Oakton Community College District 535

Procurement Department, Room 1240
1600 E. Golf Rd., Des Plaines, IL 60016
847-635-1635

Invitation to Bid # 1221-22-02
Issue Date: December 21, 2022

Mandatory Pre-Bid Date: Wednesday, January 11, 2023 at 11:00 am

Bids will be received in the Procurement Office at the above address until
11:00 am on Wednesday, January 25, 2023
Bids will be publicly opened at this time. Late bids will not be accepted.

Courtyard Rehabilitation

The College is accepting bids for courtyard rehabilitation at the Des Plaines Campus.
This bid consists of 2 documents:

1) Business Specifications (this document)
2) Oakton Community College Courtyard Rehabilitation Plans
    a. Manhard Consulting Civil Plans dated 11/04/22
    b. ECT Landscaping Plans dated 11/04/22
    c. Kluber Electrical Plans dated 11/04/22

A mandatory pre-bid meeting will be held on Wednesday, January 11, 2023 starting at 11:00 am at the College's Des Plaines campus, 1600 E. Golf Road, Suite 1240.
Only contractors who attend the pre-bid meeting will be allowed to submit a bid.

Any questions regarding this bid must be submitted in writing via email by 11:00 am on January 18, 2023
Questions will be answered through an addendum and must be submitted to the following individuals:

Joe Scifo, Director of Facilities, jscifo@oakton.edu
Rich Schwass, Construction Manager at rschwass@oakton.edu
Jim Frayn, Manhard Consulting at jfrayn@manhard.com
Trinh Than, Purchasing Manager at tthan@oakton.edu

Oakton Community College District 535 is exempt from all Federal, State, and Municipal Taxes.
I have examined the specifications and instructions included herein and agree, provided I am awarded a contract within 60 days of the bid due date, to provide the specified items for the sum shown in accordance with the terms stated herein. All deviations from the specifications and terms are in writing and attached hereto. I offer the following discount terms _____

Company Name: _____ Date: _____

Address: _____ City/St/Zip: _____

Name: _____ Title: _____

Phone #: _____ Fax #: _____

Signature: _____ E-mail:_____

SECTION 015639

TEMPORARY TREE AND PLANT PROTECTION

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 general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Related Requirements:
   1. Construction Drawing Sheets:
      a. Sheet 2 “Existing Conditions and Demolition Plan”
      b. Sheet L1.0 “Plant Removal and Protection”
   2. Specifications:
      a. 31 10 00 “Site Clearing”
      b. 32 93 00 “Exterior Plantings”

1.3 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape or the average of the smallest and largest diameters at a height 6 inches (150 mm) above the ground for trees up to and including 4-inch (100-mm) size at this height and as measured at a height of 12 inches (300 mm) above the ground for trees larger than 4-inch (100-mm) size.

B. Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape or the average of the smallest and largest diameters at a height 54 inches (1372 mm) above the ground line for trees with caliper of 8 inches (200 mm) or greater as measured at a height of 12 inches (300 mm) above the ground.

C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, other vegetation, or soil zones to be protected during construction and indicated on Drawings.

D. Tree-Protection Area: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:

a. Tree-service firm's personnel, and equipment needed to make progress and avoid delays.
b. Arborist's responsibilities.
c. Quality-control program.
d. Coordination of Work and equipment movement with the locations of protection zones.
e. Trenching by hand or with air spade within protection zones.
f. Field quality control.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1. Species and size of tree.
2. Location on site plan. Include unique identifier for each.
3. Reason for pruning.
4. Description of pruning to be performed.
5. Description of maintenance following pruning.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For arborist and tree service firm.

B. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

D. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1. Use sufficiently detailed photographs or video recordings.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.7 QUALITY ASSURANCE

A. Arborist Qualifications: Licensed arborist in jurisdiction where Project is located.

B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

1.8 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Moving or parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Soil: Stockpiled soil mixed with planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

B. Organic Mulch: Free from deleterious materials and suitable as a temporary cover for exposed roots or heeled-in plant material, consisting of one of the following:

1. Type: Shredded hardwood.
2. Size Range: 3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum.
3. Color: Natural.

C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:

1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch (50-mm) maximum opening in pattern and weighing a minimum of 0.4 lb/ft. (0.6 kg/m);

remaining flexible from minus 60 to plus 200 deg F (minus 16 to plus 93 deg C); inert to most chemicals and acids; minimum tensile yield strength of 2000 psi (13.8 MPa) and ultimate tensile strength of 2680 psi (18.5 MPa); secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches (2400 mm) apart.

a. Height: 48 inches (1200 mm).
b. Color: Green, nonfading.

2. Gates: Double- swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width 24 inches (610 mm).

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Flag each tree trunk at 54 inches (1372 mm) above the ground.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.3 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Landscape Architect. Install one sign spaced approximately every 20 feet (6 m) on protection-zone fencing, but no fewer than four signs with each facing a different direction.

C. Maintain protection zones free of weeds and trash.

D. Maintain protection-zone fencing and signage in good condition as acceptable to Landscape Architect and remove when construction operations are complete and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to plans.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.

C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches (75 mm) back from new construction and as required for root pruning.

D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. **Do not use** a backhoe or other equipment that rips, tears, or pulls roots.
2. Cut Ends: Do not paint cut root ends.

3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
4. Cover exposed roots with burlap and water regularly.
5. Backfill as soon as possible.

B. Root Pruning at Edge of Protection Zone: Prune tree roots 12 inches (300 mm) outside of the protection zone by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.

1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
3. Pruning Standards: Prune trees according to ANSI A300 (Part 1).

B. Unless otherwise directed by arborist and acceptable to Landscape Architect, do not cut tree leaders.

C. Cut branches with sharp pruning instruments; do not break or chop.

D. Do not paint or apply sealants to wounds.

E. Provide subsequent maintenance pruning during Contract period as recommended by arborist.

F. Chip removed branches and legally dispose of off-site.

3.7 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.

1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

D. Minor Fill within Protection Zone: Where existing grade is 2 inches (50 mm) or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Landscape Architect.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Landscape Architect.

B. Trees: Remove and replace trees indicated to remain that are more than 66 percent dead or in an unhealthy condition or are damaged during construction operations that Landscape Architect determines are incapable of restoring to normal growth pattern.

1. Small Trees: Provide new trees of same size and species as those being replaced for each tree that measures 4 inches (100 mm) or smaller in caliper size.
2. Large Trees: Provide two new tree(s) of 4-inch (100-mm) caliper size for each tree being replaced that measures more than 4 inches (100 mm) in caliper size.

    a. Species: As selected by Landscape Architect.

3. Plant and maintain new trees as specified in Section 329300 "Exterior Plantings."

C. Soil Aeration: Where directed by Landscape Architect, aerate surface soil compacted during construction. Aerate 10 feet (3 m) beyond drip line and no closer than 36 inches (900 mm) to tree trunk. Drill 2-inch- (50-mm-) diameter holes a minimum of 12 inches (300 mm) deep at 24 inches (600 mm) o.c. Backfill holes with an equal mix of augered soil and sand.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 015639

SECTION 12 93 00

SITE FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes site furnishings as indicated in plans including:

1. Benches

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Maintenance Data: To include in maintenance manuals. Include manufacturer's recommended methods for repairing damage to the finish. Include cleaning procedures or products that may be detrimental to surface finish.

PART 2 - PRODUCTS

2.1 BENCHES

A. Product: Knight Bench, FSC 100% Ipe Hardwood slats, 6 foot, backed, two-armed, surface mounted bench by Forms + Surfaces.

1. Model: SBKNI-072B-2A-SFM-TD
2. As supplied by: Forms + Surfaces. Contact Shawn Davison, territory manager, 1(800)451-0410, shawn.davidson@forms-surfaces.com.

B. Mounting: Surface mount to concrete piers per manufacturer’s recommendation with stainless steel, tamper-proof hardware.

C. Quantity: five (5)

D. Assemble and install in locations shown on plan.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored at locations indicated in the Drawings.

D. Fit exposed connections accurately together to form tight, hairline joints.

E. Perform cutting, drilling, and fitting required for installation of site furnishings.

F. Set work accurately in location, alignment and elevation plumb, level, true, non-rocking and free of rack, measured from established lines and levels. Do not weld, cut, or abrade surfaces of components which have been coated or finished after fabrication, and are intended for field connection by mechanical means without further cutting or fitting.

3.3 ADJUSTMENT AND CLEANING

A. Protect finishes of all items from damage during construction by use of temporary protective coverings approved by manufacturers. Remove protective covering immediately before Preliminary Acceptance / Substantial Completion.

1. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items which cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units as required.

END OF SECTION

SECTION 311000

SITE CLEARING

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. Removing existing vegetation.
   2. Clearing and grubbing.

B. Related Sections:

   1. Section 015639 “Temporary Tree and Plant Protection”

   2. Section 329300 “Exterior Plantings”

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.

D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings.

F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.6 QUALITY ASSURANCE

A. Pre-installation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Traffic: Comply with Site Access requirements as indicated in plans. Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
3. Provide traffic control as required by Owner.

B. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

C. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

PART 2 - PRODUCTS – NOT APPLICABLE

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag each tree trunk at 54 inches (1372 mm) above the ground. Similarly flag or surround in marking tape on stakes a minimum of 4’ above grade shrubs, or herbaceous vegetation to remain.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TREE AND PLANT PROTECTION

A. General: Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations per Section 015639.

3.3 EXISTING UTILITIES

A. Locate, identify, and disconnect utilities indicated to be abandoned in place.

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

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

C. Excavate for and remove underground utilities indicated to be removed.

3.4 VEGETATION REMOVAL (HERBACEOUS VEGETATION)

A. Remove herbaceous vegetation to permit installation of new construction.
1. Do not remove trees, shrubs, and other vegetation indicated to remain
2. Refer to Plant Removal Procedures on sheet L1.0.

3.5 CLEARING AND GRUBBING (WOODY VEGETATION)

A. Remove woody trees and shrubs to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Cut out or grind stumps and remove roots, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.
3. Use only hand methods for grubbing within protection zones or protect soil from unnecessary compaction through the use of plywood supports
4. Chip removed tree branches and dispose of off-site.

5. Refer to Plant Removal Procedures on sheet L1.0.

3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

SECTION 329300

EXTERIOR PLANTINGS

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.

B. References:

1. ASTM D 4972 pH of Soils
2. ASTM D 5268-02. Standard Specification for Topsoil Used for Landscaping Purposes.
3. ASTM D698-00ae1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
4. American Joint Committee on Horticultural Nomenclature, “Standardized Plant Names,” second edition.
5. ANSI Z60.1 Nursery Stock (1990)
6. AASHTO T 194 Organic Content of Soils.
7. Munsell Soil Color Charts, revised edition 1992.

1.2 SUMMARY

A. Provide all labor, materials and equipment required or inferred from the plan documents and this section to complete the indicated work. Section includes:

1. Preparation, materials delivery and installation, and maintenance as indicated on drawings and specified herein. This Section includes:
   a. Deciduous Shade Trees
   b. Transplanted Evergreens
   c. Shrubs
   d. Turfgrass Sod
   e. Ornamental Perennials, Grasses, and Groundcovers
   f. Top Soil
   g. Soil Amendments
   h. Mulch Placement

B. Related Sections include the following:

1. Section 015639 “Temporary Tree Protection”

1.3 DEFINITIONS

A. Balled and Burlapped Stock (B&B): Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree or shrub required; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.

B. Balled and Potted Stock: Exterior 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 the diameter and depth recommended by ANSI Z60.1 for type and size of exterior plant required.

C. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with 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 kind, type, and size of exterior plant required.

D. Finish Grade: Elevation of finished surface of planting soil.

E. Top Soil: Imported topsoil or imported soil modified to become topsoil; mixed with soil amendments.

F. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Plant Supplier: Within two (2) weeks following notification to proceed, submit for approval to the Landscape Architect a written list indicating the following:

1. Name and address of plant source supplier for each plant species.
2. Quantity of each species to be installed shall be submitted eight (8) weeks prior to delivery to project site.

C. Qualification Data: For Landscape Installer showing compliance with 1.5A.

D. Material Test Reports: For topsoil.

E. Invoices: Vendor or grower’s invoice for each shipment of plants shall show botanical name, common name, size, quantity by species, location where grown, and root treatment of plants.

F. Planting Schedule: Indicating anticipated planting dates for exterior plants (refer to Parts 1.7A & B).

G. Dated timesheets showing fulfillment of required maintenance operations – see 1.9.

H. Samples: for all mulch types used.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A contractor with a minimum of five (5) years experience specializing in planting and seeding, and maintenance procedures for woody plant and native herbaceous species of similar species and maintenance requirements, and of similar size and scope.

1. Installer's Field Supervision: A qualified, experienced, English-speaking full-time supervisor shall be on site during all planting and maintenance operations.
2. Landscape Architect will review and approve all contractor qualifications prior to contract award.
3. The Contractor shall comply with all federal, state and local ordinances, and permits issued for the project.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, clay content; cation exchange capacity; deleterious material; and pH of topsoil.

1. Sampling for topsoil analysis shall consist of a composite sample composed of a minimum of ten (10) subsamples.
2. Results of topsoil analysis shall have approval and sign-off by Landscape Architect prior to delivery of off-site topsoil or placement of on-site topsoil.

D. All relevant materials and work shall comply with applicable sections of the following references unless waived in writing:

1. American Association of Nurserymen, Inc. (AAN) Standard: American Standard for Nursery Stock (ANSI Z60.1-1986).
2. Hortus Third, Cornell University, 1976.
3. American Joint Committee on Horticultural Nomenclature “Standard Plant Names”, second edition, 1942.
4. ASTM: American Society for Testing Materials.

E. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements six (6) inches above ground for trees up to 4-inch caliper size, and 12 inches above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

F. Observation: Landscape Architect may observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from project site.

G. Plant Material: Provide quality, size, genus, species, and variety of herbaceous plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock".

1. All landscape materials shall be from stock sources located within 200 miles of project site.

2. Substitutions: Must be approved in writing by the Landscape Architect following proof of non-availability and proposal for use of equivalent material. For proof of non-availability, submit a list of sources queried.

3. Plants shall be supplied at the sizes specified. Plants of larger size may be used if acceptable to the Landscape Architect and if sizes of containers or root balls are proportionately increased.

