CERRONE
Associates • Consulting Engineers

401 Main Street

Wheeling, WV 26003

304.232.5550(T)

304.233.2512(F)

mail@cerrone1.com

RITCHIE COUNTY PARK AND RECREATION
LAKESIDE RECREATION AREA

October 7, 2010

Addendum #2

TO ALL BIDDERS:

1) **Specification Section 02936**
Replace the seeding specification with the enclosed revised version.

2) **Specification Section 02670**
Paragraph 3.05 Delete the reference to Section 02770.

3) **Specification Section 02731**
Paragraph 3.02 The reference to Article 3.02E should be Article 3.01E.

4) **Specification Section 08114**
Paragraph 1.01 Delete reference to Section 09900. The reference to Section 08710 should be Section 08700.
Paragraph 3.02 The reference to Section 08710 should be Section 08700.

5) **Specification Section 08115**
Paragraph 1.01 The reference to Section 08710 should be Section 08700.
Paragraph 3.02 The reference to Section 08710 should be Section 08700.

6) **Specification Section 08360**
Paragraph 2.04 The reference to section 16150 should be 16120. Delete reference to section 16225.

7) **Specification Section 10350**
Paragraph 3.03 The reference to Section 03300 should be Section 03100.

CERRONE
Associates • Consulting Engineers

8) **Specification Section 15410**
Replace the plumbing fixtures specification with the enclosed revised version.

9) **Specification Section 16510**
Replace the lighting fixtures specification with the enclosed revised version.

10) **Specification Section 16526**
Replace the sports field lighting specification with the enclosed revised version.

11) **Concession Building**
The first floor datum elevation for the Concession Building is 752 ft. Therefore, 100.00 ft. (assumed datum) = 752.00 ft.

Respectfully,

CERRONE ASSOCIATES, INC.

Manning H. Frymier, PE

Encls.

[redacted]

SECTION 02936

SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Seeding and fertilizing.

B. Seed protection on slopes.

C. Hydroseeding

D. Maintaining seeded areas until acceptance.

1.02 DELIVERY, STORAGE AND HANDLING

A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging and location of packaging. Damaged packages are not acceptable.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.03 EXISTING CONDITIONS

A. Beginning work means acceptance of existing conditions.

PART 2 PRODUCTS

2.01 GROWING MEDIA

A. Imported Topsoil: Natural, fertile, agricultural soil typical of locality, capable of sustaining vigorous plant growth, from well drained site free of flooding, not in frozen or muddy condition, not less than 10% organic matter. Free from subsoil, slag, clay, stones, lumps, live plants, roots, sticks, crabgrass, coughgrass, noxious weeds and foreign matter.

B. Existing Topsoil: Natural, fertile agricultural soil capable of sustaining vigorous plant growth, not in frozen or muddy condition, containing not less than 10% organic

matter. Free from subsoil, slag, clay, stones, lumps, live plants, roots, sticks, crabgrass, noxious weeds, and foreign matter.

C. Peatmoss: Horticultural Grade Class A decomposed plant material, elastic and homogeneous. Free of decomposed colloidal residue, wood, sulphur, and iron. Peatmoss: pH value of 5.9 to 7.0, 60% organic matter by weight, moisture content not exceeding 15% and water absorption capacity of not less than 300% by weight on over dry basis.

D. Sand: Hard, granular natural beach sand, washed, free of impurities, chemical or organic matter.

E. Fertilizer: 10-10-10, commercial type with 50% of the elements derived from organic sources.

F. Lime: Used to correct pH of soil to the range of 6.0 to 6.5 pH.

2.02 SEED

A. Seed Mixture Lawn: 40 Percent Kentucky Blue grass, 40 per cent Creeping Red Fescue, and 20 percent Applaud Perennial Rye Grass.

B. Seed Mixture Athletic Field: Wilken Athletic Field Mix available from the Wilken Seed Company.

C. Seed Mixture Crown Vetch: 30 percent Penngift, Emerald or Chemung commercial Crown Vetch seed with 50 percent K31 Tall Fescue and 20 percent Annual Rye Grass.

