

SAINT JOHN PAUL II SHRINE



MASTER PROJECT SPECIFICATIONS

ISSUED FOR:

- POOL INFILL
- SECOND FLOOR GALLERY
- COLLECTIONS CARE CENTER AND WINTER GARDEN
- MISCELLANEOUS PROJECTS
- MAIN CHURCH (ADDENDUM NO. 1)
- SITE MODIFICATIONS

DATE:

4/04/2014
5/19/2014
6/11/2014
9/15/2014
10/24/2014
04/03/2015

SECTION 00 0110

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END OF SECTION

SECTION 01 1000**SUMMARY****PART 1 GENERAL****1.01 PROJECT**

- A. Project Name: Saint John Paul II National Shrine - Site Modifications.
- B. Owner's Name: John Paul II Shrine and Institute, Inc.
- C. Architect's Name: LSC Design.
- D. The Project consists of site modifications including:
 - 1. New sidewalk along Harewood Road.
 - 2. Harewood Road entry modifications.
 - 3. Additional buffer planting on north side of access drive.
 - 4. Meadow plantings.
 - 5. Select site demolition.
 - 6. Exterior light fixture replacement.
 - 7. Demolition of existing exterior stairs.
 - 8. Construction of a new exterior stair, and planter with retaining wall.
 - 9. Provide new stainless steel railing.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on GMP Contract as issued by the Owner.

1.03 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

1.04 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.
- B. Arrange use of site and premises to allow:
 - 1. Owner occupancy.
 - 2. Work by Others.
 - 3. Use of site and premises by the public.
- C. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. By accepting the Contract for demolition and construction of this Project, the Contractor confirms they are aware that the remainder of the building beyond the work area will remain occupied.
- E. Noise Control:
 - 1. Demolition and construction activities that may generate excessive noise or vibrations that interrupt the Shrine's functions, create public disturbances, or disturb the occupied areas of the building will be required to be performed during off-hours unless otherwise approved by the Owner.
 - 2. Contractor shall comply with District of Columbia ordinances, OSHA Standard 1926.52, OSHA Standard 1910.95, and all other regulations relative to noise safety and noise control.
 - 3. Provide sound attenuation to maintain acoustic levels in adjacent occupied spaces 50 dBA and no more than 65dBA 10% of the time. The Contractor shall provide sound recording devices on the Ground, 1st, 2nd and 3rd floors of adjacent spaces. Data from the devices

will be review on a regular basis by the Owner's Representative for compliance with these noise requirements.

- F. The Contractor shall protect and maintain all services and systems that supply services to the areas outside of the demolition throughout the demolition process.
- G. The Contractor shall coordinate and provide necessary protocol to be used by the Owner's employees to access the work area during the Contract period. The Contractor shall provide the Owner and the Owner's representative access to the work site the at all times.
- H. Use of the Freight Elevator:
 - 1. The Contractor may use the freight elevator to transport materials from the work area horizontally through the elevator to the loading dock and the exterior of the building.
 - 2. The elevator shall be made available to the building staff for their use upon request.
 - 3. The Contractor shall be responsible for protecting the elevator during demolition.
 - 4. The Contractor shall ensure that the demolition and construction activities do not apply weight to the elevator greater than it is rated for .
 - 5. Any damage to the elevator shall be repaired or the elevator replaced at no expense to the Owner.
- I. Loading Dock:
 - 1. Coordinate with the Owner to accomodate their access requirements to the loading dock area.
 - 2. Maintain a clear unobstructed path to the security office to allow deliveries for Owner and to allow security personnel access to the building and site.
 - 3. Coordinate with the Owner's exhibit fabricator and other contractors for their use of the loading dock, freight elevator and access to the site.

1.05 WORK HOURS AND RESTRICTED HOURS OF OPERATION

- A. Work Hours:
 - 1. Monday Through Friday: Work may begin at 6 am. and shall be completed by 11 pm.
 - 2. Saturday: 9 am to 4 pm.
 - 3. Sunday: No work shall be performed.
 - 4. Additional hours may be arranged with the Owner.
- B. Restricted Work Hours:
 - 1. Daily Mass: Between the hours of 11:10 am and 12:30 pm Mass will be conducted; and noise producing operations shall not be performed.
 - 2. Friday Afternoons: Between 3:00 pm and 4:00 pm noise producing operations shall not be performed.

1.06 SUBMITTALS

- A. Upon award of the Contract, submit the following for review prior to the start of construction:
 - 1. An overall schedule of work
 - 2. Intended hours of operation
 - 3. A safety plan
 - 4. A site logistics plan that defines staging areas, location of dumpsters, trailers and other items outside of the work area; schedule of delivery and pick up of materials and trash, sequence and schedule of the demolition, and any other specific items that will be required to be coordinated during the demolition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 2300
ALTERNATES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of alternates.

1.02 SCHEDULE OF ALTERNATES

- A. Alternate No. 1 - Provide Additional Buffer Plantings.
- B. Alternate No. 2 - Provide Flexipave in lieu of concrete sidewalk.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Preconstruction meeting.
- B. Progress meetings.
- C. Submittals for review, information, and project closeout.
- D. Submittal procedures.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION****3.01 ELECTRONIC DOCUMENT SUBMITTALS**

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format and transmitted via e-mail, provides electronic stamping and signatures, and notifies addressees via email.
 - 1. Besides submittals for information, and closeout, this procedure applies to requests for information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, and any other document any participant wishes to make part of the project record.
 - 2. It is Contractor's responsibility to submit documents in PDF format.
 - 3. Subcontractors need an email address, Internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com).
 - 4. Paper document transmittals will not be reviewed; emailed PDF documents will not be reviewed.
 - 5. All other specified submittal and document transmission procedures apply, except that electronic document requirements to not apply to samples or color selection charts.

3.02 PREDEMOLITION AND PRECONSTRUCTION MEETINGS

- A. Attendance Required:
 - 1. Owner.
 - 2. Architect.
 - 3. Contractor.
 - 4. Construction Manager.
- B. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of Subcontractors, schedule of values, and progress schedule.
 - 5. Submittal and shop drawing schedule.
 - 6. Designation of personnel representing the parties to Contract and Architect.
 - 7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 8. Scheduling.
- C. Record minutes and distribute copies within two days after meeting to participants, with e-mail copies to Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at least once every two weeks.

- B. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Architect, as appropriate to agenda topics for each meeting.
- C. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems that impede, or will impede, planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Maintenance of progress schedule.
 - 7. Corrective measures to regain projected schedules.
 - 8. Planned progress during succeeding work period.
 - 9. Maintenance of quality and work standards.
 - 10. Effect of proposed changes on progress schedule and coordination.
 - 11. Other business relating to Work.
- D. Record minutes and distribute copies within two days after meeting to participants, with e-mail copies to Architect, Owner, participants, and those affected by decisions made.

3.04 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Shop drawings.
 - 2. Samples for selection.
 - 3. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Submit relevant submittals to the Owner's Exhibit Fabricator for review and coordination with the exhibit design requirements.
- D. Samples will be reviewed only for aesthetic, color, or finish selection.
- E. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below .

3.05 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

3.06 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Documents for Project Closeout:
 - 1. Make one reproduction of submittal originally reviewed, noting any changes that have occurred since the approval.
 - 2. Electronic Documents: Submit one copy.
 - 3. Warranties may not be submitted electronically and must have a "wet signature".
- B. When the following are specified in individual sections, submit them at project closeout:
 - 1. Project record documents.
 - 2. Other types as indicated.
- C. Submit for Owner's benefit during and after project completion.

3.07 NUMBER OF COPIES OF SUBMITTALS

- A. Documents for Information:
 - 1. Electronic Documents: Submit one copy. The Contractor shall make his own copies from document returned by the Architect.
- B. Documents for Project Closeout:
 - 1. Make one reproduction of submittal originally reviewed, noting any changes that have occurred since the approval.
 - 2. Electronic Documents: Submit one copy.
 - 3. Warranties may not be submitted electronically and must have a "wet signature".
- C. Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 - 1. After review, produce duplicates.
 - 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.08 SUBMITTAL PROCEDURES

- A. Transmit each submittal with approved form.
- B. Sequentially number the transmittal form. All submittals for this Project shall have an "SM" prefix. Revise submittals with original number and a sequential alphabetic suffix.
- C. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
- D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - 1. Coordinate submittal meeting with Architect, Engineers and Exhibit Fabricator for review of specific submittal packages.
- F. For each submittal for review, allow 10 business days excluding delivery time to and from the Contractor. Submittals received after 5 p.m. will be logged as being received the following business day. Submittals received on Saturday or Sunday will be logged as being received the next business day.
- G. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- H. Provide space for Contractor, Architect, and Exhibit Fabricator's review stamps.
- I. When revised for resubmission, identify all changes made since previous submission.
- J. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- K. Submittals not requested will not be recognized or processed.

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. References and standards.
- B. Informational submittals.
- C. Mock-ups.
- D. Control of installation.
- E. Tolerances.
- F. Testing and inspection services.
- G. Manufacturers' field services.

1.02 REFERENCE STANDARDS

- A. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2012.
- B. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
- C. ASTM E329 - Standard Specification for Agencies Engaged Construction Inspection and/or Testing; 2011.
- D. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2009.
- E. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2010.

1.03 SUBMITTALS

- A. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
- B. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
 - 1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.04 REFERENCES AND STANDARDS

- A. For workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION****3.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

3.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

- A. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified standards.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
 - 5. Perform additional tests and inspections required by Architect.
 - 6. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:

1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.
- E. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.05 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Temporary utilities.
- B. Temporary telecommunications services.
- C. Security requirements.
- D. Vehicular access and parking.
- E. Waste removal facilities and services.
- F. Field offices.

1.02 TEMPORARY UTILITIES

- A. Owner will provide the following:
 - 1. Electrical power , consisting of connection to existing facilities.
 - 2. Water supply, consisting of connection to existing facilities.
- B. Existing facilities may be used.

1.03 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
 - 1. Email: Account/address reserved for project use.

1.04 EXTERIOR ENCLOSURES

- A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons.

1.05 SAFETY AND SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. The Contractor is responsible for job site safety and for securing the work site at all times.
- C. The Contractor shall provide supervision of all work personnel and sub-contractors while they are on site.
- D. The Contractor shall meet with the Owner's head of security prior to start of demolition to identify security systems to remain operational during demolition.
- E. Upon award of Contract, the Contractor shall require each his employees, his sub-contractors and their employees to complete and submit Background Check Authorization and Information Forms provided by the Owner.
 - 1. Information shall be provided to the Owner a minimum of five work days prior to the start of work of the employee.
 - 2. All of the Contractor's employees and sub-consultants shall participate with the Owner's badge system to be worn on their person at all times while on site.
 - 3. Information to be provided by each employee shall include:
 - a. Name, address, birthday, phone number, and last four digits of their social security number.

1.06 VEHICULAR ACCESS AND PARKING

- A. Coordinate access and haul routes with Owner.
- B. Provide and maintain access to fire hydrants, free of obstructions.

- C. Owner will provide designated parking areas to accommodate construction personnel. When designated space is not adequate, coordinate additional with the Owner or park off-site.

1.07 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from the building daily and from the site weekly.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.08 FIELD OFFICES

- A. Office: Provide office area, with office equipment, and sturdy furniture .
- B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

1.09 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION - NOT USED**

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Transportation, handling, storage and protection.
- B. Product option requirements.
- C. Substitution limitations and procedures.
- D. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS**2.01 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. Do not use products having any of the following characteristics:
 - 1. Made using or containing CFC's or HCFC's.
 - 2. Made of wood from newly cut old growth timber.

2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION**3.01 SUBSTITUTION PROCEDURES**

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- C. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.

3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- D. Substitution Submittal Procedure:
1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 3. The Architect will notify Contractor in writing of decision to accept or reject request.

3.02 TRANSPORTATION AND HANDLING

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- B. Transport and handle products in accordance with manufacturer's instructions.
- C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Prevent contact with material that may cause corrosion, discoloration, or staining.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Closeout procedures, except payment procedures.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
 - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
 - 2. Identify demolition firm and submit qualifications.
 - 3. Include a summary of safety procedures.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.03 QUALIFICATIONS

- A. For demolition work, employ a firm specializing in the type of work required.
 - 1. Minimum of 5 years of documented experience.
- B. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.04 PROJECT CONDITIONS

- A. Use of explosives is not permitted.
- B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- C. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 - 1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
 - 2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- D. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

1.05 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS**2.01 PATCHING MATERIALS**

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Verify locations of control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- D. Periodically verify layouts.

3.05 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as shown.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
 - 2. Relocate items indicated on drawings.
 - 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 - 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- C. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
- D. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
- E. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- F. Refinish existing surfaces as indicated:
 - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- G. Clean existing systems and equipment.
- H. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- I. Do not begin new construction in alterations areas before demolition is complete.

- J. Comply with all other applicable requirements of this section.

3.06 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-conforming work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Match color, texture, and appearance.
 - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.07 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

- F. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.09 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 ADJUSTING

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

3.11 FINAL CLEANING

- A. Use cleaning materials that are nonhazardous.
- B. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- D. Clean filters of operating equipment.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.
- F. Clean site; sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
- B. Notify Architect when work is considered ready for Substantial Completion.
- C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's review.
- D. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.
- E. Notify Architect when work is considered finally complete.
- F. Complete items of work determined by Architect's final inspection.

END OF SECTION

SECTION 02 4100
DEMOLITION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Selective demolition of site elements, site lighting, and building elements for alteration purposes, including the following:
 - 1. Site elements, and lighting demolition as reference on the Drawings.
 - 2. Removal of pavers, setting bed and stairs where indicated to accomdate new construction.
- B. The Contractor shall be responsible for the protection of all existing finishes to remain. The contractor shall repair or replace at the owners option, any finish to remain that is damaged during demolition.

1.02 SAFETY AND SECURITY

- A. The Contractor is responsible for job site safety and for securing the work site at all times.
- B. The Contractor shall provide supervision of all work personnel and sub-contractors while they are on site.
- C. The Contractor shall meet with the Owner's head of security prior to start of demolition to identify security systems to remain operational during demolition.
- D. Upon award of Contract, the Contractor shall require each his employees, his sub-contractors and their employees to complete and submit Background Check Authorization and Information Forms provided by the Owner.
 - 1. Information shall be provided to the Owner a minimum of five work days prior to the start of work of the employee.
 - 2. All of the Contractor's employees and sub-consultants shall participate with the Owner's badge system to be worn on their person at all times while on site.
 - 3. Information to be provided by each employee shall include:
 - a. Name, address, birthday, phone number, and last four digits of their social security number.

1.03 USE OF THE SITE

- A. Refer to Section 01 1000 - Summary for additional restrictions.
- B. By accepting the Contract for Demolition, the Contractor confirms they are aware that the remainder of the building beyond the work area will remain occupied.
- C. Noise Control:
 - 1. Demolition activities that may generate excessive noise or vibrations that interupt museum functions, create public disturbances, or disturb the occupied areas of the building will be required to be performed during off-hours unless otherwise approved by the Owner.
 - 2. Contractor shall comply with District of Columbia ordinances, OSHA Standard 1926.52, OSHA Standard 1910.95, and all other regulations relative to noise safety and noise control.
 - 3. Provide sound attenuation to maintain acoustic levels in adjacent occupied spaces 50 dBA and no more than 65dBA 10% of the time. The Contractor shall provide sound recording devices on the Ground, 1st, 2nd and 3rd floors of adjacent spaces. Data form the devices will be review on a regular basis by the Owner's Representative for compliance with these noise requirements.
- D. The Contractor shall protect and maintain all services and systems that supply services to the areas outside of the demolition throughout the demolition process.
- E. The Contractor shall be responsible for the protection of all existing finishes to remain. The Contractor shall repair or replace at the Owner's option, any finish to remain that is damaged during demolition.

- F. Demolition and Construction personnel are limited to the work area, and shall not be allowed in other parts of the Shrine unless authorization is provided by either security personnel on duty or the Owner's representative.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Upon award of the Contract, submit the following for review prior to the start of demolition:
 - 1. An overall schedule of work
 - 2. Intended hours of operation
 - 3. A safety plan
 - 4. A site logistics plan that defines staging areas, location of dumpsters, trailers and other items outside of the work area; schedule of delivery and pick up of materials and trash, sequence and schedule of the demolition, and any other specific items that will be required to be coordinated during the demolition.
 - 5. A partition schedule and details
- C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
 - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
 - 2. Identify demolition firm and submit qualifications.
 - 3. Include a summary of safety procedures.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

- A. Remove site and lighting elements referenced for demolition.
- B. Remove portions of existing plaza where indicated on the Drawings to accommodate new construction.

3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

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

3.03 PREPARATION / PROTECTION

- A. Define clear limits of elements to be removed, while protecting those to remain.
- B. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.

3.04 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent the public.
 - 1. Take precautions to prevent uncontrolled collapse of structures or items to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 2. Provide, erect, and maintain temporary barriers and security devices.
 - 3. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 4. Do not close or obstruct roadways or sidewalks.
 - 5. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.

- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Protect existing structures and other elements that are not to be removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.

3.05 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as shown.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
- C. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
 - 4. Patch as specified for patching new work.

3.06 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

3.07 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Provide proper disposal of computer and audio visual equipment.
- C. Leave site in clean condition, ready for subsequent work.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL**1.01 SUMMARY**

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Sections:
 - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.
- D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1.03 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Material certificates.
- C. Material test reports.
- D. Floor surface flatness and levelness measurements.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5 and Section 7, "Lightweight Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- F. Pre-installation Conference: Conduct conference at project site.

1.05 PRECONSTRUCTION TESTING

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

1.06 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1.
 - 1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

- B. Hot-Weather Placement: Comply with ACI 301.

PART 2 - PRODUCTS

2.01 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301
 - 2. ACI 117

2.02 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.03 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.04 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I or Type III (Type II for concrete in contact with earth). Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F or C.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C 33, graded.
 - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M potable.

2.05 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.06 FIBER REINFORCEMENT

- A. Synthetic Minro-Fiber: Monofilament polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116, Type III, ½ to 1-1/2 inches long.

2.07 WATERSTOPS

- A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.
- B. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.

2.08 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.09 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1752, cork or self-expanding cork.

2.11 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of Portland cement, which would otherwise be used, by not less than 40 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 2. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
- D. Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: As indicated on drawings.
 2. Maximum Water-Cementitious Materials Ratio: As indicated on drawings.
 3. Slump Limit: As indicated on drawings.
 4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
 5. Air Content: 5-.5 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
 6. Air Content at point of delivery for Foundations: 4.5 percent, plus or minus 1.5 percent. Do not allow air content of trowel-finished slabs to exceed 3 percent.

7. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of 1.0 lb/cu. yd.

2.12 FABRICATING REINFORCEMENT

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

2.13 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 1. When air temperature is between 85 and 90 deg F reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete.

3.02 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.03 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 1. Lap joints as required by manufacturer (minimum 6 inch lap) and seal with manufacturer's recommended material.

3.04 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.05 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.06 WATERSTOP INSTALLATION

- A. Waterstops: Install in construction joints and at other joints indicated according to manufacturer's written instructions.

3.07 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- C. Cold-Weather Placement: Comply with ACI 306.1.
- D. Hot-Weather Placement: Comply with ACI 301.

3.08 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.09 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
 - 1. Apply scratch finish to surfaces indicated to receive trowel finish and to be covered with mortar bed and granite.
- C. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces of sidewalks. While concrete is still plastic, slightly scarify surface with a broom perpendicular to direction of travel.
 - 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

3.10 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 CONCRETE SURFACE REPAIRS

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

3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 03 3000

SECTION 04 4200
EXTERIOR STONE WORK

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Metal anchors and supports.
- B. New exterior steps.
- C. Flashing materials.

1.02 RELATED REQUIREMENTS

- A. Section 07 1400 - Fluid Applied Waterproofing: Stone Pavers

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on stone, flashing, mortar products, and sealant products.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with NBGQA (SPEC).

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store stone panels vertically on edge, resting weight on panel edge.
- B. Protect stone from discoloration.

1.06 FIELD CONDITIONS

- A. During temporary storage on site, at the end of working day, and during rainy weather, cover stone work exposed to weather with non-staining waterproof coverings, securely anchored.

PART 2 PRODUCTS**2.01 STONE**

- A. Granite: Steps; complying with ASTM C615.
 - 1. Granite: Strzegom Granite
 - 2. Color: To match existing granite.
 - 3. Thickness: As shown on the Drawings.
 - 4. Finish: Thermal finish to match pavers.
 - 5. Nosing: Fill slots with non-slip epoxy grout.
- B. Granite: Coping; complying with ASTM C615.
 - 1. Granite: Strzegom Granite
 - 2. Color: To match existing granite.
 - 3. Thickness: As shown on the Drawings.
 - 4. Finish: Thermal finish to match pavers.
 - 5. Slope to drain with drip edge grooves.
- C. Granite Pavers Set in a Mortar Bed: As specified in Section 07 1400, except thickness shall be 1-1/4 inches thick.

2.02 MORTAR

- A. Mortar: ASTM C270, Type N, Proportion specification, using Portland cement of white color.
- B. Mortar to match existing stone mortar.

2.03 ANCHORS AND ACCESSORIES

- A. Anchors and Other Components in Contact with Stone: Stainless steel, ASTM A666, Type 304.
 - 1. Sizes and configurations: As required for vertical and horizontal support of stone and applicable loads.
 - 2. Wire ties are not permitted.
- B. Support Components not in Contact with Stone: Stainless steel, ASTM A167, Type 304.

- C. Setting Buttons and Shims: Lead type.
- D. Metal Flashing: Lead Coated copper.
 - 1. Provide 16 ounce lead coated copper.
 - 2. Dowel Caps: Similar to those available from Krando Metal Products.
 - 3. Solder: ASTM B32.
- E. Joint Filler: 1/2 inch Homasote.

2.04 STONE FABRICATION

- A. Panel Size: As indicated on drawings.
- B. Fabrication Tolerances: In accordance with NBGQA (SPEC).
- C. Fabricate units for uniform coloration between adjacent units and over the full area of the installation.
- D. Where corner detail is not indicated, form external corners to square joint profile.
- E. Slope exposed top surfaces of stone and horizontal sill surfaces for natural wash.
- F. Cut drip slot in bottom surface of work projecting more than 1/2 inch over wall openings. Size slot not less than 3/8 inch wide and 1/4 inch deep; full width of projection.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that support work and site conditions are ready to receive work of this section.
- B. Verify that items built-in under other sections are properly located and sized.

3.02 DEMOLITION AND REMOVAL

- A. Demolish limestone insulation as required to install wall flashing and weeps.
- B. Install new through wall flashing and termination bar with new copper drip.
- C. Install modify existing limestone the remains in place to accept new stone anchor to anchor stone below.

3.03 PREPARATION

- A. Clean stone prior to erection. Do not use wire brushes or implements that will mark or damage exposed surfaces.

3.04 CONCRETE MASONRY UNIT INSTALLATION

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.
- D. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- E. Lay hollow masonry units with face shell bedding on head and bed joints.

3.05 INSTALLATION

- A. Set stone with a consistent joint width to match existing stone.
- B. Install anchors and place setting buttons to support stone and to establish joint dimensions.
- C. Fill joints with pointing mortar. Pack and work into voids. Neatly tool surface to concave joint.

3.06 STEP INSTALLATION

- A. Mortar Bed Installation.

1. Apply mortar bed over concrete surfaces to a thickness of 1-1/2 to 2 inch.
2. Set stone in full mortar bed to support stone over full bearing surface.

B. Set stone level.

3.07 TOLERANCES

- A. Positioning of Elements: Maximum 1/4 inch from true position.
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet; 1/2 inch in 50 feet.
- C. Maximum Variation Between Face Plane of Adjacent Panels: 1/16 inch.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in any two stories.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch maximum.
- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

3.08 CUTTING AND FITTING

- A. Obtain approval prior to cutting or fitting any item not so indicated on Drawings.
- B. Do not impair appearance or strength of stone work by cutting.

END OF SECTION

SECTION 05 7000
DECORATIVE METAL

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Free-standing railings at steps and planter.

1.02 REFERENCE STANDARDS

- A. ASTM A307 - Standard Specification for Carbon Steel Bolts Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2012.
- B. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing; 2013.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.
- D. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2010 w/Errata.
- E. AWS D1.6/D1.6M - Stainless Steel Welding Code; 2007.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's product data including description of materials, components, finishes, fabrication details, glass, anchors, and accessories.
- C. Shop Drawings: Indicate wall system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.
- D. Samples: Submit one (1) of each item below for each type and condition shown.
 - 1. Railing: 12 inch long section of handrail illustrating finish and connection detail.
- E. Test Reports: Submit test reports from an independent testing agency showing compliance with specified design and performance requirements.
- F. Manufacturer's Installation Instructions.
- G. Maintenance Data: Manufacturer's instructions for care and cleaning.
- H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Installation by manufacturer.
- B. Templates: Supply installation templates, reinforcing and required anchorage devices.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in factory provided protective coverings and packaging.
- B. Protect materials against damage during transit, delivery, storage, and installation at site.
- C. Inspect materials upon delivery for damage. Repair damage to be indistinguishable from undamaged areas; if damage cannot be repaired to be indistinguishable from undamaged parts and finishes, replace damaged items.
- D. Prior to installation, store materials and components under cover, in a dry location.

1.06 FIELD CONDITIONS

- A. Do not install railings until project is enclosed and ambient temperature of space is minimum 65 degrees F and maximum 95 degrees F.
- B. Maintain ambient temperature of space at minimum 65 degrees F and maximum 95 degrees F for 24 hours before, during, and after bracket installation.

PART 2 PRODUCTS**2.01 STAINLESS STEEL RAILING**

- A. General: Factory- or shop-fabricated in design indicated, to suit specific project conditions, and for proper connection to building structure, and in largest practical sizes for delivery to site.
 - 1. Design Criteria: Design and fabricate bracket and anchorages to resist the following loads without failure, damage, or permanent set; loads do not need to be applied simultaneously.
 - a. Lateral Force: 75 lb minimum, at any point, when tested in accordance with ASTM E935.
 - b. Distributed Load: 50 pounds per foot minimum, applied in any direction at the top of the bracket, when tested in accordance with ASTM E935.
 - c. Concentrated Load: 200 lbs minimum, applied in any direction at any point along the handrail system, when tested in accordance with ASTM E935.
 - 2. Assembly: Join lengths, seal open ends, and conceal exposed mounting bolts and nuts using slip-on non-weld mechanical fittings, flanges, escutcheons, and wall brackets.
 - 3. Joints: Tightly fitted and secured, machined smooth with hairline seams.
 - 4. Field Connections: Provide sleeves to accommodate site assembly and installation.
 - 5. Welded and Brazed Joints: Make exposed joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
 - a. Ease exposed edges to small uniform radius.
 - b. Welded Joints:
 - 1) Stainless Steel: Perform welding in accordance with AWS D1.6/D1.6M.
- B. Metal Tube Railing: Engineered, post supported railing system with metal infill.
 - 1. Grip Rail: Round, stainless steel, 1-1/2 inch diameter.
 - 2. Fasteners: Concealed.
 - 3. End and Intermediate Posts: Same material and size as top rails.
 - a. Horizontal Spacing: As indicated on drawings.
 - b. Mounting: Welded.

2.02 MATERIALS

- A. Stainless Steel Components:
 - 1. ASTM A666, Type 304.
 - 2. Stainless Steel Tubing: ASTM A554, Type 304, 16 gage, 0.0625 inch minimum metal thickness, 1-1/2 inch diameter.
 - 3. Stainless Steel Finish: No. 4 Finish.

2.03 ACCESSORIES

- A. Welding Fittings: Factory- or shop-welded from matching pipe or tube; joints and seams ground smooth.
- B. Anchors and Fasteners: Provide anchors and other materials as required to attach to structure, made of same materials as bracket components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete for bolting anchors.
 - 2. Provide stainless steel sleeves to be cast into concrete
 - 3. Exposed Fasteners: No exposed bolts or screws.
- C. Stainless Steel Bolts and Nuts: ASTM A593 and nuts A594.
- D. Sealant: Silicone; black.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that substrate and site conditions are acceptable and ready to receive work.
- B. Verify field dimensions of locations and areas to receive work.

- C. Notify Architect immediately of conditions that would prevent satisfactory installation.
- D. Do not proceed with work until detrimental conditions have been corrected.
- E. Furnish components to be installed in other work to installer of that other work, including but not limited to blocking, sleeves, inserts, anchor bolts, embedded plates and supports for attachment of anchors.

3.02 PREPARATION

- A. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions and directions for installation of anchorages and fasteners.
- B. Clean surfaces to receive units. Remove materials and substances detrimental to the installation.

3.03 INSTALLATION

- A. Comply with manufacturer's drawings and written instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects and with tight joints, except where necessary for expansion.
- C. Anchor securely to structure.
- D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- E. Weld connections that cannot be shop welded due to size limitations.
 - 1. Weld in accordance with AWS D1.1/D1.1M.
 - 2. Match shop welding and bolting.
 - 3. Clean welds, bolted connections and abraded areas.
 - 4. Touch up welds to match factory applied finish.
- F. Isolate dissimilar materials with bituminous coating, bushings, grommets or washers to prevent electrolytic corrosion.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

3.05 FIELD QUALITY CONTROL

- A. Field Services: Provide the services of the manufacturer for field observation of installation of brackets.

3.06 CLEANING

- A. Remove protective film from exposed metal surfaces.
- B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents or other substances that may damage the material or finish.

3.07 PROTECTION

- A. Protect installed components and finishes from damage after installation.
- B. Repair damage to exposed finishes to be indistinguishable from undamaged areas.
 - 1. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.

END OF SECTION

SECTION 07 1400
FLUID-APPLIED WATERPROOFING

PART 1 GENERAL**1.01 SUMMARY**

- A. Section Includes:
 - 1. Demolition of existing pool, demolition existing trench drain.
 - 2. New hot fluid applied waterproofing membrane system including flashings to receive the following roof coverings:
 - a. New granite pavers and new limestone pavers including pedestals system.
 - b. New vegetated roof covering.
 - 3. New trench drain grate, new drainage mat, new drainage system and new over flow drains.
 - 4. Stripping in new trench drain to existing waterproof membrane.
- B. Related Sections:
 - 1. Section 07 7273 - Membrane Integrity Test System

1.02 SYSTEM DESCRIPTION (SYSTEM FROM DECK UP)

- A. Waterproof Membrane
 - 1. Concrete Deck Primer
 - 2. Hot Fluid Applied Membrane (90 mils)
 - 3. Reinforcement Layer
 - 4. Hot Fluid Applied Membrane (125 mils)
 - 5. Protection Board
- B. Root Barrier
- C. Drainage Mat
- D. Accessories:
 - 1. Drainage Accessories
 - 2. Flashings
- E. Insulation: Extruded Polystyrene Insulation
- F. Provide additional drainage mat at planted areas.

1.03 DEFINITIONS

- A. Standard Definitions
 - 1. Waterproofing: Synonymous with "roofing" and "roof" within this Section.
 - 2. Waterproofing Manufacturer: Company that provides and warrants the building waterproofing system.
 - 3. Waterproofing System: Entire membrane, pavers, pedestals and vegetated waterproofing system described in this Section.

1.04 REFERENCES

- A. The following standards are applicable to this section:
 - 1. ACI 301 American Concrete Institute Specifications for Structural Concrete
 - 2. ANSI VF 1: External Fire Design Standard for Vegetative Roofs
 - 3. ANSI/GRHC/SPRI VR-1: Procedure for Investigating Resistance to Root Penetration on Vegetative Roofs
 - 4. ANSI/SPRI RP-14 Wind Design Standard for Vegetative Roofing Systems
 - 5. ASTM: American Society for Testing and Materials
 - 6. CGSB/37-GP-50M: Canadian Government Specifications Board

1.05 QUALITY ASSURANCE

- A. Source Limitations: The Waterproofing Manufacturer and Vegetated System Manufacturer shall provide the entire system.
- B. Installer shall:

1. Be certified by the Waterproofing Manufacturer and Vegetated System Manufacturer to install the specified systems;
 2. Contractor shall have 10 years experience in rooftop sandwich slab waterproofing.
 3. Provide full-time site supervision during all phases of installation; Site Supervisor must have a minimum of three (3) years documented experience in successful installation of projects of similar complexity and scale; Site Supervisor must be able to communicate effectively with Owner, Architect and installation crews; Site Supervisor must be a full-time employee of Installer.
- C. Tests for media shall be conducted by an independent laboratory with experience in testing of green roof media.
- D. Pre-Construction Meeting: At least one week prior to the commencement of work described under this section, the Installer and Manufacturer shall meet with the general contractor and applicable subcontractors to discuss project sequence, procedures for methods for protecting the work, and review completed work for compliance with the specifications.
- E. Standards and measurements included in this Section set a minimum standard of acceptable quality. Products of superior quality that are otherwise compatible with the specified systems will be considered by the Architect.
- F. Field Quality Control:
1. Adhesion Tests and Thickness Tests of the membrane shall be monitored by Installer every hour throughout the application process.
 2. Test Cuts of waterproofing or flashing membrane shall be made at locations of Architect's or Manufacturer's request.
 - a. Remove one 2 inch x 6 inch unsurfaced cut per 100 squares (10,000 SF) of deck area.
 - b. Follow field audit criteria outlined by ASTM Standards.
 - c. Send roof cuts to Manufacturer-approved accredited laboratory for laboratory examinations. Laboratory reports shall be submitted by the laboratory directly to the Architect and Manufacturer.
 - d. Repair sampled areas by filling in the cut-out area then use a "feathered in" patch consisting of reinforcement layer and hot fluid applied membrane following the Manufacturer's procedures.
 3. Correct any deficiencies in the deck membrane, if any, (determined by deck cut analysis) as prescribed by material Manufacturer and approved by the Architect.

