mechanical connectors, suitable for the temperature and voltage conditions to which they are subjected.

M. Wiring utilized for connections to or between individual lamp sockets and lamp auxiliaries (i.e. wires which do not constitute "through circuit" wiring) shall be suitable for temperature, current and voltage conditions to which it is subjected.
N. Mount fluorescent lamps on rapid-start circuits within 1 in. of grounded metal, minimum 1 in. wide, as long as lamp.

O. Provide equipment grounding connections for interior lighting fixtures. Tighten connections to comply with the tightening torques specified in UL 486A to assure permanent and effective grounds.

P. Mount fluorescent lamps free of conditioned air below the recommended ambient room temperature for the lamp/ballast system. Adjacency to cool air temperatures will adversely affect the lamp operation causing reduced output, discoloration and flicker. Coordinate mounting locations of mechanical air supply such that it is not directed toward or located directly above exposed fluorescent lamps. This is particularly true at cove lighting locations.

Q. Provide secondary fixture support in addition to standard mounting procedures, i.e. additional cable ties to black iron or additional hangers and rods to the building structure, to secure light fixtures mounted in floating acoustical ceiling systems. Such that should the floating ceiling system move out of alignment the light fixture will not be in danger of falling from the ceiling.

3.3 AIMING AND ADJUSTMENT

A. After the installation is complete; aim, focus, and lock adjustable lighting units as directed by Architect and/or Lighting Consultant. Provide ladders, scaffolds, and other equipment required to perform the Works. During aiming and adjustment, tighten locking setscrews, bolts and nuts securely.

B. Night Work: Where possible, focus units during the normal working day. However; where daylight interferes with vision, perform work at night.

3.4 CLEANING

A. Prior to final acceptance by the Owner, clean lighting fixtures thoroughly with materials and methods recommended by the manufacturers. Clean fingerprints and smudges from the lenses. Replace broken parts and replace lamps, which are dim or have burned out.

B. Do not remove protective coverings of louvers or diffusers, which are delivered in protective coverings until area is clean. Replace blemished, damaged or unsatisfactory fixtures as directed.
NOTES:
1. Architect to verify all finishes.
2. Electrical Engineer shall verify final voltage, control-switching and emergency.
3. Architect to verify all mounting details and mounting heights. Electrical Contractor to coordinate.
4. Electrical Engineer to verify all emergency fixture types, quantity, and locations.
5. Complete specification includes fixture schedule, fixture cuts and general fixture specification.
6. All LED light source listed in the fixture schedules are system wattages and delivered lumens.
7. All LED fixtures shall have drivers with NEMA 401 compliance.

Please note multiple manufacturers are listed wherever possible. Where an equivalent manufacturer
does not exist, we have listed alternate fixtures. Alternate manufacturers are listed for competitive bidding. Please note these alternates may vary in performance or appearance. All fixture substitutions or alternate manufactures other than the ones stated are subject to approval by SBLD Studio.

Exterior Fixtures:

Type A Description: Exterior rated, die-strength cast aluminum structure with textured polycarbonate globe LED fixture mount to a diameter 3” by 3” tall tenon at a 12’ high pole. Nominal 18”D x 26”H. Compatible with 0-10V lighting control systems. Fixture to have 3000K color temperature, 80 CRI LED source, 38 W power consumption, 3805 lumens output, an integral driver, and type 5 distribution. Fixture finish to be verify by architect. Refer to RICO pedestrian pole standard for pole specifications and mounting detail.

Manufacturers: 1. Sentry Electric LLC (Catalog#: SLR-OB-LEDV29B-0.7A-830-120-277V-KHT5SQ-BPC-TLR7-RSC)

Remarks: Contractor to coordinate and provide all mounting and hardware, structural support, accessories and requirements as required for a complete and operable system. E/E to verify all emergency, controls and voltage requirements. Architect and G.C. to verify in field final adjustments of fixture angles, alignment and positioning.

Location: ROIC Hope Memorial court
Supply: 120/277V (EE to verify)
Lamp: 3000K LED, provided by manufacturer
Driver: Non-dimmable driver, provided by manufacturer
Input Watts: 38 watts; 3805 lumens
Type B Description: Exterior rated, Compact floodlight with a standard yoke mounting. Standard yoke aluminum mounting for direct attachment to a pole at the height of 10’. Nominal 8.375” Dia. x 5” Depth. Fixture housing made from high pressure die cast aluminum and polyester powder coat. Luminaire shall have clear tempered lens with silicon gaskets suitable for exterior conditions. Fixture to have 28W watts LED power consumption, 1754 delivered lumens, 80+ CRI, 3000K color temperature LED source, and an integral 0-10V dimmable driver. Additional snoot and linear spread lens required. Fixture finish to be verify by architect.

Manufacturers:
1. Lumenpulse # LBM-120-30K-NS-LSLH-BK-NO-SN-PM4

Remarks:
Contractor to coordinate and provide all mounting hardware, structural support, accessories and requirements as required for a complete and operable system. Pole mounted kit PM4 – to be verified with existing pole dimensions. Refer to fixture product data for mounting hole pattern and bolt connections and pole mounted accessory. E/E to verify all emergency, controls and voltage requirements. Architect and G.C. to verify in field final adjustments of fixture angles, alignment and positioning.

Location: ROIC Hope Memorial court
Supply: 120/277V (EE to verify)
Lamp: 3000K LED, provided by manufacturer
Driver: Integral 0-10V dimmable driver, provided by manufacturer
Input Watts: 28 watts; 1754 lumens

END OF SECTION 265600
SLR Riverside Series Luminaires

CONSTRUCTION:
All structural components and decorative base to be of high-strength ASTM 356.1 cast aluminum. Luminaire shall be fully welded creating one integral housing. Injection-molded polycarbonate globe and large dome shall create a IP66 weather tight chamber for LED module, driver and internal optics.

DIMENSIONS: (h x Ø)
(26" x 18")

WEIGHT: (approximate)
40 pounds

OPTICAL:
LEDs with Lens can be placed to create symmetrical or asymmetrical light distributions

ELECTRICAL:
Meets U.L. 1598 and 8750 standards for safety. Driver shall provide constant current. The system has a surge protection 10kV/10kA per IEEE/ANSI C62.41.2. Luminaire has to be grounded. Surge current rating = 20,000 Amps using industry standard 8/20 uSec wave.

FINISH:
All components shall be finished with high gloss Super Durable polyester powder coat paint to be applied utilizing a multi-stage process that includes phosphate pretreatment, electrostatic powder application, and convection curing. Shall be in compliance with the American Architectural Manufacturers Association's specification AAMA 2604-05. Color to be specified.

MOUNTING:
Mounts to a 3" diameter by 3" tall tenon. (3) 3/8"-16 UNC stainless steel allen head cup point set screws secure luminaire to post top tenon. All mounting hardware shall be stainless steel.

Catalog #: SLR-OB-LEDV29B-0.7A-830-KHT2-STR45-TLR7-RSC
Color: BLACK

OPTIONS:
Light Distribution:
- KHT5SQ Type V
- KHT2-STR45 Type II
- BPC Photocell (Button Type)
- TLR Twist Lock Receptacle (3 position)
- TLR7 Twist Lock Receptacle (7 position)

ACCESSORIES:
- RSC Receptacle Shorting Cap

VOLTAGE
- 120-277V

LUMINAIRE WATTAGE:
- LEDV29B-1.05A 1050mA, 58 Watt
- LEDV29B-0.7A 700mA, 38 Watt
- LEDV29B-0.53A 530mA, 29 Watt

CRI, CCT:
- 830 80CRI, 3000K CCT
- 835 80CRI, 3500K CCT
- 840 80CRI, 4000K CCT

Sentry Electric LLC
185 Buffalo Avenue, Freeport, New York 11520
Tel 516-379-4660 Fax 516-378-0624
www.sentrylighting.com E-mail: info@sentrylighting.com

NYC SUBMITTAL

LAMP: 3000K, 38W, 3805Lumens, 90 CRI, LED Provided by Manufacturer
DRIVER: NON - DIM

ROIC - FDR HOPE MEMORIAL
ARCHITECTURAL LIGHTING FIXTURE CUT
PROJECT NO. 21834
ISSUED FOR BID 08-20-2019

PAGE 1 of 11
EXISTING PEDESTRIAN POLE
+ TOGGLED SPOTLIGHT
(LUMEN PULSE)

LIGHTING OF SCULPTURE AS SEEN FROM APPROACH (FROM PROJECT WEST)

LAMP: 3000K, 28W, 1552 Lumens, 80 CRI, LED Provided by Manufacturer
DRIVER: No Control
**Specification Sheet**

**LT01B**

**MOUNTED TO EXISTING PEDESTRIAN POLE**

**FDR HOPE MEMORIAL**

---

**Project Name:** FDR HOPE MEMORIAL

**Type:** LT01B

---

**Description**

The Lumenbeam Medium is a high-performance, 28W luminaire for solving numerous interior and exterior challenges such as facades, columns, trees or other architectural and landscape features. It offers a flexible package of options: a choice of optics for flood or accent lighting; a number of color temperatures and colors; various mounting options, accessories, spread lenses and controls.

---

**Features**

- **Color and Color Temperature:** 2200K, 2700K, 3000K, 3500K, 4000K, 5700K, Red, Green, Blue
- **Optics (nominal distribution):** 6°, 10°, 20°, 40°, 60°
- **Optical Option:** Linear spread lens horizontal distribution, linear spread lens vertical distribution
- **Options:** Short Yoke, 3G ANSI C136.31 Vibration Rating for bridge applications, corrosion-resistant coating for hostile environments

---

**Photometric Summary**

<table>
<thead>
<tr>
<th>4000K</th>
<th>Delivered output (lm)</th>
<th>Intensity (peak cd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VN</td>
<td>1,754</td>
<td>75,278</td>
</tr>
<tr>
<td>NS</td>
<td>1,552</td>
<td>56,914</td>
</tr>
<tr>
<td>NF</td>
<td>1,484</td>
<td>10,878</td>
</tr>
<tr>
<td>FL</td>
<td>1,428</td>
<td>4,003</td>
</tr>
<tr>
<td>WFL</td>
<td>1,370</td>
<td>1,312</td>
</tr>
</tbody>
</table>

Photometric performance is measured in compliance with ESNA IM-900B.

