ADDENDUM NUMBER 2

Central Park Phase II Development
Oak Brook Park District #1040

DATE: January 31, 2023

TO: ALL KNOWN BID DOCUMENT RECIPIENTS

VIA EMAIL – One cover page and attachment as described below
The following changes for the above referenced bid shall be made part of the bidding documents and a copy of this addendum cover page shall be submitted and attached to the Bid Proposal Form and/or acknowledged in the bid submission.

Central Park Phase II Project

1. **Updated Bid Form**
    a. See attached document for reissued bid form for Central Park Phase II Project.
2. **Clarifications**
    a. Bid Item #2
        i. Stormwater Pollution Prevention Measures line item to include all stormwater pollution prevention activities including the coffer dam, turbidity curtain, silt fence, inspections and documentation as required.
    b. Bid Item #17
        i. The owner furnished amphitheater kit includes framing, roof decking, roof materials and required fasteners. Contractor to bid installation only.
        ii. Amphitheater install shall include footings, see attached detail.
    c. Sheet 1.0 Existing Conditions & Removals Plan
        i. Fishing Outcropping Enlargement - remove “alternate” text. All fishing outcropping items shall be part of base bid. Costs associated with these items shall be part of the general removals line item.
    d. Sheet 2.1 Standard Notes: SWPP
        i. Detail 2, Cofferdam Details Elevation: A bathymetric survey was not completed during design and depth at cofferdam cannot be confirmed. Contractor to verify in field. Location on the plans is approximate and can be moved closer to shore if necessary.
    e. Sheet 3.1 Layout Plan - Challenge Course / Game Area
        i. Updated site amenities schedule attached.

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Chicago 312.350.4088 uplandDesign.com 815.254.0091 **Plainfield**

f. Sheets 6.0, 6.1 and 6.2 Landscape & Restoration Plans

   i. Updated plant lists attached.

g. Sheet 8.1 Construction Details

   i. Detail 5, Unit Paving - Pedestrian: Material to be Unilock Series, 3 7/8” x 7 7/8” x 2 3/8", color golden tan, set on concrete paving. See attached detail replacement.

   ii. Detail 11, Bocce Ball Court Edge: Reference detail 12 for all dimensions.

   iii. Detail 12, Artificial Turf: Approved material to be BocceGrass Court as supplied by ForeverLawn OR Nylon 38-36 as supplied by Perfect Turf.

3. Added Specification Sections

a. 12 9353 Amphitheater Shelter – (Owner Purchase Kit)

b. 32 1400 Unit Paving

c. 32 1813 Artificial Turf

d. 32 8400 Irrigation Systems

End of Addendum.

Upland Design Ltd
Chicago 312.350.4088 uplandDesign.com 815.254.0091 **Plainfield**

Contractor:_____

UPDATE: 2023/01/31

TO: Oak Brook Park District
Central Park Phase II
1450 Forest Gate Rd,
Oak Brook, Illinois 60523

Project # 1040

The undersigned bidder has carefully examined the plans and specifications for Oak Brook Park District Central Park Phase II , in Oak Brook, Illinois as prepared by Upland Design Ltd. and having carefully examined the site and completely familiarized him/herself with local conditions affecting the cost of the work: hereby states that he/she will provide all necessary labor, equipment, tools, machinery, apparatus and all other means of construction, do all the work and furnish all materials, called for by said plans and specifications in the manner prescribed by in accordance with the requirements of the contract, specification and drawings: and will accept as full and complete payment therefore the base bid amount which is the summation of the cost of the items of work and is equal to the summation of the extension of the unit prices .

Description of abbreviations:

SF = Square Feet	CF = Cubic Feet	LF= Lineal Feet
SY = Square Yard	CY = Cubic Yard	LS = Lump Sum
FF = Finished Face		

BASE BID

Item #	Description	Quantity	Unit	Installed Unit Price	Item Total
1	Site Preparation, Removals & Earthwork, Complete	1	LS	$	$
2	Stormwater Pollution Prevention Measures	1	LS	$	$
3	Concrete Paving	9795	SF	$	$
4	Heavy Duty Concrete	6254	SF	$	$
5	Turfstone	210	SF	$	$
6	Curb and Gutter B6-12	13	LF	$	$
7	Curb at Challenge Course	145	LF	$	$
8	Poured in Place Surfacing	3826	SF	$	$
9	Artificial Turf	790	SF	$	$
10	Bocce Ball Court Edge and Nailer Board	178	LF	$	$
11	Painted Games	1	LS	$	$
12	4" Perf SDR26 Underdrainage	292	LF	$	$
13	4" Solid SDR26 Underdrainage	66	LF	$	$
14	Drain Cleanout	2	EA	$	$
15	12" PVC Yard Inlet	1	EA	$	$
16	6" dia. Metal Flared End Section	1	EA	$	$

Amphitheater Shelter					
17	Install Amphitheater Shelter (Purchase Kit by Owner)	1	LS	$	$
18	Conduit, Fish Wire, and GCFI at Amphitheater Shelter	1	LS	$	$
19	Pedestrian Light Fixture, Footings and Electrical Connection	5	EA	$	$
Pavilion and Amphitheater Wall / Columns					
20	Excavation for Pavilion and Amphitheater Wall/Columns	1	LS	$	$
21	Concrete Placement Including but not limited to: Form-Work, Sub-Grade, Reinforcing, and Finishing	1	LS	$	$
22	CMU Materials	1	LS	$	$
23	Stone / Cut Stone Material	1	LS	$	$
24	Masonry Placement Including but not Limited to: Reinforcing Flashing, Venting, and Clean Up	1	LS	$	$
25	Structural Steel Components and Erection Including Setting and Anchor Plates, Repair Paint, Gusset Plates. Tension Rods and Accessories	1	LS	$	$
26	Structural Wood Components Including Beams and Roof Decking	1	LS	$	$
27	Column Finishes and Misc Trim	1	LS	$	$
28	Water Repellents	1	LS	$	$
29	Fluid Applied Membrane Barriers	1	LS	$	$
30	Asphalt Roofing and Accessories	1	LS	$	$
31	Wood Stain	1	LS	$	$
32	Electrical at Pavilion	1	LS	$	$
33	Lighting at Pavilion	1	LS	$	$
34	Conduit, Fish Wire, and GCFI at Amphitheater Wall/Columns	1	LS	$	$
Fitness Equipment shall be purchased by Owner, Contractor shall take delivery and fully install.					
35	Fitcore Extreme Angled Balance Beam Double	1	LS	$	$
36	Fitcore Extreme Angled Overhead Ladder	1	LS	$	$
37	Fitcore Extreme Ledge Hanger	1	LS	$	$
38	Fitcore Extreme Quintuple Steps	1	LS	$	$
39	Fitcore Extreme A-Frame Cargo	1	LS	$	$
40	Fitcore Extreme High Step	1	LS	$	$
41	Fitcore Extreme Rope Climb	1	LS	$	$
42	Healthbeat Assisted Row/Push-Up	1	LS	$	$
43	Chin-Up Station	1	LS	$	$