2.03 ACCESSORIES

A. Mulching Material: Oat or wheat straw, reasonably free from weeds, foreign matter detrimental to plant life, and in dry condition. Hay or chopped cornstalks is not acceptable.

B. Establishment Blanket: Uniform, open weave jute matting; erosion control mulching fabric consisting of knitted construction of yarn interwoven with strips of biodegradable paper; or organic fiber protective fiber mat consisting of half-inch layer of chopped straw, knitted into mat with thin netting of biodegradable polypropylene.

PART 3 EXECUTION

3.01 PREPARATION

A. Grade to eliminate rough spots and low areas where ponding may occur. Maintain smooth, uniform grade.

B. Assure positive drainage away from structures.

C. Finish ground level firm and sufficient to prevent sinkage pockets when irrigation is applied.

3.02 SPREADING TOPSOIL

A. Areas designated as Lawn or Athletic Field: Use existing stockpiled topsoil. If additional topsoil is required, imported topsoil is to be used. When suitable topsoil is not available a growing medium consisting of 50% peatmoss, 40% horticultural grade vermiculite, and 10% sand.

B. Areas designated as Crown Vetch: Use existing soil.

C. Seed Bed Cultivation: Spread and cultivate topsoil to depth of 6 inches over area to be seeded. Place during dry weather, and on dry unfrozen subgrade. Rake until surface is smooth.

D. Remove from site, foreign materials collected during cultivation.

E. Grade to eliminate rough spots and low areas where ponding may occur. Maintain smooth, uniform grade.

F. Assure positive drainage away from structures.

G. Finish ground level firm and sufficient to prevent sinkage pockets when irrigation is applied.

3.03 FERTILIZING

A. Apply fertilizer, at a rate of 1,000 lbs. per acre (23 lbs. per 1,000 sq. ft.).

B. Apply lime at a rate of 2 tons per acre (92 lbs. per 1000 sq. ft.). Apply lime after the fertilizer has been applied and before the grass seed, not at the same time.

3.04 SEEDING LAWN AND ATHLETIC FIELD

A. Apply Seed Mixture at a rate of 200 lbs. per acre (4-1/2 lbs. per 1,000 sq. ft.) evenly in two intersecting directions. Rake in lightly.

B. Do not sow immediately following rain, when ground is too dry, or during windy periods.

C. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inch. Maintain clear of shrubs and trees.

3.05 SEEDING CROWN VETCH - HYDROSEED

A. Apply Seed Mixture a rate of 100 lbs. per acre (2-1/4 lb. per 1,000 sq. ft.) using hydroseed equipment

B. Super-inoculate by using five times the specified amount of inoculate. Keep inoculant in a cool and dry before applying to the hydroseed tank.

C. Apply lime and fertilizer before seeding.

D. Ensure that the hard seed coat is scarified by hydroseed equipment specifically recommended for crown vetch seed.

E. Apply straw mulch with blower at a rate of 60 bales (3,000 lbs.) per acre. Apply with a bituminous asphalt tacking agent to hold on steep slopes.

3.06 SEED PROTECTION ON SLOPES

A. Cover seeded slopes where grade is 2:1 or greater with establishment blanket. Roll blanket down over slopes without stretching or pulling.

B. Lay blanket smoothly on soil surface, burying top end of each section in narrow trench, 6 inches deep. Leave 12 inches overlap from top roll over bottom roll. Leave 4 inches overlap over adjacent section.

C. Staple outside edges and overlaps at 36 inch intervals.

D. Lightly dress slopes with topsoil to ensure close contact between blanket and soil.

E. In ditches, unroll blanket in direction of flow. Overlap ends of strips 6 inches with upstream section on top.

3.07 MAINTENANCE

A. Mow lawn and athletic field grasses at regular intervals to a maximum height of 2 inches. Do not cut more than 1/3 of the grass blade with each mowing. Perform first mowing when seedlings are 40 percent higher than desired height. Neatly trim edges and hand clip where necessary. Immediately remove clippings after mowing and trimming.