1.06 SUBMITTALS

- A. Manufacturer's written certification of Installer for installation of the specified Waterproofing System.
- B. Sample warranty. Include details of warranty phase Stewardship program.
- C. Product Data for the specified systems via a single full-system submittal. Include MSDS sheets for all materials.
- D. Shop Drawings showing typical profile conditions and thicknesses, conditions at terminations, transitions, penetrations, roof drains, scuppers, or other unusual or project-specific details. Shop Drawings shall bear the Manufacturer's approval as warrantable conditions.
- E. Samples:
 1. Submit three 8 x 10 inches sheet samples approximately or alternately 3 units that are representative of the following products.
 - a. Hot Fluid Applied Membrane
 - b. Reinforcement Layer
 - c. Protection Layer
 - d. Membrane Flashing
 - e. Vent Pipe Flashing
 - f. Pavers
 - g. Insulation

- F. Waterproofing Certification: Signed by the Waterproofing Manufacturer, certifying that the proposed waterproofing system is fully compatible with the waterproofing system and that the waterproofing system is eligible for a warranty from the Waterproofing Manufacturer.

1.07 DELIVERY, HANDLING AND STORAGE

- A. Deliver materials to the jobsite in undamaged boxes or pallets that are clearly marked with the project name, contractor name, Manufacturer's name, product name, production date and product code.
- B. Maintain rolled and sheet goods in manufacturer's original packaging; store in a safe and secure location until installation.
- C. Store materials in dry, protected areas in an upright position. Control temperature of storage areas in accordance with Manufacturer's instructions. Protect moisture sensitive materials with breathable tarps on sides and top surfaces.
- D. Palletize and cover pavers and masonry materials; store in a safe and secure location until installation.

1.08 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit work to be performed when optimum results may be obtained. Apply products during favorable weather conditions according to Manufacturer's written instructions and warranty requirements. Do not plant herbaceous materials when planting media temperatures are below freezing or when ice or snow is present.
- B. Follow local, state and federal regulations, safety standards and codes. When a conflict exists use the stricter requirement.
- C. Do not apply waterproofing materials unless proper bitumen application temperatures (350°F minimum) can be maintained, or when moisture in any form (i.e. rain, dew, ice, frost, snow, etc.) is present on the deck. Do not heat bitumen above temperature recommended by manufacturer.
- D. Ensure deck is structurally sound to support the live and dead load requirements of the waterproofing system and sufficiently rigid to support construction traffic.
- E. Sequencing and Scheduling: The Work shall be scheduled in the construction sequence so that designated complete contiguous areas can be installed and completed, including overlay elements and wear courses, before other construction trades are allowed in the area. Prior to starting the Work, all drains shall be operative and all deck projections, sleeves and all other penetrations shall be installed, in place and operative.

1.09 WARRANTY

- A. Waterproofing:
 - 1. Provide a single Manufacturer's warranty for the Waterproofing System.
 - 2. Terms: Terms listed below are terms which commence upon Substantial Completion.
 - a. Workmanship Warranty: Two years.
 - b. System Warranty: Twenty years
 - c. Overburden Warranty: Ten years
 - 3. Workmanship Warranty: Repair or replace portions of the waterproofing system that fail in workmanship within specified warranty period.
 - 4. System Warranty: Repair or replace portions of the waterproofing system that fail in materials within specified warranty period.

PART 2 PRODUCTS

2.01 SYSTEM MANUFACTURER

- A. Acceptable Manufacturer:
 - 1. Henry Gold Warranty
- B. Acceptable Substitutions:

1. Barrett Ram-Tough 250 Waterproofing Membrane
2. American Hydrotech, Inc., Monolithic Membrane 6125EV

2.02 INSULATION

- A. Provide extruded polystyrene, Type VII:
 1. Provide thickness of insulation as indicated on the Drawings.
 2. Provide tapered insulation where indicated on the Drawings.
- B. Insulation Performance Characteristics:
 1. Type VII Extruded Polystyrene Insulation ASTM 578
 2. Thermal conductivity – “k” (BTU x in/°F x ft2 x h)
 - a. @ 75°F mean temperature 0.2 ASTM C 518
 - b. @ 40°F mean temperature 0.18 ASTM C 518
 3. Thermal resistance “R-value” per inch, min (°F x ft2 x h/BTU)
 - a. @ 75°F mean temperature 5 ASTM C 518
 - b. @ 40°F mean temperature 5.4 ASTM C 518
 4. Compressive Strength: Minimum value after 1,000 freeze/thaw cycles 60 psi ASTM D 1621
 5. Flexural strength (lb/in2 min) 140 ASTM C 203
 6. Water absorption, max (% by volume)* 0.05 ASTM C 272
 7. Water vapor permeance, max (perm) 1.1 ASTM E 96
 8. Dimensional stability, max (% linear change) 2 ASTM D 2126
 9. Linear coefficient of thermal expansion 2.7 x 10-5 max (in/in/°F)
 10. Flame spread 5 ASTM E 84
 11. Smoke developed 45-175 ASTM E 84
 12. Oxygen index, min 24 ASTM D 2863

2.03 WATERPROOFING MEMBRANE

- A. Waterproofing: Henry 790-11
- B. Reinforcement Layer: Spunbond polyester fabric, from the same manufacturer as waterproofing membrane.
- C. Flashings: Uncured neoprene flashing sheet complying with the following minimum specifications:
 1. Thickness 60 Mils ASTM D-412
 2. Thickness Tolerance, % ±10 ASTM D-412
 3. Tensile Strength min, psi 1500 ASTM D-412
 4. Elongation, Ultimate min, % 250 ASTM D-412
 5. Hardness, Curometer, A Tear resistance min, 60 ±10 ASTM D-2240
 6. Product from the same manufacturer as waterproofing membrane.

2.04 ACCESSORIES

- A. Drainage Mat: Provide composite drainage course composed of rot resistant non-woven filter fabric on high-density polyethylene, polypropylene or polystyrene drainage core with the following characteristics:
 1. Thickness: 7/16 inch nominal
 2. Compressive Strength: 10,800 lbs/sq.ft., ASTM D1621.
 3. Flow Capacity per Foot of Width: 16 gpm, ASTM D4491.
 4. Mat shall be compatible with extruded polystyrene insulation.
- B. Drains and Drain Piping: Refer to Drawings for Drain sizes and locations.
 1. Scupper Drains Installed in New Trench: Zurn ZB160 DuraCoated Cast Iron with 4 inch outlets.
 2. Waterstop: Provide Henry SF302 Synko-Flex or HF302 Hydro-Flex Waterstop apply with Synko-Flex Primer.
 3. Stainless Steel: Bent plates, Type 304 stainless steel.
 4. Drain Pipe:

- a. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1) Fittings: PVC.
 - 2) Joints: Solvent welded, with ASTM D2564 solvent cement.
- C. Drainage Stone: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D 448, coarse aggregate, Size No. 57, with 100 percent passing 1-1/2-inch sieve and not more than 5 percent passing No. 8 sieve.
- D. Termination Bar: 1/8 inch thick, Type 304 stainless steel.

2.05 PAVERS

- A. Granite Pavers: Pavers set on pedestals.
 - 1. Material: Granite to match existing.
 - 2. Color, and Finish: Match existing.
 - 3. Size: 30 inch x 30 inch x 2 inches thick typical
- B. Brick Pavers: Set on metal frame over trench drain.
 - 1. Grade: ASTM C902 Weather Class SX Traffic Type I, with dimensional tolerances complying with Application PX.
 - 2. Face Size: 4 by 8 inches.
 - 3. Thickness: 2-5/8 inches.
 - 4. Exposed Surface Texture: Wirecut.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine the completed roof deck for compliance with drawings, installation tolerances, and other conditions affecting performance.
- B. Remove trash, debris, grease, oil, water, moisture and other contaminants from the deck which may affect bond of bitumen to deck surface.
- C. Concrete Surfaces: Concrete shall be cured a minimum of 14 days and comply with the following:
 - 1. All concrete shall pass ASTM D-4263 Moisture Content Test and the NRCA deck dryness test.
 - 2. All surfaces shall be dry, clean, firm and free from laitance, frost, dust, dirt, oil, unapproved curing compounds or other foreign matter detrimental to performance of waterproofing membrane.
 - 3. Follow ASTM D-5295 Guide for preparation of concrete surfaces.
- D. Notify the Architect in writing immediately if any conditions are present that may be detrimental to the performance of the Work. Proceed only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Removal of Existing Components:
 - 1. Remove existing system components including insulation down to the deck.
 - 2. Remove existing drains in areas to receive new new waterproofing system.
- B. Contractor shall be responsible for protection of property during course of work. Lawns, shrubbery, paved areas, and building shall be protected from damage. Repair damage at no cost to Owner.
- C. Provide at site prior to commencing removal of debris:
 - 1. Coordinate the location of a dumpster or dump truck with the Construction Manager.
 - 2. Protect building surfaces at areas of demolition from damage.
 - 3. Remove dumpster from premises when full and empty at approved dumping or refuse areas.
 - 4. Deliver empty dumpster to site for further use. Upon job completion, dumpster/chute shall be removed from premises.
 - 5. Spilled or scattered debris shall be cleaned-up immediately.

6. Removed material to be disposed from plaza as it accumulates.
- D. Sand-blast or shot-blast existing deck as required to provide the best possible surface for adhesion of the membrane.
- E. Repair voids, cracks, holes and other damaged surfaces with materials compatible with hot fluid applied membrane. On existing concrete decks, all old existing membrane and flashings shall be completely removed to stained or bare concrete.
- F. Expansion Joints: Expansion joints shall be sharply formed and free of broken edges or loose aggregate and completely free of preformed joint fillers, sealants or back-up materials to a depth that is at least twice the width of the joint. Curb expansion joints at each side of the joint, either by integrally forming with the slab or securely fastening sulfate treated wood strips to deck. Chamfer the edges of curbs that membrane will be installed over.
- G. Prepare non-concrete surfaces according to respective Manufacturer's published instructions. All metal work shall be free of process oils and rust, cleaned to a bright condition. Use cleaning materials and methods necessary to render an acceptable dust free surface, including oil free filtered compressed air or high speed power blowers.
- H. Provide temporary protection for installed membrane to prevent damage by mechanical gouging, scraping, spilling of oil, solvents or exposure to excessive heat. Protect adjacent areas from damage with tarpaulin or other durable materials.
- I. Coordinate the installation of insulation, waterproofing, and flashings, so that the waterproofing installation work is not exposed to the elements or exposed overnight.
- J. Provide cut-offs at end of each day's work. Seal edges as recommended by the roof system manufacturer. Remove cut-offs immediately before resuming work.

3.03 GENERAL

- A. Install Waterproofing System in accordance with approved submittals, manufacturer's installation procedures and the Contract Documents.
- B. After the deck is primed and until the protection layer is completed, limit traffic over the working area to essential personnel only.
- C. Protect heavily traveled areas (e.g., corridors for transporting media to the working areas) in a manner that does not damage the waterproofing.
- D. Protect lay down areas using protection fabric, ½-inch plywood or particle board over 1-inch sheets of insulation, or similar protective material approved by the membrane manufacturer.
- E. Protect all loose-laid fabrics from wind damage. Maintain overlaps, folds, turn-ups, and turn-downs by methods which will not damage the waterproofing system.

3.04 MEMBRANE INSTALLATION

- A. Surface Conditioner:
 1. Each day, prior to application of hot fluid applied membrane, apply surface conditioner, as a fine spray at a rate of approximately 1 gallon per 300-600 square feet.
 2. Allow to dry completely tack free.
 3. Do not allow primed surface to be contaminated with construction debris or dust barrier.
 4. Re-prime and allow to dry as may be required by job conditions.
- B. Application:
 1. Units of hot fluid applied membrane shall be melted in an approved double-jacket air or oil bath melter under continuous agitation until the material can be drawn free flowing and lump-free at the temperature recommended by manufacturer but not less than 350°F.
 2. The hot fluid applied membrane shall be applied at a rate to provide a continuous coating not less than 90 mils thick. Carry slab applications up all vertical wall surfaces a minimum of 8 inches.
- C. Reinforcement:
 1. Hot fluid applied membrane shall be applied in a width exceeding the reinforcement fabric roll width.

2. While hot fluid applied membrane is hot and tacky, install specified reinforcement layer, brooming in place from the side of the fabric.
 3. Side laps shall be a minimum of 2 inches with lap placement so that water flows over them and not against them.
 4. All laps shall be sealed with hot fluid applied membrane under lap. In no place shall reinforcement touch reinforcement. End laps shall be 7 inches.
 5. Carry reinforcement up all vertical wall surfaces a minimum of 6 inches.
- D. Top Coat:
1. After reinforcement fabric has been placed and broomed in, install second layer of hot fluid applied membrane, a minimum of 125 mils thick, at all points of the deck and walls.
 2. Carry slab applications up vertical wall surfaces a minimum of 8 inches.
 3. Do not leave any reinforcement fabric uncoated at end of day's work or in inclement weather.
 4. Complete installation of all plies each day including cap sheet.

3.05 FLASHING INSTALLATION

- A. Carry hot fluid applied membrane and reinforcement up all junctions of horizontal deck and vertical surfaces, all changes of plane and all cold joints and cracks as indicated on the drawings.
- B. At all walls, curbs, penetrations, drains, edges, changes of plane and stress conditions install neoprene flashing with hot fluid applied membrane under the reinforcement layer as shown on the drawings, extending to top of the flashing.
- C. Where applicable, mechanically fasten with 1/8 inch flat bar stock termination bar and fasteners approved for the substrate receiver.
- D. Overcoat the neoprene flashing with another 125 mil coat of hot fluid applied membrane. Application width of neoprene flashing sheet shall be a minimum 6 inches total, minimum 3 inches in any single direction, or greater if required by field conditions.

3.06 CRACK TREATMENT

- A. At all cracks and construction joints, apply hot fluid applied membrane, 125 mils thick, then center a 6 inch wide strip of neoprene flashing over the joint or crack and embed into the hot fluid applied membrane. Avoid air pockets.
- B. Allow assembly to cool.
- C. Reinforcement and flashing should be installed before the continuous, unbroken thick film of bitumen or reinforcement layer is applied over the entire roof surface and flashing areas in accordance with specification in Section 3.2.

3.07 EXPANSION JOINTS

- A. Over Expansion Joints, Up To 3 Inches In Width:
 1. Install neoprene flashing embedded into a 125 mil thick coating of hot fluid applied membrane.
 2. The sheet shall be looped into the joint 1-1/2 times the joint width at maximum opening and extend 8 inches onto the deck on each side of the joint.
 3. The sheet shall be covered and the loop filled solid and flush with hot fluid applied membrane.
 4. Install 2 inch foam rod and second sheet of neoprene flashing looped over the foam rod.
 5. Extend sheet 12 inches onto the deck on each side of the joint.
 6. Overcoat flange on each side with hot fluid applied membrane.

3.08 LEAK TEST

- A. Each contiguous flat deck area shall be water tested with 2 inches of standing water for a 24-hour period. Provisions for overflow in event of rain shall be provided. Any area not passing Water Test shall be repaired and retested until watertight. Water Test shall be witnessed and approved by Architect and Manufacturer providing the system warranty.

- B. Test Waterproofing System for leaks using Electronic Field Vector Mapping (EFVM) per Division 7 Section "Membrane Integrity Test Systems". Submit written reports of each test to the Architect.

3.09 PROTECTION COURSE

- A. After leak test is completed, using hot fluid applied membrane as adhesive and starting at the low points, apply protection course lapping the side laps a minimum of 2 inches in direction of drainage gradient so water flows over and not against laps.

3.10 INSULATION

- A. After the membrane, flashing and other associated work is completed, leak-tested and approved by the Manufacturer, proceed with the installation of the extruded polystyrene insulation.
- B. Place insulation panels directly on the protection course and root barrier with open channel sides down.
- C. Stagger end joints. Tightly abut all boards.
- D. The maximum acceptable opening between boards is 1/8 inch. Provide temporary ballast as required to prevent wind damage.

3.11 CURBS, DRAINS AND PAVER INSTALLATION

- A. Prefabricated Drainage Course: Install drainage course horizontally and vertically against wall and wrap filter fabric around perimeter drainage pipe as recommended by the manufacturer.
- B. Drainage Pipe:
 - 1. Connect drain pipe to new scupper drains located in new concrete trench and connected to storm water piping.
 - 2. Join pipes and fitting for soiltight joints.
 - 3. Install according to ASTM D 2321 and manufacturer's written instructions
- C. Overflow Drains:
 - 1. Core overflow drain through existing concrete wall.
 - 2. Overflow drains shall be centered in new stone scuppers.
 - 3. Install drain cover over through wall scupper drain.
- D. Drainage Accessories: Place drain access chambers, scupper access chambers, drainage conduit and other drainage accessories per drawings. Ensure unobstructed flow to roof drains. Secure until permanently ballasted in-place.
- E. Pavers:
 - 1. Where cutting is required, it shall be done with a high speed masonry saw producing clean sharp edges.
 - 2. Paver units shall fit to within 1/4 inch of all projections and walls or as shown on drawings. Protect units in place from soiling or damage during the construction process.
 - 3. Replace any units damaged prior to completion. Provide shims as required to align paver surface with existing elements and other pavers.
 - 4. Tolerances:
 - a. Install pavers to vary not more than 1/16 inch in elevation between adjacent pavers and not more than 1/8 inch from surface plane elevation of individual paver.
 - b. Maintain tolerances of paving installation within 1/4 inch in 10 feet of surface plane in any direction.