Site Furniture shall be purchased by Owner, Contractor shall take delivery and fully install.					
44	Skyways Cantilever Single Post Shade and Footing	2	EA	$	$
45	Game Table	3	EA	$	$
46	Ping Pong Table	1	EA	$	$
47	Picnic Table	6	EA	BY OWNER	BY OWNER
48	Bench	4	EA	$	$
49	Soccer Goals	2	SETS	BY OWNER	BY OWNER
50	Interpretive Sign	2	EA	$	$
Items below shall be purchased by Contractor, Contractor shall take delivery and fully install.					
51	Limestone Outcrop	190	SFF	$	$
52	Boulder Toe	1	LS	$	$
53	Shade Tree	26	EA	$	$
54	Protect and Relocate Existing Trees	8	EA	$	$
55	Ornamental Tree	4	EA	$	$
56	Deciduous Shrub	6	EA	$	$
57	Evergreen Shrub	13	EA	$	$
58	Perennial and Ornamental Grass	786	EA	$	$
59	Ground Cover	385	EA	$	$
60	Lawn restoration and establishment including core aeration, seeding, fertilizing, and blanket cover at all disturbed areas.	1	LS	$	$

Base Bid Total $ _____

Base Bid in Writing:

_____

Contractor:_____

UPDATE: 2023/01/31

ALTERNATE #1: Irrigation at Sports Fields - 2 Soccer Fields

Item #	Description	Quantity	Unit	Installed Unit Price	Item Total
Add A1-1	All wiring, grounding, rotors, valves, pvc lines and misc. for a complete irrigation system at the Sports Fields including Site Preparation, Removals & Earthwork	1	LS	$	$
Add A1-2	Lawn restoration and establishment including core aeration, seeding, fertilizing, and blanket cover at all disturbed areas.	1	LS	$	$

Alternate #1 Bid Total $ _____

Alternate #1 Bid in Writing:

_____

ALTERNATE #2: Specialty Paving at Amphitheater

Item #	Description	Quantity	Unit	Installed Unit Price	Item Total
Deduct A2-1	Concrete Paving	-1543	SF	$	$
Add A2-2	Concrete Paving - Colored	1071	SF	$	$
Add A2-3	Unit Paving on Concrete - Pedestrian	472	SF	$	$
Add A2-4	Precast Medallion	1	LS	$	$

Alternate #2 Bid Total $ _____

Alternate #2 Bid in Writing:

_____

ALTERNATE #3: Irrigation at Amphitheater

Item #	Description	Quantity	Unit	Installed Unit Price	Item Total
Add A3-1	All wiring, grounding, rotors, valves, pvc lines and misc. for a complete irrigation system at the Amphitheater including Site Preparation, Removals & Earthwork	1	LS	$	$
Add A3-2	Lawn restoration and establishment including core aeration, seeding, fertilizing, and blanket cover at all disturbed areas.	1	LS	$	$

Alternate #3 Bid Total $ _____

Alternate #3 Bid in Writing:

_____

ALTERNATE #4: Electrical at Amphitheater Shelter and Wall

Item #	Description	Quantity	Unit	Installed Unit Price	Item Total
Add A4-1	Wiring at Amphitheater Shelter and Wall for Complete and Functional System	1	LS	$	$
Add A4-2	Purchase and Install Ilumiline ML	12	EA	$	$
Add A4-3	Purchase and Install Ilumipod SL	2	EA	$	$
Add A4-4	Purchase and Install Ilumipanel ML	9	EA	$	$

Alternate #4 Bid Total $ _____

Alternate #4 Bid in Writing:

_____

End of Bid Items - Fill out remainder of forms.
Provide 2 copies of bid form.

CONTRACTOR:_____

CONTACT:_____SIGNATURE:_____

PHONE:_____FAX:_____

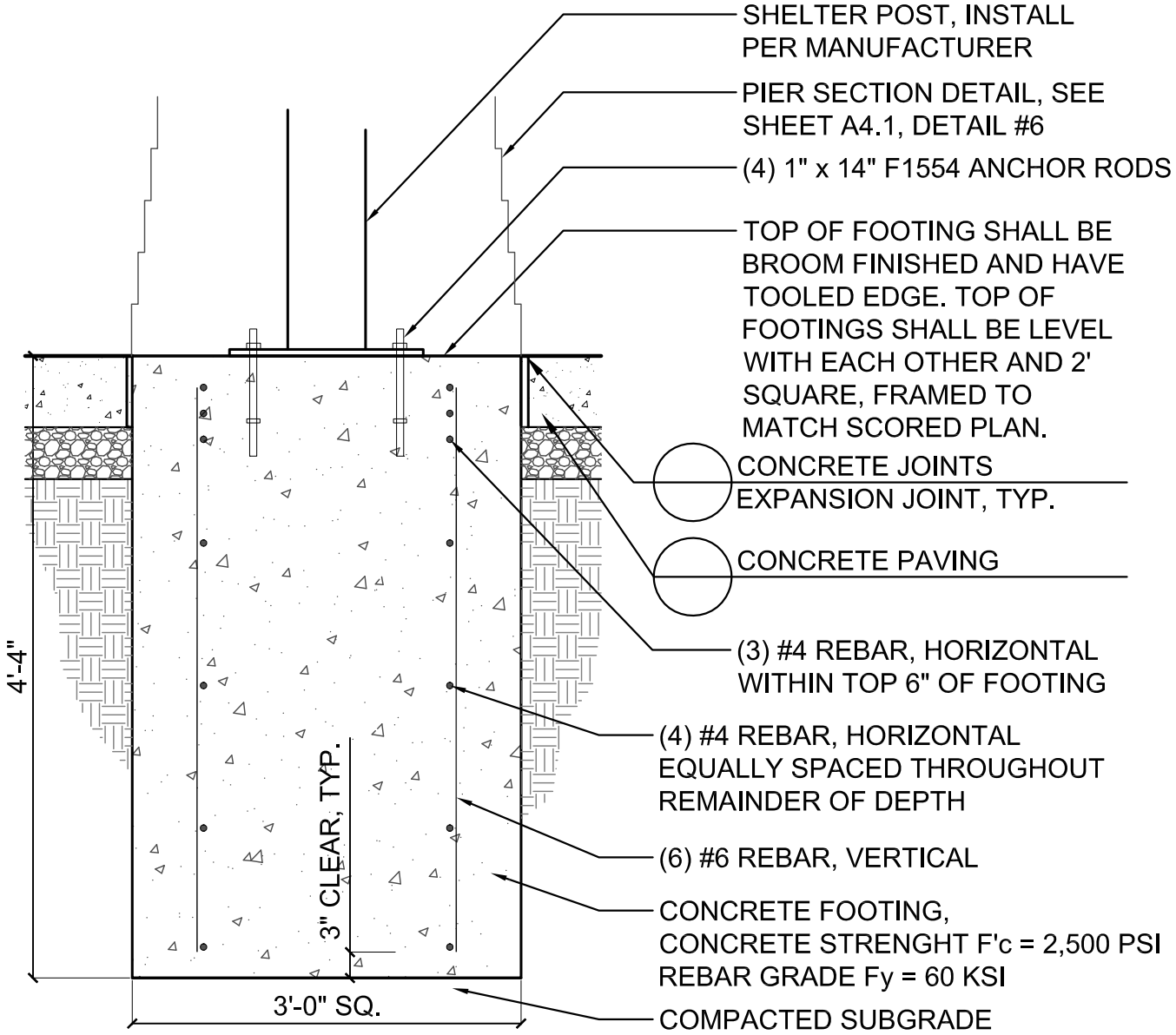
ADDRESS:_____

_____

List Surety Company Which Contractor will be using for Performance and Payment Bonds:_____
_____