4. Container plants may be substituted for those designated "B & B" only if approved by the Landscape Architect.

H. Pre-installation Conference: Conduct pre-installation conference at Project site.

I. Approval and Selection of Materials and Work: The selection of all materials and the execution of all operations required under the specifications and drawings are subject to the approval of the Landscape Architect. He/she has the right to reject any and all materials and any and all work, which, in his/her opinion, does not meet the requirements of the contract documents at any stage of the operations. The Contractor shall remove rejected work and/or material from job site and replace promptly.

1.6 DELIVERY, STORAGE, AND HANDLING

A. General:

1. Notify Landscape Architect 48 hours in advance of all delivery times.

B. Plant Materials:

1. Do not prune trees and shrubs before delivery, except as approved by Landscape Architect.

2. Transport plant material in closed vehicles or in open vehicles with the entire load properly covered for protection from drying winds, heat, freezing or other exposure that may be harmful. Make arrangements to have plant material watered during shipment as necessary to avoid excessive stress. Plant material

may be rejected if not properly shipped. Plant material shall not be shipped when temperatures are below 20 degrees Fahrenheit.

3. Labels: Shipment of plants shall be clearly identified with durable and legible, waterproof labels stating correct botanical plant name (genus and species) and size of plant securely attached to individual plants or to bundles of like variety and size.

C. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's (Turfgrass Producers International's) "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

D. Shipping shall be scheduled to minimize on site storage of seed/plants. Deliver seed material/plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants in shade, protect from weather and mechanical damage, and keep roots moist.

1. Plants shall not be bent, stacked, or bound in a manner that damages bark, breaks branches, deforms root balls, or destroys natural shape.
2. Handle planting stock by root ball.
3. Cover root balls of trees and shrubs with soil and mulch.
4. Water root systems of all plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.
5. Do not remove container-grown stock from containers until planting time.
6. If it is necessary to store seed material after arrival to the project site, it shall be stored in an approved cool, dry, waterproof building in such a manner as to protect the seeds from deterioration and to permit easy access for inspection. Seed shall be stored away from contaminants. Any chemical treatment material shall not be stored with the seed or plant material.

E. Plant material shall be inspected upon arrival at the project site for conformity to species and quality.

F. Packaged Materials: Deliver packaged materials in original, unopened containers, showing weight, analysis and name of manufacturer. During shipment and storage on site, protect materials from breakage, moisture, heat or other damage.

1.7 COORDINATION

A. Exterior Planting Schedule: Two (2) weeks following contract award, submit description of work and schedule for woody, seed, and herbaceous planting and maintenance. Planting Schedule shall include dates for each of the following items of work and shall be provided to the Landscape Architect:

1. Exterior Planting Material order verification.

2. Delivery of exterior planting materials to the project site.
3. Tree/Shrub/Sod/Plant Installation.
4. Substantial Completion.
5. Maintenance period.
6. Final acceptance.

B. Installation Seasons and Conditions: Consult the Landscape Architect for a detailed construction schedule that indicates the timeframes during which all planting must be completed. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion. The following outlines the recommended installation timeframe provided the construction schedule is completed on a timely basis.

1. Tree/shrub installation: Sequence tree/shrub installation after completion of construction work including construction access. There shall be no disturbance to areas after woody material installation. Preferred installation timeframe is April 15 to June 15. If installation cannot occur until later, contractor shall be responsible for supplemental watering.

2. Turfgrass sod installation: Sodding shall be preferentially conducted in spring between May 1st and July 1st, as soon as farms are cutting sod or between Sept 1st and Oct 1st. In no event may sod be installed after October 15th.

3. Herbaceous material installation: Sequence installation with completion of seeding and erosion blanket installation where applicable. Herbaceous material installation shall be preferentially installed between May 1st and July 1st or between Sept 1st and Oct 15th.

4. Boxwood transplanting: Boxwood should be transplanted between September 1st and October 15th.

5. If special conditions exist which warrant installation outside these proposed planting timeframes, submit a written request to the Landscape Architect describing conditions and stating the proposed variance. If approved, the installation contractor may be responsible for the supplemental watering at a frequency and duration for proper vegetation establishment and development.

C. Project Site Conditions:

1. Prior to beginning work, the contractor shall examine and verify the acceptability of the project site and notify the Landscape Architect in writing of unsatisfactory conditions. Do not proceed with any work until unsatisfactory conditions have been corrected or resolved in writing with the Landscape Architect.

2. Where seeding/planting occurs in close proximity to other site improvements, adequate protections shall be given to all features prior to commencement of work. Any items damaged during planting operations shall be promptly repaired to their original condition at no cost to the owner.

3. Contractor shall have all underground utilities located by servicing agencies prior to beginning work. In the vicinity of utilities, hand excavate to minimize possibility of damage to underground utilities.

D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit. Do not plant when weather conditions are unfavorable such as during high winds, or extremely wet or muddy conditions.

1. When conditions detrimental to plant growth are encountered such as adverse drainage conditions or obstructions, notify the Landscape Architect prior to planting.

E. Coordination with Other Work:

1. Proceed with and complete work as rapidly as portions of project site become available, working within the seasonal limitations for each kind of work required.
2. Herbaceous plant material shall be planted following seed and erosion blanket installation within those areas that are to receive erosion blanket as indicated on plan documents, unless otherwise coordinated with and accepted by the Landscape Architect.

1.8 WARRANTY

A. Warranty Period: Warrant all exterior planting material, for the warranty period indicated, against defects including death, disease or infestation, and unsatisfactory growth, except for defects resulting from neglect, or abuse by Owner, or incidents that are beyond Contractor's control.

1. Warranty Period for Trees and Shrubs: 1 year from date of Substantial Completion.
2. Warranty Period for Sodding covered under this Section: 1 year from date of Substantial Completion.
3. Warranty Period for Herbaceous Plants: 2 years from date of Substantial Completion.
4. Warranty Period for transplanted Boxwood: None

B. Replacements within Warranty Period:

1. At end of warranty period replace exterior plants that are more than 25 percent dead or in an unhealthy or unsightly condition, or for woody material that have lost their natural shape due to dead branches.
2. Remove dead plant material immediately. Replace immediately unless required to plant in the succeeding planting season.
3. Replacement plants and planting operations shall be in accordance with the original specifications. Fully restore areas damaged by replacement operations to their original and specified condition.

4. The guarantee of all replacement plants shall extend for an additional period of one (1) year from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of said extended guarantee, the Landscape Architect may elect subsequent replacement or credit for that item.

C. Warranty/Performance Standards:

1. At the end of the Warranty Maintenance Period and at the time of final acceptance the following performance standards shall be met:

a. 100% of the woody material shall be alive and growing in a healthy condition.

b. 95% of the seeded species within each corresponding planting zone shall be alive and growing in a healthy condition.

c. 95% of the planted plugs and container-grown plants shall be alive and growing in a healthy condition.

1.9 MAINTENANCE

A. Begin maintenance immediately after each tree/shrub is installed and area is seeded and planted and continue until final acceptance and approval by the Landscape Architect at the end of the warranty maintenance period.

1. Trees and Shrubs: Maintain for the maintenance period by pruning, cultivating, watering, weeding, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Coordinate with Landscape Architect for application of insecticide, fungicide, fertilizer, etc. Restore or replace diseased, deformed, or damaged trees and shrubs.

2. For sodded areas, establish and maintain sod vegetation by watering, mowing, weeding, reseeding, and other Landscape Architect approved operations. Do not let weedy volunteer species exceed 10% of total ground cover unless a different rate is agreed to in writing prior to contract award.

3. Planted plugs and container-grown plants: Maintain for the maintenance period by watering, weeding, and other operations as required to establish healthy, viable plantings. Do not let weedy volunteer species exceed 10% of total ground cover unless a different rate is agreed to in writing prior to contract award.

a. Hand weed and/or use appropriate herbicide (by licensed applicator) at a minimum twelve (12) times each growing season during the maintenance period. Submit dated time sheets of required maintenance operations to Landscape Architect.

1) Hand pulling should include the removal of all aboveground and belowground stems, roots, and flower masses prior to the development of seeds. Care should be taken to disturb as little soil as

possible during hand pulling to avoid exposure of additional weed seed in the soil layer, and protect adjacent emerging seedlings.

4. Transplanted Boxwoods: Maintain for the maintenance period by pruning, cultivating, watering, weeding, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Coordinate with Landscape Architect for application of insecticide, fungicide, fertilizer, etc. Remove and dispose of any transplanted Boxwoods that die, or suffer from severe decline during the warranty/maintenance period.

PART 2 - PRODUCTS

2.1 GENERAL

A. Warrant all plant material to be true to botanical name and specified size. Any repercussions resulting from incorrect supplied materials (i.e. removal/replacement) will be borne by the contractor.

2.2 PLANT MATERIAL

A. Tree and Shrub Material: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Grade: Provide trees and shrubs of sizes and grades complying with ANSI Z60.1 for type of trees and shrubs required.
2. Label at least one tree and one shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.
3. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.
4. Multi-stem Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1.
5. Deciduous Shrubs: Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.

B. Herbaceous Plant Material: Provide nursery propagated stock in accordance with best horticultural practice. Collected stock or nursery grown wild plants will not be permitted. Plants shall be free of disease, insects, eggs, larvae, and defects such as knots, sunscald, injuries, abrasions, or disfigurement. They shall be sound, healthy and vigorous of uniform growth typical of the species and variety, well formed, free from

irregularities with the minimum quality conforming to American Society for Nursery Stock:

1. Plants designated as plugs shall be grown in containers with sidewall grooves, ribs, or slits and a minimum of 2 ¼ inch in diameter by 5 ½ inches depth.
2. Plants furnished in containers shall have roots well established in the soil mass and shall exhibit root growth that holds soil together when pulled from the container. Containers shall be large enough to provide earth-root mass of adequate size to support the plant tops being grown. Plants over-established in the container, as evidenced by pot-bound root ends, will not be accepted.
3. Herbaceous perennial plant material shall be subject to final approval by the Landscape Architect at the project site prior to installation.
4. Refer to plan documents for species, type, quantity and planting locations.

2.3 TURFGRASS SOD

A. Turfgrass Species: Sod of grass species as follows, with not less than 85 percent germination, not less than 95 percent pure seed, and not more than 0.5 percent weed seed:

1. Full Sun: Kentucky bluegrass (Poa pratensis), a minimum of three cultivars.
2. Sun and Partial Shade: Proportioned by weight as follows:

    a. 50 percent Kentucky bluegrass (Poa pratensis).
    b. 30 percent chewings red fescue (Festuca rubra variety).
    c. 10 percent perennial ryegrass (Lolium perenne).
    d. 10 percent redtop (Agrostis alba).

3. Shade: Proportioned by weight as follows:

    a. 50 percent chewings red fescue (Festuca rubra variety).
    b. 35 percent rough bluegrass (Poa trivialis).
    c. 15 percent redtop (Agrostis alba).

2.4 PLANTING SOIL

A. Topsoil: ASTMD 5268, pH range of 5.5 to 7; consists of 45-50% sand, 35-40% silt, and 10-15% clay as determined by mechanical analysis and based on the U.S.D.A. classification system; uniformly composed from the A-horizon of soil profiles of local soils without admixture of subsoil. Provide topsoil that is free of toxic material, fertile, friable, (i.e. not pulverized), natural loam free from subsoil, clay lumps, brush, litter, stones, weed propagules (seeds, rhizomes, and plants), roots, or similar objects larger than 1-inch in any dimension, or other deleterious materials.

1. Organic content: Between 3% and 10%.

2. Topsoil Source: Import topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction sites where topsoil occurs at least 4 inches deep; do not obtain from bogs or marshes. The top two (2) inches of surface soil shall be removed/scrapped to remove primary weed seed source; clean soil shall be obtained from 2-inch to subsoil interface depth. Topsoil shall not have been stored or stockpiled for more than one year.
3. Material stripped from the following sources shall not be considered suitable for use as topsoil: chemically contaminated soils, areas from which the original surface has been stripped and/or covered over such as borrow pits, open mines, demolition sites, dumps and sanitary landfills.

2.5 MULCHES

A. Top Dress Mulch: Free from deleterious materials and suitable as a top dressing of trees and perennial areas consisting of one of the following:

1. For Woody Tree and Shrub beds: Double shredded hardwood bark that is clean, fresh, free from branches, free of dyes, free of pieces over 2” in length, free of foreign matter and free of insects.

2. For Herbaceous Plant Beds: Partially-composted leaf mulch that is clean, free of foreign matter, and free of insects.

B. Straw Mulch:

1. Shall be clean, seed-free hay of threshed straw of wheat, rye, oats, or barley.

2.6 COMPOST

A. Aged Pine Fines

1. Physical Properties (dry weight basis):

Percent passing	Sieve Size
95-100	6.35 mm (1/4 in.)
80-100	2.38 mm (#8, 8 mesh)
0-30	500 micron (#35, 32 mesh)

2. Organic Content (dry weight basis): 94% minimum as determined by ash analysis.
3. Chemical Properties
   a. Nitrogen Content (dry weight basis): 0.8% minimum
   b. Soluble Salts/Salinity: Maximum Saturation Extract Conductivity 3.0 millimhos/cm at 25 degrees C, by method.
   c. Iron (dry weight basis): 0.08% minimum
   d. pH: 6.5-7.5

4. Wettability:
    a. When applied to a cup or small beaker of water @ 70 degrees F. in the amount of 1 teaspoon, the air-dry product shall become completely wet in a period not exceeding 2 minutes.
    b. All wetting agents to be non-phytotoxic at rate used.

2.7 FERTILIZERS

A. Do not apply fertilizers unless coordinated with and approved by the Landscape Architect.

2.8 PESTICIDES

A. Do not apply pesticides unless expressly directed to in the plans/specs and coordinated with and approved by the Landscape Architect.

2.9 STAKES AND GUYS

A. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2 by 2 inches by length indicated, pointed at one end.

B. Guy and Tie Wire: ASTMA 641/A641M, Class 1, galv.-steel wire, 2-strand, twisted, 0.106 inch in dia.

C. Guy Cable: 5-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.

D. Hose Chafing Guard: Reinforced rubber or plastic hose at least 1/2 inch in diameter, black, cut to lengths required to protect tree trunks from damage.

E. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.

PART 3 - EXECUTION

3.1 PROCUREMENT

A. Immediately following contract award, the installing contractor shall begin exterior planting material procurement. During the procurement period, the contractor shall locate sufficient quantities of specified materials and set up growing contracts, if necessary, to ensure that the quantities and quality of exterior plant material will be available during the specified installation period. Contractor shall provide the Landscape Architect with this information as soon as possible.