---

**Optics**

<table>
<thead>
<tr>
<th>VN</th>
<th>NS</th>
<th>NF</th>
<th>FL</th>
<th>WFL</th>
</tr>
</thead>
</table>

---

**Rating**

- ON/OFF: 0-10V DALI DMX SWDM

---

**Power Consumption:** 28 W

**Warranty:** 5-year limited warranty

---

**Performance**

- **Delivered Output:** 1,754 lm (4000K, VN optic)
- **Delivered Intensity:** 75,278 cd at nadir (4000K, VN optic)
- **Illuminance at Distance:** Minimum 1 fc at 274 ft distance (4000K, VN optic)
- **Color Consistency:** 2 SDCM
- **Color Rendering:** CRI 80+
- **Lumen Maintenance:** L70 120,000 hrs [Ta 25 °C]

---

**Lumenpulse**

1220 Marie-Victorin Blvd., Longueuil, QC J4G 2W9 CA • T 1 877 937 3003 • 514 937 3003 • F 514 937 6289

info@lumenpulse.com • www.lumenpulsegroup.com

LAMP: 3000K, 28W, 1552 Lumens, 80 CRI, LED Provided by Manufacturer DRIVER: No Control

---

**ROIC - FDR HOPE MEMORIAL**

**DRAWING**

ARCHITECTURAL LIGHTING FIXTURE CUT

**PAGE**

3 of 11

**PROJECT NO.**

21834

**DATE**

08-20-2019

**ISSUED FOR**

ISSUE FOR BID
### Physical

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing Material</td>
<td>Low copper content high pressure die-cast aluminum</td>
</tr>
<tr>
<td>Yoke Material</td>
<td>Heavy aluminum (standard yoke included)</td>
</tr>
<tr>
<td>Lens Material</td>
<td>Clear tempered glass</td>
</tr>
<tr>
<td>Hardware Material</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Gasket Material</td>
<td>Silicone</td>
</tr>
<tr>
<td>Surface Finish</td>
<td>Electrostatically applied polyester powder coat</td>
</tr>
<tr>
<td>Weight</td>
<td>6.7 lbs</td>
</tr>
<tr>
<td>EPA</td>
<td>Front = 0.46 sq ft, Side = 0.37 sq ft</td>
</tr>
</tbody>
</table>

### Electrical and Control

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>100 to 277 volts</td>
</tr>
<tr>
<td>Fixture Cable</td>
<td>Power and data in 1 cable, 3 ft cord standard (#16-5), other lengths available</td>
</tr>
<tr>
<td>Resolution (DMX/RDM)</td>
<td>Per fixture, 8-bit or 16-bit</td>
</tr>
<tr>
<td>Control</td>
<td>On/Off control, Dim to Warm via 0-10V (DWW only), DALI dimming, DMX/RDM enabled, Lumentalk system is enabled with LDB accessory - see typical wiring diagrams for details</td>
</tr>
</tbody>
</table>

### Environmental

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-13 °F to 122 °F</td>
</tr>
<tr>
<td>IP Rating</td>
<td>IP66</td>
</tr>
<tr>
<td>IK Rating</td>
<td>IK09</td>
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</tbody>
</table>

### Accessories (Order Separately)

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Boxes</td>
<td>Power and control box - daisy chain configuration, Power and control box - star configuration, Lumentalk Data Bridge</td>
</tr>
<tr>
<td>Control Systems</td>
<td>Lumentouch 2.0™, Lumencue, Lumentone</td>
</tr>
<tr>
<td>Diagnostic and Addressing Tools</td>
<td>LumenID, LumentalkID</td>
</tr>
</tbody>
</table>
Specification Sheet

Mounting options

SY - Short yoke

Front view

Side view

Mounting details

Mounting hole pattern - standard and short yoke

Adjustable pivot limits

Standard yoke

Short yoke

Optical options

LSUH - Linear spread lens horizontal distribution
LSUV - Linear spread lens vertical distribution

<table>
<thead>
<tr>
<th>Beam angle with LSUH/LSUV</th>
</tr>
</thead>
<tbody>
<tr>
<td>VN</td>
</tr>
<tr>
<td>NS</td>
</tr>
<tr>
<td>NF</td>
</tr>
<tr>
<td>FL</td>
</tr>
</tbody>
</table>

LAMP: 3000K, 28W, 1552 Lumens, 80 CRI, LED Provided by Manufacturer

DRIVER: No Control

lumenpulse

1220 Marie-Victorin Blvd., Longueuil, QC, J4G 2H9 CA T 1 877 937 3003 | 514 937 3003 | F 514 937 6289
info@lumenpulse.com www.lumenpulsengroup.com

LAMP: 3000K, 28W, 1552 Lumens, 80 CRI, LED Provided by Manufacturer

DRIVER: No Control

ROIC - FDR HOPE MEMORIAL

ARCHITECTURAL LIGHTING FIXTURE CUT

PROJECT NO. 21834

DRAWING DATE 08-20-2019

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ISSUED FOR ISSUE FOR BID
Specification Sheet

Mounting accessories (order separately)

Round pole mounting accessory

PM4 model shown.
Consult factory for square pole section.

PM4-1, PM4.5-1, PM5-1 - Round pole mounting accessory - single fixture
PM4-2, PM4.5-2, PM5-2 - Round pole mounting accessory - twin fixtures
*One bracket assembly is supplied per 2 fixtures unless otherwise specified.

Tenon adapter

TN2 - Tenon adapter to fit on 2 3/8 in O.D. tenon
TN4 - Tenon adapter to fit on 4 in O.D. tenon

SK - Stake mounting

VERIFY IN FIELD

PM4
PM4.5
PM5
For pole Ø
4" ± 1/8
4.5" ± 1/8
5" ± 1/8
Consult factory for other pole diameters.

lumenbeam

Medium
WHITE AND STATIC COLORS

LAMP: 3000K, 28W, 1552 Lumens, 80 CRI, LED Provided by Manufacturer
DRIVER: No Control
Optical accessories (order separately)

Installed optical accessories will affect the maximum pivot limits for each mounting option, consult factory for details.

**SN - Snoot**

LBSM-SN-FINISH-BK
Interior surface painted black. Please specify desired exterior FINISH from list of available finishes.

**SNW - Snoot wide**

LBSMSNW-FINISH-BK
Interior surface painted black. Please specify desired exterior FINISH from list of available finishes.

**VS - Visor**

LBMVS-FINISH-BK
Interior surface painted black. Please specify desired exterior FINISH from list of available finishes.

**LSA - Linear spread lens adjustable**

LBMALSA-FINISH
Please specify desired exterior FINISH from list of available finishes.

**WG - Wire guard**

LBMWG-FINISH
Please specify desired exterior FINISH from list of available finishes.

Accessory combinations

<table>
<thead>
<tr>
<th>Linear spread lens adjustable</th>
<th>Snoot</th>
<th>Snoot wide</th>
<th>Visor</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO*</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Wire guard</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

Accessory combinations must be ordered together on a single line. Ex: A snoot + wire guard combination order code is LBSMNSG-WG-BK.

*Consult factory for a linear spread lens adjustable + snoot wide combination.

---

**LAMP:** 3000K, 28W, 1552 Lumens, 80 CRI, LED Provided by Manufacturer

**DRIVER:** No Control
Available exterior finishes for optical accessories

- BK - Black Sandtex®
- BRZ - Bronze Sandtex®
- SI - Silver Sandtex®
- WH - Smooth white
- BKTX - Textured black
- BRZTX - Textured bronze, non-metallic
- GRATX - Textured medium gray
- GRNTEX - Textured green
- WHTX - Textured white
- CC - Custom color and finish (please specify RAL color)*

*Lumenpulse offers a wide selection of RAL CLASSIC (K7) colors with a smooth texture and high-gloss finish. Please consult factory for a list of available K7 colors, other RAL textures and glasses, or to match alternate color charts. Final color matching results may vary.

**Typical wiring diagrams**

**Wiring color code**

<table>
<thead>
<tr>
<th>Color Code</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Ground</td>
</tr>
<tr>
<td>Black</td>
<td>Live 100-277V</td>
</tr>
<tr>
<td>White</td>
<td>Neutral</td>
</tr>
<tr>
<td>Red/Purple</td>
<td>0-10V / Data +</td>
</tr>
<tr>
<td>Orange</td>
<td>0-10V / Data -</td>
</tr>
</tbody>
</table>

**On/Off control (NO)**

A - Power input [100-277V]  
B - Junction box (by others)  
C - Power wiring (by others)  
D - Lumenbeam Medium

**On/Off control (NO) - wiring detail**

- A - Power input or from previous fixture
- B - To fixture
- C - To next fixture
- D - Live
- E - Ground
- F - Neutral
- G - Wire-nuts (by others)
- H - Junction box (by others)

- Consult factory for specific applications and maximum fixture count/cable length recommendations.
- 28 watts per fixture.
LAMP: 3000K, 28W, 1552 Lumens, 80 CRI, LED Provided by Manufacturer
DRIVER: No Control

- Consult factory for specific applications and maximum fixture count/cable length recommendations.
- 0-10V mA ratings: passive dimmer (Current Sink): 3mA per fixture, active dimmer (Current Source): 0.5mA per fixture.
- 10% minimum dimming value.
- 28 watts per fixture.
### How to order

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBM</td>
<td>30K</td>
<td>NS</td>
<td>LSLH</td>
<td>FINISH</td>
<td>NO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**UL** CABLE LENGTH