B. Water where required to ensure uniform seed germination and to keep surface of soil damp.

C. Apply water slowly so that surface of soil will not puddle and crust.

D. Replant damaged grass areas showing root growth failure, deterioration, bare or thin spots, and eroded areas.

E. Control growth of weeds in lawns. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

3.08 ACCEPTANCE

A. Seeded areas will be accepted at end of maintenance period when seeded areas are properly established and otherwise acceptable.

END OF SECTION

SECTION 15410

PLUMBING FIXTURES

PART 1 GENERAL

1.01 GENERAL INCLUDES

A. Plumbing fixtures and trim.

B. Hot Water Tank.

1.02 Submit manufacturers' product data and installation instructions.

1.03 GENERAL REQUIREMENTS

A. Provide new fixtures, Owner approved, free from flaws and blemishes with finished surfaces clear, smooth and bright.

B. Provide Owner approved plumbing fittings. Visible parts of fixture brass and accessories shall be heavily chrome plated.

C. Fixtures shall be product of one manufacturer. Fittings of same type shall be product of one manufacturer.

D. Protect fixtures against use and damage during construction.

1.04 JOB CONDITIONS

A. Check millwork shop drawings. Conform location and size of fixtures and openings before rough-in and installations.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Substitutions: Items of same function and performance are acceptable.

2.02 SCHEDULE

A. Water Closet: Refer to fixture schedule on plans.

B. Lavatory Bowl: Refer to fixture schedule on plans.

C. Lavatory Faucet: American Standard Insbrook electronic proximity low voltage with below deck mixing.

D. Urinal: Refer to fixture schedule on plans.

E. Kitchen Sink: Refer to fixture schedule on plans.

F. Kitchen Sink Faucet: American Standard Reliant #4205.100 Finished Polished Chrome, 002

G. Grab Bars: 1-1/2" diameter aluminum, clear finish, with end eschutcheon.

H. Hot Water Tank - Refer to fixture schedule on plans.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning. At completion thoroughly clean plumbing fixtures and equipment.

B. Provide chrome plated rigid or flexible supplies to fixtures with screw driver stops, reducers and escutcheons.

C. Install wall mounted lavatories and water closets with approved wall carriers, model to suit installation.

D. Mount fixtures the following heights above finished floor:
1. Water Closet: Standard; 15 inches to top of bowl rim.
2. Lavatory: Standard; 31 inches to top of basin rim.

E. Solidly attach floor mounted water closets to floor with lag screws. Lead flashing shall not hold closet in place.

3.02 FIXTURES ROUGH-IN SCHEDULE

A. Rough-in fixture piping connections in accordance with following table of minimum sizes, or as required for particular fixtures.

	Hot Water	Cold Water	Waste	Vent
Lavatories	3/4 in.	3/4 in.	1½ in.	1¼ in.
Water Closet	--	3/4 in.	3 in.	2 in.

Floor Drains	--	--	4 in.	1½ in.
Hose Bibs	3/4 in.	3/4 in.	--	--

END OF SECTION

SECTION 16510

LIGHTING FIXTURES

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Provide UL listed and labeled lighting fixtures complete with lamps at light outlets indicated on the drawings. Eac h fixture shall bear the UL Label, and shall comply with Code Requirements. Exterior fixtures shall be UL approved for damp locations in soffits and for wet locations elsewhere, and shall be so labeled.

B. Design (including the frames) of recessed fixtures shall e compatible with the ceiling construction. Verify the type of ceiling and suspension method prior to ordering fixtures. Owner's representative's favorable review of the shop drawings for both the ceiling system and the lighting fixtures, with "No Exception Taken" or "Approved" on the Owner's representative's stamp, will not relieve the Contractor of the ceiling/lighting fixture compatibility requirement.

C. Fixtures are listed and described in the Fixture Schedule and in the following paragraphs. Fixture catalog numbers are to be used as a guide only and shall be understood to be followed by the words "except as modified by the total fixture description both text and pictorial." Provide accessories, features and adaptations necessary to meet the requirements of the description.

D. If the fixture designation is omitted from a light outlet, assume a fixture of the type used in similar areas in preparing the Bid. Confirm type with Owner's representative prior to ordering.