3.2 EXAMINATION

A. Examine areas to receive exterior plant material for compliance with requirements and conditions affecting installation and performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 GENERAL PREPARATION

A. General.

1. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.
2. The newly prepared site shall be protected with barricades as required from traffic, compaction, and erosion.
3. The final grading contractor will establish finished grades per all applicable project specifications and documentation. All subgrade elevations shall be approved by the Landscape Architect prior to placement of topsoil.

3.4 LAYOUT

A. Woody Planting:

1. Individual tree/shrub locations shall be staked on the project site by the contractor and approved by the Landscape Architect before any planting pits are dug. The Landscape Architect reserves the right to adjust plant material locations prior to planting to meet field conditions without additional cost to the owner.

B. Herbaceous Planting:

1. Contactor shall layout planting zones by species as per plan documents, establish transect lines for linear layout of prairie plantings per plan; stake or flag locations, outline areas, adjust areas when requested, and obtain Landscape Architect's acceptance of layout prior to any planting. The Landscape Architect reserves the right to make field adjustments without any additional cost to the owner. Review course of action with Landscape Architect prior to proceeding with this part.

3.5 NEW PLANTING BED ESTABLISHMENT AND PREPARATION (IN FORMERLY PAVED AREAS)

A. Comply with Part 1.7B of this Section for timeframe of topsoil placement.

B. Refer to plans for location of new planting areas.

C. In areas with new planting soil (formerly paved areas): Loosen subgrade to a minimum depth of 6 inches

a. Before topsoil installation, Contractor shall ensure area to be covered is free from debris including deleterious materials, such as, but not limited to, building

materials, plaster, paints and stains, concrete and stucco, road base type materials, petroleum based chemicals, oils, and other harmful materials as well as remove stones larger than 1 inch in any dimension and sticks, roots, and rubbish. Contractor shall designate an area for these materials to be disposed in and shall follow local ordinances for disposal of said materials.

b. Contractor shall give Landscape Architect sufficient notice before topsoil installation to allow inspection of the site to ensure that subsoil is free of debris and meets penetrability standards.

D. Placement of Top Soil. Spread planting soil mix to a depth of 12 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

1. Placement of planting soil must be coordinated with construction access and schedule to minimize traffic over soil lifts and the final grade as to prevent undesirable soil compaction.

2. Spread top soil mix over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Moderately hand-tamp planting soil not to exceed 85 Proctor density.

E. Finish Grading: Fine grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus/minus ½ inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.6 AMENDING EXISTING TOPSOIL

A. Comply with Part 1.7B of this Section for timeframe of topsoil placement.

B. Refer to plans for locations of existing topsoil to be amended.

C. Place 4 inches of compost directly on top of existing topsoil to be amended after first removing existing vegetation and deleterious material.

D. Integrate compost thoroughly into the existing topsoil using a powered cultivator to a total depth of 8 inches.

E. Moderately hand-tamp planting soil not to exceed 85 Proctor density.

3.7 WOODY PLANTING

A. Excavation: Rocks and other underground obstructions shall be removed to a depth necessary to permit proper planting according to plans and specifications. If underground utilities or other structural obstructions are encountered, alternate planting locations will be determined by the Landscape Architect.

B. Tree/Shrub Planting: Planting, unless otherwise directed, shall be performed as specified in Part 1.7. Do not plant when ground is frozen or too wet.

1. Balled and burlapped plants: Excavate circular pits that are twice the size of the root ball with sides sloped inward. Scarify sides of plant pit. If necessary, add compacted planting mixture in the bottom of the pit or to a depth necessary to set the plant flare above grade. Set the plant in the pit to the proper position, faced to give the best appearance or relationship to one another and adjacent structures. Cut away burlap, rope, wire or other wrapping materials from the top of the ball, and remove from pit. Do not remove burlap or ties from sides or bottom of ball. Clearly cut off broken or frayed roots. Place planting mixture around the ball and carefully compact to avoid injury to the roots and to fill the voids. After backfilling planting pit approximately two-thirds full, add water and allow planting mixture to settle. After water has been absorbed, fill the planting pit with planting mixture and tamp light to 2" below grade. Apply 3" top dress mulch to 12 inches beyond the edge of the planting pit or trench, or as indicated throughout a planting bed. Place mulch to within (4) inches of the plant's trunk. Mulch shall be applied within five (5) days after planting.

2. Container-grown stock shall be planted the same as specified above for balled and burlapped plants, and as modified herein. Remove containers before planting and sever the sides of root ball in several places, loosening the roots on the outside of the ball sufficiently to encourage rapid root extension into the surrounding soil and to prevent girdling of root mass.

C. Smooth planting areas to conform to specified grades after full settlement has occurred.

3.8 SODDING

A. Lay sod within 24 hours of harvesting unless a suitable preservation method is accepted by Landscape Architect prior to delivery time. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than two anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.9 HERBACEOUS PLANTING

A. Install herbaceous plant material within specified timeframe as provided in part 1.7 of this Section.

B. Restore planting beds if eroded or otherwise disturbed after seeding, and remove any accumulated debris, trash, or other extraneous materials within the planting zones before planting.

C. For those areas that are to receive erosion blanket as specified on the plan documents, plant after seeding and placement of erosion control blanket. Contractor will be required to carefully slit installed erosion control blanket for plug installation. Contractor shall ensure minimal disturbance to the erosion control blanket.

D. Herbaceous plant zones and plant spacing shall be as per the plan documents.

E. Remove plugs from containers of cells, loosen roots and install in prepared soil.

F. Dig holes large enough to allow spreading of roots, and backfill with planting soil. Plant to a depth to sufficiently cover all roots.

G. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

H. Plants shall be moist at the time of planting. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

I. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

J. Place a 3 inch deep layer of leaf mulch around all herbaceous plug and ornamental perennial areas.

3.10 BOXWOOD TRANSPLANTING

A. Transplant boxwood plants within specified timeframe as provided in part 1.7 of this Section.

B. Before digging plants from their existing locations the new planting locations should be prepared and ready to receive them. Boxwood plants should be installed in their new locations within 24 hours of being removed.

C. Thoroughly water boxwoods 24-36 hours before transplanting procedure will take place.

D. Boxwoods should be dug from the ground using hand spades or a mechanical tree spade. The size of the root ball should be a minimum of 36 inch diameter wide by 24 inches high.

E. Care should be taken to keep the root balls intact after extraction. This could include wrapping the balls in burlap or placing into a container.

F. If plants are to remain above ground for longer than 1 hour, they should be moved to a shady location and lightly misted until they are re-installed.

G. Plant boxwood into new locations per the direction of 3.7B.

H. Thoroughly water the boxwoods after transplanting operations are complete.

I. Backfill holes left by removed boxwoods with top soil.

3.11 TREE AND SHRUB PRUNING

A. Do not prune plants prior to delivery. After planting, minimally prune the branches of deciduous stock to removed damaged or broken branches. Pruning shall be done by workers with two years experience in this type of work. Do not leave stubs or use hedge shears.

1. Prune trees to retain required height and spread. Unless otherwise directed by the Landscape Architect, do not cut tree leaders. Only remove injured or dead branches from flowering trees.

2. Prune shrubs to retain natural character.

3.12 GUYING AND STAKING

A. Guying and Staking: Trees that shift in the weeks following planting or during the maintenance period shall be promptly staked with no fewer than 3 guys attached to stakes 30 inches long, driven to grade.

3.13 ACCEPTANCE

A. Substantial Completion: Notify the Landscape Architect in writing of the completion of exterior planting.

1. Within 10 days after notification of completion of work, the Landscape Architect will inspect the work and prepare a Notice of Substantial Completion, along with a list of items the require completion or correction.

2. Issuance of the “Notice of Substantial Completion” shall constitute the start of the Warranty Maintenance Period for any portion accepted.

B. Periodic inspections will be made from time to time by the Landscape Architect to review the quality and progress of the work. Work found to be unacceptable must be corrected within 15 calendar days.

C. Final Acceptance Inspection: The final inspection of all exterior plantings will be made by the Landscape Architect. Before final acceptance shall be made, the terms of the warranty shall be met.

1. Acceptance of all exterior planting will be granted after warranty conditions and warranty performance standards are met and all materials are viable and vigorous, free of insects and diseases, firmly rooted and reflect industry standards of appearance.

D. If all of the above and the warranty conditions are met, the work will be accepted. If not accepted and the work is deemed by the Landscape Architect to be an installation failure, the contractor shall replant/reseed the appropriate zones at no additional cost to the owner.

3.14 CLEANUP AND PROTECTION

A. All materials, equipment and procedures used on the site shall conform to all federal, state, and local ordinances, regulations, and laws. Excavated materials unsuitable to backfilling, as well as debris and other refuse materials shall be disposed of off site in compliance with local codes and ordinances.

B. During planting operations, keep adjacent areas clean and the work area in an orderly condition.

1. No hauling operations and construction site traffic on planting areas that have been previously seeded.

2. Excess and waste material shall be removed daily during construction.

C. Repair, to original condition, any damage to existing landscape, paving, or other such features as a result of work related to this contract. Work to be completed at no additional cost to owner.

D. Protection: Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after vegetation establishment.

1. Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades, trespassers, vandalism and herbivory. Maintain protection during installation and maintenance periods. Treat, repair, or reseed/replant as directed by the Landscape Architect.

E. Repair: Any damage to existing landscape or other features as a result of work related to this contract shall be repaired by the responsible contractor to its original condition.

3.15 DISPOSAL

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off owner's property.

END OF SECTION 329300

SECTION 05 52 13
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall mounted handrails.

1.02 RELATED REQUIREMENTS

A. Section 09 91 13 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2020.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

D. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021.

E. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2014.

F. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings 2013, with Editorial Revision.

G. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings 2000 (Reapproved 2006).

H. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2014 (Amended 2015).

I. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.

J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 1999 (Ed. 2004).

1.04 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

B. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated within the previous 12 months.

1.05 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.

B. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months.

C. Fabricator Qualifications:
   1. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.

B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E 935.

C. Allow for expansion and contraction of members and building movement without damage to connections or members.

D. Dimensions: See drawings for configurations and heights.
   1. Wall Rails: 1-1/4 inches diameter, nominal, round.

E. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; provide exposed fasteners.
   1. For anchorage to concrete, provide expansion inserts to be drilled and set into concrete, for bolting anchors.

F. Provide welded connections to join lengths and seal open ends, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

G. Welded Joints: Make visible joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
   1. Ease exposed edges to a small uniform radius.
   2. Welded Joints:
      a. Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.

2.02 STEEL RAILING SYSTEM

A. Steel Pipe: ASTM A 53/A 53M Grade B Schedule 40, shop-primed finish.

B. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.

C. Exposed Fasteners: Screws or bolts; consistent with design of existing wall handrails being replaced.

D. Straight Splice Connectors: Steel welding collars.

E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.03 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

D. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.
   3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

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 and abraded areas.
   4. Touch up shop primer and factory-applied finishes.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Install railings in compliance with ADA Standards for accessible design at applicable locations.

D. Anchor railings securely to structure.

E. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.

F. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

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.

END OF SECTION

SECTION 09 91 13
EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Exterior painting and coating systems.

C. Scope:
   1. Finish surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
      a. Exterior:
         1) Metal, Miscellaneous: Iron, ornamental iron, structural iron and steel, ferrous metal.

1.02 REFERENCE STANDARDS

A. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).

B. SSPC-SP 6 - Commercial Blast Cleaning 2007.

1.03 SUBMITTALS

A. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Product characteristics.
   2. Surface preparation instructions and recommendations.
   3. Primer requirements and finish specification.
   4. Storage and handling requirements and recommendations.
   5. Application methods.
   6. Clean-up information.

B. Samples: Submit four paper draw down samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.

C. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, product name, product code, color designation, VOC content, batch date, environmental handling, surface preparation, application, and use instructions.

C. Paint Materials: Store at a minimum of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

D. Handling: Maintain a clean, dry storage area to prevent contamination or damage to materials.

1.06 FIELD CONDITIONS

A. Do not apply materials when environmental conditions are outside the ranges required by manufacturer.

B. Follow manufacturer's recommended procedures for producing the best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Products: Subject to compliance with requirements, provide Sherwin-Williams Company (The) products indicated; www.sherwin-williams.com.

B. Comparable Products: Products of approved manufacturers will be considered in accordance with 01 60 00 - Product Requirements, and the following:
   1. Products are approved by manufacturer in writing for application specified.
   2. Products that meet or exceed performance and physical characteristics of basis of design products.

2.02 PAINTINGS AND COATINGS

A. General:
   1. Provide factory-mixed coatings unless otherwise indicated.
   2. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application.
   3. Do not reduce, thin, or dilute coatings or add materials to coatings unless specifically indicated in manufacturer's instructions.

B. Volatile Organic Compound (VOC) Content:
   1. Provide paints and finishes that comply with the most stringent requirements specified in the following:

C. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

2.03 PAINT SYSTEMS - EXTERIOR

A. Metal, Miscellaneous: Iron, ornamental iron, structural iron and steel, ferrous metal.
   1. Alkyd Systems, Water Based:
      a. Semi-Gloss Finish:
         1) 1st Coat: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series: www.sherwin-williams.com.
            a) 5 mils wet, 2 mils dry per coat.
         2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial Water Based Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series: www.sherwin-williams.com/.
            a) 4 to 5 mils wet, 1.4 to 1.7 mils dry per coat.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Prime bare steel surfaces.
   3. Remove rust, loose mill scale, and other foreign substances using methods recommended by paint manufacturer and blast cleaning according to SSPC-SP 6. Protect from corrosion until coated.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions.

C. Apply coatings at spread rate required to achieve manufacturer's recommended dry film thickness.

3.04 PRIMING

A. Apply primer to all surfaces unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

B. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to top coat manufacturers.

3.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. Clean surfaces immediately of overspray, splatter, and excess material.

C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

3.06 PROTECTION

A. Protect finished coatings from damage until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 26 05 00
BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Basic Electrical Requirements and materials specifically applicable to Division 26 Sections. Section includes:
   1. Electrical Identification.
   2. Minor Demolition.
   3. Conductors and Devices.
   4. Raceways and Boxes.
   5. Supporting Devices.