3.12 DAILY WATERSTOP/TIE-INS

- A. Remove sand, gravel and debris from top ply of waterproofing along termination.
- B. As early as possible during the course of each working day, the Contractor shall make provisions for overnight tie-ins, if required. The tie-ins shall be completed as follows:
 - 1. Width: Eighteen (18) inches.
 - 2. Adhere eighteen (18) inch wide neoprene sheets from exposed deck to existing roofing with a continuous 1/16 inch thick application of mastic.

3. Install "deadman" insulation filler at insulation staggers.
 4. Extend waterproofing system at least twelve (12) inches onto prepared area of adjacent adjacent waterproofing.
- C. At beginning of next day's work remove temporary connection including "deadman" insulation fillers.

3.13 CLEANING

- A. Remove equipment, trash, debris and any excess material from the jobsite.
- B. Repair damage and remove any stains caused by Work of this Section.

END OF SECTION

SECTION 07 7273
MEMBRANE INTEGRITY TEST SYSTEMS

PART 1 GENERAL**1.01 SUMMARY**

- A. Section Includes: Roofing membrane leak detection system, including the following:
 - 1. EFVM conductor cable and accessories.
 - 2. Leak detection testing of installed membrane.
- B. Related Sections
 - 1. Division 01 Sections "Quality Requirements" for general requirements for testing and inspection.
 - 2. Division 07 Fluid Applied Waterproofing for coordination and quality assurance provisions.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Integrate layout of membrane integrity test system with rooftop structures and equipment and roof penetrations for building utilities and services.
 - 2. Coordinate membrane integrity test system with work of other Sections.
- B. Preinstallation Meetings: Conduct preinstallation meeting in coordination with the roofing preinstallation conference to verify project requirements, manufacturer's installation instructions, and coordination with installation requirements for membrane, vegetative roof assemblies and pavers.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product required for a complete membrane integrity test system.
- B. Shop Drawings: Showing the following.
 - 1. Diagram of proposed system showing complete test area, rooftop structures and equipment, and roof penetrations for building utilities and services. Show location of the EFVM integrity test conductor cable and EFVM connection boxes.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualifications: For manufacturer and installing and testing firm.
- B. Field Quality Control Reports: Digital drawings, digital photographic documentation, and written report detailing location and nature of membrane breaches, defects found, and verification of corrective actions taken.

1.05 CLOSEOUT SUBMITTALS

- A. Record Drawings: Digital drawings, photographic documentation, and written report detailing installed location of components of membrane integrity test system.

1.06 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer of membrane integrity test systems with minimum ten year record of satisfactory manufacturing and support of installed systems comparable to system required as Work of this Section.
- B. Installing and Testing Firm Qualifications: Approved or certified by membrane integrity test system manufacturer, with minimum five year record of satisfactory experience.

1.07 CORRECTION PERIOD SERVICES

- A. Perform field quality control testing at end of one year period for correction of Work.
 - 1. Repair defects in membrane and retest to demonstrate membrane integrity.
 - 2. Submit test and retest reports.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide membrane integrity test system and service by International Leak Detection (ILD), (866)282-LEAK, ((866)282-5325), info@leak-detection.com <mailto:info@leak-detection.com> or comparable system and service from a single manufacturer approved by Architect prior to bidding, with the following characteristics.

2.02 SYSTEM DESCRIPTION

- A. Membrane integrity test System: Conductor cable, placed on top of membrane, delivering direct current tension to membrane surface, enabling inspection and isolation of points of moisture infiltration through membrane to conductive substrate under membrane.

2.03 MATERIALS

- A. Conductor Cable: Nine strands of 0.06 inch (1.5 mm) diameter highly-conductive stainless steel wire interwoven with braided polyethylene strands, placed on weather side of membrane:
 - 1. Basis of Design Product: International Leak Detection, Vector-9 Conductor Wire.
- B. Connection Box: Weatherproof, corrosion-resistant electrical enclosure with permanent terminal connections for connecting diagnostic and testing equipment, NEMA 4X with the following characteristics:
 - 1. Permanent connections for attachment of diagnostic and testing equipment without opening contact box.
 - 2. Weatherproof cover to seal terminals when membrane integrity test system is not in use.
 - 3. Hardware, brackets, and fittings required to permanently mount contact box to building structure.
 - 4. Basis of Design Product: International Leak Detection, EFVM Connection Box.

2.04 ACCESSORIES

- A. Provide corrosion-resistant fasteners and hardware, electrical terminations, sealants, and other items required to provide complete installation.
- B. Lap Joint Tape: Provide self adhesive aluminum tape, minimum 2 inch (50 mm) wide.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Examination: Verify that substrate complies with roofing manufacturer's and integrity test manufacturer's requirements. Proceed with installation once substrate complies with requirements.
- B. Conductor Wire: Install conductor wire on top of membrane at spacing and layout indicated on approved shop drawings.
 - 1. Secure conductor wire using method recommended by manufacturer.
- C. Installation Testing: Verify continuity and functioning of conductor wire upon completion of installation.

3.02 FIELD QUALITY CONTROL

- A. Engage Installation and Testing Firm to perform membrane integrity testing. Perform testing in accordance with membrane integrity test system manufacturer's recommendations.
 - 1. Perform testing following adequate precipitation or wet membrane and membrane overburden adequately to enable accurate testing.
 - 2. Identify locations of membrane leaks; record locations and document with photographs. Submit test reports to Architect.
 - 3. Confirm completed repair of identified leaks and retest to verify water tightness of membrane.

- B. Initial Membrane Test: Perform initial membrane integrity test upon completion of membrane and integrity test system installation and prior to installation of above-membrane components.
- C. Assembly Test: Repeat membrane integrity test following installation of above-membrane components.
- D. Final Testing: Repeat membrane integrity test if roof assembly is exposed to traffic or construction operations prior to Substantial Completion.

3.03 PROTECTION

- A. Protect tested membrane according to requirements of Division 07 roofing section.

END OF SECTION

SECTION 07 7273
MEMBRANE INTEGRITY TEST SYSTEMS

PART 1 GENERAL**1.01 SUMMARY**

- A. Section Includes: Roofing membrane leak detection system, including the following:
 - 1. EFVM conductor cable and accessories.
 - 2. Leak detection testing of installed membrane.
- B. Related Sections
 - 1. Division 01 Sections "Quality Requirements" for general requirements for testing and inspection.
 - 2. Division 07 Fluid Applied Waterproofing for coordination and quality assurance provisions.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Integrate layout of membrane integrity test system with rooftop structures and equipment and roof penetrations for building utilities and services.
 - 2. Coordinate membrane integrity test system with work of other Sections.
- B. Preinstallation Meetings: Conduct preinstallation meeting in coordination with the roofing preinstallation conference to verify project requirements, manufacturer's installation instructions, and coordination with installation requirements for membrane, vegetative roof assemblies and pavers.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product required for a complete membrane integrity test system.
- B. Shop Drawings: Showing the following.
 - 1. Diagram of proposed system showing complete test area, rooftop structures and equipment, and roof penetrations for building utilities and services. Show location of the EFVM integrity test conductor cable and EFVM connection boxes.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualifications: For manufacturer and installing and testing firm.
- B. Field Quality Control Reports: Digital drawings, digital photographic documentation, and written report detailing location and nature of membrane breaches, defects found, and verification of corrective actions taken.

1.05 CLOSEOUT SUBMITTALS

- A. Record Drawings: Digital drawings, photographic documentation, and written report detailing installed location of components of membrane integrity test system.

1.06 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer of membrane integrity test systems with minimum ten year record of satisfactory manufacturing and support of installed systems comparable to system required as Work of this Section.
- B. Installing and Testing Firm Qualifications: Approved or certified by membrane integrity test system manufacturer, with minimum five year record of satisfactory experience.

1.07 CORRECTION PERIOD SERVICES

- A. Perform field quality control testing at end of one year period for correction of Work.
 - 1. Repair defects in membrane and retest to demonstrate membrane integrity.
 - 2. Submit test and retest reports.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide membrane integrity test system and service by International Leak Detection (ILD), (866)282-LEAK, ((866)282-5325), info@leak-detection.com <mailto:info@leak-detection.com> or comparable system and service from a single manufacturer approved by Architect prior to bidding, with the following characteristics.

2.02 SYSTEM DESCRIPTION

- A. Membrane integrity test System: Conductor cable, placed on top of membrane, delivering direct current tension to membrane surface, enabling inspection and isolation of points of moisture infiltration through membrane to conductive substrate under membrane.

2.03 MATERIALS

- A. Conductor Cable: Nine strands of 0.06 inch (1.5 mm) diameter highly-conductive stainless steel wire interwoven with braided polyethylene strands, placed on weather side of membrane:
 - 1. Basis of Design Product: International Leak Detection, Vector-9 Conductor Wire.
- B. Connection Box: Weatherproof, corrosion-resistant electrical enclosure with permanent terminal connections for connecting diagnostic and testing equipment, NEMA 4X with the following characteristics:
 - 1. Permanent connections for attachment of diagnostic and testing equipment without opening contact box.
 - 2. Weatherproof cover to seal terminals when membrane integrity test system is not in use.
 - 3. Hardware, brackets, and fittings required to permanently mount contact box to building structure.
 - 4. Basis of Design Product: International Leak Detection, EFVM Connection Box.

2.04 ACCESSORIES

- A. Provide corrosion-resistant fasteners and hardware, electrical terminations, sealants, and other items required to provide complete installation.
- B. Lap Joint Tape: Provide self adhesive aluminum tape, minimum 2 inch (50 mm) wide.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Examination: Verify that substrate complies with roofing manufacturer's and integrity test manufacturer's requirements. Proceed with installation once substrate complies with requirements.
- B. Conductor Wire: Install conductor wire on top of membrane at spacing and layout indicated on approved shop drawings.
 - 1. Secure conductor wire using method recommended by manufacturer.
- C. Installation Testing: Verify continuity and functioning of conductor wire upon completion of installation.

3.02 FIELD QUALITY CONTROL

- A. Engage Installation and Testing Firm to perform membrane integrity testing. Perform testing in accordance with membrane integrity test system manufacturer's recommendations.
 - 1. Perform testing following adequate precipitation or wet membrane and membrane overburden adequately to enable accurate testing.
 - 2. Identify locations of membrane leaks; record locations and document with photographs. Submit test reports to Architect.
 - 3. Confirm completed repair of identified leaks and retest to verify water tightness of membrane.

- B. Initial Membrane Test: Perform initial membrane integrity test upon completion of membrane and integrity test system installation and prior to installation of above-membrane components.
- C. Assembly Test: Repeat membrane integrity test following installation of above-membrane components.
- D. Final Testing: Repeat membrane integrity test if roof assembly is exposed to traffic or construction operations prior to Substantial Completion.

3.03 PROTECTION

- A. Protect tested membrane according to requirements of Division 07 roofing section.

END OF SECTION

SECTION 26 5500
EXTERIOR LIGHT FIXTURES

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Procurement and installation of exterior light fixtures.
- B. The Contractor shall be responsible for installing a fully functional light fixture or track for each symbol shown on the electrical lighting drawings or inferable therefrom.

1.02 SUBMITTALS

- A. See Section 01 3300 - Submittal Requirements, for submittal procedures.
- B. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of lighting fixture including dimensions.
 - 2. Ballast or driver.
 - 3. Energy-efficiency data.
 - 4. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
 - 5. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.
 - a. Testing Agency Certified Data: For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.
 - b. Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Product.

1.03 COORDINATION

- A. Coordinate layout and installation of light fixtures and bases with other construction, including landscaping, plantings, and conduit runs.

1.04 LISTING & LABELING

- A. All light fixtures shall listed and labeled for their intended use by a Nationally Recognized Testing Laboratory.
- B. The terms "listed" and "labeled" are used as defined in NEC, Article 100.
- C. "Nationally Recognized Testing Laboratory" is defined in OSHA Regulation 19010.7.

1.05 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910, complying with the IESNA Lighting Measurements Testing & Calculation Guides.

- C. 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.
- D. Comply with NFPA 70.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Metal Parts: Free of burrs and sharp corners and edges.
- B. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- D. Diffusers and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
 - b. UV stabilized.
 - 2. Glass: Annealed crystal glass unless otherwise indicated.
- E. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
- F. Fixture housings shall be sealed and gasketed to prevent water and dust penetration, and have a minimum IP66 rating.

2.02 LED LIGHT FIXTURES

- A. LED lamp source shall not flicker, either while in steady state, or while actively dimming up or down.
- B. Manufacture's submitted photometry shall adhere to LM-79-08.
- C. IESNA LM-80-08 shall be the Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- D. Efficacy shall be 30 Lumens per Watt or greater.
- E. CRI Shall be 80 or greater for white LEDs.
- F. LEDs shall be measured via photopic lumens.
- G. Rated Life is when source reaches 70% of initial output (known as L70).
- H. Binning shall ensure a CCT tolerance of $\pm 175\text{K}$.

- I. All LEDs must dim to 10 percent of maximum lumen output with no visible stepping.
- J. Power supplies, transformers, drivers or other electronic components shall not emit audible hum, buzzing, or other electrical noise.

2.03 EXTERIOR LIGHT FIXTURE SCHEDULE

EXTERIOR LIGHT FIXTURE SCHEDULE

TYPE	MANUFACTURER	CATALOGUE NO.	LAMP	WATTS	VOLTS	QTY.	COMMENT
S1	BEGA	9002LED-WHT + 1308HR-WHT POLE	INTEGRAL LED	39	UNV	8	Mount fixture with 15 degree up-tilt. Concrete footer required, refer to architectural details.
S2	BEGA	7740LED-WHT + 895A ANCHORAGE	INTEGRAL LED	18.2	UNV	17	Concrete footer required, refer to architectural details.
S3	B-K LIGHTING	AR-LED-TR-x37-FL-BLP-12-11-F-D11-MT + PP-J-18-B-BLP MOUNT	INTEGRAL LED	11	UNV	64	Small concrete footer required, refer to manufacturer's detail.
S4	NOT USED						
S5	NOT USED						
S6	ACCLAIM LIGHTING	DFB.121.AEBE + DYNAFGS	INTEGRAL LED	50	277	5	Verify voltage. Mount to exterior 4" cast aluminum j. box in small concrete footer, refer to architectural details.
S7	ACCLAIM LIGHTING	DFB.111.ABBE + DYNAFGS	INTEGRAL LED	50	277	1	Verify voltage. Mount to exterior 4" cast aluminum j. box in small concrete footer, refer to architectural details.

2.04 EXTERIOR LIGHT FIXTURE CUT SHEETS

Housing: Die-cast aluminum housing and slip fitter. Slip fits 3" O.D. pole top, secures to pole with six stainless steel set screws. Die-cast aluminum knuckle allows for 0° or 15° tilt adjustment from horizontal. Die castings are marine grade, copper free (≤ 0.3% copper content) A360.0 aluminum alloy.

Enclosure: Faceplate is constructed of die-cast aluminum and is hinged for easy maintenance. The faceplate is secured to the housing with captive stainless steel fasteners. Tempered clear glass, 1/4" thick. Reflector of pure anodized aluminum. Fully shielded to comply with LEED zones 1 and higher. Fully gasketed with a molded silicone gasket.

Electrical: 39W LED luminaire, 41 total system watts, -30° C start temperature. Integral 120V through 277V electronic LED driver, 0-10V dimming. Standard LED color temperature is 4000K with a >80 CRI. Available in 3000K (>80 CRI); add suffix K3 to order.

Note: LEDs supplied with luminaire. Due to the dynamic nature of LED technology, LED luminaire data on this sheet is subject to change at the discretion of BEGA-US. For the most current technical data, please refer to www.bega-us.com.

Finish: All BEGA standard finishes are polyester powder coat with minimum 3 mil thickness. These luminaires are available in four standard BEGA colors: Black (BLK); White (WHT); Bronze (BRZ); Silver (SLV). To specify, add appropriate suffix to catalog number. Custom colors supplied on special order.

UL listed for US and Canadian Standards, suitable for wet locations. Protection class: IP66.