E. Spare Parts: Provide the following spare parts to the Owner upon the completion of the project.
   1. Two (2) of each size and type lamp used for use in less than 5 luminaires.
   2. Six (6) of each size and type lamp used for use in more than 5 luminaires.
   3. Two (2) of each type of luminaire lens used.

F. Cleaning: After construction of total project is completed:
   1. Remove all nonessential labels and other markings.
   2. Wash dirty luminaires inside and out with nonabrasive mild soap or cleaner.
   3. Clean luminaire plastic lenses with anti-static cleaners only.
   4. Touch up all painted surfaces of luminaires and poles with matching paint supplied by the manufacturer.

1.02 SUBMITTALS

A. Material List including reflector type and each type of lamp and ballast.

B. Catalog cuts for each fixture including complete photometric data in IES format.

C. Electronic ballast warranty and combined lamp/ballast warranty where applicable.

D. Shop drawings for custom fixtures, modifications or installations.

E. Submit also catalog cuts for photocell, occupancy sensors, dimming components, time clock and lighting contractors.

F. Where applicable, verify field dimensions and include them on shop drawings showing exact location of lamp holders, lamp shapes and length.

1.03 LAMP REPLACEMENT

A. Replace lamps that burn out after Owner's use or acceptance of the project.
   1. Lamps (except incandescent) which burn out within 120 days.
   2. Incandescent lamps that burn out after usage that is less than 80% of rated life.

PART 2 PRODUCTS

2.01 FINISH

A. Treat surface mounted fixtures and exposed trim of recessed fixtures with a rust-inhibitant process.

2.02 OPTICAL SYSTEMS

A. Lighting fixtures for use with HPS lamps shall have the optical system specifically designed for a clear HPS lamp of the wattage indicated.

2.03 BALLASTS

A. Electromagnetic Fluorescent Ballasts - Performance Requirements
   1. Fluorescent fixture electromagnetic ballasts shall be high power factor, low wattage, 86 watts maximum for two 40 watt standard rapid start (RS) lamps when tested in accordance with ANSI C82.2 methods and shall be the recycling thermal protected type. Ballast for compact fluorescent lamps shall be A sound rated and high power factor. Replace all noisy ballasts. Ballasts installed outdoors shall be low temperature rated.

B. Electronic Fluorescent Ballasts
   1. Performance Requirements
      a. Provide electronic ballasts in all T8, T5, T4 and smaller diameter fluorescent fixtures where they are available unless otherwise noted.
      b. Ballasts shall operate at a frequency above 20 KHz, shall have no detectable flicker.
      c. Ballasts shall operate from 60Hz or 50 Hz input source, shall have input power factor above 95%, and a maximum current crest factor (CCF) of 1.7.
      d. Ballasts shall have total harmonic distortion (THD) of 20% or less (10% or less for Professional Series) when used with primary lamp types.
      e. Ballast shall have maximum cast temperature rating of 70 C.
      f. Ballast output shall be protected against lamp rectification or shorted output leads.
   2. Regulatory Requirements
      a. Ballasts shall be UL listed, class P, Type 1 outdoor rated, CSA certified and manufactured in accordance with ANSI C82.11 methods where applicable.
      b. Ballasts shall meet FCC 47CFR Part 18 non-consumer for EMMI and RFI ensuring suitability in commercial and industrial installations.
      c. Ballasts shall comply with ANSI and IEEE standards for harmonic distortion and withstand transients as specified by ANSI C62.41 for location category A.
      d. Ballasts shall contain no PCB's.
   3. Electronic ballasts for T8 OCTRON type fluorescent lamps.
      a. Ballasts shall be Rapid Start or Programmed Rapid Start for remote locations or high shut off frequency.
      b. Rapid Start ballasts shall be series wired, THD<10%,minimum starting temperature of 50° F, maximum

case temperature of 70°C, and allow remote mounting up to 18 feet. Ballast factor to be 0.90 for Normal Light Output.

c. Programmed Rapid Start ballasts shall be series wired, THD <10%, minimum starting temperature of 0°F, maximum case temperature of 70°F, and allow remote mounting up to 18 feet. Ballast factor shall be .875 for Normal Light Output of T8 lamps Ballast to provide 50,000 or better switching cycles for use on occupancy sensors and building control systems.