1.03 REGULATORY REQUIREMENTS

A. Conform to NFPA 70 - National Electrical Code, 2014 edition with amendments as adopted by the City of Des Plaines, IL.

B. Install electrical Work in accordance with the NECA Standard of Installation.

1.04 DELIVERY, STORAGE AND HANDLING

A. Store and protect all materials as specified herein.

B. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

C. Ship products to the job site in their original packaging. Receive and store products in a suitable manner to prevent damage or deterioration. Keep equipment upright at all times.

D. Investigate the spaces through which equipment must pass to reach its final destination. Coordinate with the manufacturer to arrange delivery at the proper stage of construction and to provide shipping splits where necessary.

1.05 PROJECT/SITE CONDITIONS

A. Install work in locations shown on Drawings, unless prevented by Project conditions. Drawings have omitted certain branch circuitry in areas for ease of reading. All branch circuitry is to be provided by Contractor.

B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission from Architect/Engineer before proceeding as specified under modification procedures.

1.06 QUALITY ASSURANCE

A. Provide Work as required for a complete and operational electrical installation.

B. All products shall be designed, manufactured, and tested in accordance with industry standards. Standards, organizations, and their abbreviations as used hereafter, include the following:
   1. American National Standards Institute, Inc (ANSI).
   2. American Society for Testing and Materials (ASTM).
   3. National Electrical Manufacturers Association (NEMA).
   4. Underwriters Laboratories, Inc. (UL).

C. Install all Work in accordance with the NECA Standard of Installation.

1.07 SUBMITTALS

A. Submit all requested items in Division 26 Sections.

1.08 PROJECT RECORD DOCUMENTS

A. Cooperate and assist in the preparation of project record documents.

1.09 TRENCHING, FILL AND COMPACTION

A. Provide trenching, fill and compaction for all work indicated on Drawings and specified in Division 26 sections.

B. Delegated Engineering Responsibility: The Contractor shall employ experienced horizontal directional drilling personnel familiar with local conditions. Contractor shall be responsible for selection of drilling equipment, drilling fluids, drilling operations, location and tracking instrumentation, ream and pull back procedures.

1.10 PROJECT MANAGEMENT AND COORDINATION

A. Proper project management and coordination is critical for a successful project. Manage and coordinate the Work with all other trades. Reliance on the Drawings and Specifications only for exact project requirements is insufficient for proper coordination.

PART 2 PRODUCTS

2.01 WIRING METHODS

A. All locations: Building wire in raceway.

B. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.

2.02 WIRE AND CABLE

A. Manufacturers:
   1. Okonite.
   2. Southwire.
   3. Collyer.

B. Building Wire:
   1. Feeders and Branch Circuits Larger Than 6 AWG: Copper, stranded conductor, 600 volt insulation.
   2. Feeders and Branch Circuits 6 AWG and Smaller: Copper conductor, 600 volt insulation. 6 and 8 AWG, stranded conductor; smaller than 8 AWG, stranded conductor (solid for device terminations).

3. Control Circuits: Copper, stranded conductor, 600 volt insulation.
4. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.
5. Use conductor not smaller than 12 AWG for power and lighting circuits.
6. Use conductor not smaller than 16 AWG for control circuits.

C. Locations:
1. Exposed Dry Interior Locations: Use only building wire with Type THHN insulation in raceway.
2. Exterior Locations: Use only building wire with Type XHHW insulation in raceway.
3. Underground Installations: Use only building wire with Type XHHW insulation in raceway.

2.03 RACEWAY REQUIREMENTS

A. Use only specified raceway in the following locations:
1. Branch Circuits and Feeders:
a. Exposed Dry Interior Unfinished Locations: Electrical metallic tubing.
b. Utility Primary and Site Lighting: Sch 40 PVC, concrete encased under road ways and parking lots.
c. All other locations: Galvanized Rigid Metallic Conduit.

B. Size raceways for conductor type installed.
1. Minimum Size Conduit Homerun to Panelboard: 3/4-inch.

2.04 METALLIC CONDUIT AND FITTINGS

A. Conduit:
1. Rigid Steel Conduit: ANSI C80.1.
2. Electrical metallic tubing: ANSI C80.3.
3. Flexible Conduit: UL 1, zinc-coated steel.
a. Liquidtight Flexible Conduit: UL360. Fittings shall be specifically approved for use with this raceway.

B. Conduit Fittings:
1. Metal Fittings and Conduit Bodies: NEMA FB 1.
a. EMT fittings: Use set-screw indentor-type fittings.

2.05 NONMETALLIC TUBING

A. Manufacturers:
1. Carlon Co.
2. LCP National Plastics, Inc.
3. Pacific Western Extruded Plastics Co.

B. Description: UL651A "Type EB and A PVC Conduit and HDPE Conduit."
1. Conduit: Schedule 40. Suitable for exposure to sunlight and direct burial.

2.06 CONDUIT HANGERS

A. Manufacturers:
1. Minerrallac Electric Company.
2. Substitutions: Or Approved Equal.

B. Description:
1. Standard conduit hanger, zinc-plated steel with bolts.

2. Threaded rod and hardware: Plated finish, size and length as required for loading and conditions.

2.07 BEAM CLAMPS

A. Manufacturers:
   1. Appleton.
   2. Midwest.
   3. Raco.

B. Description: Malleable beam clamp, zinc plated steel.

2.08 ELECTRICAL BOXES

A. Manufacturers:
   1. Raco.
   2. Steel City.
   3. Appleton.
   4. Substitutions: Or Approved Equal.

B. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel, suitable for installation in masonry:

C. Equipment Support Boxes: Rated for weight of equipment supported; include 2 inch male fixture studs where required.

D. Wet Location Outlet Boxes: Cast aluminum: Cast alloy, deep type, gasket cover, threaded hubs.

2.09 PENETRATION SEALANTS

A. Fire-rated assemblies: Provide firestopping of all penetrations made by Work under this Contract.

B. Thermal and Moisture Protection: Provide thermal and moisture protection made by Work under this Contract of all exterior wall, floor and roof penetrations.

2.10 HAND HOLES

A. Manufacturers:
   1. Quazite.
   2. Or Approved Equal.

B. Description: Precast polymer concrete or precast concrete, Non-conductive, non-flammable with open bottom. Flanged, non-conductive, gasketed cover enclosure with stainless-steel cover screws.
   1. Load Rating: UL listed Tier 8 as suitable for non-deliberate vehicular traffic.
   2. Cover inscribed with "FIELD LIGHTING" or "ELECTRIC" or other suitable description.

2.11 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, black letters on white background.

B. Locations:
   1. Each electrical distribution and control equipment enclosure.

C. Letter Size:
   1. Use 1/8 inch letters for identifying individual equipment and loads.
   2. Use 1/4 inch letters for identifying grouped equipment and loads.

D. Labels: Embossed adhesive tape, with 3/16 inch white letters on a black background. Use only for identification of individual wall switches and receptacles and control device stations.

2.12 WIRE AND CABLE MARKERS

A. Manufacturers:
   1. Brady Model PCPS.
   2. Panduit Model PCM.
   3. T & B Model WM.

B. Description: Cloth type wire markers.

C. Locations: Each conductor at panelboard gutters, pull boxes, and each load connection.

D. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

E. Legend: Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

2.13 CONDUIT MARKERS

A. Location: Furnish markers for each conduit longer than 6 feet.

B. Spacing: 20 feet on center.

C. Color:
   1. 480 Volt System: Orange
   2. 208 Volt System: Black
   3. Fire Alarm System: Red.

2.14 UNDERGROUND WARNING TAPE

A. Description: 4 inch wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Demolition Drawings are based on casual field observation and are intended to identify the limits of the construction site. Remove all electrical systems in their entirety in proper sequence with the Work.

B. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

C. Beginning of demolition means installer accepts existing conditions.

D. Verify that supporting surfaces are ready to receive work.

E. Electrical boxes are shown on Drawings, in approximate locations, unless dimensioned.
   1. Obtain verification from Architect/Engineer for locations of outlets throughout prior to rough-in.

F. Degrease and clean surfaces to receive wire markers.

G. Verify that interior of building is physically protected from weather.

H. Verify that mechanical work which is likely to injure conductors has been completed.

I. Completely and thoroughly swab raceway system before installing conductors.

3.02 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Remove all existing electrical installations to accommodate new construction.

B. Remove abandoned wiring to source of supply.

C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

D. Repair adjacent construction and finishes damaged during demolition and extension work.

E. Properly dispose of all ballast to approved ballast recycler. Do not land fill ballasts.

3.03 APPLICATION

A. Install nameplate and label parallel to equipment lines.

B. Secure nameplate to equipment front using screws.

C. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.

D. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches below finished grade.

E. Neatly train and secure wiring inside boxes, equipment, and panelboards.

F. Use wire pulling lubricant for pulling 4 AWG and larger wires.

G. Route wire and cable as required to meet project conditions.
   1. Wire and cable routing indicated is approximate unless dimensioned.
   2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

H. Pull all conductors into raceway at same time.

I. Protect exposed cable from damage.

J. Neatly train and lace wiring inside boxes, equipment and panelboards.

K. Support cables above accessible ceilings to keep them from resting on ceiling tiles.

L. Make splices, taps, and terminations to carry full ampacity of conductors without perceptible temperature rise.

M. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

N. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".

O. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.

P. Do not use powder-actuated anchors.

Q. Do not drill or cut structural members.

R. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

S. Install surface-mounted cabinets and panelboards with minimum of four anchors.

T. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall.

U. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

V. Terminate spare conductors with electrical tape.

END OF SECTION

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.

B. Poles and accessories.

1.02 REFERENCE STANDARDS

A. IEEE C2 - National Electrical Safety Code(R) (NESC(R)) 2023.

B. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products 2019.

C. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources 2021.

D. IES RP-8 - Recommended Practice: Lighting Roadway and Parking Facilities 2021.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

F. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems 2000 (Reaffirmed 2006).

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

H. UL 1598 - Luminaires Current Edition, Including All Revisions.

I. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
   2. Notify Architect/Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.04 SUBMITTALS

A. Shop Drawings:
   1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
   2. Provide photometric calculations where luminaires are proposed for substitution upon request.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:
   a. Include estimated useful life, calculated based on IES LM-80 test data.
   b. Include IES LM-79 test report upon request.
2. Lamps: Include rated life and initial and mean lumen output.
3. Poles: Include information on maximum supported effective projected area (EPA) and weight for the design wind speed.

C. Certificates for Poles and Accessories: Manufacturer's documentation that products are suitable for the luminaires to be installed and comply with designated structural design criteria.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

F. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

C. Receive, handle, and store wood poles in accordance with ANSI O5.1.

1.07 WARRANTY

A. Provide three year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Type F1A : Pole-mounted LED luminaire.
   1. Luminaire(s):
      a. Products:
         1) HADCO - CXF5-32-G3-T-A-3-730-A-3-N-SP1.
         2) Substitutions: Not Permitted.
      b. Housing: Aluminum.
      c. Shape: Round.
      d. Lighting Distribution per IES RP-8:
         1) Lateral Distribution: Type III.

e. Voltage: Multi-tap 120/208/240/277 V.
f. Mounting: bracket arm suitable for mounting on specified pole, finish to match pole.
1) Products:
a) Hadco - HFP310 P4 A N PM.
g. Listings:
1) Suitable for wet locations.
2. Pole:
a. Products:
1) Hadco - P195 14 A N N ISF.
b. Material: Aluminum.
c. Shape: Square straight.
d. Finish: Match luminaire finish.
e. Mounting: Install on concrete foundation, height as indicated on the drawings.

B. Type F1B : Pole-mounted LED luminaire.
1. Luminaire(s):
a. Products:
1) HADCO - CXF5-32-G3-T-A-4-730-A-3-N-SP1.
2) Substitutions: Not Permitted.
b. Housing: Aluminum.
c. Shape: Round.
d. Lighting Distribution per IES RP-8:
1) Lateral Distribution: Type IV.
2) Cutoff Category: Full cutoff.
e. Voltage: Multi-tap 120/208/240/277 V.
f. Mounting: bracket arm suitable for mounting on specified pole, finish to match pole.
1) Products:
a) Hadco - HFP310 P4 A N PM.
g. Listings:
1) Suitable for wet locations.
2. Pole:
a. Products:
1) Hadco - P195 14 A N N ISF.
b. Material: Aluminum.
c. Shape: Square straight.
d. Finish: Match luminaire finish.
e. Mounting: Install on concrete foundation, height as indicated on the drawings.

C. Type F2 : Ground mounted LED floodlight.
1. Products:
a. Hadco - B9DWA-SP1.
2. Housing: Aluminum.
3. Finish: Black.
4.

5. Voltage: Multi-tap 120/208/240/277 V.
6. Provide with the following features/accessories:
   a. Surge Protection.
7. Listings:
   a. Suitable for wet locations.

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.

H. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.
   3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 POLES

A. Manufacturers:

B. All Poles:
   1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
   2. Material: Steel, unless otherwise indicated.
   3. Shape: Round straight, unless otherwise indicated.
   4. Finish: Match luminaire finish, unless otherwise indicated.
   5. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.

C. Metal Poles: Provide ground lug, accessible from handhole or transformer base.

2.04 HELICAL PILE LIGHTING FOUNDATION

A. Manufacturers:
   1. CHANCE Foundation Solutions; https://www.hubbell.com/
   2. ECP Products; https://www.earthcontactproducts.com/
   3. Substitutions: Approved Equal.

B. All helical pile lighting foundations:
   1. Provide lighting foundation and associated support components suitable for the luminaire(s), pole and associated supports and accessories to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 00 as required for installation of luminaires provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires in accordance with NECA/IESNA 501.

E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

F. Pole-mounted Luminaires:
   1. Foundation Mounted:
      a. Provide cast-in-place concrete or driven helical pile foundations for luminaires as indicated.
         1) Install anchor bolts plumb per template furnished by pole manufacturer.
         2) Position conduits to enter bollard shaft.
      b. Install foundations plumb.
      c. Tighten anchor bolt nuts to manufacturer's recommended torque.
   2. Grounding:
      a. Bond luminaires, metal accessories, and foundation reinforcement to branch circuit equipment grounding conductor.
   3. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.
   4. Electrical Contractor shall provide conduits, fuse holder and fuses for each phase.

G. Install accessories furnished with each luminaire.

H. Bond products and metal accessories to branch circuit equipment grounding conductor.

3.04 FIELD QUALITY CONTROL

A. Inspect each product for damage and defects.

B. Operate each luminaire after installation and connection to verify proper operation.

C. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect/Engineer.