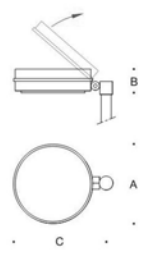
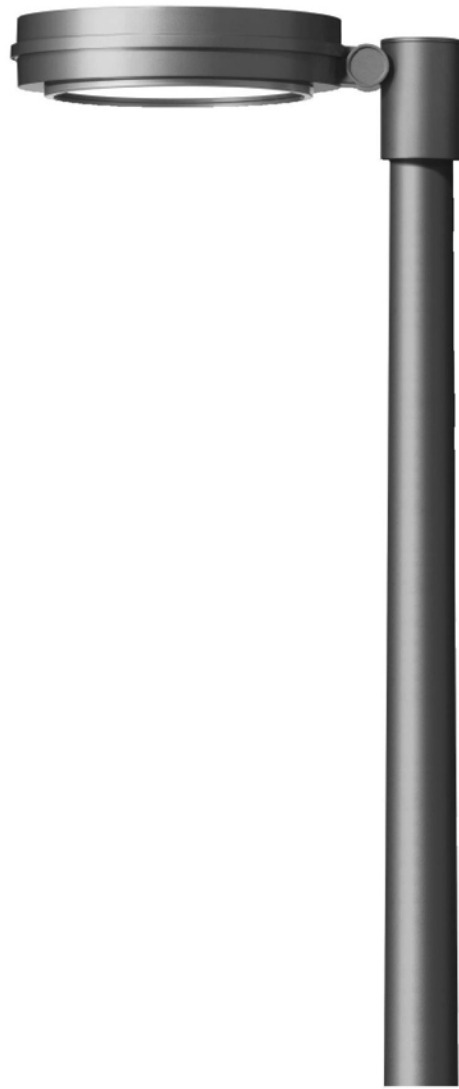
Weight: 18.2 lbs.

EPA: .53 ft²

Luminaire Lumens: 1989

Tested in accordance with LM-79-08

Type:
 BEGA Product:
 Project:
 Voltage:
 Color:
 Options:
 Modified:



Single pole-top luminaires

	Lamp	LEED	A	B	C
9002 LED	39W LED	LZ-1	16½	4	20

Type - II distribution

Recommended for use with 14' to 20' poles.

BEGA-US 1000 BEGA Way, Carpinteria, CA 93013 (805) 684-0533 FAX (805) 566-9474 www.bega-us.com

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1308HR 3" - 5" Tapered round hinged pole

Wall thickness: .156"

Shaft: Extruded from all new seamless 6063 aluminum alloy tubing, heat treated to a T-6 condition.

Anchor base: Round cast aluminum A356 alloy, heat treated to a T-6 condition. Anchor base and shaft continuously welded at the outside top and inside bottom of the anchor base casting. Pole base to be round hinged two piece casting. Hinge Pole shaft to be welded to upper base casting which is secured to lower base casting by three (3) stainless steel bolts. Bolts to be fastened to cast-in stainless threaded inserts in lower casting. Cast round two piece base cover supplied with pole.

Anchor bolts: Four (4) 3/4" x 17" galvanized steel anchor bolts supplied with double nuts and flat washers. Maximum bolt projection 3 1/2". For luminaires requiring threaded inserts and pole cap -specify: 1D (single); 2D (2@ 180°); 3D (3 @ 120°).

GCO or GFI: Standard GCO/GFI location is opposite the hinge. Height above base for ballast in luminaires is 18". For single luminaires with a pole base mounted (PBM) ballast the minimum height is 24" and 42" minimum for double PBM luminaires.

Weight: 62.0 lbs.

Disclaimer

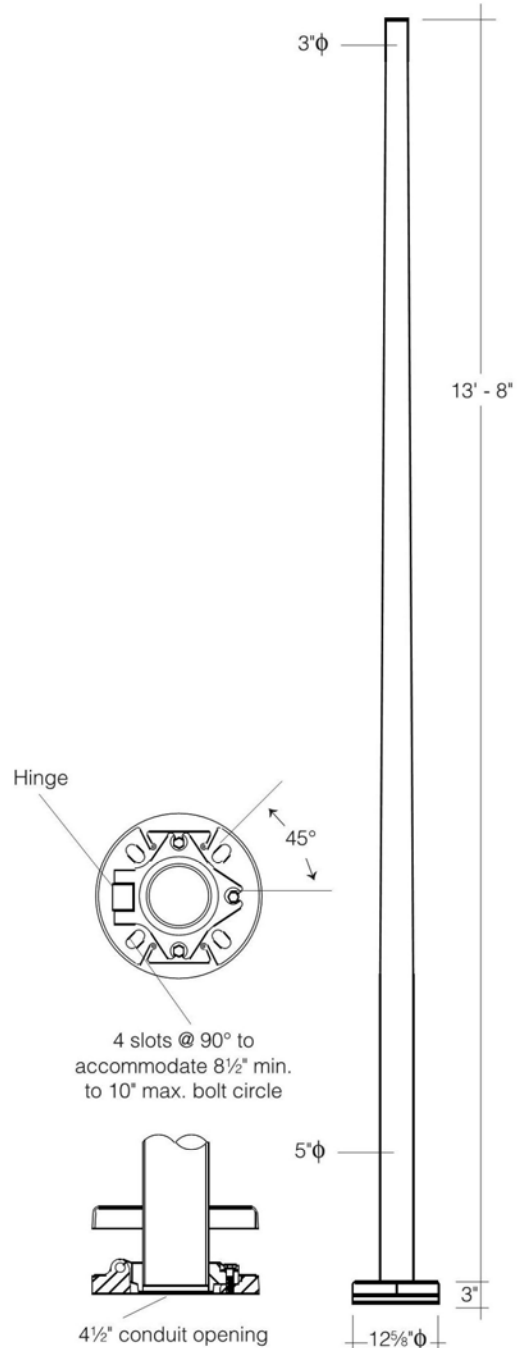
BEGA-US warrants the specific anchor bolts and pole combination according to the product number(s) and description(s) indicated on this submittal sheet. Structural changes to the pole requested by the customer, including changes to pole length, may affect the compatibility of the anchor bolts and corresponding poles. BEGA-US is not responsible for the incompatibility of the anchor bolts and poles resulting from such structural changes without review by the BEGA-US engineering department. This includes, but is not limited to, any labor charges, charges for replacement materials and shipping.

Pole wind load rating:
 MPH: 70 80 90 100 120
 EPA: 15.6 11.5 8.7 6.7 4.6

Note: Data above assumes grade level installation and a maximum luminaire weight of 50 lbs.

BEGA-US 1000 BEGA Way, Carpinteria, CA 93013 [P] 805-684-0533 [F] 805-684-6682

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Post construction: One piece extruded aluminum, with a one piece aluminum top housing and base, internally welded into an assembly. Die castings are marine grade, copper free ($\leq 0.3\%$ copper content) A360.0 aluminum alloy.

Enclosure: Heavy walled, die-cast aluminum cap. Clear $\frac{1}{4}$ " thick borosilicate glass with pure anodized aluminum cone reflector. Fully gasketed using high temperature silicone rubber O-ring gaskets.

Electrical: 18.2W LED luminaire, 24.5 total system watts, -20°C start temperature. Integral 120V through 277V electronic LED driver, dimming not available. LED module(s) are available from factory for easy replacement. Standard LED color temperature is 3000K with a >80 CRI. Available in 4000K (>80 CRI); add suffix K4 to order.

Note: Due to the dynamic nature of LED technology, LED luminaire data on this sheet is subject to change at the discretion of BEGA-US. For the most current technical data, please refer to www.bega-us.com.

Anchor base: Heavy cast aluminum, slotted for precise alignment. Mounts to BEGA #895A anchorage kit (supplied).

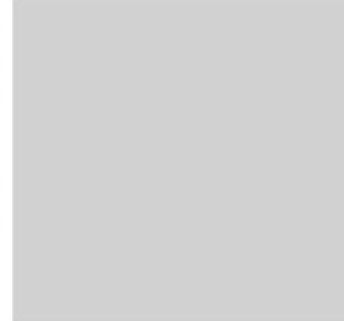
Finish: All BEGA standard finishes are polyester powder coat with minimum 3 mil thickness. Available in four standard BEGA colors: Black (BLK); White (WHT); Bronze (BRZ); Silver (SLV). To specify, add appropriate suffix to catalog number. Custom colors supplied on special order.

UL listed for US and Canadian Standards, suitable for wet locations. Protection class IP65.

Luminaire Lumens: 881

Tested in accordance with LM-79-08

Type:
 BEGA Product:
 Project:
 Voltage:
 Color:
 Options:
 Modified:



	Lamp	A	B	Anchorage
7740LED	18.2W LED	6½	8½	895A

BEGA-US 1000 BEGA Way, Carpinteria, CA 93013 (805) 684-0533 FAX (805) 566-9474 www.bega-us.com
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BEGA Installation and Technical Information

Anchorage

Tools Required:

- Phillips medium screwdriver
- Medium slotted screwdriver
- Adjustable wrench

For BEGA anchorage kits:

- 894A, 895A, 896A, 896B, 902A



UL listed, suitable for wet locations.

The above anchorage kits are supplied with BEGA fixtures.

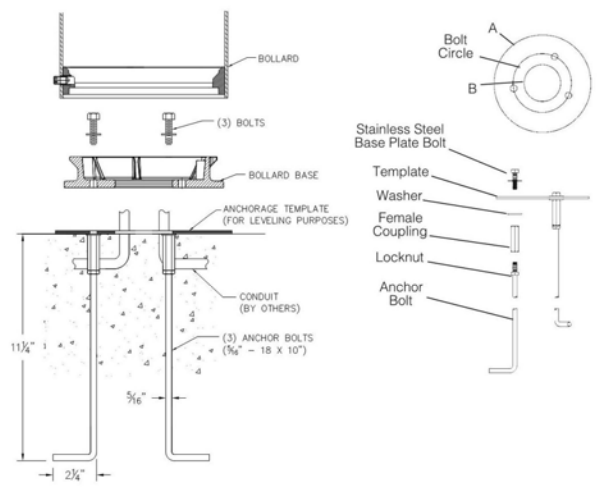
Notice to Installer:

1. Fixture may be damaged if connected to conduit systems that contain water - Article 300-5G of the National Electric Code requires that "Conduits or raceways through which moisture may contact energized live parts shall be sealed or plugged at either or both ends."
2. Anchorage kit must be installed in concrete pad/foundation.
3. It is recommended that when installing in planting areas the bollard base be slightly elevated to avoid prolonged submerging during heavy rains.
4. Wet location listing does not imply suitability for exposure to standing water for long periods of time.

Anchorage installation:

1. Provide means to bring supply wiring to the bollard in accordance with local code. See table for size of template conduit hole for conduit entry.
 2. Assemble anchorage kit. Unscrew the (3) hex bolts from the female couplers. Remove each hex bolt and washer. Align each anchor bolt with the hole in the template. Attach each anchor bolt to the template by replacing the washer and hex bolt and tightening.
 3. Determine the finished grade for the application. Use leveling hardware to adjust template to desired finished height after pouring.
 4. Install anchorage kit using either method:
 - A. Attach template to forming or cross bracing using the (2) nail holes provided in the template. Level template properly. Pour concrete.
 - B. Insert anchorage assembly into poured concrete. Concrete must be vibrated to ensure proper anchorage setting. Level template properly.
 5. Remove (3) hex bolts and washers once anchorage is set.
 6. Remove template. Smooth concrete pad as required.
- NOTE:** Allow adequate time for concrete to cure properly.
7. Remove base plate from bollard by loosening bolt(s) or set screw(s) near bollard base.
 8. Align base plate holes with anchorage holes.
 9. Bolt the base plate to the anchorage kit using the (3) hex bolts and washers.
 10. Make supply wiring connections to wire leads from ballast inside the fixture
 MAIN VOLTAGE SUPPLY WIRE TO BLACK BALLAST WIRE;
 NEUTRAL (COMMON) SUPPLY WIRE TO WHITE BALLAST WIRE;
 GREEN GROUND WIRE TO GREEN BALLAST WIRE.
 11. Place the bollard over the base plate so that the (3) notches in the base plate align with the top. Lock fixture into place by turning bollard 1/4" turn.
 12. Secure the bollard by tightening the bolt(s) or set screw(s) provided.

	Bolt Circle	A	B
894A:	2 3/4	4 1/4	1
895A:	3 15/16	6 5/8	2 3/8
896A:	5 3/16	9 1/8	3
896B:	5 3/16	9 1/8	3
902A:	5 3/16	7	2 3/8

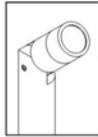


NOTE: Refer to specific bollard installation sheet for proper anchor bolt orientation, if required.

Accessories

Please refer to the appropriate accessory installation sheet for further instruction when applicable.

Replacement Parts



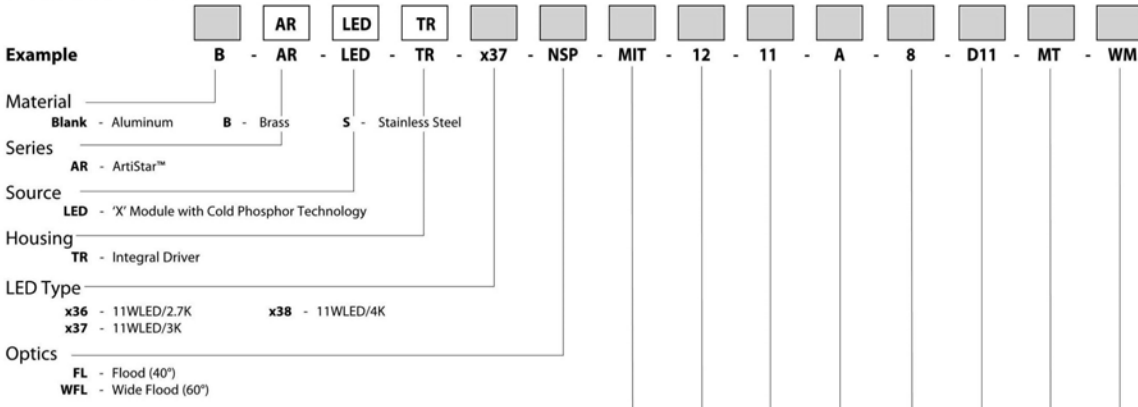
ArtiStar™
BKSSL
 Integral Driver



FLOODLIGHT

PROJECT:	
TYPE:	
CATALOG NUMBER:	
SOURCE:	
NOTES:	

CATALOG NUMBER LOGIC



Aluminum Finish			Brass Finish		Premium Finish		
Powder Coat Color	Satin	Wrinkle	Machined	MAC	ABP	CMG	RMG
Bronze	BZP	BZW	Polished	POL	AMG	CRI	SDS
Black	BLP	BLW	Mitique™	MIT	AQW	CRM	SMG
White (Gloss)	WHP	WHW	Stainless Finish		BCM	HUG	TXF
Aluminum	SAP	—	Machined	MAC	BGE	MDS	WCP
Verde	—	VER	Polished	POL	BPP	NBP	WIR
			Brushed	BRU	CAP	OCP	<i>Also available in RAL Finishes See submittal SUB-1439-00</i>

Lens Type: 12 - Soft Focus Lens, 13 - Rectilinear Lens

Shielding: 11 - Honeycomb Baffle

Cap Style: A - 45°, B - 90°, C - Flush, D - 45° less Weep Hole (Interior Use Only), E - 90° less Weep Hole (Interior Use Only), F - 90° with Flush Lens

Base Height: 8 - 8" with Anchor Base, 14 - 14" with Anchor Base, 20 - 20" with Anchor Base, 26 - 26" with Anchor Base

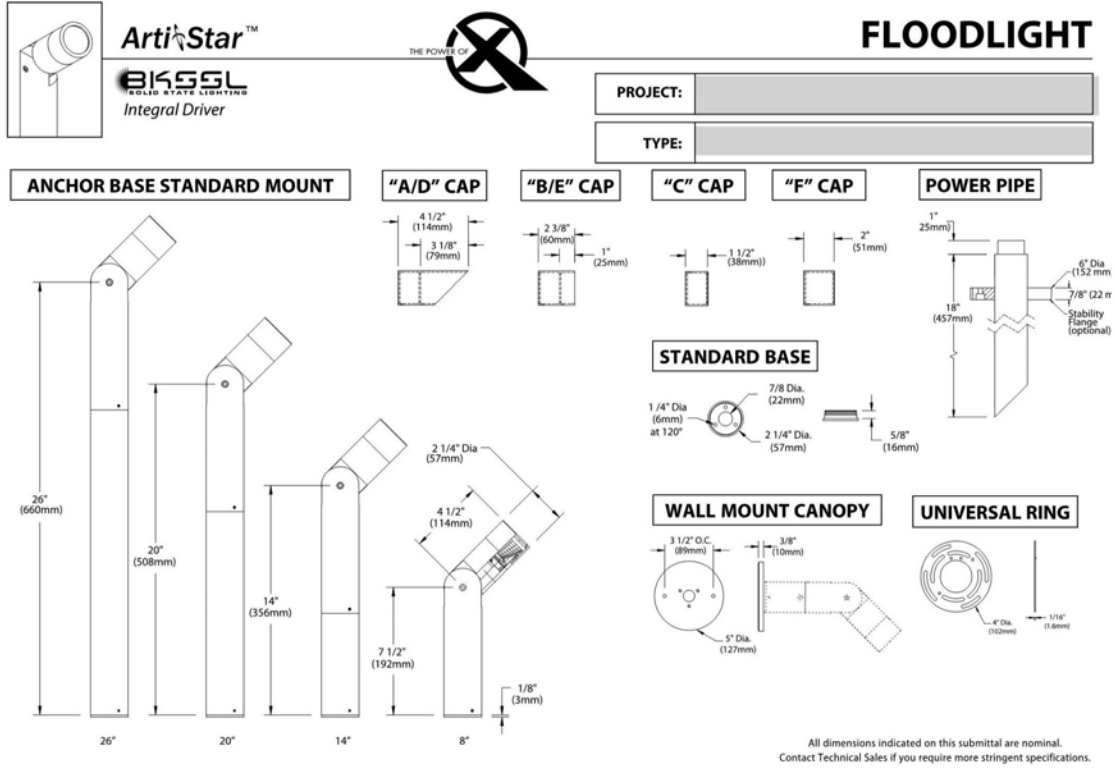
Driver Type: D11INC - 11W Dimming Driver (for use with Incandescent Dimmer)*
*120V only