**PROVIDE AS ADDITIONAL:**
1. ROUND POLE MOUNTING ACCESSORY
2. SNOOT (ORDER CODE: SN)

### 1. Housing

| LBM | Lumenbeam™ Medium |

### 3. Color and Color Temperature

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>22K</td>
<td>2200K</td>
</tr>
<tr>
<td>27K</td>
<td>2700K</td>
</tr>
<tr>
<td>30K</td>
<td>3000K</td>
</tr>
<tr>
<td>35K</td>
<td>3500K</td>
</tr>
<tr>
<td>40K</td>
<td>4000K</td>
</tr>
<tr>
<td>57K</td>
<td>5700K</td>
</tr>
<tr>
<td>RD</td>
<td>Red</td>
</tr>
<tr>
<td>GR</td>
<td>Green</td>
</tr>
<tr>
<td>BL</td>
<td>Blue</td>
</tr>
</tbody>
</table>

### 2. Voltage

<table>
<thead>
<tr>
<th>Voltage</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>100 volts</td>
</tr>
<tr>
<td>120</td>
<td>120 volts</td>
</tr>
<tr>
<td>208</td>
<td>208 volts</td>
</tr>
<tr>
<td>220</td>
<td>220 volts</td>
</tr>
<tr>
<td>240</td>
<td>240 volts</td>
</tr>
<tr>
<td>277</td>
<td>277 volts</td>
</tr>
</tbody>
</table>

### 4. Optics

<table>
<thead>
<tr>
<th>Optics</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VN</td>
<td>Very Narrow 6°</td>
</tr>
<tr>
<td>NS</td>
<td>Narrow Spot 10°</td>
</tr>
<tr>
<td>NF</td>
<td>Narrow Flood 20°</td>
</tr>
<tr>
<td>FL</td>
<td>Flood 40°</td>
</tr>
<tr>
<td>WFL</td>
<td>Wide Flood 60°</td>
</tr>
</tbody>
</table>

### 5. Optical Option

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSLH</td>
<td>Linear spread lens horizontal distribution</td>
</tr>
<tr>
<td>LSVV</td>
<td>Linear spread lens vertical distribution</td>
</tr>
</tbody>
</table>

### 6. Finish

<table>
<thead>
<tr>
<th>Finish</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BK</td>
<td>Black Sandtex®</td>
</tr>
<tr>
<td>BRZ</td>
<td>Bronze Sandtex®</td>
</tr>
<tr>
<td>SI</td>
<td>Silver Sandtex®</td>
</tr>
<tr>
<td>WH</td>
<td>Smooth white</td>
</tr>
<tr>
<td>BKTX</td>
<td>Textured black</td>
</tr>
<tr>
<td>BRZTX</td>
<td>Textured bronze non-metallic</td>
</tr>
<tr>
<td>GRATX</td>
<td>Textured medium gray</td>
</tr>
<tr>
<td>GRNTX</td>
<td>Textured green</td>
</tr>
<tr>
<td>WHTX</td>
<td>Textured white</td>
</tr>
<tr>
<td>CC</td>
<td>Custom color and finish (please specify RAL color)</td>
</tr>
</tbody>
</table>

### 7. Control

<table>
<thead>
<tr>
<th>Control</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>On/Off control</td>
</tr>
<tr>
<td>DM</td>
<td>0-10V dimming</td>
</tr>
<tr>
<td>DALI</td>
<td>DALI dimming</td>
</tr>
<tr>
<td>DMX/RDM</td>
<td>DMX/RDM enabled</td>
</tr>
</tbody>
</table>

### 8. Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SY</td>
<td>Short Yoke</td>
</tr>
<tr>
<td>3GV</td>
<td>3G ANSI C136.31 Vibration Rating for bridge applications</td>
</tr>
<tr>
<td>CRC</td>
<td>Corrosion-resistant coating for hostile environments</td>
</tr>
</tbody>
</table>

---

**LAMP:** 3000K, 28W, 1552 Lumens, 80 CRI, LED Provided by Manufacturer

**DRIVER:** No Control

**PROJECT NO.** 21834

**DATE** 08-20-2019

**ISSUE FOR BID**
### Specification Sheet

**LT01B**

**9. Certification**

<table>
<thead>
<tr>
<th>UL</th>
<th>UL compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE</td>
<td>CE compliant</td>
</tr>
</tbody>
</table>

**10. Cable Length (ft)**

<table>
<thead>
<tr>
<th>Length</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>3FT</td>
<td>3 ft</td>
</tr>
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**Notes:**

1. Consult factory for availability of static Royal Blue, 6500K and 90+ CRI.
2. Factory installed, not available for 60° optic. Field adjustable spread lens optical accessory available, order separately.
3. Lumenpulse offers a wide selection of RAL CLASSIC [K7] colors with a smooth texture and high-gloss finish. Please consult factory for a list of available K7 colors, other RAL textures and glosses, or to match alternate color charts. Final color matching results may vary.
4. Lumenspul system is enabled with LED accessory, DMX or DMX/RF must be specified in the order code. See the typical wiring diagrams in the specification sheet for details.
5. A Lumenspul and LumenspulID (UDT) must be specified for Lumenspul applications. Consult Lumenspul and Lumenspul pages and specification sheets for details.
6. Use only when exposed to UV spray and harsh chemicals. This option is not required for normal outdoor exposure.
7. 3 ft cable length is standard unless otherwise specified.
8. Maximum of 3 ft cable length for daisy chain DMX applications with CBX-DS.

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**LUMENBEAM**

**Medium**

**WHITE AND STATIC COLORS**

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**LAMP:** 3000K, 28W, 1552 Lumens, 80 CRI, LED Provided by Manufacturer

**DRIVER:** No Control

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**ROIC - FDR HOPE MEMORIAL**

**PROJECT NO.**

**DRAWING**

**ARCHITECTURAL LIGHTING FIXTURE CUT**

**DATE**

**ISSUED FOR**

**ISSUE FOR BID**
SECTION 311300 - TREE PROTECTION, REMOVAL AND TRIMMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

   A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 1 Specifications, apply to this Section.

1.2 SUMMARY

   A. This Section includes the protection and trimming of trees that interfere with, or are affected by, execution of the Work, whether temporary or new construction.

   B. Related Sections include the following:
      1. Section 312000 “Earth Moving” for building and utility trench excavation, backfilling, compacting and grading requirements and soil materials.

1.3 GENERAL CONDITIONS

   A. These specifications and procedures for tree protection have been established to save significant trees and existing tree areas. Individual trees to be saved are indicated on the landscape drawings and tree areas to be saved are indicated on the civil drawings as the construction limits.

   B. Prior to commencement of work, it shall be the responsibility of the General Contractor to install tree protection measures in accordance with plans and specifications herein, and to make every effort to safeguard the trees and tree areas designated to be preserved.

   C. Tree root systems shall be protected from smothering, flooding, excessive wetting resulting from de-watering operations, from off-site run-off, and spillage and drainage of solutions containing materials which could be hazardous to tree roots.

   D. Examples of ways trees are damaged or destroyed are as follows:
      1. Placing backfill in protected areas;
      2. Felling trees into protected areas;
      3. Driving construction equipment into or through protected areas;
      4. Burning in or in close proximity to protected areas;
      5. Changing site grades, which cause drainage to flow into, or to collect in protected areas;
      6. Conducting trenching operations, or utility installation, in the vicinity of trees;
      7. Grading in the vicinity of trees;
      8. Dumping of liquids, or spoiling of debris within the protected areas.
      9. Parking or driving vehicles under canopy of trees.
     10. Storing construction materials.

1.4 SCOPE

   A. These specifications shall apply to all topsoil stripping, excavation and general construction activity in the vicinity of existing vegetation to be preserved.
1.5 SUBMITTALS

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

B. Qualification Data: For firms and persons specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Certification: From a qualified arborist that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

D. Maintenance Recommendations: From a qualified arborist for care and protection of trees affected by construction during and after completing the Work.

1.6 QUALITY ASSURANCE

A. Tree Service Qualifications: An experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Project and currently employs a certified arborist.

B. Arborist Qualifications: An arborist certified by the International Society of Arboriculture or licensed in the jurisdiction where the project is located.

C. Tree Pruning Standards: Comply with ANSI A300, “Trees, Shrubs, and Other Woody Plant Maintenance—Standard Practices,” unless more stringent requirements are indicated.

D. Pre-construction Conference: Conduct conference at Project Site

1. Before construction of project begins, Construction Manager is responsible to schedule a Pre-Construction Conference for informing appropriate personnel of the requirements of the tree protection portions of the project to make sure they are informed and that the construction process goes smoothly. Meet with representatives of authorities having jurisdiction, Owner, Architect, consultants, and other concerned entities. Review tree protection and trimming procedures and responsibilities. Notify participants at least three working days before convening conference. Record discussions and agreements and furnish a copy to each participant.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Drainage Fill: Selected crushed stone, or crushed or uncrushed gravel, washed, ASTM D 448, Size 24, with 90 to 100 percent passing a 2-1/2 inch (63-mm) sieve and not more than 10 percent passing a ¾” (19-mm) sieve.

B. Approved Topsoil: See specification Section 32 92 00.

C. Filter Fabric: Manufacturer’s standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers.
D. Chain Link Fence: Metallic-coated steel chain link fence fabric, 0.120-inch- (3-mm) diameter wire size; 72" high minimum line posts, 1.9 inches (48mm) in diameter; terminal and corner posts, 2-3/8 inches (60mm) in diameter; top rail, 1-5/8" (41mm) in diameter; bottom tension wire, 0.177 inch (4.5 mm) in diameter; with tie wires, hog ring ties, and other accessories for a compete fence system.

E. Barricades –
   1. Posts shall be 4x6 yellow pine or fir, pressure treated for ground contact, minimum length 6 feet.
   2. Horizontal struts shall be 2x6 yellow pine or fir, pressure-treated for ground contact.

F. Mulch: Fine-shredded, hardwood.

**PART 3 - EXECUTION**

3.1 PREPARATION

A. All trees that are to be preserved shall be marked in the field by the consultant prior to the start of any construction. Trees shown on plans to be removed shall be marked for removal and verified by construction manager prior to removal. Sediment and erosion control plans shall be reviewed by the construction manager to assure that these protective devices do not jeopardize the vitality of trees that are designated for preservation.