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect/Engineer. Secure locking fittings in place.

3.06 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

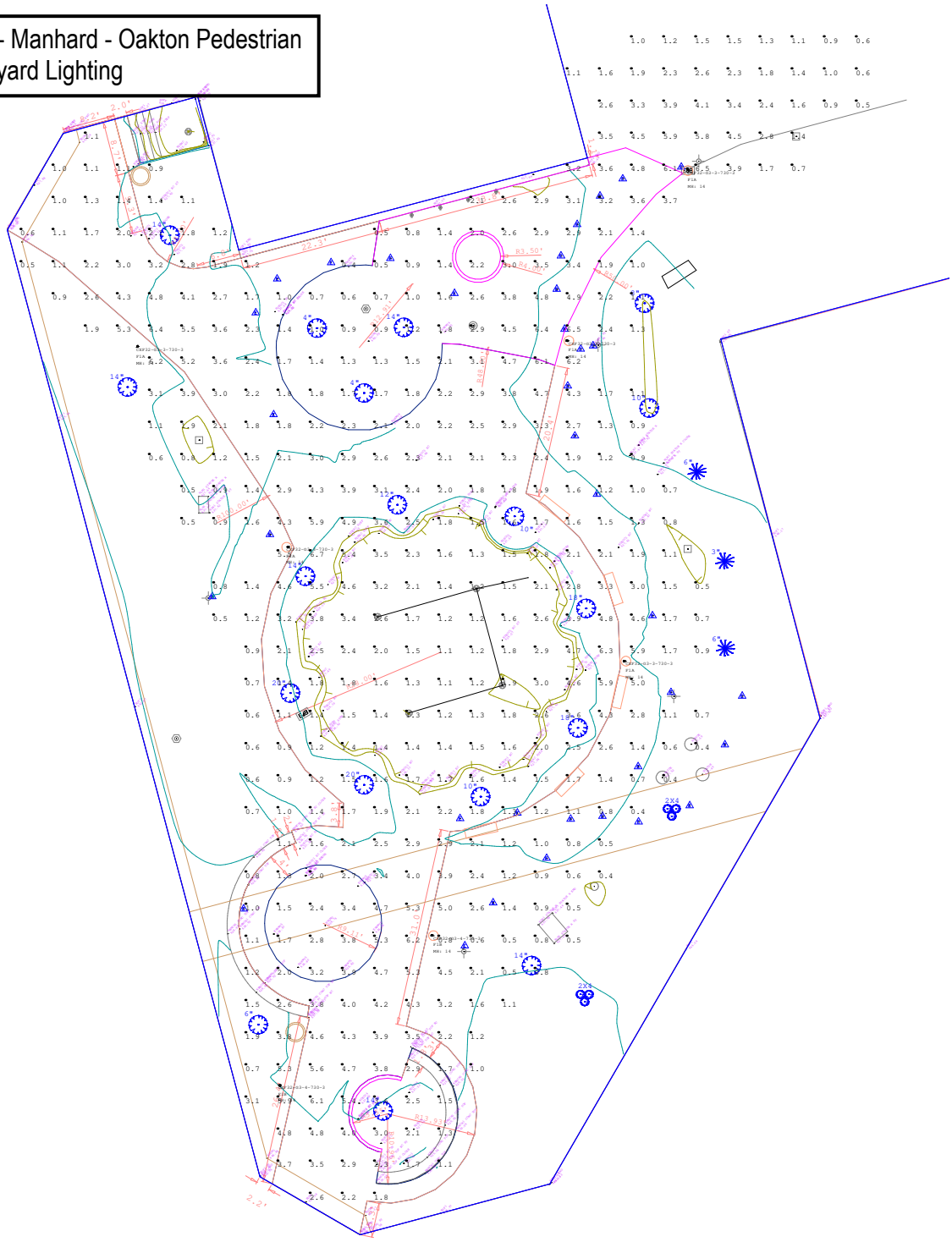
3.09 ATTACHMENTS

A. Photometric calculations.

B. Luminaire cut sheets.

END OF SECTION

1451 - Manhard - Oakton Pedestrian Courtyard Lighting



Luminaire Schedule					
Symbol	Qty	Label	LLF	Description	Tag
	5	CXF32-G3-3-730-3	1.000	CXF32-G3-3-730-3	F1A
	2	CXF32-G3-4-730-3	1.000	CXF32-G3-4-730-3	F1B

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CalcPts_1	Illuminance	Fc	2.33	6.7	0.4	5.83	16.75

Aurora Office
41 W. Benton Street
Aurora, Illinois 60506
630.406.1213

Chicago Office
222 S Riverside Plaza, Suite 1500
Chicago, Illinois 60606
312.667.5670

Bloomington Office
2401 E. Washington Street, Suite 200-B2
Bloomington, Illinois 61704
309.430.6460

HADCO by signify

Urban

PIMA

CXF5 Pendant

Project: OCC - Pedestrian Courtyard Lighting
Location:
Cat.No:
Type:
Lamps: Qty:
Notes:

The Hadco Pima pendant family offers a simple modern take on the traditional pendant lantern, providing style and elegance to downtownareas, commercial developments, parks and residential communities. These pendants use the latest LED technology which maximizes energy savings and provides uniform and comfortable light.

Ordering guide

example: CXF5-32-G3-T-A-2-730-A-3-N-SP1-N

Series	LEDs	Generation	Mounting	Finish	Optics	CCT	Voltage	Drive current
CXF5		G3	T					
CXF5 Pima Receptacle 7 pin is available for this luminaire but must be selected with the arm bracket. It is not part of the luminaire code. See bracket ordering guide for coding.	**32**[1] 32 LEDs **48** 48 LEDs **64** 64 LEDs **80** 80 LEDs	**G3** Gen 3	**T** Top arm	**A** Black **B** White **G** Verde **H** Bronze **I** Gray **J** Green	**2** Type 2 **2H** Type 2 w/HSS **3** Type 3 **3H** Type 3 w/HSS **3W** Type 3 Wide **3WH** Type 3 Wide w/HSS **4** Type 4 **5** Type 5	**730** Warm 3000K **740** Neutral 4000K	**A** 120-277 VAC **B**[1,2] 347-480 VAC	**3** 350mA **5** 530 mA **7** 700mA

Ordering guide (continued)

Driver Options	Surge protection
DA 4 Hrs 25% Reduction **DB** 4 Hrs 50% Reduction **DC** 4 Hrs 75% Reduction **DD** 6 Hrs 25% Reduction **DE** 6 Hrs 50% Reduction **DF** 6 Hrs 75% Reduction **DG** 8 Hrs 25% Reduction **DH** 8 Hrs 50% Reduction **DJ** 8 Hrs 75% Reduction **DALI** Compatible with DALI **S** FAWS Filed adjustable wattage slector **SRD**[2] Sensor ready driver, standard configuration **SRD1**[2] Sensor ready driver, alternate configuration **N** No dimming	**SP1** 10kV/20kA **SP2** 20kV/10kV

Footnotes

1. 32 LED at 350mA and 530mA are not compatible with 347-480V.
2. 347-480V not compatible with optional dimming or optional programming.

DLC LISTED

CXF5 PIMA

Pendant

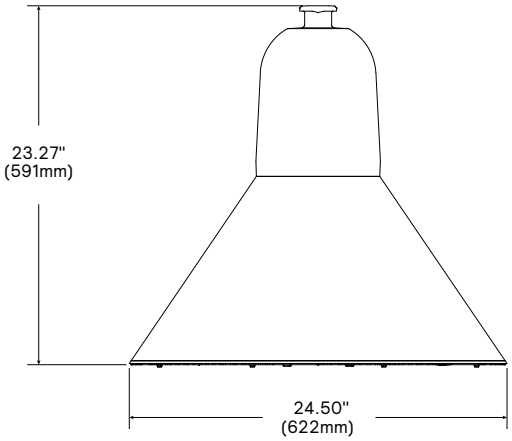
Dimensions

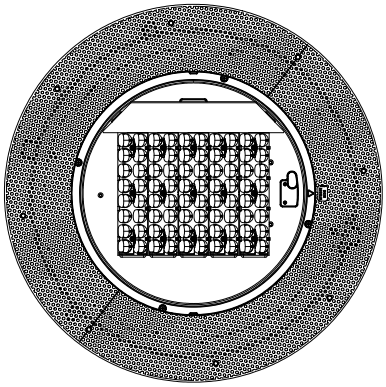
Width 24-1/2" diameter

Height 23-3/8"

EPA 1.52 sq. ft

Weight (maximum) 44 lbs (19.96 kg)





Predicted Lumen Depreciation Data

Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions.L_{70} is the predicted time when LED performance depreciates to 70% of initial lumen output. Calculated per IESNA TM21-11. Published L_{70} hours limited to 6 times actual LED test hours.

Ambient Temperature °C	Driver mA	Calculated L_{70} Hours	L_{70} per TM-21	Lumen Maintenance % at 60,000 hrs
25°C	700 mA	>100,000 hours	>60,000 hours	>87%

Field Adjustable Wattage (FAWS) Multiplier Chart

FAWS Position	Typical Delivered Lumens Multiplier	Typical System Wattage
1	0.31	0.28
2	0.53	0.50
3	0.62	0.58
4	0.70	0.67
5	0.78	0.75
6	0.83	0.81
7	0.89	0.87
8	0.92	0.91
9	0.96	0.95
10	1.00	1.00

Note: Typical value accuracy +/- 5%

CXF5 PIMA

Pendant

LED Wattage and Lumen Values: Pima CXF5

LED Module: 3000K				Type 2			Type 3			Type 3W			Type 4			Type 4W		
Ordering Code	LED qty	LED Current (mA)	Color Temp.	Delivered Lumens[2]	BUG Rating	Efficacy (LPW)	Delivered Lumens[2]	BUG Rating	Efficacy (LPW)	Delivered Lumens[2]	BUG Rating	Efficacy (LPW)	Delivered Lumens[2]	BUG Rating	Efficacy (LPW)	Delivered Lumens[2]	BUG Rating	Efficacy (LPW)
32-G3-x-730-3	32	350	35	4715	B1-U0-G1	134	4601	B1-U0-G1	131	4521	B1-U0-G1	128	4650	B1-U0-G1	132	4516	B3-U0-G1	128
32-G3-x-730-5	32	530	51	6750	B2-U0-G1	132	6587	B1-U0-G1	129	6473	B1-U0-G2	126	6657	B1-U0-G2	130	6465	B3-U0-G1	126
32-G3-x-730-7	32	700	71	8405	B2-U0-G1	119	8203	B2-U0-G2	116	8061	B2-U0-G2	114	8290	B2-U0-G2	118	8051	B3-U0-G2	114
48-G3-x-730-3	48	350	54	6870	B2-U0-G1	127	6705	B1-U0-G1	124	6589	B1-U0-G2	122	6776	B1-U0-G2	125	6580	B3-U0-G1	122
48-G3-x-730-5	48	530	80	9836	B2-U0-G2	123	9599	B2-U0-G2	120	9433	B2-U0-G2	118	9701	B2-U0-G2	121	9421	B3-U0-G2	118
48-G3-x-730-7	48	700	105	12249	B3-U0-G2	117	11954	B2-U0-G2	114	11747	B2-U0-G2	112	12081	B2-U0-G2	115	11732	B4-U0-G2	112
64-G3-x-730-3	64	350	68	7602	B2-U0-G1	112	7418	B2-U0-G1	109	7290	B1-U0-G2	107	7497	B2-U0-G2	110	7281	B3-U0-G2	107
64-G3-x-730-5	64	530	99	10882	B2-U0-G2	110	10620	B2-U0-G2	107	10437	B2-U0-G2	105	10733	B2-U0-G2	108	10423	B4-U0-G2	105
64-G3-x-730-7	64	700	114	13552	B3-U0-G2	119	13226	B2-U0-G2	116	12997	B2-U0-G2	114	13367	B2-U0-G2	117	12980	B4-U0-G2	114
80-G3-x-730-3	80	350	87	10695	B2-U0-G2	123	10438	B2-U0-G2	120	10257	B2-U0-G2	118	10549	B2-U0-G2	121	10244	B4-U0-G2	118
80-G3-x-730-5	80	530	126	15312	B3-U0-G2	121	14943	B3-U0-G2	118	14684	B2-U0-G2	116	15102	B3-U0-G2	120	14665	B4-U0-G2	116
80-G3-x-730-7	80	700	168	19068	B3-U0-G2	113	18609	B3-U0-G2	111	18287	B3-U0-G3	109	18807	B3-U0-G3	112	18263	B4-U0-G2	109

LED Module: 4000K				Type 2			Type 3			Type 3W			Type 4			Type 4W		
Ordering Code	LED qty	LED Current (mA)	Color Temp.	Delivered Lumens[2]	BUG Rating	Efficacy (LPW)	Delivered Lumens[2]	BUG Rating	Efficacy (LPW)	Delivered Lumens[2]	BUG Rating	Efficacy (LPW)	Delivered Lumens[2]	BUG Rating	Efficacy (LPW)	Delivered Lumens[2]	BUG Rating	Efficacy (LPW)
32-G3-x-740-3	32	350	35	4950	B1-U0-G1	141	4831	B1-U0-G1	137	4747	B1-U0-G1	135	4882	B1-U0-G1	139	4741	B3-U0-G1	135
32-G3-x-740-5	32	530	51	7087	B2-U0-G1	138	6916	B1-U0-G1	135	6797	B1-U0-G2	133	6990	B1-U0-G2	137	6788	B3-U0-G1	133
32-G3-x-740-7	32	700	71	8826	B2-U0-G1	125	8613	B2-U0-G2	122	8464	B2-U0-G2	120	8705	B2-U0-G2	123	8453	B3-U0-G2	120
48-G3-x-740-3	48	350	54	7214	B2-U0-G1	134	7040	B2-U0-G1	130	6918	B1-U0-G2	128	7115	B1-U0-G2	132	6910	B3-U0-G1	128
48-G3-x-740-5	48	530	80	10328	B2-U0-G2	129	10079	B2-U0-G2	126	9904	B2-U0-G2	124	10186	B2-U0-G2	127	9892	B4-U0-G2	124
48-G3-x-740-7	48	700	105	12861	B3-U0-G2	122	12552	B2-U0-G2	120	12334	B2-U0-G2	117	12685	B2-U0-G2	121	12319	B4-U0-G2	117
64-G3-x-740-3	64	350	68	7982	B2-U0-G1	117	7789	B2-U0-G2	114	7655	B1-U0-G2	112	7872	B2-U0-G2	116	7645	B3-U0-G2	112
64-G3-x-740-5	64	530	99	11427	B3-U0-G2	115	11151	B2-U0-G2	112	10958	B2-U0-G2	111	11270	B2-U0-G2	114	10944	B4-U0-G2	110
64-G3-x-740-7	64	700	114	14230	B3-U0-G2	125	13887	B3-U0-G2	122	13647	B2-U0-G2	120	14035	B2-U0-G2	123	13629	B4-U0-G2	120
80-G3-x-740-3	80	350	87	11230	B3-U0-G2	129	10960	B2-U0-G2	126	10770	B2-U0-G2	124	11076	B2-U0-G2	127	10756	B4-U0-G2	123
80-G3-x-740-5	80	530	126	16077	B3-U0-G2	127	15690	B3-U0-G2	124	15418	B2-U0-G2	122	15857	B3-U0-G2	126	15399	B4-U0-G2	122
80-G3-x-740-7	80	700	168	20022	B3-U0-G2	119	19539	B3-U0-G2	116	19201	B3-U0-G3	114	19747	B3-U0-G3	117	19177	B4-U0-G2	114

1. System input wattage may vary based on input voltage, by up to +/- 10% , and based on manufacturer forward voltage, by up to +/- 8%.
2. Lumen values based on photometric tests performed in compliance with IESNA LM-79.