Input Voltage: MT - 120-277 VAC Input

Option: PP - Power Pipe™ option with 18" Stake, SF - Stability Flange (for use with Power Pipe™), WM - Wall or ceiling Mount with 5" dia. canopy**
** Base height limited to 8" max. with brass and stainless steel fixtures

LM79 DATA					L70 DATA		OPTICAL DATA	
BK No.	CCT (Typ.)	CRI (Ra. Typ.)	Color Consistency	Input Watts (Typ.)	Minimum Rated Life (hrs.) 70% of initial lumens (L70)		Beam Type	Angle
x36	2700K	>80	±40K	11.3	50,000		Flood	40°
x37	3000K	>80	±50K	11.3	50,000		Wide Flood	60°
x38	4000K	>80	±70K	11.3	50,000			

B-K LIGHTING	40429 Brickyard Drive • Madera, CA 93636 • USA 559.438.5800 • FAX 559.438.5900 www.bklighting.com • info@bklighting.com	SUBMITTAL DATE 06-25-14	DRAWING NUMBER SUB-2125-00
	<small>THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF B-K LIGHTING, INC. AND ITS RECEIPT OR POSSESSION DOES NOT CONVEY ANY RIGHTS TO REPRODUCE, DISCLOSE ITS CONTENTS, OR TO MANUFACTURE, USE OR SELL ANYTHING IT MAY DESCRIBE. REPRODUCTION, DISCLOSURE OR USE WITHOUT SPECIFIC WRITTEN AUTHORIZATION OF B-K LIGHTING, INC. IS STRICTLY FORBIDDEN.</small>		



SPECIFICATIONS

GreenSource Initiative™
Metal and packaging components are made from recycled materials. Manufactured using renewable solar energy, produced onsite. Returnable to manufacturer at end of life to ensure cradle-to-cradle handling. Packaging contains no chlorofluorocarbons (CFC's). Use of this product may qualify for GreenSource efficacy and recycling rebate(s). Consult www.bklighting.com/greensource for program requirements.

Materials
Furnished in Copper-Free Aluminum (Type 6061-T6), Brass (Type 360) or Stainless Steel (Type 304).

Body
Fully machined from solid billet. Unibody design provides enclosed, water-proof wireway and integral heat sink for maximum component life. Integral knuckle for maximum mechanical strength. High temperature, silicone 'O' Ring provides water-tight seal.

Knuckle
'Aim and Lock' knuckle is comprised of two components. The first is integral to the body and features an interior, machined taper. The second is machined from solid billet and features a second, reverse angle taper. The resultant mechanical taper-lock allows a full 180° vertical adjustment without the use of serrated teeth, which inherently limit aiming. High temperature, silicone 'O' Ring provides water-tight seal and compressive resistance to maintain fixture position. Design withstands 73 lb. static load prior to movement to ensure decades of optical alignment. Biaxial source control with 360° horizontal rotation in addition to vertical adjustment.

Cap
Fully machined. Accommodates [1] lens or louver media. Choose from 45° cutoff ('A' or 'D'), 1" deep bezel with 90° cutoff ('B' or 'E'), flush lens ('C'), or 1" deep cutoff with flush mounted lens ('F') cap styles. 'A' and 'B' caps include weep-hole for water and debris drainage. 'D' and 'E' caps exclude weep-hole and are for interior use only.

Lens
Shock resistant, tempered, glass lens is factory adhered to fixture cap and provides hermetically sealed optical compartment. Specify soft focus (#12) or rectilinear (#13) lens.

BKSSL™
Integrated solid state system with 'x' technology is scalable for field upgrade. Modular design with electrical quick disconnects permit field maintenance.

LM-80 certified. Minimum 50,000 hour rated life at 70% of initial lumens (L70). BKSSL technology provides long life, significant energy reduction and exceptional thermal management.

Color Management
Corrected cold phosphor technology delivers near-perfect natural white light. Long term phosphor maintenance over product life. Exact color point conformity exceeds ANSI C78.377 standard. Provides uniform beam with no color variation over angle. Module exceeds 80 CRI (RA>80, R9>16).

Installation
Available for installation in three distinct mounting conditions:

Anchor Base (Standard)
Machined anchor base with 7/8" dia. slip conduit hole and [3] 3/16" dia. anchor bolt holes (hardware by others).

Power Pipe™ (Optional)
Provides a clean transition from wiring system to fixture. Schedule 80, 18" PVC housing for direct burial into soil or concrete. Machined 2-1/4" dia. cap for fixture mounting. Stainless steel hardware. Optional 6" diameter, molded stability flange, which simplifies installation and projects into substrate to reinforce housing stability.

Wall Mount Canopy (Optional)
Optional 5" dia. machined canopy permits mounting to junction box (gasket by others). 8" maximum base height for canopy-mounted brass or stainless steel fixture.

Driver
[1] 700mA, Class A, constant current driver. 120-277VAC (nominal) primary input voltage. 50/60Hz. >0.94 Power Factor, <15.0A in-rush current, 0.25A input current, ≤20%THD (nominal at 120VAC full load). Output over-voltage, over-current, and short circuit protection with auto recovery. EMC: FCC47CFR Part 15 Class B compliant.

Dimming driver for use with standard incandescent dimmers. 10-100% range.

Optics
Interchangeable OPTIKIT™ modules permit field changes to optical distribution.

Wiring
Teflon® coated, 18AWG, 600V, 250° C rated and certified to UL 1659 standard.

Hardware
Tamper-resistant, stainless steel hardware. Knuckle vertical aiming screw is additionally black oxide treated for additional corrosion resistance.

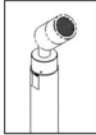
Finish
StarGuard®, our exclusive RoHS compliant, 15 stage chromate-free process cleans and conversion coats aluminum components prior to application of Class 'A' TGIC polyester powder coating. Brass components are available in powder coat or handcrafted metal finish. Stainless steel components are available in handcrafted metal finish. (Brushed finish for interior use only).

Warranty
5 year limited warranty.

Certification and Listing
ITL tested to IESNA LM-79. Lighting Facts Registration per USDOE (www.lightingfacts.com). ETL Listed to ANSI/UL Standard 1598 and UL Standard 8750. Certified to CAN/CSA Standard C22.2 No. 250. RoHS compliant. Suitable for indoor or outdoor use. Suitable for use in wet locations. Suitable for installation within 4' of the ground. IP66 Rated. Made in USA.



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Specify Fixture Separately

POWER PIPE™ SYSTEM

PROJECT:	
TYPE:	
CATALOG NUMBER:	
LAMP(S):	
NOTES:	

CATALOG NUMBER LOGIC

Example **B** - **PP** - **J** - **18** - **T-L75E** - **C** - **MIT** - **120** - **SF**

Material
 Blank - Aluminum
B - Brass
S - Stainless

Series
 PP - Power Pipe™ System

Type
S - Stake
J - Junction Box
A - Adjustable 18" Stem* (requires 18" Power Pipe)
*Not available with Transformer Housing

Power Pipe Length
12 - 12" Power Pipe Length
18 - 18" Power Pipe Length

Transformer Housing
 Blank - Less Transformer
T-L75E - Transformer housing with 75VA Electronic Transformer*
T-TRe20 - Transformer housing with TRe20 Electronic Transformer* (105-300 VAC, 50/60 Hz, Non-Dimming). For use with **BIGSSL** fixtures)
*Not available with Adjustable Stem (Type A)

Cap Style
 Blank - Less Cap (Adjustable Stem only)
B - Single Hole Cap
C - Solid Cap

Finish

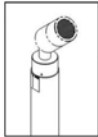
Aluminum Finish			Brass		Premium Finish		
Powder Coat Color	Satin	Wrinkle	Machined	MAC	ABP	CMG	RMG
Bronze	BZP	BZW	Polished	POL	AMG Aleutian Mountain Granite	CRI Cracked Ice	SDS Sonoran Desert Sandstone
Black	BLP	BLW	Mitique™	MIT	AQW Antique White	CRM Cream	SMG Sierra Mountain Granite
White (Gloss)	WHP	WHW	Stainless		BCM Black Chrome	HUG Hunter Green	TXF Textured Forest
Aluminum	SAP	—	Machined	MAC	BGE Beige	MDS Mojave Desert Sandstone	WCP Weathered Copper
Verde	—	VER	Polished	POL	BPP Brown Patina Powder	NBP Natural Brass Powder	WIR Weathered Iron
			Brushed	BRU <small>Interior use only.</small>	CAP Clear Anodized Powder	OCP Old Copper	<small>Also available in RAL Finishes See submittal SUB-1439-00</small>

Input Voltage
 Blank - Less Transformer or For use with TRe20 Electronic Transformer (105-300 VAC, 50/60 Hz, Non-Dimming)
120 - 120 VAC Input (For use with L75E)
230 - 230 VAC Input (Non-Dimming, For use with L75E)
277 - 277 VAC Input (Non-Dimming, For use with L75E)

Options
SF - Stability Flange

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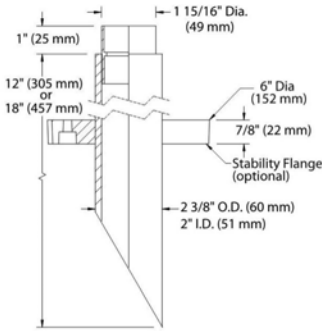
Specify Fixture Separately

POWER PIPE™ SYSTEM

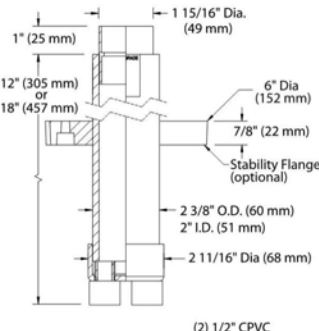
PROJECT: _____

TYPE: _____

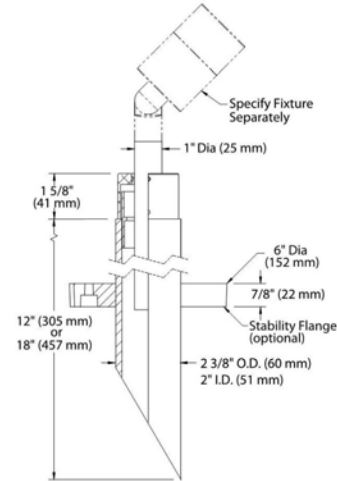
STAKE (S)



JUNCTION (J)

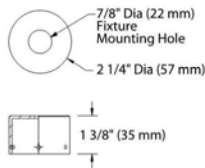


ADJUSTABLE STEM (A)

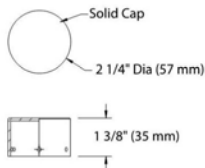


CAP STYLES

'B' Cap (Single Hole)

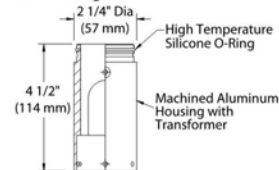


'C' Cap (Solid Cap)



TRANSFORMER

Transformer with Housing



All dimensions indicated on this submittal are nominal. Contact Technical Sales if you require more stringent specifications.

SPECIFICATIONS

GreenSource Initiative™

Metal and packaging components are made from recycled materials. Manufactured using renewable solar energy, produced onsite. Returnable to manufacturer at end of life to ensure cradle-to-cradle handling. Packaging contains no chlorofluorocarbons (CFC's). Use of this product may qualify for GreenSource efficacy and recycling rebate(s). Consult www.bklighting.com/greensource for program requirements.

Installation

Provides a clean, architectural transition from wiring system to fixture. 2" Schedule 80 PVC pipe. For direct burial into soil or concrete. Available in 12" and 18" lengths. Available in three installation types:

Stake (Type S)

60° angled bottom designed for use with conduit or direct burial low voltage cable.

Junction Box (Type J)

Includes [2] 1/2" PVC slip connectors for branch circuit wiring.

Adjustable Stem (Type A18)

18" field adjustable stem accommodates future landscape growth. Unused stem length remains hidden inside housing. Delrin bushing and stainless steel set screws lock mounting height.

Stability Flange

Optional 6" diameter, molded stability flange simplifies installation and projects into substrate to simplify installation and reinforce housing stability.

Cap Style

Machined from copper-free aluminum or machined brass. Choose from Solid ('C'), or Single Hole ('B') cap styles.

Transformer Housing

Fully machined from copper-free aluminum, solid machined brass or stainless steel. Stainless steel hardware. High temperature, silicone 'O' Ring provides watertight seal.

Electronic Transformer

For use with halogen lamps. 120V, 230V, and 277V primary voltage. 120V is fully dimmable (40W minimum load). 50/60Hz. 11.6V secondary voltage. 10 watt minimum load (Halogen) non-dimmed. 75 watt maximum load. >0.93 Power Factor. <20% THD. Operating frequency >10kHz. Soft start circuitry to extend lamp life.

TRe20 Electronic Transformer

For use with **ESSL** solid state 12V systems. 105-300VAC primary voltage. 50/60Hz. Non Dimming. 200VA maximum load.

Wiring

Teflon® coated wire, 18AWG, 600V, 250° C rated and certified to UL 1659 standard. Adjustable stem mount additionally includes 24" or 36" 12/2 direct burial low voltage cable.

Hardware

Tamper resistant, stainless steel hardware.

Finish

StarGuard®, our exclusive RoHS compliant, 15 stage chromate-free process cleans and conversion coats aluminum components prior to application of Class 'A' TGIC polyester powder coating.

Warranty

5 year limited warranty.

Listings

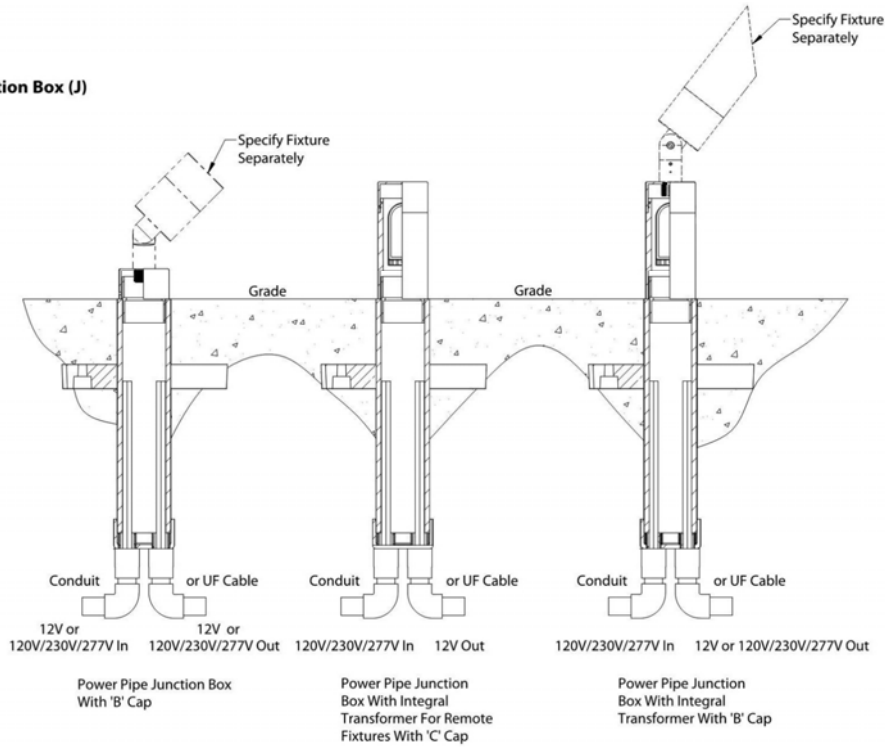
ETL listed. Made in USA.



*Teflon is a registered trademark of DuPont Corporation

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Junction Box (J)



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		8-15-13	SUB-1104-07



DynaFlood HO

Client:	
Project:	
Type:	
Order Code:	
Quantity:	



DynaFlood HO is a high powered flood fixture designed for exterior illumination and outdoor signage. It's integral power supply is universal voltage and can be dimmed via ELV or TRIAC. The head pivots 180 to help you get the exact angle needed for your application.