NOTES:

1. MANUFACTURER: ICON SHELTER SYSTEMS, INC., SUPPLIER: PARKREATION, INC. 815-735-1497
2. CONTRACTOR TO PROVIDE ALL NECESSARY EQUIPMENT FOR A COMPLETE INSTALLATION.
3. CONTRACTOR TO TAKE DELIVERY OF SHELTER AND INSTALL COMPLETE. UNCRATE, CHECK, DELIVER TO SITE AND FULLY ASSEMBLE AND INSTALL.
4. APPROXIMATE FOOTING DIMENSIONS SHOWN. FINAL FOOTING SIZE BASED ON MANUFACTURER'S RECOMMENDATIONS FOR WIND LOAD.
5. POSTS TO SET ON FOOTING AND ATTACHED TO GALVANIZED STEEL ANCHOR BOLTS SUPPLIED BY MANUFACTURER.
6. BID ITEMS TO INCLUDE COMPLETE SHELTER INSTALL INCLUDING, FOOTINGS, FILL & COMPACTION
7. FOLLOW MANUFACTURER'S SPECIFICATIONS FOR INSTALLATION INSTRUCTIONS. COLOR: PER SITE AMENITIES SCHEDULE. ALL STEEL COMPONENTS TO BE POWDERCOATED.
8. TONGUE AND GROOVE STAIN SHALL MATCH RESTROOM BUILDING MATERIAL AND COLORS.
9. REFER TO OWNER PURCHASED STAMPED ENGINEERED SHOP DRAWINGS.



Shelter Footing

SCALE: 1"=1'-0"

det-shelter-footing_12

SITE AMENITIES SCHEDULE

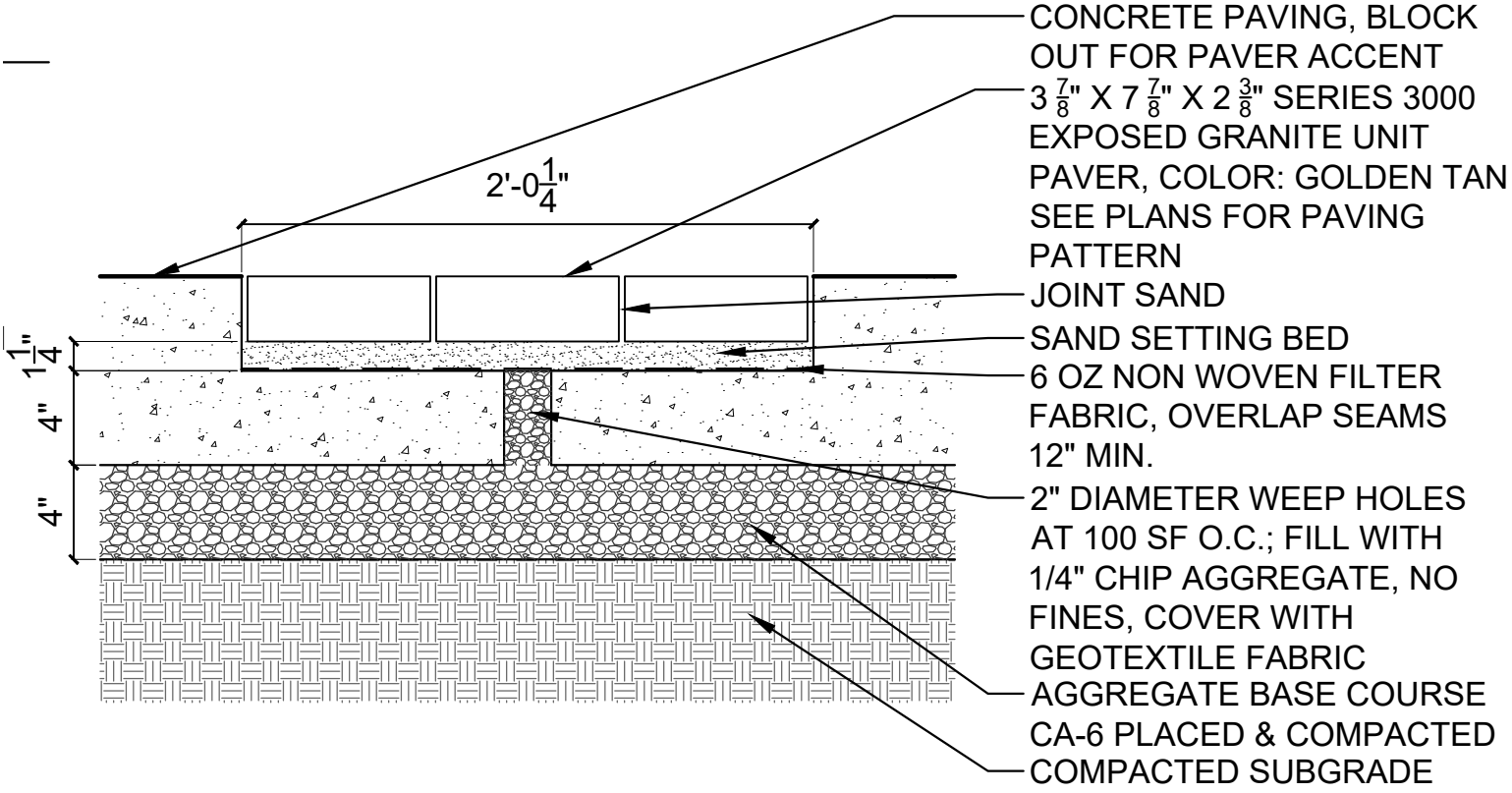
Key	Item	Color	Quantity	Model	Manufacturer	Supplier
A	Fitcore Extreme Angled Balance Beam Double	Posts: Blue Accent: Pine Green	1	#243908	Landscape Structures	Nutoys Leisure Products 800-526-6197
B	Fitcore Extreme Angled Overhead Ladder	Posts: Blue Accent: Pine Green	1	#243907	Landscape Structures	Nutoys Leisure Products 800-526-6203
C	Fitcore Extreme Ledge Hanger	Posts: Blue Accent: Pine Green	1	#243778	Landscape Structures	Nutoys Leisure Products 800-526-6203
D	Fitcore Extreme Quintuple Steps	Posts: Blue Accent: Pine Green	1	#243062	Landscape Structures	Nutoys Leisure Products 800-526-6199
E	Fitcore Extreme A-Frame Cargo	Posts: Blue Accent: Pine Green	1	#243016	Landscape Structures	Nutoys Leisure Products 800-526-6198
F	Fitcore Extreme High Step	Posts: Blue Accent: Pine Green	1	#244064	Landscape Structures	Nutoys Leisure Products 800-526-6202
G	Fitcore Extreme Rope Climb	Posts: Blue Accent: Pine Green	1	#243910	Landscape Structures	Nutoys Leisure Products 800-526-6199
H	Healthbeat Assisted Row/Push-Up	Posts: Blue Accent: Pine Green	1	#192452	Landscape Structures	Nutoys Leisure Products 800-526-6200
I	Chin-Up Station	Posts: Blue Accent: Pine Green	1	#137958	Landscape Structures	Nutoys Leisure Products 800-526-6201
J	SkyWays Cantilever Single Post Pyramid 10'x10'	Posts: Dune Fabric: Blue	2	#237673	Landscape Structures	Nutoys Leisure Products 800-526-6202
K	Game Table	Standard Finish, Grey	3	#T7102, 3 Seat	Doty & Sons	Doty & Sons 800-233-3907
L	Ping Pong Table	Standard Finish, Grey	1	#T1086050	Doty & Sons	Doty & Sons 800-233-3907
M	Picnic Table ADA		6			
N	Bench	Black Powdercoat	4	#678, P238H-P8P	Ultrasite	Ultrasite 800-458-5872
O	Drinking Fountain - Part of Building Package	Black Powdercoat	1	#10145SMFA with Pet Fountain and Recessed Hose Bibb with Lock Door	Most Dependable Fountains	Play Design Scapes 224-324-4597
P	Soccer Goal Pair	White	2 SET	#2239-00A, Complete Soccer Goal System, 8'x24', Portable Aluminum Goals (Pair) with Net, Ties, and Auger Anchor System	PW Athletics	Nutoys Leisure Products 800-526-6197
Q	Pedestrian Light Fixture	Black Powdercoat	5	Light Fxiture: VPR-EA30 Post: 1030T Base: 3500 Base		
R	Interpretive Sign		2			