Temporary Fencing: Install temporary fencing located as indicated as tree protection fencing—outside the drip line of the Trees. For the large trees, establish a 30-foot radius from the tree. The area within this 60-foot diameter circle will be the TREE PRESERVATION ZONE (TPZ).

   1. Install chain link fence according to ASTM F 567 and manufacturer’s written instructions for individual trees marked on plans.
   2. Install orange construction fencing around tree drip line in forested areas.

B. Protect TPZ and tree root systems from damage due to noxious materials caused by runoff or spillage while mixing, placing, or storing construction materials. Protect from flooding, eroding, or excessive wetting cause by dewatering operations.

C. Do not store construction materials, debris, or excavated material within the TPZ or drip line of remaining trees. Do not permit vehicles or foot traffic within the TPZ or drip line; prevent soil compaction over root systems.

D. Do not allow fires under or adjacent to remaining trees or other plants.

E. The protective fence around the trees may not be removed for any reason during construction. There is to be no entry into the TPZ or tree preservation zone, and no other intrusions, as noted above, for any reason during construction. The area within the fence is not to be violated in any way.

F. Provide signs on the fence or protective barricades for the specimen tree(s). The signs should indicate that the specimen tree is in a “TREE PRESERVATION ZONE”, and no entry, disturbance, dumping, etc. is permitted. The Contractor shall have the location of the signs approved in the field by the Construction Manager.
3.2 EXCAVATION

A. Install shoring or other protective support systems to minimize sloping or benching of excavations. Any disturbance within the root zone should only be done using the methods indicated below.

B. Do not excavate within the drip line of trees, unless otherwise indicated on the plans.

C. Root pruning shall be performed if any excavating must be done in close proximity to the trees to be saved (within a diameter 40 times each 1” of caliper, i.e. for a 3” caliper tree – any excavating within 5’ of the trunk). The following procedures shall be followed for root pruning:

1. Mark the line of excavation for the proposed work along the areas of trees to be saved. This line should then be root pruned using a verti-trencher or similar device. The intent is to have the roots cut cleanly, so that they are not ripped or pulled apart by a backhoe. The tree protection fence can then be installed about one to two feet back from the line of the root pruning.

2. Trench the area 3 ft. inside the area to be excavated with a 4-6” trencher, (e.g. a verti-trencher or similar device), approximately 36” deep (i.e. for a 3” caliper tree, with an excavation 5’ out from the trunk, root prune 2’ out from the trunk – 3’ deep.).

3. Immediately after trenching and cutting through all roots in the trench area, backfill trench with excavated material.

4. Water the backfilled trench immediately, until trench overflows. Fill any settled areas to level with finish grade.

D. Where excavation for new construction is required within drip line of trees, handclear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.

1. Relocate roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required for bending and relocating them without breaking. If encountered immediately adjacent to location of new construction and relocation is not practical, cut roots approximately 3 inches (75 mm) back from new construction.

2. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

E. Where utility trenches are required within the drip line of trees, tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.

1. Root Pruning: Do not cut main lateral roots or taproots: cut only smaller roots that interfere with the installation of utilities. Cut roots with sharp pruning instruments; do not break or chop.

3.3 REGRADING

A. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade beyond drip line of trees. Maintain existing grades within drip line of trees.

B. Grade lowering: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by qualified arborist, unless otherwise indicated.
1. Root pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.

C. Minor Fill: Where existing grade is 6 inches or less below elevation of finish grade, fill with Approved Topsoil. Place Approved Topsoil in a single uncompacted layer and hand grade to required finish grade elevations (see specification Section 32 92 00 for Approved Topsoil).

D. Moderate Fill: Where existing grade is more than 6 inches, but less than 12 inches, below elevation of finish grade, place drainage fill, filter fabric, and topsoil on existing grade as follows:
   1. Carefully place drainage fill against tree trunk approximately 2 inches above elevation of finish grade and extend not less than 18 inches from tree trunk on all sides. For balance of area within drip-line perimeter, place drainage fill up to 6 inches below elevation of grade.
   2. Place filter fabric with edges overlapping 6 inches minimum.
   3. Place fill layer of topsoil to finish grade. Do not compact drainage fill or topsoil. Hand grade to required finish elevations.

3.4 TREE PRUNING

A. Prune remaining trees affected by temporary and new construction.

B. Prune remaining trees to compensate for root loss caused by damage or cutting root system. Provide subsequent maintenance during Contract period as recommended by qualified arborist.

C. Pruning Standards: Prune trees according to ANSI A300 as follows:
   1. Type of Pruning: Crown cleaning
   2. Type of Pruning: Crown thinning.
   3. Type of Pruning: Crown raising.
   4. Type of Pruning: Crown reduction.
   5. Type of Pruning: Vista pruning
   6. Type of Pruning: Crown restoration.

D. Cut branches with sharp pruning instruments: do not break or chop.

E. Chip branches removed from trees. Spread chips where indicated or as directed by Architect.

3.5 TREE REPAIR AND REPLACEMENT

A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to written instructions of the qualified arborist.

B. Remove and replace dead and damaged trees that the qualified arborist determines to be incapable of restoring to a normal growth pattern.

C. Aerate surface soil, compacted during construction, 10 feet (3 m) beyond drip line and no closer than 36 inches (900 mm) to tree trunk. Drill 2-inch (50-mm-) diameter holes a minimum of 12 inches (300 mm) deep at 24 inches (600 mm) o.c. Backfill holes with an equal mix of augured soil and sand.
3.6 DISPOSAL OF WASTE MATERIALS
   A. Burning is not permitted.
   B. Disposal: Remove excess excavated material, displaced trees, and excess chips from Owner’s property.

3.7 REMOVALS
   A. Remove preservation measures when and as requested by the Owner or Architect. They shall be removed from site.

END OF SECTION 311300
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Preparing subgrades for slabs-on-grade.
2. Excavating and backfilling for structures.
3. Drainage course for concrete slabs-on-grade.
4. Subbase course for concrete walks.
5. Subsurface drainage backfill for walls and trenches.
6. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Sections:

1. Section 013200 "Construction Progress Documentation" for recording preexcavation and earth moving progress.
2. Section 015000 "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities; also for temporary site fencing if not in another Section.
3. Section 033000 "Cast-in-Place Concrete" for granular course if placed over vapor retarder and beneath the slab-on-grade.
4. topsoil, and removal of above- and below-grade improvements and utilities.
5. Section 312319 "Dewatering" for lowering and disposing of ground water during construction.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. (0.57 cu. m) or more in volume that exceed a standard penetration resistance of 100 blows/2 inches (97 blows/50 mm) when tested by a geotechnical testing agency, according to ASTM D 1586.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.
2. Controlled low-strength material, including design mixture.
3. Warning tapes.

B. Samples for Verification: For the following products, in sizes indicated below:

1. Geotextile: 12 by 12 inches (300 by 300 mm).
2. Warning Tape: 12 inches (300 mm) long; of each color.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.
1.6 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

B. Preexcavation Conference: Conduct conference at Project site WITH ARCHITECT.

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
   1. Do not proceed with work on adjoining property until directed by Architect.

C. Utility Locator Service: Notify 1-800 DIG-RITE for area where Project is located before beginning earth moving operations. VERIFY PRIVATE UTILITY LOCATIONS WITH OWNER AS DIGRITE MAY NOT MARK ALL UTILITIES.

D. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Section 015000 “Temporary Facilities and Controls,” are in place.

E. Do not commence earth moving operations until plant-protection measures specified in Section 015639 “Temporary Tree and Plant Protection” are in place.

F. The following practices are prohibited within protection zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Foot traffic.
   4. Erection of sheds or structures.
   5. Impoundment of water.
   6. Excavation or other digging unless otherwise indicated.
   7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

G. Do not direct vehicle or equipment exhaust towards protection zones.

H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

D. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

E. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

F. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

G. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

H. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

I. Sand: ASTM C 33; fine aggregate.

J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:

2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.
B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. See Dewatering spec section.

3.3 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
   a. 24 inches (600 mm) outside of concrete forms other than at footings.

B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.
1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
   
a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:

3.4 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

2. Pile Foundations: Stop excavations 6 to 12 inches (150 to 300 mm) above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.

3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended as bearing surfaces.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.6 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches (300 mm) each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.

2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.

3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.

4. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

E. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.7 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

B. If unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).

2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.8 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.9 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Backfill voids with satisfactory soil while removing shoring and bracing.

D. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches (300 mm) over the pipe or conduit. Coordinate backfilling with utilities testing.

E. Place and compact final backfill of satisfactory soil to final subgrade elevation.

F. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

G. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.10 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

   1. Under grass and planted areas, use satisfactory soil material.
   2. Under walks and pavements, use satisfactory soil material.
   3. Under steps and ramps, use engineered fill.
   4. Under building slabs, use engineered fill.
   5. Under footings and foundations, use engineered fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.
3.11 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95%

3.13 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch (25 mm).

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.14 SUBSURFACE DRAINAGE

A. Subdrainage Pipe: Specified in Section 334600 "Subdrainage."

B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch (150-mm) course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches (300 mm) of
Filter material, placed in compacted layers 6 inches (150 mm) thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).

1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698.

C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches (300 mm) of final subgrade, in compacted layers 6 inches (150 mm) thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).

1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698.
2. Place and compact impervious fill over drainage backfill in 6-inch- (150-mm-) thick compacted layers to final subgrade.

3.15 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place base course material over subbase course under hot-mix asphalt pavement.
3. Shape subbase course to required crown elevations and cross-slope grades.
4. Place subbase course 6 inches (150 mm) or less in compacted thickness in a single layer.
5. Place subbase course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
6. Compact subbase course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.16 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.
3. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.17 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections: (CONTRACTOR SHALL KEEP WRITTEN NOTES, MARKED UP PLANS, PHOTOS, & TEST RESULTS AND SHARE WITH OWNER and ARCHITECT CONCURRENTLY.)