Note: Some data may be scaled based on tests of similar, but not identical, luminaires.

CXF5 PIMA

Pendant

Specifications

Housing

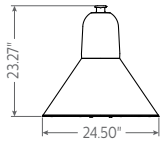
In a round shape, this housing is constructed of low copper die-cast aluminum and 0.090" thick spun aluminum. All non-ferrous fasteners prevent corrosion and ensure longer life.

Access-mechanism

The hinged lens frame is cast aluminum with a stainless steel spring latch for tool-less access

Mounting

T: Top arm mount



Light engine

LEDgine is composed of five main components: **Heat Sink, Lens, LED lamp, Optical System, and Driver.** Electrical components are RoHS compliant.

LED module

LED type Lumileds LUXEON T.Composed of high-performance white LEDs. Color temperature as per ANSI/NEMA bin Neutral White, 4000 Kelvin nominal (3985K +/- 275K or 3710K to 4260K) or Warm White, 3000 Kelvin nominal (3045K +/- 175K or 2870K to 3220K), CRI 70 Min. 75 Typical.

Heat sink

Made of cast aluminum optimizing the LEDs efficiency and life. Product does not use any cooling device with moving parts (only passive cooling device).

Finish

Color in accordance with the AAMA 2603 standard. Application of polyester powder coat paint (4 mils/100 microns) with ± 1 mils / 24 microns of tolerance. The Thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard. The surface treatment achieves a minimum of 2000 hours for salt spray resistant finish in accordance with testing performed and per ASTM B117 standard.

Optical system

Composed of high performance UV stabilized optical grade polymer refractor lenses to achieve desired distribution optimized to get maximum spacing, target lumens and a superior lighting uniformity. System is rated IP66. Performance shall be tested per LM-63, LM-79 and TM-15 (IESNA) certifying its photometric performance. Type 2, 3, 3W, 4 and Type 5 Street side indicated. House side shield optional (can be field installed) 2H: Type 2 with House Side Shield, 3H: Type 3 short with house side shield, 3WH: Type 3 Wide with House side shield.

Driver

Driver comes standard with dimming compatible 0-10V. High power factor of 95%. Electronic driver, operating range 50/60 Hz. Auto adjusting universal voltage input from 120 to 277 VAC rated for both application line to line or line to neutral, Class I, THD of 20% max. Maximum ambient operating temperature from 40°F (4°C) to 130°F (55°C). Certified in compliance to UL1310 cULus requirement (dry and damp location). Assembled on a unitized removable tray with Tyco quick disconnect plug resisting to 221°F (105°C). The current supplying the LEDs will be reduced by the driver if the driver experiences internal overheating as a protection to the LEDs and the electrical components. Output is protected from short circuits, voltage overload and current overload. Automatic recovery after correction. Standard built in driver surge protection of 2.5kV (min).

DA: 4 Hrs 25% Reduction
DB: 4 Hrs 50% Reduction
DC: 4 Hrs 75% Reduction
DD: 6 Hrs 25% Reduction
DE: 6 Hrs 50% Reduction
DF: 6 Hrs 75% Reduction
DG: 8 Hrs 25% Reduction
DH: 8 Hrs 50% Reduction
DJ: 8 Hrs 75% Reduction
DALI: Pre-set driver compatible with the the DALI logarithmic control system.

FAWS: Field Adjustable Wattage Selector, pre-set to the highest position, can be easily switched in the field to the required position. This reduces total luminaire wattage consumption and reduces the light level – see the FAWS multiplier chart for more details. **Note:** It is not recommended to use FAWS with other dimming or controls; if you do, set the switch to position 10 (maximum output) to enable the other dimming or controls. Switching FAWS to any position other than 10 will disable the other dimming or controls.

SRD: Sensor Ready Driver including SR communication (used for dimming and other functionalities), 24V auxiliary supply and a logical signal input (LSI) connected to the top NEMA twist lock receptacle.

SRD1: Sensor Ready Driver including SR communication (used for dimming and other functionalities) but with 24V auxiliary supply and a logical signal input (LSI) not connected to the top NEMA twist lock.

Surge protection

Surge protector tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line Ground, Line Neutral and Neutral Ground, and in accordance with U.S. DOE (Department of Energy) MSSLC (Municipal Solid State Street Lighting Consortium) model specification for LED roadway luminaires electrical immunity requirements for High Test Level 10kV / 10kA.

Wiring

Gauge 18 wires. Top mount option come with quick disconnects. Arm mount options provide a 6" Minimum exceeding from luminaire.

Hardware

All non-ferrous fasteners prevent corrosion and ensure longer life.

CXF5 PIMA

Pendant

Specifications (cont.)

Luminaire useful life

Refer to IES files for energy consumption and delivered lumens for each option. Based on ISTMT in situ thermal testing in accordance with UL1598 and UL8750, using LM-80 data from LED manufacturers and engineering prediction methods, the luminaire useful life is expected to reach 100,000+ hours with >L70 lumen maintenance @ 25°C. (48 LED and 64 LED@700mA is 82,000) Luminaire useful life accounts for LED lumen maintenance and additional factors, including LED life, driver life, PCB substrate, solder joints on/off cycles and burning hours for nominal applications.

LED products manufacturing standard

The electronic components sensitive to electrostatic discharge (ESD) such as light emitting diodes (LEDs) are assembled in compliance with IEC61340 5 1 and ANSI/ ESD S20.20 standards so as to eliminate ESD events that could decrease the useful life of the product

Quality control

The manufacturer must provide a written confirmation of its ISO 9001 2008 and ISO 14001 2004 International Quality Standards Certification.

Vibration resistance

Meets the ANSI C136.31 2001, American National Standard for Roadway Luminaire Vibration specifications for normal Applications.

Certifications and Compliance

cETL listed to Canadian safety standards for wet locations. Manufactured to ISO 9001:2008 Standards. UL8750 and UL1598 compliant. ETL listed to U.S. safety standards for wet locations. cETL listed to Canadian safety standards for wet locations. LM80 & LM79 tested. IP Rating: The LED optics chamber is IP66 rated. The LED driver is IP66 rated. Pima LED luminaires are DesignLights Consortium qualified.

Warranty

5 year extended warranty.

Signify North America Corporation
400 Crossing Blvd, Suite 600
Bridgewater, NJ 08807
Telephone: 855-486-2216

Signify Canada Ltd.
281 Hillmount Road,
Markham, ON, Canada L6C 2S3
Telephone: 800-668-9008

HADCO by signify

Urban

Arm bracket

HFP310 Single

Project:

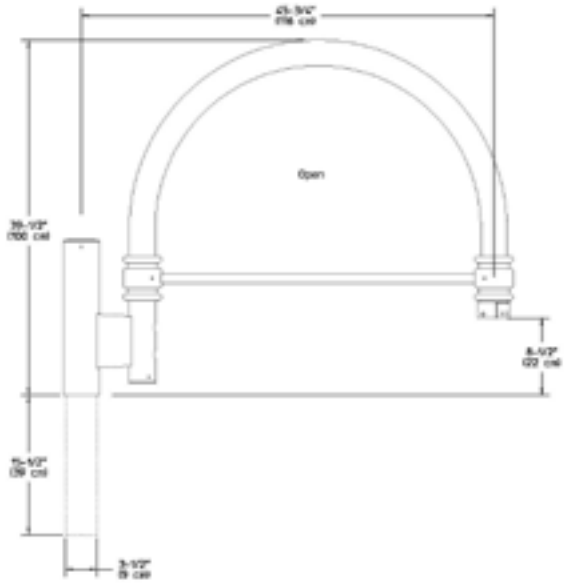
Location:

Cat.No:

Type:

Lamps: Qty:

Notes:



Ordering Guide

Example: HFP310 P4 A N PM

Product Code	HFP310	Single
Post diameter	P4	4" Post Mount
Finish	A B G H I J	Black White Verde Bronze Gray Green
Arm Accessory	N	None
Post Machining	PM	Post Machining

Specifications

HOUSING:
6063-T6 Extruded aluminum .

FINISH:
Thermoset polyester powdercoat is electrostatically applied after a five-stage conversion cleaning process and bonded by heat fusion thermosetting. Laboratory tested for superior weatherability and fade resistance in accordance with ASTM B117 specifications. For larger projects where a custom color is required, contact the factory for more information.

WARRANTY:
Three-year limited warranty.

Height :
39 1/2" (100 cm)

Length:
45 3/4" (116 cm)

Internal Slip Fitter Height:
15 1/2" (39 cm)

Internal Slip Fitter Diameter:
3 1/2" (9 cm)

EPA:
3.05 sq. ft.

signify

Signify North America Corporation
200 Franklin Square Drive,
Somerset, NJ 08873
Telephone 855-486-2216

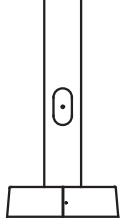
Signify Canada Ltd.
281 Hillmount Road,
Markham, ON, Canada L6C 2S3
Telephone 800-668-9008

HADCO by signify

Poles & Brackets

Urban Decorative

P100 Series Poles



Hadco P100 Series decorative aluminum poles provide a wide range of options in a timeless aesthetic. All poles are made in the USA and always open to a wide range of add-ons and customizations to meet any project need.

Project:

Location:

Cat.No:

Type:

Qty:

Notes:

Ordering guide

example: P120 8 B

Product Code	Pole Height	Finish	Accessory Location	Pole Accessories	Tenon Options
P120	**8** 8ft **10** 10ft **12** 12ft **14** 14ft	**A** Black **B** White **G** Verde **H** Bronze **I** Gray **J** Green **Z** Custom [1]	**N** No Option **T** 12" Down from Top – Aligned with House Side **B** 4" Up from Top of Base – Aligned with House Side **Z** Custom	**N** No Option **D** Standard Duplex **G** GFI Duplex **M** Motion Control [1]	**N** Standard Tenon – 3" OD x 3" **ISF** Internal Slip Fitter (for HFP Brackets) **T4** 4" OD Tenon or 4" pole w/o standard 3" tenon (consult factory for 3" OD poles)
P150	**8** 8ft **10** 10ft				
P195	**12** 12ft **14** 14ft **15** 15ft **16** 16ft **18** 18ft **20** 20ft				

Note: Top outlets not available with the HFP arms. Consult factory for HFP arm outlet mounting.

1. Consult factory for quotation.

Anchor Bolts & Templates (ordered separately)

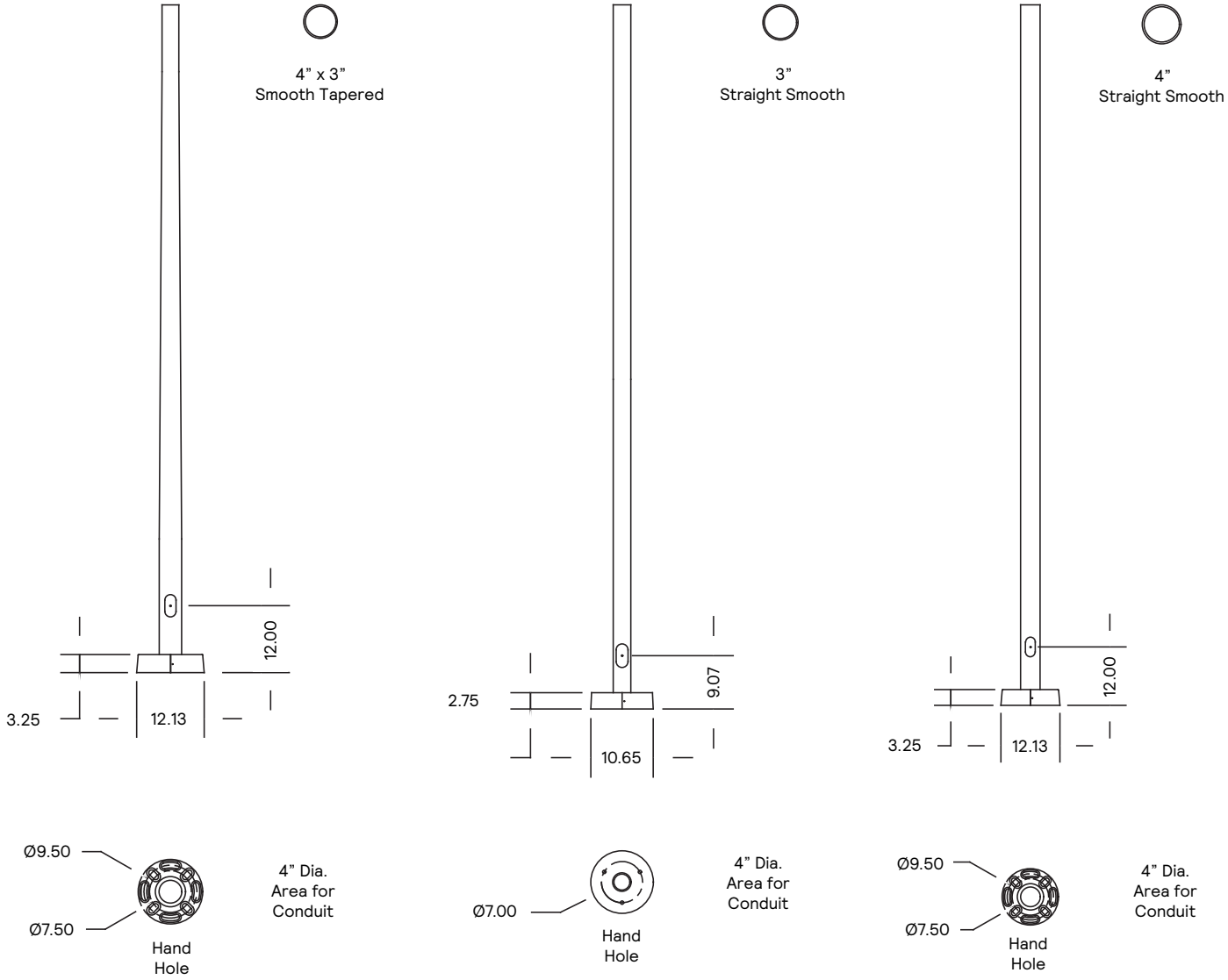
12NC	Description
912400110297	ANCHOR BOLT, 3/4-10x19x3 ,4/PK
912400110295	ANCHOR BOLT, 1/2-13x15x3, 3/PK
912400128343	AB TEMPLATE, P120/P195
912400128339	AB TEMPLATE, P150

P100 Series

Urban Decorative Poles

Dimensions

10ft models shown for P120 and P150. 12ft model shown for P195.