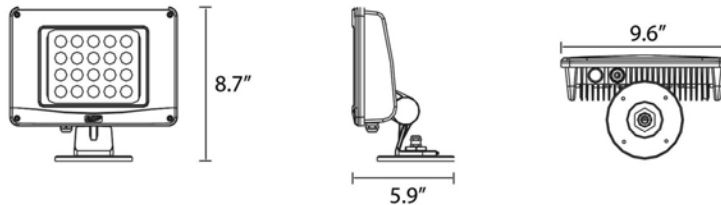
SPECIFICATIONS

Color Temperature	2700k, 3000K, 3500K, 4000k
Beam Angle	7° Standard, 20°, 40°, 10° x 60°, 60° via LSF Filter
Drive Current	500ma
Power Consumption	50W
Total Lumens	2455 @ 4000K, 7°
Efficacy (lm/W)	49
CRI	79
Lumen Maintenance	70% @ 50,000 hours
Housing	Die Cast Aluminum
Operating Temperature	-40°F to 122°F (-40°C to 50°C)
Operating Voltage	90-135VAC / 200-300VAC
Dimming	ELV, TRIAC
Fixture Connections	2 Conductor, Bare Wire Leads
Rating	IP 66, Wet Location
Warranty	5 Years
Weight	6 lbs (2.7 kg)
Dimensions	W 9.6" x H 13.9" x D 5.9" (245 mm x 221 mm x 149.5mm)

Certifications



DIMENSIONS



www.acclaimlighting.com

Lumen measurements comply with IES LM-79-08 provided by a recognized, independent testing lab. LM79 Photometry, LM80 LED source compliance documents, and IES files are available at www.acclaimlighting.com

Specification subject to change without notice.

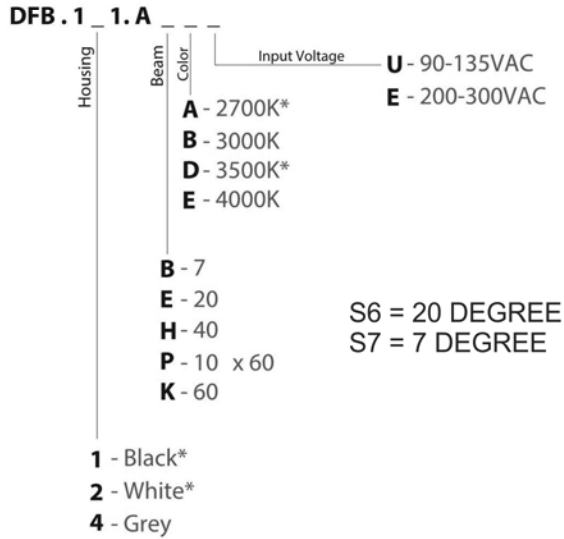
S6,S7
1 of 2



DynaFlood HO

Client:	
Project:	
Type:	
Order Code:	
Quantity:	

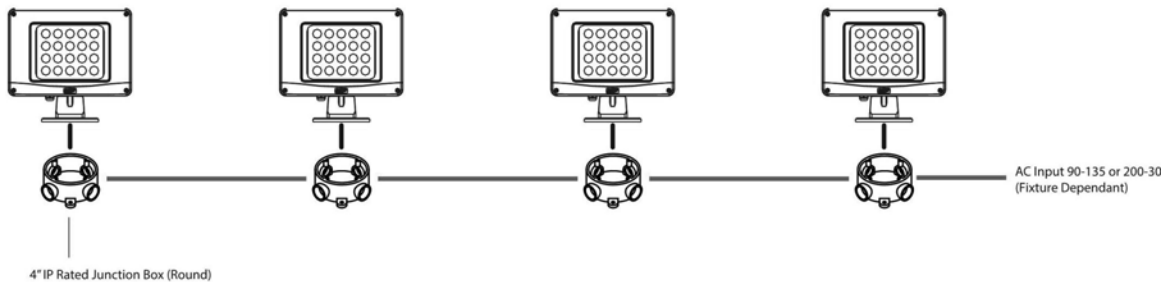
ORDER CODES *special order



RELATED COMPONENTS

DYNAFEB6	Dyna Flood Extender Bar 6"
DYNAFEB12	Dyna Flood Extender Bar 12"
DYNAFEB36	Dyna Flood Extender Bar 36"
DYNAFGS	Dyna Flood Glare Shield
DYNAFHWG	Dyna Flood HO Wire Guard

WIRING



S6,S7
2 of 2

PART 3 EXECUTION

3.01 INSTALLATION

- A. Light fixtures:
 - 1. Set level, plumb, and square.
 - 2. Provide concrete footers for fixtures as shown on the architectural drawings or as directed by the fixture manufacturer.
 - 3. Ensure voltage compatibility.

- B. Remote Mounting of Ballasts and Drivers: Distance between the ballast or driver and fixture shall not exceed that recommended by the manufacturer. Verify with the manufacturers maximum distance between ballast or driver and luminaire.

3.02 IDENTIFICATION

- A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in general conditions.

3.03 FIELD QUALITY CONTROL

- A. Ensure that all fixtures are functioning properly.

3.04 MANUALS

- A. Contractor to supply at minimum one copy of light fixture user and maintenance manuals to Owner.

END OF SECTION

SECTION 31 2000
EARTH MOVING

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Excavation, backfill and compaction for new sidewalks, access drive entrance, lighting bases, curbing, etc.

1.02 RELATED SECTIONS

- A. Section 033000 - Cast-In-Place Concrete.

1.03 DEFINITIONS

- A. Unclassified Excavation: Removal of all materials of any kind or nature encountered in completion of the Work, including rock, to the elevations required and subsequent disposal or placement of materials removed.
- B. Subgrade: Areas upon which the planned bottoms of foundations, footers, slabs, curbing, paving base courses or sidewalks shall rest.

1.04 REFERENCES

- A. AASHTO T180 - Moisture-Density Relations of Soils Using a 10 pound (4.54 kg) Rammer and an 18 inch (457 mm) Drop.
- B. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- C. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 pound (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
- D. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- E. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- F. ASTM D3017- Test methods for moisture content of soil and soil-aggregate mixtures.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01 3000.
- B. Aggregate Certificates.

1.06 PROJECT CONDITIONS

- A. Excavation and Grading: Unclassified.
 - 1. No consideration will be given to the nature of the materials encountered in excavation operations or for difficulties encountered during excavating or handling of materials.
- B. Fill: Includes the subgrade preparation, proof-rolling of subgrade, placement and compaction of all structural fill and backfill materials required to achieve design grades.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel meeting the requirements of AASHTO No. 57 course aggregate.
- B. Class 3 Material: Excavated material approved by Architect and containing no stones larger than 6 inches in maximum dimension. A maximum of 20% of the backfill volume may be stones so long as the stones are evenly distributed within the material.
- C. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetable, organic and other deleterious matter. This would include crushed building materials, brick, concrete and concrete masonry units free of reinforcing, organic or other unsuitable materials.

- D. Utility Pipe and Conduit Bedding:
 - 1. First Class Bedding Coarse Aggregate conforming to AASHTO Number 57.
 - 2. Initial Backfill: Coarse Aggregate conforming to AASHTO Number 57.

PART 3 EXECUTION

3.01 PREPARATION

- A. Install sediment and erosion control facilities in accordance with the requirements of local Conservation District.
- B. Perform shoring and bracing in as required to prevent damage to the existing building.
- C. Identify required lines, levels, elevations, contours and benchmark(s) with intended datum.
 - 1. Compact subgrade to density requirements for subsequent backfill materials
 - 2. Cut out soft areas of subgrade not capable of compaction in place. Backfill with subsoil fill or suitable aggregate backfill and compact to density equal to or greater than requirements for subsequent fill material
 - 3. Scarify and proof roll subgrade surface to identify soft spots with a smooth drum vibratory roller. Fill and compact to density equal to or greater than requirements for subsequent fill material
 - 4. Proof rolling shall be performed at the last practical moment before the subbase is placed on exposed subgrades and again at the subbase level before pavements are placed. Any soft or unstable areas disclosed by the proof rolling should be completely removed and repaired utilizing aggregate backfill.

3.02 REQUIREMENTS AND RESTRICTIONS

- A. Keep excavations free from water. Build dams and all other devices necessary. If required, lower water table below excavation bottom by deep wells, well points and pumping. Provide and operate pumps of sufficient capacity for dewatering the excavations. Dispose of water removed from excavations in a manner that will not cause injury to the public health, to public or private property, to the work of other contractors, to any portion of the Work completed or in progress, or to produce impediment to the use of highways, roads, lanes and streets by the public. All discharges from the dewatering must comply with the Sediment and Erosion Control Procedures. No additional payment will be made for pumping or other difficulties encountered due to water.
- B. Maintain sewers, drains and ditches free of debris to convey surface drainage. No damming or ponding of water in gutters or other waterways will be permitted. Do not direct flow of water across pavements except through approved pipes or properly constructed troughs. Provide pipes or troughs of such sizes and lengths as may be required. Control grading in the vicinity of excavations so the ground surface is properly pitched to prevent water from running into excavated areas.
- C. Control groundwater and surface water during construction in order to maintain soil stability, if required. Maintain the water table elevation sufficiently below the levels of excavations that slopes will remain stable and bottoms of excavations will not become loosened by flow of water. If the foundation material loses its strength due to improper dewatering techniques, over excavate the material and replace it with Foundation Fill at no additional cost to Owner.
- D. Do not perform excavating, backfilling or compacting when weather conditions or the condition of materials are such, that in the opinion of Architect or Construction Manager, the Work cannot be completed in accordance with the Specifications.
- E. Do not use as backfill frozen materials or wet materials containing moisture in excess of the amount necessary for satisfactory compaction.
- F. Prior to use, moisten dry backfill material not having sufficient moisture to obtain satisfactory placement or compaction.
- G. Dust Control: Prevent spread of dust during performance of work by thoroughly moistening excavation areas by sprinkling or other methods approved by Architect.

- H. If the required quantity of backfill exceeds the quantity of suitable material excavated within the limits of the project site and rights-of-way, obtain sufficient material to complete the backfill at no additional cost to Owner. If borrow excavation is needed, notify Architect sufficiently in advance of borrow excavation requirements to permit Architect to verify the need for such borrow excavation and to view the proposed borrow pit and determine the suitability of the material to be provided. Any tests required by Architect to assist in determining suitability of the borrow material shall be responsibility of Contractor. Use of borrow excavation from offsite must be approved by Architect.
- I. No right of ownership of excavated materials is granted to Contractor prior to backfilling. This provision does not relieve Contractor of his responsibility to remove and dispose of surplus excavated material.
- J. Assume sole responsibility for the condition and results of excavations. Slides and cave-ins shall be removed without additional compensation at whatever time and under whatever circumstances they may occur.
- K. Protect all pipes, conduits, walls, plant material (trees), buildings and other structures or property whether above or below ground, or that may appear in the excavation unless removal is called for. Maintain sufficient quantity of material and equipment on the site and for use as necessary for sheeting, sustaining and supporting any pipes, conduits, walls, building, structure or property.
- L. Removal of Obstructions: Should the position of any pipe, conduit, pole, or other structures, above or below the ground be such as, in the opinion of the Owner or Owner's Representative, to require its removal, realignment, or change due to work to be done under the Contract that was not indicated on the Drawings or called for elsewhere in the Contract Documents, the work of removal, realignment, or change will be done as extra work, or will be done by the owner of the obstructions, without cost to the Contractor; but the Contractor shall uncover and sustain the structures, at his own expense, before such removal and before and after such realignment or changes as constituting part of the Contract; and the Contractor shall not be entitled to any claim for damage or extra compensation on any account of the presence of said structure, or on account of any delay in the removal or rearrangement of same.
- M. No explosives may be stored on site.

3.03 EXCAVATION

- A. General Procedures:
 - 1. Perform excavation using machinery, except where hand excavation may be required to protect existing structures, piping, conduits, utilities or private or public properties. No additional compensation will be paid for hand excavation instead of machine excavation as may be necessary from any cause whatever.
 - 2. Perform excavation of every description and of whatever substances encountered to the elevations indicated by the Drawings and as specified herein.
 - 3. Where work space is limited, remove excavated material from the limited area and replace the material after the work has been completed. No additional compensation will be made for such removal and replacement of the excavated material.
 - 4. Extend excavation a sufficient distance from footings, and foundations to permit placing and removal of concrete formwork, installation of services, other construction and for inspection.
- B. Excavation Below Subgrade:
 - 1. Do not excavate below depths indicated on the Drawings or such depths as required for the proper installation of the Work.
 - 2. Excavation below depths indicated on the Drawings or as required for the proper installation of the Work through the fault of the Contractor, shall be restored to the indicated or required depths with Foundation Fill at the expense of Contractor.
 - 3. If the foundation for any structure is required by Architect to be carried lower than subgrade elevation, the voids caused by this excavation shall be backfilled up to subgrade elevation shown on the Drawings with Foundation Fill.

- C. Storage of Approved Materials:
 - 1. Store on site all unused approved materials.
 - 2. Do not mix unused approved materials of differing types.
 - 3. Do not mix unused approved materials with unapproved materials.
 - 4. No additional compensation will be made for storage, stockpiling or rehandling of materials.

3.04 SUBGRADE PREPARATION

- A. General Procedures:
 - 1. Remove and replace soft, loose, and disturbed materials. Perform compaction in accordance with Section 3.7 or as otherwise directed by Architect.
 - 2. Do not place fill materials on surfaces that are muddy, frozen, or contain frost.
 - 3. Trim bottoms to indicated lines and grades to leave solid base to receive other work.
- B. Placement and Compaction:
 - 1. Foundation Fill:
 - a. Spread material uniformly without segregation of coarse and fine material.
 - b. Place material in layers not exceeding 6 inches and compact to at least 95 percent of the Maximum Modified Density based on ASTM D 1557 (AASHTO T-180).
 - c. Perform field density tests for each layer of material placed in accordance with testing requirements (3.8 Field Quality Control).
 - 2. Aggregate Base Course:
 - a. Provide beneath concrete slabs, curbing and structures as indicated on the Drawings.
 - b. Place directly on excavation bottoms and where required on previously completed structural fills.
 - c. Compact with a vibratory compactor to the satisfaction of Architect.

3.05 BACKFILLING

- A. General Procedures:
 - 1. Perform backfilling using machinery, except where hand backfilling is required to prevent damage to walls, foundations, utilities, conduits or piping. No additional compensation will be paid where backfilling by hand is required.
 - 2. Clean excavation free of trash and debris prior to backfilling.
 - 3. Do not place backfill material prior to seven days after completion of structure walls.
 - 4. Do not place backfill material on wet or frozen areas.
 - 5. Do not operate heavy equipment closer to walls than a distance equal to the height of backfill material above the top of the structure footing.
 - 6. Do not place backfill material against exterior walls until supporting floors, other reinforcing or supporting members, or slabs at top of walls are in place.
 - 7. Perform compaction using power driven tampers or compactors suitable for material being placed.
- B. Backfilling (Other than Aggregate Backfill):
 - 1. Place backfill in loose, uniform horizontal layers not exceeding 6 inches in depth.
 - 2. Compact backfill to at least 95 percent of the Maximum Modified Density based on ASTM D 1557 (AASHTO T-180).
- C. Aggregate Backfill: Place Aggregate Backfill in 4-inch layers and thoroughly compact each layer with a vibratory compactor to the satisfaction of Architect.
- D. Cleanup: Excess excavated material that cannot be used at the project site shall be removed and disposed of off site in a legal manner at no additional expense to Owner.

3.06 FILLS

- A. General:
 - 1. Construct in accordance with these Specifications to line and grades on Drawings to within 0.10 foot tolerance of finish grade.

- B. Preparation:
1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface. Scarify all lesser sloped surfaces to a depth of 8 inches.
 2. When existing ground surface has a density less than that specified for particular area, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.
 3. Partially completed embankment areas shall be shaped to drain at all times. Embankment subgrades shall be inspected and approved by Architect before any fill material is placed. Do not place fill material on surfaces that are muddy, frozen or contain frost or ice.
- C. Fill Under Concrete On Grade:
1. Where fill is required to raise the subgrade for concrete slabs to the elevations indicated on the Drawings, such fills shall be made with suitable materials, equipment, and workmanship, and under control and supervision of an approved testing laboratory. Where such fills exceed 8 inches in depth, the fill shall be constructed before proceeding with foundation work.
 2. Construction:
 - a. Area to be filled shall be cleared of all loose material and inspected and approved by Architect.
 - b. The surface shall then be loosened to a depth of at least 4 inches and satisfactorily compacted.
 - c. Fill material shall be free from frost and shall not be placed on frozen ground. It shall be deposited in layers of such thickness as required by the nature of the soil or as directed, but the uncompacted thickness of each layer shall not exceed 8 inches.
 - d. Each layer shall be separately compacted to a uniform solid mass by machine rolling or other approved means. Fill shall be placed in horizontal layers, beginning with the lowest areas and building up until the entire areas to be filled is at a uniform elevation.
 - e. Contractor shall control the moisture content of the fill material, to insure maximum density by either the addition of water, or by harrowing and working the soil prior to compacting.
 - f. Each layer shall be free of ruts and shall meet compaction requirements before a succeeding layer is placed. Compaction of each layer shall continue until no weaving or creeping takes place.
 - g. Field tests of moisture content prior to compaction and dry weight after compaction shall be made to insure thorough and uniform compaction.
 3. Required Results: All fills under concrete slabs shall be compacted to specified density. Whenever in-place density, is found to not meet the specified density, additional compaction will be required to produce the specified density, as shown by additional tests.