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material and maximum lift thickness comply with requirements.
3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.18 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000
SECTION 312301 – WATTLE SYSTEM

PART 1 - GENERAL

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

1.2 SUMMARY
A. Section includes construction of Wattle system.
B. Related Requirements:
   1. Section 013233 "Photographic Documentation" for recording preexisting conditions and system progress.

1.3 ACTION SUBMITTALS
A. Shop Drawings:
   1. Include plans, elevations, sections, and details.
   2. Show arrangement, locations, and details of the system.

1.4 FIELD CONDITIONS
A. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Performance: Design, furnish, install, test, operate, monitor, and maintain Wattle system of sufficient scope, size, and capacity to control water pressures and to lower, control, remove, and dispose of sediment runoff, etc., and permit excavation and construction to proceed on dry, stable subgrades.
   1. Design system, including comprehensive engineering analysis by a qualified professional engineer.
2. Continuously monitor and maintain operations to ensure erosion control, stability of excavations and constructed slopes, prevention of flooding in excavation, and prevention of damage to subgrades and permanent structures.

3. Prevent surface water and sediment from entering excavations by grading, dikes, or other means.

B. Regulatory Requirements: Comply with governing EPA notification regulations.

2.2 PRODUCTS

<table>
<thead>
<tr>
<th>Property</th>
<th>9&quot; wattle</th>
<th>12&quot; wattle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit per linear foot weight</td>
<td>1.70 lbs</td>
<td>2.75 lbs</td>
</tr>
<tr>
<td>Dimension</td>
<td>8&quot; ± 1&quot;</td>
<td>12&quot; ± 1&quot;</td>
</tr>
<tr>
<td>Fiber length</td>
<td>4&quot; ± 3&quot;</td>
<td></td>
</tr>
<tr>
<td>Netting weight</td>
<td>9.2 grams/ft</td>
<td></td>
</tr>
<tr>
<td>Tensile strength @ Yield</td>
<td>4.0 grams/strand</td>
<td></td>
</tr>
<tr>
<td>Tensile strength @ Max Load</td>
<td>4.6 grams/strand</td>
<td></td>
</tr>
<tr>
<td>Biodegradability</td>
<td>Straw-natural, Green netting EarthSwitch ® technology.</td>
<td></td>
</tr>
</tbody>
</table>

Approximate Pallet Dimensions

<table>
<thead>
<tr>
<th>Wattle</th>
<th>L</th>
<th>W</th>
<th>H</th>
<th>Approx. Pallet Weight</th>
<th>Wattle/Pallet</th>
</tr>
</thead>
<tbody>
<tr>
<td>9&quot; x 25'</td>
<td>50&quot;</td>
<td>50&quot;</td>
<td>100&quot;</td>
<td>lbs.</td>
<td>12</td>
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<tr>
<td>12&quot; x 10'</td>
<td>50&quot;</td>
<td>50&quot;</td>
<td>100&quot;</td>
<td>lbs.</td>
<td>20</td>
</tr>
<tr>
<td>12&quot; x 20'</td>
<td>50&quot;</td>
<td>50&quot;</td>
<td>100&quot;</td>
<td>lbs.</td>
<td>10</td>
</tr>
</tbody>
</table>

1) Physical Characteristic
   a) Straw wattle shall consist of 99.9% weed-free wheat, oat, barley, or rice straw, compacted. Diameter may vary from ± 13%.
   b) Wattle netting is made out of non-woven photodegradable HDPE (high density polypropylene) with a 1 year UV inhibitor.

2) Storage
   a) Wattles should be stored in a dry covered area, out of direct exposure to sun until use.
   b) Wattles may be tarped on the jobsite but should be monitored to ensure it avoids excessive moisture and light exposure. Excessive exposure can significantly reduce the life of the wattle.
   c) In the event that wattles are stored longer than 2 weeks, precautions should be taken for rodent control.

3) Usage
   a) To be installed following contours intermittently throughout the slope to decrease water velocity and sediment retention.
   b) Reduce runoff velocities.
   c) Reduce and capture of soil particle runoff.
   d) Installation can also be beneficial around water inlets and catch basins, or topsoil stockpiles.
4) Installation Instructions
   a) Soil Installation (standard)
      i) Excavate a 1” to 2” rounded trench length of proposed wattle position. Attempt to throw
         spoils on upside of trench.
      ii) Place wattle into position ensuring that wattle is firmly in contact with soil.
      (1) Either butt wattle ends up to each other and zip tie. If you can’t achieve a good
          continuous fit, wattle ends can either be doglegged, overlapped and zip tied, or place a
          stub role to the upslope side.
      iii) Wattle should be staked approximately every four feet. A pilot hole may be desirable
          to refrain from continuous ripping. Where excessive ripping occurs, wattle should be replaced,
          repaired, or staked on the downhill side on both sides of the rip.
      iv) Rake loose dirt to back side (uphill or erosion side) of wattle to ensure good contact.
      v) Final installed height is approximately 75% of wattle original height.
      vi) The system should be visually inspected on a weekly basis or after significant weather.
      vii) For temporary wattle installation, dispose in place by slitting the top and removing the
          netting and stakes, orentirely removed from position.
      viii) Permanent erosion control installation may leave the wattle in place.
      ix) If desirable or necessary, the trench can be filled in.
   b) Hard surface installation (asphalt concrete around storm drains, catch basins, or
      stockpiles on hard surfaces).
   c) i) Instead of staking used sandbags.

5) Performance
   a) The wattle is intended to survive for longer than 12, but less than 24 months under normal use
      and traffic.
   b) Sediment retention is dependent on staking and installation technique.
   c) Wattles can be used in conjunction with other erosion control techniques including, but not
      limited to, erosion control blanket, silt fence, hydro- seeding and straw.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by
   settlement, lateral movement, undermining, washout, and other hazards created by operations.

   1. Prevent sediment and surface water and subsurface or ground water from entering
      excavations, from ponding on prepared subgrades, and from flooding site or surrounding
      area.
   2. Protect subgrades and foundation soils from softening and damage by rain or water
      accumulation.

B. Install system to ensure minimum interference with roads, streets, walks, and other adjacent
   occupied and used facilities.

   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities
      without permission from Owner and authorities having jurisdiction. Provide alternate
routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Provide temporary grading to facilitate operation of system.

D. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 015000 “Temporary Facilities and Controls,” during operations.

3.2 INSTALLATION

A. Install Wattle System utilizing methods recommended by manufacturer.

B. Provide flow-control devices if required by authorities having jurisdiction.

C. Provide standby materials on-site, installed and available for immediate operation, to maintain Wattle system on continuous basis if any part of system becomes inadequate or fails.

3.3 OPERATION

A. Operate system continuously.

3.4 FIELD QUALITY CONTROL

A. Provide continual observation.

B. Prepare reports of observations.

3.5 PROTECTION

A. Protect and maintain system during operations.

B. Promptly repair damages to adjacent facilities caused by system.

END OF SECTION 312301
SECTION 312319 - DEWATERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes construction dewatering.

B. Related Requirements:

1. Section 013233 "Photographic Documentation" for recording preexisting conditions and dewatering system progress.
2. Section 312000 "Earth Moving" for excavating, backfilling, site grading, and controlling surface-water runoff and ponding.

1.3 ACTION SUBMITTALS

A. Shop Drawings: For dewatering system, prepared by or under the supervision of a qualified professional engineer.

1. Include plans, elevations, sections, and details.
2. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.
3. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
4. Include written plan for dewatering operations including sequence of well and well-point placement coordinated with excavation shoring and bracings and control procedures to be adopted if dewatering problems arise.

1.4 FIELD CONDITIONS

A. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for dewatering according to the performance requirements.
2. The geotechnical report is included elsewhere in Project Manual.
B. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

1. Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer.
2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, prevention of flooding in excavation, and prevention of damage to subgrades and permanent structures.
3. Prevent surface water from entering excavations by grading, dikes, or other means.
4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
5. Remove dewatering system when no longer required for construction.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with water- and debris-disposal regulations of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site or surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
C. Provide temporary grading to facilitate dewatering and control of surface water.

D. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 015000 “Temporary Facilities and Controls,” during dewatering operations.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

1. Space well points or wells at intervals required to provide sufficient dewatering.
2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

B. Place dewatering system into operation to lower water to specified levels before excavating below ground-water level.

C. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.

D. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails.

3.3 OPERATION

A. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

B. Operate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
2. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
3. Maintain piezometric water level a minimum of 24 inches (600 mm) below bottom of excavation.

C. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

D. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches (900 mm) below overlying construction.
3.4 FIELD QUALITY CONTROL

A. Observation Wells: Provide observation wells or piezometers, take measurements, and maintain at least the minimum number indicated; additional observation wells may be required by authorities having jurisdiction.

1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

B. Survey-Work Benchmarks: Resurvey benchmarks regularly during dewatering and maintain an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

C. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

D. Prepare reports of observations.

3.5 PROTECTION

A. Protect and maintain dewatering system during dewatering operations.

B. Promptly repair damages to adjacent facilities caused by dewatering.

END OF SECTION 312319
SECTION 321177 – EDGING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 QUALITY ASSURANCE

A. Installer Qualification: An experienced installer who has completed installation of site furnishings and whose work has resulted in construction with a record of successful in-service performance.
B. Manufacturer Qualifications: Experienced site furniture manufacturer since 1984.

1.3 SUBMITTALS

A. Product Data: Include physical characteristics such as shape, dimensions and finish for each bench.
B. Shop Drawings: Provide installation details for each product.
C. Samples for Verification: For the following product, show the color of the powder coat finish.
D. Maintenance Data: For each product.
   1. Provide recommended methods for repairing damage and abrasions to the powder coat finish.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store products in original undamaged packaging in a dry location until ready for installation.
B. Handle powder coated products with carefully to prevent any damage to the finish.