4. Electronic ballasts for T5, T4, compact fluorescent and smaller diameter fluorescent lamps.
   a. Ballasts to provide dynamic end-of-life sensing to protect against overheated lamp bases and sockets.
   b. Ballasts shall have 0.80-1.15 ballast factor, depending upon lamp type.
   c. Ballasts for linear T5 lamps shall be Programmed Rapid Start
      1) Programmed Rapid Start ballasts shall be series wired, TDH <10%, minimum staring temperature of 0°F, maximum case temperature of 70°C, and allow remote mounting up to 18 feet. Ballast factor to be 1.00 for Normal Light Output of T5 lamps. Ballast to provide up to 100,000 switching cycles for use on occupancy sensors and building control systems. Ballast to provide dynamic end-of-life sensing with auto-reset feature when lamps are changed.
   d. Ballasts for T5 long (high lumen) compact fluorescent lamps shall be Programmed Rapid Start.
      1) Programmed Rapid Start ballasts shall be series wired, TDH <10%, minimum starting temperature of 0°F, maximum case temperature of 70°C, and allow remote mounting up to 18 feet. Ballast factor to be 0.88 - 1.00 for Normal Light Output.
   e. Ballasts for T4 compact fluorescent lamps shall be Programmed Rapid Start.
      1) Programmed Rapid Start ballasts shall be series wired, TDH <10%, minimum starting temperature of 0°F, maximum case temperature of 70°C, and allow remote mounting up to 18 feet. Ballast factor to be 0.88 - 1.00 for Normal Light Output. Ballast input voltage shall be one of the following:
         a) Dedicated input voltage (120V or 277V)
         b) Universal Voltage (120V through 277V)

5. Fluorescent Dimming Ballasts
   a. Ballasts shall be Programmed Rapid Start, Series wired, TDH <10%, minimum starting temperature of 0°F, maximum case temperature of 70°C.

b. Ballasts shall have a 2-wire 0-10Vdc interface compatible with industry standard 0-10V dimmers, daylight sensors, occupancy sensors, building automation systems and other industry standard controllers.
c. Ballasts shall have anti-flash circuitry that will start lamp in any light level mode without flashing to full light output. Light level output shall be continuous, even and flicker free over the entire dimming range.
d. Ballast dimming range shall be 110%-5% for 1, 2 & 3-lamp T8 models, 110%-10% for lamp T8 model - 100%-1% for T5 lamps.

6. Other
a. All fluorescent lamp/ballast combinations shall be covered by a combined lamp/ballast warranty. Covered ballasts shall carry a five-year warranty.
b. Lamp/ballast warranty period shall commence from date of installation.

C. High intensity Discharge Lamp Ballasts: Provide HID lamp ballasts, including remote ballasts as necessary, externally fused, capable of operating lamp types with rating indicated and of starting lamps between 0°F and 105 0°F; constant wattage auto-transformer type, high power factor, core and coil assembly encapsulated in non-melt resin; install capacitor outside ballast encapsulation for easy field replacement; enclose assembly in drawn aluminum alloy housing(s) with necessary wiring compartments and provisions for electrical connections and devices; and mount assembly with necessary hardware and vibration dampers. Encase ballast for outdoor use in weathertight enclosures and provide proper outdoor type wiring devices. Outdoor HID ballasts shall have a minimum starting temperature of -20 degrees F.

1. Metal Halide:
a. Metal halide ballasts shall be high power factor, constant wattage (CWA) ballasts for various voltages and wattages as shown or linear-reactor Pulse Start ballasts for pulse start wattages as shown (note lamp starting current will be up to 3 times greater than lamp operating current for linear reactor type).
b. Ballasts shall limit lamp wattage variation to 5% for line voltage of 10%.