3.07 COMPACTION

- A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification.
- B. Percentage of Maximum Density Requirements: Compact soil to not less than 95 percent of the Maximum Modified Density based on ASTM D-1557 (AASHTO T-180), except in unpaved/non-structural areas. Refer to Section 3.08 Field Quality Control.
- C. Moisture Control:
1. Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.
 2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.08 FIELD QUALITY CONTROL

A. Testing

1. All testing to be completed by Independent Testing Laboratory selected by the Owner.
2. Field density tests shall be performed by the Independent Testing Laboratory in accordance with ASTM D 1556, and ASTM D 1557/AASHTO T-180 or ASTM D 2167 OR ASTM D 2922 as approved. If methods of ASTM D 2922 are used for density testing, moisture content will be determined by ASTM D 3017.
3. Concrete Slab Subgrade: Make at least one field density test of subgrade for each 2000 sq. ft. concrete slab, but in no case less than one test for each area of construction. In each compacted fill layer, make one field density test for each 2000 sq. ft. of overlaying building slab or paved area, but in no case less than 1 test. Contractor is responsible for coordination of testing with Independent Testing Laboratory.
4. Lawn Areas: Compact fill to at least the density of the surrounding undisturbed soil. If settlement occurs the Contractor shall be responsible for replacement/compaction to eliminate settlement at no additional cost to the Owner.

B. Corrective Measures:

1. Whenever tests indicate that the field moisture or density does not meet specified requirements, take corrective action as approved by Architect.
2. Corrective measures may include loosening the soil and wetting or drying it prior to recompaction, additional compaction, or removing and replacing the material.
3. Retest material that did not meet the moisture and density requirements after corrective measures have been performed.

- #### **C. Retesting:** Architect may at any time require retesting of any material, whether in stockpiles or being placed, if it appears that the material differs from that which has previously been approved for use.

END OF SECTION

SECTION 32 1243
FLEXIBLE POROUS PAVING

PART 1 - GENERAL**1.1 SCOPE**

- A. This specification provides requirements for the construction of flexible porous paving.
- B. In case the requirements of this specification conflict with the contract documents, this document shall govern.

1.2 RELATED SECTIONS

- A. Subgrade preparation under Section 31 2000 Earth Moving.

1.3 DEFINITIONS

- A. Exposure Condition, Moderate: Exposure to a climate where the paving will not be in a saturated condition when exposed to freezing and will not be exposed to deicing agents or other aggressive chemicals.
- B. Exposure Condition, Severe: Exposure to deicing chemicals or other aggressive agents or where the paving can become saturated by continual contact with moisture or free water before freezing.
- C. Base Reinforcement: The use of a geosynthetic within the aggregate base course to enhance the performance of a paving
- D. Geogrid: Biaxial or triaxial woven polypropylene material for base course reinforcement and confinement, and subgrade stabilization and increased subgrade load capacity
- E. Panel: An individual paving slab bordered by joints or slab edges.
- F. Porous/Pervious Paving: A paving comprising material with sufficient continuous voids to allow water to pass from the surface to the underlying layers.
- G. Porous/Pervious: The property of a material which permits movement of water through it under ordinary hydrostatic pressure.
- H. Flexible Porous Paving: Paving system comprised of three components: recycled passenger car tires, aggregate, and urethane binder that provides a strong, pervious, yet flexible paving.
- I. Subbase: A layer in a paving system between the subgrade and the base course, or between the subgrade and a flexible pervious paving.
- J. Subgrade: The soil prepared and compacted to support a structure or paving system.

1.4 REFERENCED STANDARDS

- A. ASTM standards:
 - 1. ASTM C 666/C 666M-03, "Standard Test Method for Resistance of Concrete to Freezing and Thawing, Procedure A - freezing and Thawing in Water." Samples shall indicate only minimal mass change results after 300 nominal freeze-thaw cycles, and visual examination of the test specimens shall indicate no cracks or breaks.
 - a. D 3385-03 Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer.
 - b. D 3665-06 Standard Practice for Random Sampling of Construction Materials E 329-06a Specification for Agencies Engaged in Construction Inspection and/or Testing.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Flexible Porous Paving installer shall be currently certified by the Manufacturer and have successfully installed a minimum of 10,000 square feet within the Mid-Atlantic region within the last year.
 - 2. Flexible Porous Paving installer shall employ no less than two Manufacturer-certified Flexible Porous Paving technicians on staff who directly oversee or perform the installations during all Flexible Porous Paving placement, unless otherwise specified.

1.6 SUBMITTALS

- A. Qualification Data
 - 1. For Porous Paving Installer:
 - a. Provide a list of successfully installed Flexible Porous Paving projects, as required herein, including the address, square footage, and photographs for each project.
 - b. Manufacturer's Certifications.
- B. Proposed Mix Design.
- C. Samples for Verification: Provide one 6" diameter sample, full thickness.

1.7 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for pedestrian traffic as required for other construction activities.
- B. Schedule placements to minimize exposure to wind and heat before curing materials are applied.
- C. Avoid placing porous paving if rain, snow, or frost is forecast within 24 hours unless measures are taken as described later. Always protect fresh paving from moisture and freezing.

PART 2 - PRODUCTS**2.1 SUBBASE**

- A. Coarse aggregates shall meet the durability requirements of ASTM C 33.

2.2 FLEXIBLE POROUS PAVING

- A. Bonding: Have the capacity to bond with: wood; steel; concrete; aluminum; compacted aggregate; enamel tile, or; fiberglass
- B. Resistance to degradation: Resistant to: chlorine; ozone; bromine; muriatic acid; salt water; oil; transmission oil, and; hydraulic oil.
- C. Aggregate:
 - 1. Stone: Triple-washed coarse aggregate, No. 8 coarse aggregate (3/8 to 1/2 inch) per ASTM C 33. Bagged and labeled as tested and certified by Flexible Porous Paving Manufacturer.
 - a. Nominal maximum aggregate size shall not exceed 1/3 of the specified paving thickness.
 - 2. Rubber: Recycled passenger tires ground to 3/8" nominal with the wire remnants removed.
- D. Binding agent: urethane liquid prepolymer based upon Diphenylmethane-Diisocyanate.
- E. Air Entraining Agents: Prohibited.
- F. Mix Design: Using materials acceptable to the Manufacturer design a tentative mix and test for the consistency intended for use on the work and specified.
 - 1. The volume by weight of aggregate per cu. yd. shall be 50% of the total dry mix.
 - 2. The volume by weight of the rubber product per cu. yd. shall be 50% of the total dry mix.

3. Permeability: Pervious infiltration rate of 2,000 gallons/square foot/hour

2.3 FORMS

- A. Make forms with steel, wood, or other material that is sufficiently rigid to maintain specified tolerances, and capable of supporting concrete and mechanical concrete placing equipment.
- B. Forms shall be clean and free of debris of any kind, rust, and hardened concrete.
- C. Form release: Diesel, Bio-diesel or vegetable oil coating.

PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION

- A. Prepare subgrade as specified in the contract documents.
- B. Construct subgrade to ensure that the required paving thickness is obtained in all locations.
- C. Keep all traffic off of the subgrade during construction to the maximum extent practical. Regrade subgrade disturbed by delivery vehicles or other construction traffic, as needed.
- D. Compact the material added to obtain final subgrade elevation.
- E. Determine subgrade permeability in accordance with ASTM D3385 before porous paving placement. Confirm that subgrade permeability meets requirements of Contract Documents.

3.2 SUBBASE

- A. Prepare subbase in accordance with contract documents.

3.3 SETTING FORMWORK

- A. Set, align, and brace forms so that the hardened paving meets the tolerances specified herein.
- B. Apply form release agent to the form face which will be in contact with porous paving, immediately before placing paving.
- C. The vertical face of previously placed concrete may be used as a form.
 1. Protect previously placed paving from damage.
 2. Do not apply form release agent to previously placed concrete.
 3. Apply liquid urethane bonding agent to face of surfaces when adhesion is desired
- D. Placement width shall be as specified in Contract Documents.

3.4 BATCHING, MIXING, AND DELIVERY

- A. Batch and mix on site in compliance with Manufacturer's written specifications, except that discharge shall be completed within 5 minutes of the introduction of urethane to the dry products .

3.5 PLACING AND FINISHING PAVING

- A. Do not place porous paving on frozen or wet subgrade or subbase
- B. Deposit porous paving either directly onto the subgrade or subbase by wheelbarrow or by material handler onto the subgrade or subbase, unless otherwise specified.
- C. Deposit porous paving between the forms to an approximately uniform height.
- D. Spread the porous paving using a come-along, short-handle, square-ended shovel or rake.
- E. Use steel trowels to finish to the elevations and thickness specified in Contract Documents.

3.6 FINAL SURFACE TEXTURE

- A. Final surface of porous paving shall be smoothed with bull float and magnesium trowels.

3.7 EDGING

- A. When forms are not used, bevel the edge of the top surface to a 45° slope

3.8 CURING

- A. Begin curing within 20 minutes of paving discharge, unless longer working time is accepted by the Manufacturer.

- B. Completely cover the paving surface with a minimum 4 mil thick polyethylene sheet only if rain or sprinklers are imminent within 20 minutes. Cut sheeting to a minimum of a full placement width.
 - 1. Cover all exposed edges of paving with polyethylene sheet.
 - 2. Secure curing cover material without using dirt.
- C. Cure paving for a minimum of 24 uninterrupted hours, unless otherwise specified.

3.9 HOT- AND COLD-WEATHER CONSTRUCTION

- A. When hot weather is anticipated up to 95 degrees Fahrenheit, no special procedures are necessary.
- B. In cold weather when temperatures may fall below freezing just after an installation, utilize a fan to maintain airflow over porous paving during the curing process.

3.10 OPENING TO TRAFFIC

- A. Do not open the paving to light vehicular traffic until the porous paving has cured for at least 24 hours during warm weather, and 48 hours during very cold temperatures at or near freezing and not until the porous paving is accepted by the Owner for opening to traffic. Paving should be checked and verified to be sufficiently hardened after the curing period as relative humidity can alter the curing time in some regions.

END OF SECTION

SECTION 32 9300**PLANTS****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. Plants.
 - 2. Soils
 - 3. Tree stabilization.
 - 4. Tree-watering devices.

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required.
- D. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- E. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.
- F. Finish Grade: Elevation of finished surface of planting soil.
- G. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

- H. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- I. Planting Area: Areas to be planted.
- J. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" for drawing designations for planting soils.
- K. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- L. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- M. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- N. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
 - 2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
 - 1. Manufacturer's certified analysis of standard products.
 - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- B. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
 - 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. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 3. Pesticide Applicator: State licensed, commercial.
- B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
 - 1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
 - 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- D. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
 - 1. Notify Architect of sources of planting materials seven days in advance of delivery to site.
 - 2. Maple Tree needs to be tagged in field by Landscape Architect.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
- 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 materials with appropriate certificates.
- C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not

bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

- D. Handle planting stock by root ball.
- E. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- F. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
 - 1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
 - 2. Do not remove container-grown stock from containers before time of planting.
 - 3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
 - 1. Trees and Shrubs
 - a. Spring Planting: March 1st – June 15th
 - b. Fall Planting: August 15th until a hard freeze.
 - c. Do not plant when the ground is frozen or during days of extreme heat, greater than 80 degrees.
- C. 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 and warranty requirements.

1.10 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
 - b. Structural failures including plantings falling or blowing over.
 - c. Faulty performance of tree stabilization.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods: From date of planting completion.
 - a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
 - b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
 - c. Annuals: Three months.
3. Include the following remedial actions as a minimum:
 - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
 - d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
 1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.
 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.
- E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.
- F. Annuals: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with

excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery.

2.2 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
 - 1. Type: Shredded hardwood.
 - 2. Size Range: 3 inches maximum, 1/2 inch minimum.
 - 3. Color: Natural.

2.3 PESTICIDES

- A. General: Pesticide registered and approved by the 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 Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.4 TREE-STABILIZATION MATERIALS

- A. Trunk-Stabilization Materials:
 - 1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
 - 2. Wood Deadmen: Timbers measuring 8 inches in diameter and 48 inches long, treated with specified wood pressure-preservative treatment.
 - 3. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.
 - 4. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch in diameter.
 - 5. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
 - 6. Guy Cables: Five-strand, 3/16-inch-diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.
 - 7. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.

2.5 PLANTING SOILS SPECIFIED BY COMPOSITION

- A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.
- B. Planting-Soil Type for On Structure Conditions: Manufactured soil consisting of manufacturer's basic sandy loam according to USDA textures, blended in a manufacturing facility with sand, stabilized organic soil amendments, and other materials to produce viable planting soil.

1. 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: Hydrotech LiteTop Growing Media.
- C. Planting-Soil Type for Off Structure Conditions : Manufactured soil consisting of manufacturer's basic sandy loam according to USDA textures, blended in a manufacturing facility with sand, stabilized organic soil amendments, and other materials to produce viable planting soil.
1. Imported natural or manufactured topsoil meeting the following characteristics: Loam to Coarse Sandy loam with clay content between 15 and 20% and sand content between 45 and 60%. Sand content must be significantly composed of medium and coarse sands. Fertile, friable, loamy soil, containing 2 to 5 percent by weight organic matter; free from subsoil, refuse, roots, heavy or stiff clay, stones larger than 1 inch, noxious seeds and weeds, sticks, brush, litter, and other deleterious substances; suitable for the germination of seeds and the support of vegetative growth. The pH value shall be between 6.0 and 6.5.
 2. Soil shall be screened and shredded prior to mixing.
 3. Provide a minimum of 3 soil tests from samples obtained throughout the source stockpile that represents the range of the soil available at the source.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.
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. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
 3. Suspend planting 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 or which is dusty.
- B. 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.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

3.3 PLACING MANUFACTURED PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply manufactured soil on-site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 6 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
- C. Application: Spread planting soil to total depth of 6 inches, but not less than required to meet finish grades after natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
- D. Compaction: Compact each lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits.
 - 1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
 - 2. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
 - 3. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
 - 4. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
 - 5. Maintain supervision of excavations during working hours.
 - 6. Keep excavations covered or otherwise protected after working hours.
 - 7. If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.
- B. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.
- C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

- D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
- E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

- A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.
 - 1. Backfill: Planting soil. For trees, use excavated soil for backfill.
 - 2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 4. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Balled and Potted and Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.
 - 1. Backfill: Planting soil. For trees, use excavated soil for backfill.
 - 2. Carefully remove root ball from container without damaging root ball or plant.
 - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 4. Continue backfilling process. Water again after placing and tamping final layer of soil.
- E. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 MECHANIZED TREE-SPADE PLANTING

- A. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.

- B. Use the same tree spade to excavate the planting hole as will be used to extract and transport the tree.
- C. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.
- D. Cut exposed roots cleanly during transplanting operations.
- E. Plant trees following procedures in "Tree, Shrub, and Vine Planting" Article.
- F. Where possible, orient the tree in the same direction as in its original location.

3.7 TREE, SHRUB, AND VINE PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.
- C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.

3.8 TREE STABILIZATION

- A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:
 - 1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend at least 72 inches above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
 - 2. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
- B. Trunk Stabilization by Staking and Guying: Install trunk stabilization as follows unless otherwise indicated on Drawings. Stake and guy trees more than 14 feet in height and more than 3 inches in caliper unless otherwise indicated.
 - 1. Site-Fabricated, Staking-and-Guying Method: Install no fewer than three guys spaced equally around tree.
 - a. Securely attach guys to stakes 30 inches long, driven to grade. Adjust spacing to avoid penetrating root balls or root masses. Provide turnbuckle for each guy wire and tighten securely.
 - b. For trees more than 6 inches in caliper, anchor guys to wood deadmen buried at least 36 inches below grade. Provide turnbuckle for each guy wire and tighten securely.
 - c. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.

- d. Support trees with guy cable or multiple strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
- e. Attach flags to each guy wire, 30 inches above finish grade.

3.9 PLACING SOIL IN ON-STRUCTURE PLANTERS

- A. Fill planter with planting soil. Place soil in lightly compacted layers to an elevation of 1-1/2 inches below top of planter, allowing natural settlement.

3.10 GROUNDCOVER PLANTING

- A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.
- B. Use planting soil for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.
- E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.11 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
 - 1. Trees in Turf Areas: Apply organic mulch ring of 3-inch average thickness, with coverage of the planting pit, bed or saucer. Do not place mulch within 3 inches of trunks or stems.
 - 2. Organic Mulch in Planting Areas: Apply 2-inch average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.12 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.13 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to 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. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.14 REPAIR AND REPLACEMENT

- A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Architect.
 - 1. Submit details of proposed pruning and repairs.
 - 2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
 - 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.
- B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

3.15 CLEANING AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.
- C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- D. After installation and before Substantial Completion Insert time, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

END OF SECTION 329300