1.5 WARRANTY

A. 15-year limited material warranty for paver restraint edging from manufacturing defects in workmanship or material.

PART 2 - PRODUCTS

2.01 PAVER RESTRAINT EDGING

A. Product: Permaloc BrickBlock, .075 inch (1.71mm) thick x 2-3/4 inch (69.9mm) high, extruded aluminum, 6063 alloy, paver restraint edging for straight-line and curvilinear applications in corrugated L-shaped profile, as manufactured by Permaloc Corporation, Holland MI 49424, telephone (800) 356-9660 or (616) 399-9600. Horizontal base shall have holes spaced 4 inches (102 mm) apart along its length to receive spikes.
B. Thickness: .065 inch (1.65 mm) gage section shall have 0.070 inch (1.78 mm) thick exposed top lip, .075 inch (1.9 mm) gage section shall have 0.080 inch (2.03 mm) thick exposed top lip.
C. Length: 8 feet (2.44 meters).
D. Connection Method: Section ends shall connect together over the top edge with 0.030 inch (.76 mm) thick x 1.25 inch (31.8 mm) wide x .75 inches (19 mm) tall steel clip.
E. Spikes: 3/8 inch x 10 inches (9.5 mm x 254 mm) bright spiral steel spike. Use plastic washers if desired.
F. Finish: Mill Finish. Paint finish shall comply with AAMA 2603 for electrostatically baked on paint.

PART 3 - EXECUTION

3.01 INSTALLATION OF PAVER RESTRAINT EDGING

A. Preparation: Ensure that all underground utility lines are located and will not interfere with the proposed edging installation before beginning work.
B. Locate border line of edging with string or other means to assure border straightness and curves as designed.
C. Edging Installation: Install base of edging resting on compacted level base and facing as shown on drawings, drive 3/8” x 10” (9.5 mm x 242 mm) bright spiral steel spikes through edging holes in section base of paver restraint edging at spaces for following applications:
   1. Anchor each section end with spike.
   2. Patios and Walkways: 12 inches (305 mm) to 24 inches (610 mm) on center.
D. Securely connect sections together in accordance with manufacturer’s instructions.
E. Install pavers.

END OF SECTION 321177
PART 1  GENERAL

1.1 SUMMARY
   A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
   B. All of the contract documents, including General and Supplementary Conditions and Division I General Requirements, apply to the work of this Section.

1.2 SECTION INCLUDES
   A. The Work of this Section includes all labor, materials, equipment and services necessary to complete the unit pavers and site furnishing as shown on the drawings and/or specified herein, including but not necessarily limited to the following:
   1. Stone pavers, including dimensioned stone, over aggregate setting bed
   2. Stone sign

1.3 RELATED SECTIONS
   A. Section 024113.13 – Paving Removal
   B. Cast-in-place concrete

1.4 QUALITY ASSURANCE
   A. Qualifications of Installers: Use only personnel who are thoroughly trained and experienced in the skills required and completely familiar with the requirements established for this work; 5 years minimum construction experience required.
   B. The following standards and definitions are applicable to the work of this Section:
   2. AASHTO: American Association of State Highway and Transportation Officials.

1.5 SUBMITTALS AND SAMPLES
   A. Manufacturer’s Data: Submit two (2) copies of supplier’s technical information and installation instructions for all used types of granite pavers.
   B. Samples: Submit 8” sq, minimum, samples of granite for all types and colors required, representative of the expected range of color and pattern variation. Sample submittals will be
reviewed for color, texture and pattern. Samples that are approved will be representative of acceptable work. Any variations beyond what is approved will not be acceptable. Include a sample of engraved granite. Compliance with all other requirements is the exclusive responsibility of the Contractor.

1.6  PRODUCT HANDLING

A. Protect stone materials during storage and construction against moisture and soilage or intermixture with earth or other types of materials.

1.7  JOB CONDITIONS

A. Cold Weather Requirements

1. Protect stone materials against freezing when the temperature of the surrounding air is forty (40) degrees F. and falling. Do not use frozen materials or materials mixed or coated with ice or frost.

2. Do not build on frozen subgrade or setting beds. Remove and replace work damaged by frost or freezing.

1.8  MOCK-UP PANEL

A. Prior to the installation of unit paving work, provide mockup panel using samples of each specified material, meshes, treatments, joints, bond and joint face shown or as specified for final work, and provide special features as directed for caulking and contiguous work. Build panel at the site, as directed, of full thickness and approximately four (4) feet by five (5) feet unless otherwise shown. Include joints and stone treatments for review and approval. Provide the range of color, texture and workmanship to be expected in the completed work. Obtain Architect's acceptance of visual qualities of the panel before start of paving work. Retain panel during construction as a standard for judging completed work.

1.9  TEST DATA

A. Submit test data from independent testing laboratory indicating that stone meets the minimum standards of ASTM C-615 & C-615M.

1.10  ATTIC STOCK

A. Provide an addition 5 % of the pavers to the owner to be used as “attic stock”.

1.11  WARRANTY

A. Contractor shall warranty the product for the time of one year from completion.

B. Contractor shall provide, for a period of sixty days after substantial completion, unconditional maintenance and repairs as required.
PART 2 PRODUCTS

2.1 STONE PAVERS & FURNISHING

A. Stone Type

1. Install solid stone pavers and any furnishing of size and thickness as noted on Drawings. Stone material types provided by North Carolina Granite as follows (or equal approved by Owner):

   **ST1-a:** ST. JOHN’S BLACK GRANITE PAVERS, THERMAL, 8”x24” NOM., x3 Thick by North Carolina Granite

   **ST1-b:** ST. JOHN’S BLACK GRANITE CURB, THERMAL, 8”x APPROX. 4’-9 11/16” NOM., x12” Thick by North Carolina Granite

   **ST3-a:** MT. AIRY WHITE GRANITE PAVERS, THERMAL, 64”x64” NOM., x3” Thick by North Carolina Granite

   **ST3-b:** MT. AIRY WHITE GRANITE TIMELINE PAVERS, THERMAL, 8”x72” NOM., x3” Thick by North Carolina Granite

   **ST3-c:** MT. AIRY WHITE GRANITE BORDER ELLIPSE, THERMAL, 8”xL. Per DWG, NOM., x3” Thick by North Carolina Granite

   **ST4-a:** MT. AIRY WHITE GRANITE ENTRY SIGN, HONED, 6’-9” Wide x 4’-0” Tall x 4” Thick by North Carolina Granite

   Source: North Carolina Granite Corporation, PO Box 151, Mount Airy, NC 27030, tel. 800-227-6242; Contact: Richard Zinsmeister, tel. 336-719-2624

B. Inscription Pavers

1. Install solid inscription stone pavers and any furnishing of size and thickness as noted on Drawings. Stone inscription types inscribed and provided by North Carolina Granite as follows:

2. **T Series:** Timeline. Thirty-Six (36) total pavers.

   **T1:** 1828 CITY OF NEW YORK PURCHASES BLACKWELL’S ISLAND FOR CHARITABLE AND CORRECTIVE INSTITUTIONS

   **T2:** 1832 THE PENITENTIARY OPENS. BUILT FROM STONE QUARRIED ON THE ISLAND

   **T3:** 1839 NEW YORK CITY ASYLUM FOR THE INSANE OPENS
T4: 1856 SMALLPOX HOSPITAL BUILT WITH CONVICT LABOR

T5: 1861 CHARITY HOSPITAL BUILT WITH CONVICT LABOR

T6: 1869 THE WORK-HOUSE OPENS

T7: 1882 FRANKLIN DELANO ROOSEVELT BORN JANUARY 30 IN HYDE PARK, NEW YORK

T8: 1894 FIRST KNOWN UNITED STATES POLIO EPIDEMIC OCCURS IN VERMONT

T9: 1905 FDR MARRIES ANNA ELEANOR ROOSEVELT

T10: 1910 FDR ELECTED TO NEW YORK STATE SENATE

T11: 1916 SEVERE POLIO EPIDEMIC HITS NEW YORK CITY

T12: 1921 FDR CONTRACTS POLIO AND NEVER REGAINS USE OF HIS LEGS

T13: 1921 BLACKWELL'S ISLAND RENAMED WELFARE ISLAND

T14: 1927 FDR FORMS GEORGIA WARM SPRINGS FOUNDATION FOR POLIO REHABILITATION

T15: 1928 FDR ELECTED GOVERNOR OF NEW YORK

T16: 1929 FIRST PATIENT SAVED BY NEWLY INVENTED "IRON LUNG"
T17: 1932 FDR ELECTED PRESIDENT OF THE UNITED STATES

T18: 1934 FDR’S BIRTHDAY BALL FUNDRAISERS FOR POLIO CARE AND RESEARCH BEGIN

T19: 1936 FDR RE-ELECTED

T20: 1937 NATIONAL FOUNDATION FOR INFANTILE PARALYSIS (MARCH OF DIMES) ANNOUNCED BY FDR

T21: 1939 GOLDWATER HOSPITAL OPENS ON THE ISLAND, BECOMES A LEADER IN CARE FOR PARALYZED POLIO PATIENTS

T22: 1940 FDR RE-ELECTED

T23: 1941-1945 FDR LEADS THE UNITED STATES DURING WORLD WAR II

T24: 1944 FDR RE-ELECTED

T25: 1945 FDR DIES APRIL 12 AT WARM SPRINGS, GEORGIA

T26: 1945 THE UNITED NATIONS, ENVISIONED BY FDR, OPENS

T27: 1952 POLIO CASES REPORTED IN THE UNITED STATES PEAK AT OVER 57,000

T28: 1953 DR. JONAS SALK DEVELOPS POLIO VACCINE
T29: 1973 WELFARE ISLAND RENAMED ROOSEVELT ISLAND, BECOMES RESIDENTIAL COMMUNITY; MEMORIAL TO FDR PLANNED

T30: GOLD WATER HOSPITAL PATIENTS JOIN COMMUNITY IN APARTMENTS DESIGNED FOR THOSE PHYSICALLY DISABLED

T31: 1990 AMERICANS WITH DISABILITIES ACT BECOMES LAW

T32: 2012 FDR FOUR FREEDOMS PARK OPENS AT THE SOUTHERN TIP OF ROOSEVELT ISLAND

T33: 2013 GOLDWATER HOSPITAL DEOMMISSIONED AND DEMOLISHED

T34: 2019 FDR HOPE MEMORIAL OPENS

T35: WORLD HEALTH ORGANIZATION ANNOUNCES POLIO IS ERADICATED GLOBALLY

T36: ALL COMMUNITIES BECOME MORE LIKE ROOSEVELT ISLAND: ACCESSIBLE, INCLUSIVE, AND WELCOMING

3. **Q Series**: Quotes. Six (6) total pavers.