PLANT LIST

SHELTER AND AMPHITHEATER			
Deciduous Shade Trees - Balled and Burlap			
2	2.5" cal.	*Acer saccharum*	Sugar Maple
1	2.5" cal.	*Aesculus glabra*	Ohio Buckeye
2	2.5" cal.	*Carya ovata*	Shagbark Hickory
1	2.5" cal.	*Catalpa speciosa*	Northern Catalpa
1	2.5" cal.	*Celtis occidentalis*	Hackberry
1	2.5" cal.	*Fagus grandifolia*	American Beech
3	2.5" cal.	*Ginkgo biloba 'Autumn Gold'*	Autumn Gold Ginkgo
4	2.5" cal.	*Ostrya virginiana*	Hop Hornbeam
3	2.5" cal.	*Platanus occidentalis*	Sycamore
1	2.5" cal.	*Quercus alba*	White Oak
2	2.5" cal.	*Quercus coccinea*	Scarlet Oak
1	2.5" cal.	*Quercus macrocarpa*	Bur Oak
3	2.5" cal.	*Quercus rubra*	Northern Red Oak
1	2.5" cal.	*Ulmus 'Patriot'*	Patriot Elm
26	Total		
Ornamental Trees - Balled and Burlap			
2	2.5" cal.	*Cercis canadensis*	Eastern Redbud
2	Total		
Deciduous Shrubs - Balled and Burlap			
4	24"x18"	*Cotinus coggygria 'Royal Purple'*	Royal Purple Smokebush
2	18"x18"	*Rhus aromatica*	Gro-Low Sumac
6			
Evergreen Shrubs - Balled and Burlap			
10	36"x18"	*Thuja occidentalis 'Art Boe'*	North Pole Arborvitae
3	24"x24"	*Thuja occidentalis 'Congabe'*	Fire Chief Arborvitae
13	Total		
Perennials and Ornamental Grasses			
73	#1 Container	*Clamatis Terniflora*	Sweet Autumn Clematis
92	#1 Container	*Echinacea purperea*	Purple Coneflower
54	#1 Container	*Monarda didyma 'Raspberry Wine'*	Raspberry Wine Beebalm
74	#1 Container	*Nepeta racemosa 'Walker's Low'*	Walker's Low Catmint
16	#1 Container	*Rudbeckia fulgida 'Viette's Little Suzy'*	Little Suzy Black-eyed Susan
20	#1 Container	*Solidage rugosa 'Fireworks'*	Fireworks Goldenrod
44	#1 Container	*Sporobulous heterolepis*	Prairie Dropseed
369	3" Cell	*Thymus praecox 'Coccineus'*	Creeping Thyme
742	Total		

PLANT LIST

POLLINATOR GARDEN AT FISHING OUTCROPPING			
Ornamental Trees - Balled and Burlap			
2	2.5" cal.	*Rhus typhina*	Staghorn Sumac
2	Total		
Perennials and Ornamental Grasses			
32	#1 Container	*Asclepias incarnata 'Cinderella'*	Cinderella Milkweed
20	#1 Container	*Asclepias tuberosa*	Butterfly Weed
21	#1 Container	*Echinacea purperea*	Purple Coneflower
20	#1 Container	*Geum triflorum*	Prairie Smoke
25	#1 Container	*Liatris spicata*	Marsh Blazing Star
34	#1 Container	*Liatris spicata 'Kobold'*	Kobold Gayfeather
27	#1 Container	*Lobelia cardinalis 'Black Truffle'*	Cardinal Flower
23	#1 Container	*Lobelia siphilitica*	Great Blue Lobelia
12	#1 Container	*Monarda didyma 'Raspberry Wine'*	Raspberry Wine Beebalm
24	#1 Container	*Monarda fistulosa*	Wild Bergamot
39	#1 Container	*Nepeta racemosa 'Walker's Low'*	Walker's Low Catmint
8	#1 Container	*Oligoneuron rigidum*	Stiff Goldenrod
45	#1 Container	*Rudbeckia fulgida 'Viette's Little Suzy'*	Little Suzy Black-eyed Susan
40	#1 Container	*Solidage rugosa 'Fireworks'*	Fireworks Goldenrod
12	#1 Container	*Symphyotrichum novae-angliae 'Purple Do*	Purple Dome Aster
31	#1 Container	*Verbena hastata*	Blue Vervain
413	Total		
Groundcovers			
16	3" Cell	*Thymus praecox 'Coccineus'*	Creeping Thyme
16	Total		



5 Unit Paving - Pedestrian

SCALE: 1 1/2"=1'-0"

d-unit paving_8.dwg

SECTION 12 9353
AMPHITHEATER SHELTER – (Owner Purchase Kit)

1.0 GENERAL

1.1 Description

Note – The Contractor **IS NOT** responsible for the purchase of the amphitheater to be installed in this bid.