2. High Pressure Sodium:
a. All HPS ballasts shall be reactor (high power factor) types for operation at voltage shown.

3. Low Pressure Sodium:
a. All low pressure sodium ballasts shall be high power factor, constant wattage.

b. Ballasts shall limit lamp wattage variation to 5% for line voltage change of 10%.
c. Line current during starting and lamp warm up time shall not exceed normal operation current.

2.04 EMERGENCY/EGRESS FIXTURES:

A. Exit Sign Fixtures:
1. Emergency exit sign fixtures with illumination by LED's (Light Emitting Diodes), providing even illumination of letters through an optical diffuser to meet or exceed requirements of NFPA Life Safety Code 101 UL-924, and the OSHA code. The power supply shall be dual input 120/277V 60Hz. All components shall be solid state, with surge protection and short circuit protection and each LED shall be individually driven such that failure of one shall not affect another.

B. Self-contained Emergency Lighting Unit:
1. Provide compact, wall mounted emergency lighting unit containing the following:
a. 6 or 12 volt nickel cadmium battery capable of supplying 50 watts for a period of at least 3 hours, with guaranteed life of at least 5 years.
b. FULLY DISCHARGED to FULLY CHARGED period of 12 hours.
c. Two sealed beam 25 watt, fully adjustable lamps mounted on unit.
d. Relay automatically energizing lights upon loss of 120/277 volt, 60 Hz power.
e. Toggle switch in each lamp circuit so that each lamp may be turned off individually.
f. Time delay relay to keep units energized for 10 minutes after normal lighting is restored.
g. Circuitry will include low voltage battery disconnect, and brownout protection.
h. Each unit shall have diagnostic circuitry that shall constantly monitor the charger performance and battery voltage.

i. Each unit shall be programmed to exercise the battery and check emergency operation by automatically performing a 5-minute discharge/diagnostic test every 29 days and a 30-minute discharge/diagnostic cycle every 6 months.

2.05 LAMPS

A. Provide lamps listed below unless specifically indicated otherwise in the Lighting Fixture Schedule.

B. Lamps shall comply with all applicable ANSI standards.

C. Each lamp type shall be made by one manufacturer to maintain color consistency.

D. Provide lamps and ballast as a compatible system from one manufacturer, so as to be warranted as a system with a combined lamp/ballast warranty.

E. All lamps shall be free from defects in manufacturer and covered by an implied warranty based on lamp mortality data as such that defective lamps or lamps failing at a higher than normal rate shall be replaced after factory inspection determining cause of failure or defect.

F. Incandescent general service lamps shall be inside frosted, standard lift, 130V.

G. All line voltage halogen PAR lamps shall have infrared conserving (IR) technology for maximum efficacy wherever available in wattages/beam spread as specified on the lighting fixture schedule.

H. All low-volt halogen reflector lamps shall have infrared conserving technology, axial filament orientation and dichroic reflectors, for maximum efficacy and beam control, when available in wattages/beam spreads as specified on the lighting fixture schedule.

I. Fluorescent Lamps:
   1. T8 lamp type: T8 lamps shall have an average rated life of 30,000 hours, minimum of 3200 lumens and minimum of 86 CRI. T8 lamps shall be 3500K.
   2. Compact fluorescent (T4) lamp type: Compact fluorescent lamps shall either be single, double or triple tube type with 4-pin bases for operation on electronic and dimming ballasts. Where available lamps shall contain end-of-life sensing to prevent overheating of lamp base and sockets. Lamps shall have a minimum CRI of 82 and shall have a color temperature of 3500K.
   3. Compact fluorescent (T5) lamp type; Lamps shall have a 2G11 base and operate on electronic ballasts. Lamps shall have a minimum CR1 of 82 and shall have a color temperature of 3500K.
   4. Linear T5 fluorescent lamp type: All linear T5 fluorescent lamp types shall have miniature bi-pin bases,

20,000 hours average rated life, a minimum CRI of 82 and shall have a color temperature of 3500K.