   Q1: THE

   Q2: ONLY THING WE HAVE

   Q3: TO FEAR IS FEAR ITSELF
Q4: . . . WHICH PARALYZES

Q5: FRANLIN DELANO

Q6: ROOSEVELT 1882-1945


A1: MEREDITH BERGMANN, ARTIST

A2: ROOSEVELT ISLAND OPERATION CORPORATION

A3: ROOSEVELT ISLAND DISABLED ASSOCIATION "UNCLE JIM" BATES AND NANCY BROWN PLAZA

A4: KEY FUNDING PROVIDED BY ALICE HEYMAN

A5: GENEROUS SUPPORT PROVIDED BY THE FOUR FREEDOMS CONSERVANCY AND THE NEW YORK CITY COUNCIL


P1: TOM BROWN QUADRIPEGIA FROM POLIO ACTIVIST, GENTLEMAN

P2: GABE WEIL MUSCULAR DYSTROPHY INSPIRING FRIEND

P3: LEANNE HABERMAN HYDROCEPHALY SMILING SISTER
P4: GEORGE LIEBERMAN QUADRIPLEGIA FROM POLIO PAST PRESIDENT, R.I.D.A.

P5: JOHN BRODERICK QUADRIPLEGIA FROM POLIO PAST PRESIDENT, R.I.D.A.

P6: VIRGINIA GRANATO QUADRIPLEGIA FROM POLIO PAST PRESIDENT, R.I.D.A.

P7: BILL HARRIS PARAPLEGIA, SPINAL CORD INJURY PAST PRESIDENT, R.I.D.A.

P8: EVAN LURIE QUADRIPLEGIA FROM POLIO A SMILE FOR ALL

P9: LEO ELLIS OLSN QUADRIPLEGIC CEREBRAL PALSY LOVED BEYOND MEASURE

P10: CALMAN L. BESSENOFF PARAPLEGIA FROM POLIO INSPIRATIONAL FATHER


E1: FDR HOPE MEMORIAL ROOSEVELT ISLAND DISABLED ASSOCIATION

E2: FDR HOPE MEMORIAL ROOSEVELT ISLAND DISABLED ASSOCIATION

2.2 SETTING BED AND JOINTS SAND

C. Stabilized Sand for Joints: Fine, sharp, washed, natural sand dry sand per ASTM C-33 & ASTM-C-144, 100 percent passing No. 16 sieve and no more than 10 percent passing No. 200 sieve.

D. Sand stabilizing admixture to be Portland cement, at 5% to 7% of sand weight.

E. Sand joint conditioner: Polymeric joint filler
2.3 MATERIAL FOR PAVEMENT AGGREGATE BASE

F. All aggregate materials shall consist of sound, durable particles that are free from clay, silt or organic materials.

G. Aggregate materials shall consist of coarse aggregate according to latest edition of the New York Department of Transportation Standard Specifications for Road and Structures (NYDOT Specifications). The aggregate base material should be compacted to 98% of the AASHTO T-180 density. In-place field density tests should be performed to evaluate the compaction.

H. Aggregate Material Properties

1. Graded Aggregate for Pavement Base: Sound, crushed stone or gravel complying with ASTM D448 for Size No. 8, ASTM D2940 (max. ½ inch stone) base material, requirements in Division 31 Section “Earthwork” for base course.

2.4 ACCESSORIES

A. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications; made from polyolefins or polyesters, with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.

2. Apparent Opening Size: No. 60 sieve, maximum; ASTM D4751.

3. Permittivity: 0.02 per second, minimum; ASTM D4491

4. UV Stability: 50 percent after 500 hours’ exposure; ASTM D4355

B. Drainage Geotextile: Non-woven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters, with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.

2. Apparent Opening Size: No. 40 sieve, maximum; ASTM D4751.

3. Permittivity: 0.5 per second, minimum; ASTM D4491.

4. UV Stability: 50 percent after 500 hours’ exposure; ASTM D4355.

I. Filter Fabric for subdrainage trench and for dry well:

1. Nonwoven needle-punched filter fabric manufactured for subsurface drainage applications; made from polyolefins or polyesters, with elongation greater than 50 percent; complying with AASHTO M288 and the following; measured per test methods referenced:

   a. Survivability: Class 2, AASHTO M288.
b. Apparent opening size: No. 40 sieve maximum; ASTM D4751.

c. Permittivity: 0.5 per second minimum; ASTM D4491.

d. UV Stability: 50% after 500 hours exposure; ASTM D4355.

e. The minimum length for a single strip of filter fabric shall be 30”.

f. Adjacent filter fabric strips shall overlap a minimum of 16”

J. Herbicide: Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid, or wettable powder form.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions under which pavers are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 PREPARATION

A. Saw cut at a straight line existing asphalt pavement at the entry to the project site, as shown on the plan layout. Remove all asphalt pavement with its base course, down to the earth grades – from project site – between edges of existing stone wall and the abovementioned saw cut, and dispose off the site all thus removed material, to a location approved by any NYC agencies having jurisdiction. Refer to Section 02 41 13.13 Paving Removal.

1. Assure that new earth subgrade top elevation below removed/excavated asphalt is at 12” (or minimum 12”) below proposed finish grades of new Granite Units paving.

B. Proof-roll prepared excavated subgrade according to requirements in Division 31 Section Earthwork, to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected, compacted and are ready to receive subbase and base course for unit pavers.

3.3 INSTALLATION, GENERAL

A. General

1. Do not use pavers with chips, cracks, voids, discolorations, and other defects which might be visible or cause staining in the finished work.
2. Cut pavers in field, as required by layout, with motor driven saw equipment, to clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full units without cutting wherever possible.

3. Set pavers in the patterns shown with uniform joints of the width indicated.

4. Tolerances: Maintain surface plane for finished paving not exceeding a tolerance of 1/8" in ten (10) feet when testing with a ten (10) foot straightedge, nor 1/32" unit to unit offset.

5. Wet granite pavers several hours before laying in accordance with paver manufacturer’s instructions.

6. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

7. Event engraved pavers shall be set so that inscriptions are read in uniform orientation, as indicated on drawing and/or as directed by Architect.

3.4 INSTALLATION ON AGGREGATE BASE

A. Compact soil subgrade uniformly to at least 98 percent of ASTM D1557 laboratory density. Use heavy vibrating plate, or at least 7 cw +/- vibrating roller, or a suitable smooth wheeled roller. Provide compaction tests to ensure compaction as specified.

B. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

C. Place separation geotextile where indicated on drawings overlapping ends and edges at least 12 inches.

D. Place aggregate base in layers not to exceed 6", over compacted subgrade. Compact base to 100 percent of ASTM D1557 maximum laboratory density and screed to depth required to allow setting of unit pavers.

E. All geotextile and base aggregate layers will extend fully to faces of existing stone walls and to straight saw cut of existing asphalt pavement. Refer to drawings layout.

F. Place drainage geotextile, overlapping ends & edges at least 12".

G. Place sand bed to a thickness of 1", per drawings, taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.

H. Treat leveling base with soil sterilizer to inhibit growth of grass and weeds.

I. Set pavers with sand joint widths as indicated on drawings, being careful not to disturb leveling base. Sand for joints 1/8" or wider shall be polymer stabilized.
J. Vibrate pavers into leveling course by hand vibrator, capable of 3,500 to 5,000 lbf force at 80 to 90 HZ, taking care to avoid damaging pavers. Perform as many passes across paving with vibrator as is necessary to effect level installation.

   1. Prior to vibrating, cover surface of all pavers with protective padding. Type of padding to be approved by paver’s manufacturer.

K. Spread sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand.

1. After edge pavers are installed and there is a completed surface or before surface is exposed to rain.

2. Before ending each day’s work, fully compact all installed pavers to within 36 inches of the lying face. Cover pavers that have not been compacted, with nonstaining plastic sheets to protect them from rain.

3. Treat sand joints with polymeric joint sealer, per sealer manufacturer’s instruction.

4. Provide Bituminous expansion joint filler between saw-cut edge of existing asphalt path and new granite curb, as shown on pavement section.

L. Coordination with installing perimeter edge of Stabilized Decomposed Granite.

   1. Provide uniform, even perimeter edge of unit pavers along existing stone wall, as shown on plans and section detail, at a minimum width of four inches from face of existing stone wall.

   2. Fill-in the perimeter edge area with Stabilized Decomposed Granite pavement, as specified in related Section 321541.

   3. The Stabilized Decomposed Granite shall fill-in all of the space above Drainage Geotextile, between perimeter edge of unit pavers and face of existing stone wall.

M. Repeat granite pavers joint-filling process 30 days later

3.5 REPAIR, POINTING, CLEANING AND PROTECTION

A. Remove and replace paver units which are loose, chipped, broken, stained, or otherwise damaged, or if units do not match adjoining units. Provide new units to match adjoining units and install fresh sand joints, pointed to eliminate evidence of replacement.

B. Repair any damage to existing stone wall, to match exactly appearance of this wall prior to construction specified herein.

C. Cleaning: Remove excess sand from pavement surfaces.

D. Installer shall advise Contractor of procedures required to protect all paving from deterioration, discoloration or damage during construction and until acceptance of the work.
NEW YORK, NEW YORK

END OF SECTION 321401
SECTION 321541 - STABILIZED DECOMPOSED GRANITE

PART 1 - GENERAL

1.1 SUMMARY
A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
B. All of the contract documents, including General and Supplementary Conditions and Division I General Requirements, apply to the work of this Section.