A. Installation shall consist of all labor, equipment and materials necessary for complete installation of as specified.

B. As part of this work, the Contractor shall coordinate with manufacturer for the delivery and secure storage. Contract bid includes the coordination and labor necessary to install a complete system. This shall also include checking freight tickets, providing a copy to the Owner's Representative and inspection of items shipped.

1.2 Submittals – by Owner

A. Three original sets of Shop Drawings for permit submittal

B. Structural calculations for permit submittal

C. Drawings/Calculations to meet the version of IBC that is current in the jurisdiction that will be providing the building permit. It is the manufacturer's responsibility to determine which codes/code version that the building is to be design to meet. The code version is to be indicated on the submittals.

D. Drawings and calculations are to be sealed by architect/structural engineer licensed in the state of Illinois.

1.3 Shelter System Description

A. The pre-engineered package shall be shipped as a pre-fabricated package that shall include the structural frame members, roof material, fasteners, trim and installation instructions. The structure shall be shipped in knocked down bundles. No on-site welding will be required.

1.3 Delivery and Storage

A. Contractor shall be responsible for delivery, storage and security of the parts and materials until final acceptance. Unload materials with necessary equipment, store covered out of weather. Inspect parts, compare with manufacturer's bill of material, and report any missing or non-conforming parts to the manufacturer.

1.4 Related Sections

A. Section 32 1313 – Concrete paving

2.0 PRODUCTS

2.1 Substitutions – **NOTE** – All products listed from the basis of design. Alternate products may be listed in the "voluntary alternates" section of the bid form.

A. When submitting a request for a substitution, provide complete product data for each product as listed in the Submittals Section.

2.2 The Shelter is to be manufactured by Icon. Shelter is powder-coated at factory. See drawings attached for general shelter information. These drawings are NOT FOR CONSTRUCTION.

2.3 Equipment

A. All proprietary items shall be considered specified as "or equal". All equivalent substitutions must be approved by Owner's Representative.

B. All fixtures shall be supplied with the complimentary accessories and parts required for proper installation and operation.

C. The Contractor shall supply and install the shelter wholly and completely with

all hardware, fixtures, utilities, components and coatings necessary to provide a finished product.

D. The shelter shall be as depicted in the plans or approved equal. The structure shall be attached to the top of the concrete by use of anchor bolt(s) furnished by the manufacturer.
E. The Schedule of Electrical Fixtures is on the plans.
F. The Schedule of Paint and Coatings is on the plans.
G. Roofing will be as specified on the plans and related specifications.
H. All steel parts shall be factory powder coated in the Owner approved color.

3.0 EXECUTION

3.1 Installation

A. Verify that all components and parts have been delivered. If not, contact manufacturer to obtain the correct parts.
B. The contractor shall not modify equipment.
C. All equipment detailed on the drawings shall be provided and installed per Manufacturers plans and specifications.
D. The Contractor shall un-crate, clean and assemble all parts as necessary to install complete a usable item.
E. Contractor shall set the shelter on prepared footings and foundation. Footings and foundations shall be as per details. Foundation will be constructed to local codes, and good construction practices for the specific site conditions. Foundation footings shall be plumb and level with each other.
F. Remove all stickers, staples, tags and packing materials from the equipment except for those required by law.

3.2 Painting

A. All coatings shall be applied strictly according to manufacturer’s instructions including surface preparation, application method, and timing, use of tack coats, re-coating and curing.
B. Store paint materials according to manufacturer’s instructions.

3.3 Cleaning

A. Clean and polish exposed surfaces, using materials and methods recommended by manufacturer.

3.4 Protection

A. Protect accessories against damage during remainder of construction period, complying with manufacturer's directions.
B. At direction of Owner, repair or replace any damaged fixtures and accessories.

END OF SECTION

SECTION 32 1400
UNIT PAVING

1.0 GENERAL

1.1 Section Includes
- A. Concrete pavers
- B. Bedding and joint sand

1.2 Related Sections
- A. Section 32 1313 – Concrete Paving

1.3 References
- A. American Society of Testing and Materials (ASTM) (latest edition):
  1. C 140 Sampling and Testing Concrete Masonry Units.
  2. C 936 Specifications for Solid Interlocking Concrete Paving Units.
  3. C 979 Specification for Pigments for Integrally Colored Concrete.

1.4 Quality Assurance
- A. Installation shall be by a contractor and crew with at least one year of experience in placing interlocking concrete pavers on projects of similar nature or dollar cost.
- B. The Contractor shall conform to all local, state/provincial licensing and bonding requirements.

1.5 Submittals
- A. Shop or product drawings and product data shall be submitted.
- B. Full size samples of concrete paving units shall be submitted to indicate Color and shape selections. Color will be selected by Landscape Architect/Owner from Manufacturer's available colors.
- C. Sieve analyses for grading of bedding and joint sand shall be submitted.
- D. Test results shall be submitted from an independent testing laboratory for compliance of paving unit requirements to ASTM C 936 or other applicable requirements.
- E. Submit a document indicating the layout, pattern, and relationship of paving joints to fixtures and formed details.

1.6 Delivery, Storage, And Handling
- A. Concrete pavers shall be delivered to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by fork lift or clamp lift. The pavers shall be unloaded at the job site in such a manner that no damage occurs to the product.
- B. Bedding and joint sand shall be covered with a secure waterproof covering to prevent exposure to rainfall or removal by wind.
- C. Delivery and paving schedules shall be coordinated in order to minimize interference with normal use of buildings adjacent to paving.

1.7 Environmental Conditions
- A. Do not install sand or pavers during heavy rain or snowfall.
- B. Do not install sand and pavers over frozen base materials.
- C. Do not install frozen sand.

2.0 MATERIALS

2.1 Concrete Pavers

A. Supplied by: Unilock® or approved equal as determined by the Owner.
B. Product name(s)/shape(s), color(s), overall dimensions, and thickness of the paver(s) specified as per plans.

All Unilock® Concrete pavers have spacer bars on each unit. These spacer bars insure a precise joint spacing between all paving stones. The spacer bars permit the use of mechanical installation equipment for a mechanized installation process. Acceptable alternates shall be equipped with a similar spacer mechanism for installation. Pavers shall meet the minimum material and physical properties set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units. Efflorescence shall not be a cause for rejection.

1. Average compressive strength 4000 psi
2. Average absorption of 5% with no unit greater than 7% when tested according to ASTM C 140.
3. Resistance to 50 freeze-thaw cycles, when tested according to ASTM C 67, with no breakage greater than 1.0% loss in dry weight of any individual unit. This test method shall be conducted not more than 12 months prior to delivery of units.

C. Efflorescence shall not be a cause for rejection.

Efflorescence is a whitish powder-like deposit that sometimes appears on concrete products. Calcium hydroxide and other water-soluble materials form or are present during the hydration of Portland cement. Pore water becomes saturated with these materials, and diffuses to the surface of the concrete. When this water evaporates, the soluble materials remain as a whitish deposit on the concrete surface. The calcium hydroxide is converted to calcium carbonate during a reaction with carbon dioxide from the atmosphere. The calcium carbonate is difficult to remove with water. However, the efflorescence will wear off with time, and it is advisable to wait a few months before attempting to remove any efflorescence. Commercially available cleaners can be used, provided directions are carefully followed. Some cleaners contain acids that may alter the color of the pavers.