P100 Series

Urban Decorative Poles

Pole Specifications

Pole Family	Catalog Number	Pole Dia. (in.)	Pole Shape	Pole Style	Pole Height (ft.)	Wall Thickness (in.)	Tenon OD x H (in.)	Weight (lbs.)	Bolt Circle (in.)	Base Size Dia. x H (in.)	Base Cover Dia. x H (in.)	Hand Hole Size W x H (in.)	Anchor Bolts (in.)
P120	P120-8	4-3	Tapered	Smooth	8	0.125	3 x 3	26	7.5 to 9.5	11.5 x 2.375	12.125 x 3.25	2 x 4	3/4 x 19 x 3
P120	P120-10	4-3	Tapered	Smooth	10	0.125	3 x 3	29	7.5 to 9.5	11.5 x 2.375	12.125 x 3.25	2 x 4	3/4 x 19 x 3
P120	P120-12	4-3	Tapered	Smooth	12	0.125	3 x 3	32	7.5 to 9.5	11.5 x 2.375	12.125 x 3.25	2 x 4	3/4 x 19 x 3
P120	P120-14	4-3	Tapered	Smooth	14	0.188	3 x 3	50	7.5 to 9.5	11.5 x 2.375	12.125 x 3.25	2 x 4	3/4 x 19 x 3
P150	P150-8	3	Straight	Smooth	8	0.125	3 x 3	19	7	9.625 x 1.375	10.25 x 2.75	2 x 4	1/2 x 15.5 x 3 (3)
P150	P150-10	3	Straight	Smooth	10	0.125	3 x 3	21	7	9.625 x 1.375	10.25 x 2.75	2 x 4	1/2 x 15.5 x 3 (3)
P195	P195-12	4	Straight	Smooth	12	0.188	4 x 3*	44	7.5 to 9.5	11.5 x 2.375	12.125 x 3.25	2 x 4	3/4 x 19 x 3
P195	P195-14	4	Straight	Smooth	14	0.188	4 x 3*	50	7.5 to 9.5	11.5 x 2.375	12.125 x 3.25	2 x 4	3/4 x 19 x 3
P195	P195-15	4	Straight	Smooth	15	0.188	4 x 3*	52	7.5 to 9.5	11.5 x 2.375	12.125 x 3.25	2 x 4	3/4 x 19 x 3
P195	P195-16	4	Straight	Smooth	16	0.188	4 x 3*	55	7.5 to 9.5	11.5 x 2.375	12.125 x 3.25	2 x 4	3/4 x 19 x 3
P195	P195-18	4	Straight	Smooth	18	0.188	4 x 3*	60	7.5 to 9.5	11.5 x 2.375	12.125 x 3.25	2 x 4	3/4 x 19 x 3
P195	P195-20	4	Straight	Smooth	20	0.188	4 x 3*	66	7.5 to 9.5	11.5 x 2.375	12.125 x 3.25	2 x 4	3/4 x 19 x 3

Tenon height is nominal, the available tenon height can be greater on tapered poles.
Anchor bolt max projection is determined by the anchor bolt template.

*Consult factory for 3" OD Tenons or other alternatives

EPA Data

Pole Family	Catalog Number	80 MPH	90 MPH	100 MPH	110 MPH	120 MPH	130 MPH	140 MPH	150 MPH
P120	P120-8	9.93	7.50	5.76	4.48	3.50	2.74	2.14	1.65
P120	P120-10	7.87	5.87	4.43	3.37	2.56	1.94	1.44	1.04
P120	P120-12	6.43	4.72	3.50	2.59	1.91	1.37	0.95	0.60
P120	P120-14	5.35	3.87	2.80	2.02	1.42	0.95	0.58	0.28
P150	P150-8	5.34	3.97	3.00	2.27	1.72	1.30	0.96	0.68
P150	P150-10	4.17	3.05	2.24	1.64	1.19	0.84	0.56	0.33
P195	P195-12	5.35	3.54	2.24	1.28	0.55	-	-	-
P195	P195-14	4.19	2.61	1.48	0.65	0.01	-	-	-
P195	P195-15	3.05	1.76	0.83	0.15	-	-	-	-
P195	P195-16	2.14	0.98	0.15	-	-	-	-	-
P195	P195-18	1.61	0.56	-	-	-	-	-	-
P195	P195-20	1.16	0.20	-	-	-	-	-	-

P100 Series

Urban Decorative Poles

Hadco poles are available with a wide variety of decorative and functional add-ons, adapters, and accessories. Use in combination with Hadco Poles and Hadco Post Top and Hanging Arms to realize your project's vision.

Post Top Tenon Adapter

example: M0090-A

Product Code		Finish
M0090	4" round pole to 3" OD luminaire tenon	**A** Black **B** White **G** Verde **H** Bronze **I** Gray **J** Green **Z** Custom
M0091	3" square pole to 3" OD luminaire tenon	
M0093	4" square pole to 3" OD luminaire tenon	

Ladder Rest

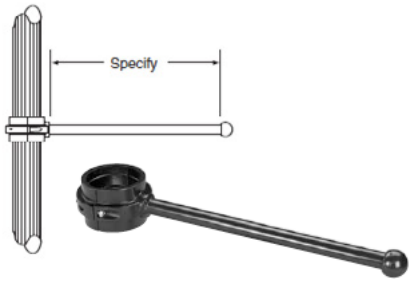
example: M0012-A

Product Code		Finish
M0012	For 3" OD Tenons (includes extended 3" OD top tenon)	**A** Black **B** White **G** Verde **H** Bronze **I** Gray **J** Green **Z** Custom

Banner Arm Bracket

example: BA31A18B-A

Product Code	Pole Dia.	# of Arms	Materials	Length	Finial	Finish
BA Banner Arm Bracket	**3"** **4"** **5"**	**1** One **2** Two at 180°	**A** Aluminum	**18"** **24"** **30"**	**B** Ball	**A** Black **B** White **G** Verde **H** Bronze **I** Gray **J** Green **Z** Custom



Tie Down Bracket

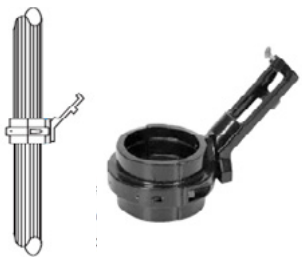
example: TD32-H

Product Code	Pole Dia.	# of Arms	Finish
TD Tie Down Bracket	**3"** **4"** **5"**	**1** One **2** Two at 180°	**A** Black **B** White **G** Verde **H** Bronze **I** Gray **J** Green **Z** Custom

Flag Holder Bracket

example: FHB411-A

Product Code	Pole Dia.	# of Arms	Length	Finish
FHB Flag Holder Bracket	**4"** **5"**	**1** One **2** Two at 180°	**12"**	**A** Black **B** White **G** Verde **H** Bronze **I** Gray **J** Green **Z** Custom



P100 Series

Urban Decorative Poles

Specifications

Housing

6000 series extruded aluminum alloy.

Anchor Base

356 HM high-strength, low-copper, proprietary cast aluminum alloy. Anchor rods are hot dipped galvanized steel.

Finish

A durable polyurethane enamel finish is applied after assemblies are shot blasted to create a surface profile which allows for the highest level of paint adhesion. Laboratory tested for superior weatherability and fade resistance in accordance with ASTM B-117-64 and ANSI/ASTM G53-77 specifications. For larger projects where a custom color is required, or to match other standard Signify brand finishes such as those from Lumec, Gardco, or the discontinued Hanover brand, contact the factory for more information as most special requests can be accommodated.

Warranty

Hadco aluminum poles are covered by a 5-year structural and finish warranty. Some exceptions apply. For more information visit **signify.com/warranties**

Outlets

Standard Duplex Outlet (D) includes a universal color-matched metal weatherproof cover. Weatherproof while in use. Heavy-duty all-metal construction. Lockable security cover. Meets NEC 406.9 (B). Weather resistant. Maximum 15A output.

GFI Duplex Outlet (G) includes a dual-function indicator light and universal color-matched metal weatherproof cover. Weatherproof while in use. Heavy-duty all-metal construction. Lockable security cover. Meets NEC 406.9 (B). Weather resistant. Maximum 15A output.

Buy American Act of 1933 (BAA)

This product is manufactured in one of our US factories and, as of the date of this document, this product was considered a commercially available off-the-shelf (COTS) item meeting the requirements of the BAA. This BAA designation hereunder does not address (i) the applicability of, or availability of a waiver under, the Trade Agreements Act, or (ii) the "Buy America"domestic content requirements imposed on states, localities, and other non-federal entities as a condition of receiving funds administered by the Department of Transportation or other federal agencies. Prior to ordering, please visit **www.signify.com/baa** to view a current list of BAA-compliant products to confirm this product's current compliance.

General Pole Information

Design

EPA specs conform to AASHTO 2001 standard. The poles as charted are designed to withstand dead loads and predicted dynamic loads developed by variable wind pressure with an additional 2.5 gust factor under the following conditions: The charted weights include luminaire(s) and/or mounting bracket(s). Poles installed in areas of known abnormal conditions may require special consideration. For example: coastal areas, airports, and areas of special winds. Poles are designed for ground mounted applications. Poles mounted on structures (such as buildings and bridges) may also necessitate special consideration requiring Hadco's recommendation. Height correction factors and drag coefficients are applied to the entire structure. An appropriate safety factor is maintained based on the minimum yield strength of the material incorporated in the pole.

Warnings

This design information is intended as a general guideline only. The customer is solely responsible for proper selection of pole, luminaire, accessory, and foundation under the given site conditions and intended usage. The addition of any items to the pole, in addition to the luminaire, will dramatically impact the EPA load on that pole. It is strongly recommended that a qualified professional be consulted to analyze the loads given the user's specific needs to ensure proper selection of the pole, luminaire, accessories, and foundation. Hadco assumes no responsibility for such proper analysis or product selections. Failure to ensure proper site analysis, pole selection, loads and installation can result in pole failure, leading to serious injury or property damage.

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SECTION 32 14 13

CONCRETE PAVER MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes the following:
1. Concrete Pavers
2. Joint Sand
3. Setting Bed Sand
4. Base Aggregate

1.02 REFERENCES

Note: Design street, industrial, port and airport pavement thicknesses in consultation with a qualified civil engineer, in accordance with established flexible pavement design procedures, LOCKPAVE® software, and in accordance with Interlocking Concrete Pavement Institute Technical Bulletins. Sample construction detail drawings are available from Unilock®. This specification may require modifications.

A. ASTM International, latest edition:
1. C 33, Standard Specification for Concrete Aggregates.
2. C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
3. C 140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
4. C 144 Standard Specifications for Aggregate for Masonry Mortar.
5. D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
6. C 936, Standard Specification for Solid Concrete Interlocking Paving Units.
7. C 979, Standard Specification for Pigments for Integrally Colored Concrete.
8. D 698 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5 lb (24.4 N) Rammer and 12 in. (305 mm) drop.
9. D 1557 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10-lb (44.5 N) Rammer and 18 in. (457 mm) drop.
10. C1645 Standard Test Method for Freeze-thaw and De-icing Salt Durability of Solid Concrete Interlocking Paving Units
11. D 2940 Graded Aggregate Material for Bases or Subbases for Highways or Airports.

Note: In order to determine the latest version of the listed specifications and standards, please consult the ASTM web page (www.astm.com)

1.03 SUBMITTALS

A. Concrete Pavers:
1. Samples for verification: Three representative full-size samples of each paver type, thickness, color and finish that indicate the range of color variation and texture expected upon project completion.
2. Accepted samples become the standard of acceptance for the product produced.
3. Test results from an independent testing laboratory for compliance of concrete pavers with ASTM C 936.
4. Manufacturer’s catalog product data, installation instructions, and material safety data sheets for the safe handling of the specified materials and products.

B. Joint and Setting Bed Sand:
1. Provide three representative one pound samples in containers of Joint Sand materials.

2. Provide three representative one pound samples in containers of Setting Bed Sand materials.
3. Test results from an independent testing laboratory for sieve analysis per ASTM C 136 conforming to the grading requirements of ASTM C 144.

D. Base and Subbase Aggregate:
1. Test results from an independent testing laboratory for sieve analysis per ASTM C 136.

E. Paving Installation Contractor:
1. Job references from a minimum of three projects similar in size and complexity. Provide Owner/Client/General Contractor names, postal address, phone, fax, and email address.

1.04 QUALITY ASSURANCE

A. Utilize a Manufacturer having at least ten years of experience manufacturing concrete pavers on projects of similar nature or project size.

B: Source Limitations:
1. Obtain Concrete Pavers from one source location with the resources to provide products of consistent quality in appearance and physical properties.
2. Obtain Joint and Setting Bed Sands from one source with the resources to provide materials and products of consistent quality in appearance and physical properties.

C. Paving Contractor Qualifications:
1. Utilize an installer having successfully completed concrete paver installation similar in design, material, and extent indicated on this project.