1.2 SECTION INCLUDES
A. The Work of this Section includes all labor, materials, equipment and services necessary to complete the unit pavers as shown on the drawings and/or specified herein, including but not necessarily limited to the following:
   1. Decomposed granite mixed with a stabilizer

1.3 RELATED SECTIONS
1. Section 024113.13 – Paving Removal
2. Section 321401 – Granite Unit Pavers

1.4 QUALITY ASSURANCE
A. Qualifications of Installers: Use only personnel who are thoroughly trained and experienced in the skills required and completely familiar with the requirements established for this work; 5 years minimum construction experience required.
B. The following standards and definitions are applicable to the work of this Section:
   2. AASHTO: American Association of State Highway and Transportation Officials.

1.5 SUBMITTALS AND SAMPLES
A. Manufacturer’s Data: Submit two (2) copies of supplier's technical information and installation instructions for all used types of granite pavers.
B. Sieve analysis of decomposed granite aggregate.
C. Samples of the decomposed granite aggregate.

1.6 PRODUCT HANDLING
A. Protect all materials against moisture and soilage.

1.7 JOB CONDITIONS
A. Cold Weather Requirements
1. Protect stone materials against freezing when the temperature of the surrounding air is forty (40) degrees F. and falling. Do not use frozen materials or materials mixed or coated with ice or frost.
2. Do not build on frozen subgrade or setting beds. Remove and replace work damaged by frost or freezing.

1.8 WARRANTY

A. Warranty Period: Contractor shall provide warranty for performance of product. Contractor shall warranty installation of product for the time of one year from substantial completion.
B. Contractor shall provide, for a period of sixty days, unconditional maintenance and repairs as required.

PART 2 - PRODUCTS

2.1 STABILIZER

A. Stabilizer for Aggregate to be one of the following, as approved by the Project Engineer:
1. Stabilizer Solutions
2. TerraKoat EX
3. G3-PS Stabilizer

2.2 DECOMPOSED GRANITE AGGREGATE

A. Decomposed granite shall consist of inert materials that are hard and durable, with stone free from surface coatings and deleterious materials.
1. Dense graded decomposed granite layer shall be furnished and installed as required and specified to a 4” compacted depth, per drawings. Granite for crushing must be Mesabi Black (from scrap pieces) by Cold Spring Granite.
2. Gradation requirements shall be as follows:

<table>
<thead>
<tr>
<th>U.S. Sieve No.</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td># 1/4”</td>
<td>95 – 100</td>
</tr>
<tr>
<td># 4</td>
<td>90-100</td>
</tr>
<tr>
<td># 8</td>
<td>65 – 80</td>
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<tr>
<td># 16</td>
<td>48 – 63</td>
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<tr>
<td># 30</td>
<td>40 – 49</td>
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<td># 50</td>
<td>30 – 40</td>
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<tr>
<td># 100</td>
<td>20 – 27</td>
</tr>
<tr>
<td># 200</td>
<td>10 – 18</td>
</tr>
</tbody>
</table>

B. Binder
   1. Non-toxic, organic binder, colorless and odorless powder that binds decomposed granite.
   2. Product to have 60% minimum pre-consumer recycled content.
   3. Product shall have minimum 20 years of successful usage.

PART 3 - EXECUTION

3.1 PREPARATION
   A. Base shall be same as for granite unit pavers, as shown on pavement section.
   B. The installation shall have proper drainage, as shown on the grading plan, to prevent standing water on surface of the Stabilized Decomposed Granite.
   C. Before proceeding with installation, notify Owner's Representative in writing of any unsuitable site/base conditions.

3.2 BLENDING
   A. Selected type of Stabilizer shall be thoroughly pre-mixed with aggregate at the rate required by the Stabilizer's manufacturer. Follow exactly the manufacturer's instructions for suitable mixing method and installation weather conditions.

3.3 PLACEMENT
   A. Place the Stabilized Decomposed Granite directly on a prepared, clean base, and rake smooth to desired grade and cross section. Place material to sufficient depth of 3”, as shown on pavement section.

3.4 WATERING AND COMPACTING
   A. Water for the full depth, as required by the instructions of Stabilizer's manufacturer.
   B. Contractor shall wait a minimum of 24 – to 48 hours, or until such time that the Stabilized Decomposed Granite is able to accept compaction. If surface aggregate dries significantly, lightly mist surface before compaction.
   C. The Stabilized Decomposed Granite shall be installed at the exact same level with the granite unit pavers
   D. The width of perimeter product installation is too small to accept a drum roller. Compact to a minimum 85% compaction using a hand-held vibratory compactor or a similar hand-held tamper. Exercise care not to damage or scratch the earlier installed granite pavers and existing stone wall, while performing compaction.

3.5 INSPECTION
A. Finished surface shall be smooth, uniform and solid. There shall be no evidence of chipping or cracking. Cured and compacted surface shall be firm throughout profile with no spongy areas. Loose material shall not be present on the surface after installation. Any irregularities in the installed surface shall be repaired to the uniformity of entire installation.

3.6 PROTECTION

A. Contractor shall furnish and install sufficient barriers around new surface to prevent public access for a minimum of 72 hours after installation, or as directed by the Owner.

B. Contractor shall notify Owner’s Representative to cease any landscape mowing and irrigation near the installed work until drying period is complete.

3.7 MAINTENANCE

A. Remove any debris, grass clippings, leaves or other organic material by mechanically blowing or hand sweeping the surface as needed, during the entire Warranty period.

B. During the period of maintenance, a minor amount of loose aggregate may appear on the surface. Redistribute such a loose material over entire surface. Water and re-compact with hand-held devices. This process shall be repeated as needed.

C. If cracking occurs, sweep fines into cracks, water and hand tamp level with entire installation.

3.9 REPAIRS

A. Remove any damaged areas to the depth of the Stabilized Decomposed Granite.

B. If area is dry, moisten damaged portion lightly.

C. Pre-blend required amount of a stabilizer with proper amount of aggregate and water, as described herein in BLENDING and WATERING methods.

D. Apply moistened pre-blended Stabilized Decomposed Granite to removed area, to finish grade.

E. Compact with a hand-held tamping device. Keep any traffic off areas for a sufficient period after repair has been completed.

END OF SECTION
SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Sodding.
   2. Turf renovation.

B. Related Sections:
   1. Division 32 Section "Planting Irrigation" for turf irrigation.
   2. Division 32 Section "Plants" for plants.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

B. Qualification Data: For qualified landscape Installer.

C. Product Certificates: For soil amendments and fertilizers, from manufacturer.

D. Material Test Reports: For standardized ASTM D 5268 topsoil existing native surface topsoil and existing in-place surface soil

E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required initial maintenance periods.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.
   1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
   2. Experience: Three years' minimum experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."
   3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
   4. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
   5. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.
   1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.


   a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.

   b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

1.6 DELIVERY, STORAGE, AND HANDLING

   A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

   B. Bulk Materials:

      1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

      2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

      3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.7 PROJECT CONDITIONS

   A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.

      1. Spring Planting: see planting section

      2. Fall Planting: see planting section.

   B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE
A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Sodded Turf: 30 calendar days from date of Substantial Completion

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

A. Turfgrass Sod: Certified Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

1. Sun and Partial Shade: Proportioned by weight as follows:

   a. 10 percent Kentucky bluegrass (Poa pratensis).
   b. 70 percent chewings red fescue (Festuca rubra variety).
   c. 10 percent perennial ryegrass (Lolium perenne).
   d. 10 percent redtop (Agrostis alba).

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

   1. Class: T, with a minimum of 99 percent passing through No. 8 (2.36-mm) sieve and a minimum of 75 percent passing through No. 60 (0.25-mm) sieve.
   2. Class: O, with a minimum of 95 percent passing through No. 8 (2.36-mm) sieve and a minimum of 55 percent passing through No. 60 (0.25-mm) sieve.
   3. Provide lime in form of ground dolomitic limestone.

B. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

C. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

   1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. (2.4 kg/cu. m) of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of loose sawdust or ground bark.

C. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.4 FERTILIZERS

A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.5 PLANTING SOILS

A. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth. Mix ASTM D 5268 topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

1. Ratio of Loose Compost to Topsoil by Volume: 1:3
2. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft. (92.9 Sq. m): 2 pounds
3. Weight of Slow-Release Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): 2 pounds

2.6 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
PART 3 • EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

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

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from any fertilizer overspray.

2. Protect grade stakes set by others until directed to remove them.

3.3 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches (150 mm) Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply fertilizer directly to subgrade before loosening.

2. Thoroughly spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.

   a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.

   b. Mix lime with dry soil before mixing fertilizer.
3. Spread planting soil to a depth of 6 inches (150 mm) but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
   a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil.
   b. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
   1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
   2. Loosen surface soil to a depth of at least 8 inches (200 mm). Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches (100 mm) of soil. Till soil to a homogeneous mixture of fine texture.
      a. Apply fertilizer directly to surface soil before loosening.
   3. Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, trash, and other extraneous matter.
   4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
   1. Lay sod across angle of slopes exceeding 1:5.
   2. Anchor sod on slopes exceeding 1 foot vertical : 6 feet horizontal with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.5 TURF RENOVATION

A. Renovate existing turf on adjacent sites disturbed by construction.

B. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
   1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
   2. Install new planting soil as required.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

E. Mow, dethatch, core aerate, and rake existing turf.

F. Remove weeds and stones larger than 1-1/2" in any direction before sodding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches (150 mm).

I. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches (100 mm) of existing soil. Install new planting soil to fill low spots and meet finish grades.

J. Apply sod as required for new turf.

K. Water newly planted areas and keep moist until new turf is established.

3.6 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
   1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
   2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches (100 mm).
   1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
   2. Water turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
   1. Mow fescue blend to a height of 2 to 3 inches (50 to 75 mm).

D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.
   1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to turf area.

3.7 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:
   1. Satisfactory Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm)
   2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.8 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.9 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200