D. Pigment in concrete pavers shall conform to ASTM C 979. ACI Report No. 212.3R provides guidance on the use of pigments.
E. Maximum allows breakage of product is 1%.

2.2 Bedding And Joint Sand

A. The bedding and joint sand shall be clean, non-plastic, and free from deleterious or foreign matter. It can be natural or manufactured from crushed rock. Do not use limestone screenings or stone dust that do not conform to the grading requirements in Table 3. When concrete pavers are subject to vehicular traffic, the sands shall be as hard as practically available.
B. The type of sand used for bedding is often called concrete sand. Sands vary regionally. Screenings and stone dust can be unevenly graded and have material passing the No. 200 (75µm) sieve. Bedding sands with these characteristics should not be used. Contact local paver contractors or manufacturers to the project and confirm sand(s) successfully used in previous similar applications.
C. If the hardness of the bedding sand is not sufficient or questionable for the application (usually a heavily trafficked thoroughfare), contact Unilock® (1-800-UNILOCK) for information and specifications on assessing bedding sand durability under heavy traffic loads.

D. The bedding sand shall conform to the grading requirements of ASTM C 33 as shown in Table 3.

TABLE 3
BEDDING SAND
GRADING REQUIREMENTS

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 (600 µm)	25 to 60
No. 50 (300 µm)	10 to 30
No. 100 (150 µm)	2 to 10

Bedding sand may be used for joint sand. However, extra effort in sweeping and compacting the pavers may be required in order to fill the joints completely. It is recommendable to use sand specially gradated for joints. The gradations shown in Table 4 are recommended. Joint sand should never be used for bedding sand.

E. The joint sand shall conform to the grading requirements of ASTM C 144 as shown in Table 4 below:

TABLE 4
JOINT SAND
GRADING REQUIREMENTS

ASTM C 144		
	Natural Sand	Manufactured Sand
Sieve Size	Percent Passing	Percent Passing
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 - 100	95 to 100
No. 16 (1.18 mm)	70 - 100	70 to 100
No. 30 (600 µm)	40 - 75	40 to 75
No. 50 (300 µm)	10 - 35	20 to 40
No. 100 (150 µm)	2 - 15	10 to 25
No. 200 (75 µm)	0	0 to 10

3.0 EXECUTIONS

3.1 Examination

A. Verify that concrete subgrade preparation and elevations conform to the specifications.

B. Verify the proper installation of any concrete that abuts the concrete pavers, in terms of location, elevation, and adherence to the specifications.
C. Verify that the base is dry, uniform, even and ready to support sand, pavers and imposed loads.
D. Beginning of bedding sand and paver installation shall signify acceptance of base and surrounding concrete.

3.2 Site Preparation

A. The concrete base must be installed and approved per Section 2520 prior to Concrete Paver installation.
B. Concrete base to be dry, uniform, even and ready to support sand, pavers and imposed loads.

3.3 Paver Installation

A. Spread the bedding sand evenly over the base course and screed to a nominal 1 in. (25 mm) thickness, not exceeding 1 ½ in. (40 mm) thickness. The screeded sand should not be disturbed. Sufficient sand shall be placed in order to stay ahead of the laid pavers. Do not use the bedding sand to fill depressions in the base surface.
B. The spread sand shall be carefully maintained in a loose condition, and protected against incidental compaction, both prior to and following screeding. Any incidentally compacted sand or screeded sand left overnight, shall be loosened before further paving units are placed. Sand shall be lightly screeded in a loose condition to the predetermined depth, only slightly ahead of the paving units. Under no circumstances shall the sand be screeded in advance of the laying face to an extent to which paving will not be complete on that day.
C. Screed sand shall be fully protected against incidental compaction, including compaction by rain. Any screeded sand which is incidentally compacted prior to laying of the paving unit, shall be removed and brought back to profile in a loose condition. Neither pedestrian nor vehicular traffic shall be permitted on the screeded sand.
D. The Contractor shall screed the bedding sand using either an approved mechanical spreader (e.g.: an asphalt paver) or by the use of screed rails and boards.
E. Initiation of paver placement shall be deemed to represent acceptance of the pavers.
F. Pavers shall be free of foreign material before installation.
G. Pavers shall be inspected for color distribution and all chipped, damaged or discolored pavers shall be replaced.
H. Color Blending - Paving units shall be installed from a minimum of 3 bundles simultaneously drawing the paver vertically rather than horizontally. (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 bundles simultaneously, variation in color is dispersed and blended throughout the project.
I. The pavers shall be laid in the pattern(s) as shown on the drawings. String lines or chalk lines on bedding sand should be used to hold all pattern lines true.
J. Joints between the pavers on average shall be between 1/16 in. and 1/8 in. (2 mm to 4 mm) wide. In order to maintain the desired pattern, joint spacing must be consistent. This spacing must also be provided for the first row abutting the edge restraint.

K. Installing pavers too tightly may lead to chipping at the edges.
L. Gaps at the edges of the paved area shall be filled with cut pavers.
M. Pavers to be placed along the edge shall be cut with a masonry saw.
N. Upon completion of cutting, the area must be swept clean of all debris to facilitate inspection and to ensure pavers are not damaged during compaction. (Debris or sand particles left on pavers which are being compacted can cause point loading which may chip, scrape or break the paver.)
O. After sweeping and prior to compaction, the paved area must be inspected by the owner or consultant to ensure satisfactory color blending. Pavers can be moved easily at this time to achieve good color distribution.
P. Low amplitude, high frequency plate compactor shall be used to compact the pavers into the sand. The compactor shall transmit an effective force not less than 75 kN per square metre (1600 Lb/ft^2) of plate area. The frequency of vibration shall be within the range of 75 to 100 Hz. Use Table 5 below to select size of compaction equipment:

TABLE 5
PAVER THICKNESS AND REQUIRED MINIMUM COMPACTION FORCE

Paver Thickness	Compaction Force
2 3/8 in. (60 mm)	3000 lbs [13 kN]
2 3/4 in. (70 mm) & 3 1/8 in. (80 mm)	5000 [22 kN]

Use of a urethane plate compactor pad is recommended to minimize any scuffing of the paving stone surface.
Q. The pavers shall be compacted to achieve consolidation of the sand bedding and brought to level and profile by not less than three passes. Initial compaction should proceed as closely as possible following the installation of the paving units and prior to the acceptance of any traffic or application of sweeping sand.
R. Any units that are structurally damaged during compaction shall be immediately removed and replaced.
S. Dry joint sand shall be swept into the joints until the joints are full. This will require at least two or three passes with the compactor. Do not compact within 3 ft. (1 m) of the unrestrained edges of the paving units.
T. All work to within 3 ft. (1 m) of the laying face must be left fully compacted with sand-filled joints at the completion of each day.
U. Excess joint sand shall be swept off when the job is complete.