J. High Intensity Discharge (HID) Lamps:
   1. All high intensity discharge lamps shall be operated on the appropriate ANSI designated electromagnetic ballast in accordance with ANSI C82.4. Low wattage metal halide lamps designated for use on electronic ballasts shall require written approval from the lamp manufacturer.
   2. Metal halide lamps: All metal halide lamps used in interior applications shall be coated, unless otherwise noted in the lighting fixture schedule. 1000W standard metal halide lamps shall have an average rated life of 18,000 hours in the vertical operating position and 12,000 hours in the horizontal operating position. All low wattage metal halide lamps (less than or equal to 150W) shall contain a protective shroud/other suitable containment material for use in open fixtures.
   3. High pressure sodium lamps: All HPS lamps shall be standard type with an average rated life of 24,000+ hours. All HPS lamps shall have a lead-free solderless base, to provide superior electrical contact in lampholder throughout lamp life.
   4. Low pressure sodium lamps: All LPS lamps shall have a non-metallic bayonet base for safe re-lamping, sodium retaining reservoirs, U-bend insulation to control lamp wattage rise, arc tube support system to protect arc tube from shock and vibration, uniform indium oxide heat reflecting coating, barium getter, triple coil electrodes and a fuse coil in the lamp base.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install fixtures in accordance with manufacturer's instructions.

B. Support suspended luminaires directly from building structure by rod hangers and inserts or metal angle headers supported from framing structure.

C. Install lamps in luminaires and lampholders.

3.02 RELAMPING

A. Relamp luninaires which have failed lamps at completion of Work.

3.03 ADJUSTING AND CLEANING

A. Align luminaires and clean diffusers prior to final acceptance. Clean paint splatters, dirt, and debris from installed luminaires.

3.04 LUMINAIRE SCHEDULE

A. Refer to Electrical Fixtures Schedules on Drawings.

END OF SECTION

SECTION 16526

SPORTS FIELD LIGHTING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Criteria for field lighting.
   2. Lighting system construction.
   3. Requirements for alternate systems.

B. Related Sections:
   1. Division 16 "Electrical".

1.02 CRITERIA FOR FIELD LIGHTING

A. Performance Requirements: Playing surfaces shall be lit to an average constant light level and uniformity. Lighting calculations shall be made on a 20 by 20 foot grid spacing, measured 3 feet above grade.
   1. Infield Grid Points: 25 (each field).
   2. Outfield Grid Points: 73 (each fields).
   3. Infield Foot-candles: 50 average.
   4. Outfield Foot-candles: 30 average.
   5. Maximum to Minimum Uniformity Ratio: Infield: 2.0 : 1.0, Outfield 2.5 to 1.0.

B. Measured Illumination: Plus or minus 10% of predicted mean in accordance with IESNA RP-6-01 and measured in the first 100 hours of operation.

C. Luminaire Mounting Height: 60 feet above grade.

1.03 LIGHTING SYSTEM CONSTRUCTION

A. System Description: Lighting system shall consist of the following:
   1. Galvanized steel poles and cross arm assembly.
   2. Pre-stressed concrete base embedded in concrete backfill allowed to cure 72 hours before pole stress is applied.
   3. All luminaires shall be constructed with a die-cast aluminum housing or external hail shroud to protect the luminaire reflector system.

4. Manufacturer will remote all ballasts and supporting electrical equipment in aluminum enclosures mounted approximately 10 feet above grade. The enclosures shall include ballast, capacitor and fusing for each luminaire. Safety disconnect per circuit for each pole structure will be located in the enclosure.
5. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.

B. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, ballast and other enclosures shall be factory assembled, aimed, wired and tested.

C. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel of 18-8 grade or better, passivated and coated for protection against corrosion and stress corrosion cracking. All wiring shall be enclosed within the cross arms, pole, or electrical components enclosure.

D. Lightning Protection: All structures shall be equipped with lightning protection meeting NFPA 780 standards. Contractor shall supply and install a ground rod of not less than 518 inches in diameter and 8 feet in length, with a minimum of 10 feet embedment. Ground rod should be connected to the structure by a copper main down conductor with a minimum size of #2 AWG. which is exothermically welded to the ground rod.

E. Safety: All system components shall be UL Listed for the appropriate application.

F. Electric Power Requirements for the Sports Lighting Equipment:

1. Electric Power: 240 Volt, Single Phase
2. Maximum Total Voltage Drop: Voltage drop from the distribution panel to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.