D. Mockups:
1. Install a 5 ft x 5 ft paver area per each paving pattern.
2. Use this area to determine surcharge of the Setting Bed Sand layer, joint sizes, lines, laying pattern(s) and levelness. This area will serve as the standard by which the workmanship will be judged.
3. Subject to acceptance by owner, mock-up may be retained as part of finished work.
4. If mock-up is not retained, remove and dispose legally.

1.05 DELIVERY, STORAGE & HANDLING

A. Deliver Concrete Pavers in manufacturer's original, unopened and undamaged container packaging with identification labels intact.
1. Coordinate delivery and paving schedule to minimize interference with normal use of streets and sidewalks adjacent to paver installation.
2. Deliver Concrete Pavers to the site in steel banded, plastic banded or plastic wrapped packaging capable of transfer by forklift or clamp lift.
3. Unload Concrete Pavers at job site in such a manner that no damage occurs to the product or adjacent surfaces.

B. Store and protect materials free from mud, dirt and other foreign materials.

C. Prevent Joint and Setting Bed Sand from exposure to rainfall or removal by wind with secure, waterproof covering.

1.06 PROJECT/SITE CONDITIONS

A. Environmental Requirements:
1. Install Concrete Pavers only on unfrozen and dry Setting Bed Sand.
2. Install Setting Bed Sand only on unfrozen and dry Base or Subbase Aggregate materials.
3. Install Base or Subbase Aggregates only over unfrozen subgrade.
4. Install Setting Bed Sand or Concrete Pavers when no heavy rain or snowfall are forecast within 24 hours.

1.07 CONCRETE PAVER OVERAGE AND ATTIC STOCK

A. Provide a minimum of 5% additional material for overage to be used during construction.

B. Owner to provide 100 square feet of each product and size used for maintenance and repair. Furnish Pavers from the same production run as installed materials.
C. Manufacture to supply maintenance and reinstatement manuals for Concrete Paver units.

PART 2 PRODUCTS

2.01 CONCRETE PAVERS
A. Basis-of-Design Product: The Concrete Paver shapes are based on:
1. Unilock:
a. Brussels Block
2. As manufactured by:
Unilock Augusta
301 E. Sullivan Rd
Aurora, IL and 60505
Contact: Brad Swanson
3. The specified products establish minimum requirements that substitutions must meet to be considered acceptable.
a. To obtain acceptance of unspecified products, submit written requests at least 7 days before the Bid Date.
B. Product requirements:
1. Concrete Paver Type 1: Brussels Block (Previously Obtained)

2.02 JOINT SAND
A. Provide natural Joint Sand as follows:
1. Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.
2. Do not use limestone screenings, stone dust, or sand for the Joint Sand material that does not conform to conform to the grading requirements of ASTM C 33.
3. Utilize sands that are as hard as practically available where concrete pavers are subject to vehicular traffic.
4. Gradation as shown in Table 1 below:

TABLE 1 – JOINT SAND
GRADATION REQUIREMENTS FOR JOINT SAND

ASTM C 144		
Sieve Size	**Natural Sand Percent Passing**	**Manufactured Sand Percent Passing**
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 to 100	95 to 100
No. 16 (1.18 mm)	70 to 100	70 to 100
No. 30 (0.600 mm)	40 to 75	40 to 75
No. 50 (0.300 mm)	10 to 30	20 to 40
No. 100 (0.150 mm)	2 to 15	10 to 25
No. 200 (0.075)	0 to 1	0 to 10

2.03 SETTING BED SAND
A. Provide Setting Bed Sand as follows:
1. Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.

2. Do not use limestone screenings, stone dust, or sand material that does not conform to conform to the grading requirements of ASTM C 33.
3. Do not use mason sand or sand conforming to ASTM C 144.
4. Utilize sands that are as hard as practically available where concrete pavers are subject to vehicular traffic.
5. Conform to the grading requirements of ASTM C 33 with modifications as shown in Table 2 below:

TABLE 2 – SETTING BED SAND
GRADATION REQUIREMENTS FOR SETTING BED SAND

ASTM C 33	
Sieve Size	**Percent Passing**
3/8 in (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300 mm)	10 to 30
No. 100 (0.150 mm)	2 to 10
No. 200 (0.075)	0 to 1

Note: Coarser sand than that specified in Table 1 above may be used for joint sand including C 33 material as shown in Table 2. Use material where the largest sieve size easily enters the smallest joints. For example, if the smallest paver joints are 2 mm wide, use sand 2 mm and smaller in particle size. If C 33 sand is used for joint sand, extra effort may be required in sweeping material and compacting the pavers in order to completely fill the joints.

2.04 BASE AGGREGATE

A. Provide Base Aggregate materials conforming to ASTM D 2940 and gradation requirements as presented in Table 3.

TABLE 3
BASE AGGREGATE
GRADATION REQUIREMENTS

ASTM D 2940	
Sieve Size	**Percent Passing**
2 in (50 mm)	100
1-1/2 in (37.5 mm)	95 to 100
3/4 in (19 mm)	70 to 92
3/8 in (9.5 mm)	50 to 70
No. 4 (4.75 mm)	35 to 55
No. 30 (600 µm)	12 to 25
No. 200 (75 µm)	0 to 8*

* In order to prevent damage by frost heaving, it may be necessary to limit the percentages of material passing the No. 200 sieve to less than shown in the tables.

2.05 EDGE RESTRAINTS

A. Plastic Edge Restraints:
   1. Pave Tech
      a. Material Type: Plastic
      b. Model No.: Pave Edge Rigid, Pave Edge Flexible, Pave Edge Industrial
   2. Snap Edge
      a. Material Type: Plastic
      b. Model No.: One Piece Edging, 96 inches

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas indicated to receive paving for compliance with requirements for installation tolerances and other conditions affecting performance for the following items before placing the Concrete Pavers.
   1. Verify that subgrade preparation, compacted density and elevations conform to specified requirements.
   2. Verify that the Base Aggregate materials, thickness, compacted density, surface tolerances and elevations conform to specified requirements.
   3. Provide written density test results for soil subgrade, Base Aggregate materials to the Owner, General Contractor and paver installation subcontractor.
   4. Verify location, type, and elevations of edge restraints, concrete curbing, concrete collars around utility structures, and drainage inlets.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. Beginning of Bedding Sand and Concrete Paver installation signifies acceptance of Base and edge restraints.

3.02 PREPARATION

A. Verify that the subgrade soil is free from standing water.

B. Stockpile Setting Bed Sand, Joint Sand, Base Aggregate materials such that they are free from standing water, uniformly graded, free of any organic material or sediment, debris, and ready for placement.

C. Remove any excess thickness of soil applied over the excavated soil subgrade to trap sediment from adjacent construction activities before placing the Aggregate materials.

D. Keep area where pavement is to be constructed free from sediment during entire job. Remove and replace all, Joint Sand, Setting Bed Sand, Base Aggregate materials contaminated with sediment with clean materials.

E. Complete all subdrainage of underground services within the pavement area in conjunction with subgrade preparation and before the commencement of Base Aggregate construction.

F. Prevent to damage underdrain pipes, overflow pipes, observation wells, or inlets and other drainage appurtenances during installation. Report all damage immediately.

G. Compact soil subgrade uniformly to at least 95 percent of Standard Proctor Density per ASTM D 698 for pedestrian areas. Compact soil subgrade uniformly to at least 98 percent Modified Proctor per ASTM D 1557 for vehicular areas. Stabilization of the subgrade and/or base material may be necessary with weak or saturated subgrade soils.

H. Backfill all service trenches within the pavement area to the sub- grade level with approved material placed in uniform lifts not exceeding 4 in. (100 mm) loose thickness. Compact each lift to at least 100 percent Standard Proctor Density as specified in ASTM D 698.

I. Trim the subgrade to within 0 to ½ in. (0 to 13mm) of the specified grades. Do not deviate the surface of the prepared subgrade by more than 3/8 in. (10mm) from the bottom edge of a 39 in. (1m) straight edge laid in any direction.

K. Do not proceed with further pavement construction, under any circumstances, until the subgrade has been inspected by the Architect/Engineer.

Note: Base compaction of the subgrade soil on the recommendations of the Design Engineer. Request the Architect/Engineer to inspect subgrade preparations, elevations and conduct density tests for conformance to specifications.

3.03 INSTALLATION

A. EDGE RESTRAINTS

1 Provide plastic edge restraints as indicated.

a. Provide plastic edge restraints along the perimeter of all paving as indicated and supported on a minimum of 6 inches (150 mm) of Base Aggregate.

b. Provide 10” spiral galvanized or stainless steel spike to fasten plastic edge restraint at 24 inches on center for straight sections and 12 inches on center for curved sections.

B. BASE AGGREGATE

1. Provide the Base Aggregate material in uniform lifts not exceeding 6 in. (150 mm) over the compacted Subgrade material and compact to at least 100 percent Standard Proctor Density as per ASTM D 698.
2. Compact the Base Aggregate material with at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 ton vibratory roller until there is no visible movement. Do not crush aggregate with the roller.
3. Tolerance: Do not exceed the specified surface grade of the compacted Base Aggregate material more than ±3/8 in. (10 mm) over a 10 ft. (3 m) long straightedge laid in any direction.
4. Compact and grade the upper surface of the base sufficiently to prevent infiltration of the bedding sand into the base both during construction and throughout its service life. Blend segregated areas of the granular base by the application of crushed fines that have been watered and compacted into the surface.

D. SETTING BED SAND

1. Provide, spread and screed Setting Bed Sand evenly over the compacted Base Aggregate course.
   a. Protect screeded Setting Bed Sand from being disturbed by either pedestrian or vehicular traffic.
   b. Screed only the area which can be covered by pavers in one day.
   c. Do not use Setting Bed Sand material to fill depressions in the base surface.
2. Keep moisture content constant and density loose and constant until Concrete Pavers are set and compacted.
3. Screed Setting Bed Sand using either an approved mechanical spreader (e.g.: an asphalt paver) or by the use of screed rails and boards. Maintain in a loose condition slightly ahead of the paving units and fully protect against incidental compaction following screeding. Loosen compacted sand by rain or screeded sand left overnight before further paving units are placed.
4. Inspect the Setting Bed Sand course prior to commencing the placement of the Concrete Pavers. Acceptance of the Setting Bed Sand occurs with the initiation of Concrete Paver placement.

E. CONCRETE PAVERS

1. Replace Concrete Pavers with chips, cracks, voids, discolorations, and other defects that might be visible in finished work.
2. Mix Concrete Pavers from a minimum of three (3) bundles simultaneously drawing the paver vertically rather than horizontally, as they are placed, to produce uniform blend of colors and textures. (Color variation occurs with all concrete products. This phenomenon is influenced by a variety of factors, e.g. moisture content, curing conditions, different aggregates and, most commonly, from different production runs. By installing from a minimum of three (3) bundles simultaneously, variation in color is dispersed and blended throughout the project).

3. Exercise care in handling face mix concrete pavers to prevent surfaces from contacting backs or edges of other units.
4. Provide Concrete Pavers using laying pattern as indicated. Adjust laying pattern at pavement edges such that cutting of edge pavers is minimized. Cut all pavers exposed to vehicular tires no smaller than one-third of a whole paver.
5. Use string lines or chalk lines on Setting Bed Sand to hold all pattern lines true.
6. Set paver surface elevation a minimum of 3 mm (1/8 inch) to a maximum of 6 mm (1/4 inch) above adjacent drainage inlets, concrete collars or channels (provided the change in slope does not impede or alter the drainage or direction of flow).
7. Place units hand tight against spacer bars. Adjust horizontal placement of laid pavers to align straight.
   a. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.
8. Provide space between paver units of 1/32 in. (1 mm) wide to achieve straight bond lines.
9. Prevent joint (bond) lines from shifting more than ±1/2 in. (±13 mm) over 50 ft. (15 m) from string lines.
10. Fill gaps between units or at edges of the paved area that exceed 3/8 inch (10 mm) with pieces cut to fit from full-size unit pavers.
11. Cut Concrete Pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
12. Prevent all traffic on installed Concrete Pavers until Joint Sand has been vibrated into joints. Keep skid steer and forklift equipment off newly laid Concrete Pavers that have not received initial compaction and Joint Sand material.
13. Vibrate Concrete Pavers into leveling course with a low-amplitude plate vibrator capable of a to 5000-lbf (22-kN) compaction force at 80 to 90 Hz. Perform at least three passes across paving with vibrator. Vibrate under the following conditions:
    a. After edge pavers are installed and there is a completed surface or before surface is exposed to rain.
    b. Compact installed Concrete Pavers to within 6 feet (2 meters) of the laying face before ending each day's work. Cover Concrete Pavers that have not been compacted and leveling course on which pavers have not been placed, with nonstaining plastic sheets to prevent Setting Bed Sand from becoming disturbed.
14. Protect face mix Concrete Paver surface from scuffing during compaction by utilizing a urethane pad.
15. Remove any cracked or structurally damaged Concrete Pavers and replace with new units prior to installing Joint Sand material.

F. JOINT SAND
1. Provide, spread and sweep dry Joint Sand into joints immediately after vibrating pavers into Setting Bed Sand course until full. Vibrate pavers and add Joint Sand material until joints are completely filled, then remove excess material. This will require at least 4 passes with a plate compactor.
2. Leave all work to within 3 ft. (1 m) of the laying face fully compacted with sand-filled joints at the completion of each day.
3. Remove excess Joint Sand broom clean from surface when installation is complete.

3.04 FIELD QUALITY CONTROL
A. Verify final elevations for conformance to the drawings after sweeping the surface clean.
1. Prevent final Concrete Paver finished grade elevations from deviating more than ±3/8 in. (±10 mm) under a 10 ft (3 m) straightedge or indicated slope, for finished surface of paving.

B. Lippage: Paver-to-Paver Lippage:

1. No greater than 3 mm (1/8 inch) difference in height between adjacent pavers.

3.05 REPAIRING, CLEANING AND SEALING

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

B. Cleaning: Remove excess dirt, debris, stains, grit, etc. from exposed paver surfaces; wash and scrub clean.

1. Clean Concrete Pavers in accordance with the manufacturer's written recommendations.

3.06 PROTECTION

A. Protect completed work from damage due to subsequent construction activity on the site.

END OF SECTION

All other specifications, terms, and conditions noted in the original bid documents remain in effect and unchanged.

Please sign and return this addendum with your bid.