3.4 Quality Control

A. Final elevations shall be checked for conformance to the drawings after removal of excess joint sand.
B. All surface and pavement structures shall be true to the lines and levels, grades, thickness and cross sections shown on the drawings. All pavements shall be finished to lines and levels to ensure positive drainage at all drainage outlets and channels. In no case shall the cross-fall of any portion of pavement be less than 2 percent. The final surface elevations shall not deviate more than 3/8 in. (10 mm) under a 10 ft. (3 m) long straight edge.
C. The surface elevation of pavers shall be 1/8 to 1/4 in. (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.

END OF SECTION 32 1400

SECTION 32 1813.1
ARTIFICIAL TURF

1.0 GENERAL

1.1 Description

A. Furnish all labor, materials, tools and equipment necessary to install, in place, all synthetic turf material as indicated on the plans and as specified herein. The installation of all new materials shall be performed in strict accordance with the manufacturer's installation instructions and in accordance with all approved shop drawings.

1.2 Quality Assurance

A. Installer: Installation team shall be an established and experienced in the work of this section with a minimum of 5 years' experience. Site superintendent shall have at least 10 installations similar with this type.

B. Manufacturer's Instructions: Comply with the manufacturer's applicable instructions and recommendations for installation to whatever extent these are more stringent or explicit than indicated in the contract documents.

C. Materials: All supplied and installed materials and products will meet or exceed the minimum specifications designated in this section.

D. Inspection: Inspect delivered field surface fabric and components if accepted immediately prior to installation. Any damaged or defective items shall be rejected. Installed artificial system shall be inspected for, but not limited to the following: acceptable seams, glue bonding, uniformity of product and color, surface bubbles, field markings, and field edge installation.

E. Certification prior to work: The synthetic turf manufacturer and/or installation contractor shall perform an inspection of the stone base onto which the synthetic turf system is to be installed and to examine the finished surface for required compaction, permeability and grade tolerances. After any discrepancies between the required materials, application and tolerance requirements noted have been corrected, the synthetic turf installer shall submit a written certification of acceptance of the base for installation of subsequent layers of the synthetic turf system. The acceptance of the base construction should be included in the certification for warranty validation.

1.3 Submittals

A. Substitutions: Products are acceptable if in compliance with all requirements of these specifications. Submit alternate products to Owner's Representative for approval prior to bidding according to bid submittal requirements.

B. Prior to installation, the following test reports shall be submitted to the owner shall meet ASTMB 3351. The dates of independent laboratory test results shall be within the five years previous to the award-of-contract date.

1. Freeze Thaw: ASTM C67
2. Manufacturers current IPEMA Certification
3. Slip Resistance: ASTM D2047 and E303.
   Dry – 1.0-.8,
   Wet - .9-.6
4. Tensile Strength: ASTM D412; 60-80 psi
5. Elongation at Breakage: ASTM D412
6. Tear Strength: ASTM D624; 140%
7. Wear surface density (durability)

8. Taber Abrasion: ASTM C501
9. Flammability: ASTM D2859

C. Provide product and maintenance warranties
D. Field test inspection reports and samples for material including permeability and flammability.
E. Installer Qualifications: A list of ten similar sized project completed with a similar product within the last 5 years. List shall include names of project representatives and respective phone numbers.
F. Product: Submit the following:
    1. Submit one sample, minimum 1’ x 1’ in size
    2. A written guarantee from installer for the workmanship of the installation.
    3. Product warranty and guarantee from manufacturer warranting against all defects for a 10-year period.
    4. The artificial grass installer/contractor will provide a maintenance procedure for the installed surface with the Owner.

1.4 Delivery, Storage, And Protection

A. Deliver products to project site in wrapped condition.
B. Store products under cover and elevated above grade.

1.5 Warranties

A. The synthetic turf and safety padding installed under this contract will be warranted for a period of ten years for materials and covers the surface for wear through, deterioration and UV degradation. Warranty is not required to cover damage caused by vandalism acts including: fire, paint, application of petroleum liquids and/or motorized mechanical abrasion. The installer must submit written warranty.
B. When defective material or workmanship is discovered which will require repair or replacement, all such repair work or replacement work shall be done by the contractor at its own expense after written notification is given of such required repairs. However, if the contractor fails to comply with the requirements of the above guarantee within reasonable time after notification is given, the Owner shall proceed to have the repairs made by others at the contractor’s expense.
    1. Any unsafe conditions that arise shall be secured and maintained by the installer until all required repairs or replacements have been completed.
    2. All resurfacing will conform in kind and quality to the specifications set forth in the plans and specifications and will be free of defects in workmanship and material.

2.0 PRODUCTS

2.1 Materials

A. Basis of Design: BocceGrass Court as supplied by Forever Lawn, Inc. Approved alternates include Nylon 38-36 as supplied by Perfect Turf LLC.
    1. Turf fibers shall be 4,200 minimum, texturized nylon
    2. Weight: The product face weight shall be 36 oz minimum or greater with backing
    3. Tufting gauge will be 3/16” with a 3/8” pile height minimum with dual

primaries, same row
4. Yarn color: Green

3.0 EXECUTION

3.1 General

A. The installation shall be performed in full compliance with approved Shop Drawings.

3.2 Examination

A. The base shall be cleared, leveled and compacted at a depth per plans.

3.3 Preparation

A. The perimeter of the area shall be defined with a nailer board per plans.
B. The entire surface shall be clean and free from any foreign and loose material.

3.4 Installation

A. The turf shall be rolled out in sections, cut around the poles, and seamed together using the micromechanical seaming system.
B. Turf shall be secured around the perimeter using stainless steel staples to secure turf to the nailer boards. Staples shall be spaced every 3”. Loose edges will not be accepted.
C. Surfacing shall be free of wrinkles or gaps.

END OF SECTION

SECTION 32 8400
IRRIGATION SYSTEMS

1.0 GENERAL

1.0 Related Documents

A. Attention is directed to the Bidding and Contract Requirements and General and Supplemental Requirements, which are hereby made a part of this Section.

1.1 Description Of Work

A. Field locate and connect to the irrigation water supply as shown on plans.

B. Furnish all labor, materials, supplies, equipment, tools, and transportation, and perform all operations in connection with and reasonably incidental to the complete installation of a complete irrigation system, and guarantee/warranty as shown on the drawings, the installation details, and as specified herein. The system shall be constructed to grades and conform to areas and locations as shown on the drawings. Removal and or restoration of existing improvements, excavation and back-fill, and all other work in accordance with plans and specifications are required. Contractor to acquire all registrations, inspections and permits, controller fees to complete the irrigation system.

C. Extent of irrigation system work is shown on drawings and by provisions of this Section.

D. Sprinkler lines shown on the drawings are essentially diagrammatic. Spacing of the sprinkler heads or quick coupling valves are shown on the drawings and shall be exceeded only with the permission of the Owner's authorized representative.

E. The irrigation system shall include a controlled valve distribution system.

F. CONTRACTOR shall furnish and install equipment as common in the industry, associated piping and incidentals as shown and specified.