1.04 REQUIREMENTS FOR ALTERNATE SYSTEMS

A. Costs Included: Extra costs for additional poles, underground branch circuitry, luminaries, circuit breakers, etc., to guarantee previously specified criteria without additional cost to the Owner. Include costs of any increased project service capacity necessitated by additional luminaries.

B. Calculations: Field illumination plan showing calculated foot-candles on a 20 by 20 foot (6.1 by 6.1 m) grid using the proposed alternate fixtures, levels shall be guaranteed for 5000 hours. Calculations shall be certified by a Professional Engineer.

C. Shop drawings showing additional work and materials required.

D. Warranty for the additional system equal to the specified system warranty providing information of all terms and conditions.

1.05 SUBMITTALS

A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:
   1. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters.
   2. Details of attaching luminaires and accessories.
   3. Details of installation and construction.
   4. Luminaire materials.
   5. Photometric data based on laboratory tests of each luminaire type, complete with indicated lamps, ballasts, and accessories.
   6. Ballasts, including energy-efficiency data.
   7. Lamps, including life, output, CCT, CRI, lumens, and energy-efficiency data.
   8. Materials, dimensions, and finishes of poles.
   9. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
   10. Precast pole base.
   11. Design calculations, certified by a qualified professional engineer, for pole base embedments and soil conditions on which they are based.
   12. Wiring Diagrams: For power, signal, and control wiring.

B. Warranty: Sample of special warranty.

1.06 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of the field lighting system that fail in materials or workmanship with the specified warranty period.
B. Failures include. hut are not limited to the entire system, excluding fuses and lamps.
   1. Warranty Period: Ten (10) years.
   2. Labor: Two (2) years.
   3. Lamps: Two (2) years parts and one (1) year labor.

C. Warranty excludes fuses, storm damage, vandalism, abuse and unauthorized repairs or alterations

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

A. Basis of Design: Musco's Light-Structure Green.
   1. All components shall be designed and manufactured as a system.
   2. All luminaries, wire harnesses, ballasts, and other enclosures shall be factory assembled, aimed, wired and tested.

B. Durability:
   1. System to be constructed of corrosion resistant material and/or coated to help prevent corrosion.
   2. Exposed carbon steel shall be hot dipped galvanized per ASTM A123.
   3. Exposed aluminum shall be powder coated with high performance polyester or anodized.
   4. All exterior reflective inserts shall be anodized, coated and protected from direct environmental exposure to prevent reflective degradation or corrosion.
   5. All exposed hardware and fasteners shall be stainless steel of 18-8 grade or better, passivated and coated for protection against corrosion and stress corrosion cracking.
   6. All wiring shall be concealed within poles and cross arms.

C. Equipment:
   1. Ballasts shall be in a separate, pole mounted, weatherproof enclosure.
   2. Poles shall be equipped with aiming lasers.
   3. Lugs shall be provided and prewired inside poles for exterior lightning protection wiring.

4. All system components shall be UL Listed for the appropriate application.
5. System shall include pre-stressed concrete slip fitter pole bases.

D. Power Available:
1. Volts: 240.
2. Phase: Single.
3. Frequency: 60 Hertz.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA RP-6-01, Appendix B.

B. Correcting Nonconformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including foot-candles, uniformity ratios, and maximum kilowatt consumptions are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be liable to any or all of the following:
1. Manufacturer shall at his expense provide and install any necessary additional fixtures to meet the minimum lighting standards. The Manufacturer shall also either replace the existing poles to meet the new wind load (EPA) requirements or verify by certification by a licensed structural engineer that the existing poles will withstand the additional Wind load.
2. Manufacturer shall minimize the Owner's additional long term fixture maintenance and energy consumption costs created by the additional fixtures by reimbursing the Owner the amount of $1,000.00 (one thousand dollars) for each additional fixture required.
3. Manufacturer shall remove the entire unacceptable lighting system and install a new lighting system to meet the specifications if necessary.

END OF SECTION