G. Items of work specifically included, but not limited to are:

1. Procurement of all applicable licenses, permits, and fees.
2. Coordination of all utilities.
3. Connection of electrical power supply to the irrigation control system.
4. Sleeving for irrigation pipe and wire.
5. As-Built Drawings

1.2 RELATED WORK

A. Division 2-Site Work:

1. Section 32 92 00 – Lawns and Grasses
2. Section 31 20 00 – Earthwork
3. Section 32 93 00 – Trees, Shrubs and Ground Cover

1.3 Quality Assurance

A. The "Contractor" shall maintain continuously a competent superintendent, satisfactory to the Owner, with authority to act for him in all matters pertaining to the work. The "Contractor" shall coordinate his work with the other trades.

B. The “Contractor” shall confine his operations to the area to be improved and to the areas allotted him by the Owner’s representative for material and equipment storage.
C. The “Contractor” shall have a minimum of 5 years’ experience installing irrigation systems of comparable size and complexity. The contractor shall also have suitable financial status to meet obligations for this project.
D. The contractor is to be a Certified Irrigation Contractor (CIC) through the Irrigation Association. They shall also hold all installer requirements for the state in which this product is located in.
E. Special Requirements
    1. Work involving substantial plumbing for installation of copper piping, backflow preventer(s), and related work shall be executed by licensed and bonded plumber(s). Secure a permit at least 48 hours prior to start of installation.
    2. Tolerances: Specified depths of mains and laterals and pitch of pipes are minimums. Settlement of trenches is cause for removal of finish grade treatment, refilling, compaction, and repair of finish grade treatment.
    3. Coordination with Other Contractors: Protect, maintain, and coordinate Work with Work under other Section.
    4. Damage to Other Improvements: Contractor shall replace or repair damage to grading, soil preparation, seeding, sodding, or planting done under other Sections during Work associated with installation of irrigation system at no additional cost to Owner.

1.4 Submittals
A. Submit samples under provisions of Section 01 33 00-Submittal Procedures.
B. Materials List: At a minimum include the following, valves, sprinklers, controller, wire, wire connectors, pipe, fittings, valve boxes, swing joints, pipe hangers, electric valves, wire splices, sprinklers, nozzles, fusing devices, grounding components and quick couplers to be used on the project prior to purchasing materials. Quantities of material need not be included.
C. Manufacturer’s Data: Submit manufacturer’s catalog cuts, specifications, and operating instructions for the equipment mentioned above and equipment shown on the materials list
D. Shop Drawings: If there is a change in the design due to an approved product change prior to bidding, submit shop drawings for acceptance, submit written operating and maintenance instructions. Provide format and contents as directed by the Landscape Architect. Include instruction sheets and parts lists for all operating equipment.
E. Project Record (As-Built) Drawings
    1. The CONTRACTOR is to provide the OWNER a scaled drawing of the completed field “As-Built” of the system.
    2. The contractor shall use GNSS survey grade equipment to locate all components on the irrigation system. GPS to use sub-decimeter accuracy. All main lines and lateral lines shall be shot in as a continuous point path as the main / lateral lines are walked with the data collector.
    3. Components of the system but not limited to, sprinkler heads, electric valves, isolation valves, all PVC and PE piping, quick couplers, PVC pipe

sizing, grounding, power wire routes and size and signal wire routes from the controller to the electric valves including wire runs, sensors, grounding locations, decoder fusing devices and any other installed components. All piping shall be referenced in the trench for lengths of run, change in direction and distance and locations of all components referenced in the data collection points.

4. Two final hard copies of the overall drawings with dimension and notes are to be provided to the LANDSCAPE ARCHITECT and OWNER and one copy of the as-built in AutoCAD 2019 digital format at the same scale drawing as provided to the Contractor. Contractor is to provide all GPS data points as separate layers or in a standard format. Drawing is to be georeferenced. Coordinate system shall be NAD83 Illinois State Planes, East Zone, US Foot. The file is to be created in autocadd and not converted to.
5. The contractor is to provide individual controller sequencing sheets in the same format as original drawings and 11” x 17” format. Both submittals shall be laminated and placed as directed by Owner.
6. The contractor is to provide proof of daily field as-builts and notes with pay submittal for each area the pay submittal is being submitted for. All daily sketches shall have the installed components for that day sketched out with dimensions to all components, fittings and layout. Payment will not be approved if progress drawings are not submitted and kept current and payment will not be processed until as-builts are updated.
7. The contractor is to take daily pictures of the work installed for that day prior to any backfilling of the trench and/or in the process of filling the trench. The picture log shall be documented in order of installation and shall be assembled daily and submitted at the end of the project in on a memory stick. The contractor is to provide a sample of the daily as-built log and picture log for approval during the first week of installation.
8. Follow all of the Client’s CAD, GIS guidelines and layer management in creating the as-built.
9. Contractor to submit documentation of GNSS survey equipment including data collector, receiver, and processing software for approval before data is collected.
10. Landscape Architect will not certify any pay request submitted by the Contractor if the as-built drawings are not current, and processing of pay request will not occur until as-builts are updated.

1.5 Rules And Regulations

A. Work and materials shall be in accordance with the latest edition of the National Electric Code, the Uniform Plumbing Code as published by the Western Plumbing Officials Association, and applicable laws and regulations of the federal, state and local governing authorities.
B. When the contract documents call for materials or construction of a better quality or larger size than required by the above-mentioned rules and regulations, provide the quality and size required by the contract documents.
C. If quantities are provided either in these specifications or on the drawings, these quantities are provided for information only. It is the “Contractor’s”

responsibility to determine the actual quantities of all material, equipment, and supplies required by the project and to complete an independent estimate of quantities and wastage.

D. Contractor to provide any plan signatures that are required for irrigation design in the state or jurisdiction in which the project is located in.

E. All sections of the standard specifications applicable to any and all parts of this project shall govern including the following.
   1. City, State and municipality of where the project is located
   2. American water works association
   3. American Society for Testing and Materials (ASTM) – Specifications and Test Methods specifically referenced in this Section
   4. Underwriters Laboratories (UL) – UL Wires and Cables.

1.6 Delivery, Storage And Handling

A. Deliver irrigation system components in manufacturer's original undamaged and unopened containers with labels intact and legible.

B. Deliver plastic piping in bundles, packaged to provide adequate protection of pipe ends either threaded or plain

C. Store and handle materials to prevent damage and deterioration.

D. Provide secure, locked storage for valves, sprinkler heads and similar components that cannot be immediately replaced, to prevent installation delays.

1.7 Codes And Standards

A. The entire installation shall fully comply with local and state laws and ordinances and with all established codes applicable thereto. Contractor to provide final documents with all licenses and certifications needed for the work in this location.

B. Any permits for the installation or construction of the work included under this contract which are required by any of the legally constituted authorities having jurisdiction, shall be obtained and paid for by the "Contractor", each at the proper time. He shall also arrange for and pay all costs concerning any inspections and examinations required by these authorities.

C. In all cases where inspection of the sprinkler system work is required and/or where portions of the work are specified to be performed under the direction and/inspection of the Owner's authorized representative, the "Contractor" shall notify the Owner's authorized representative at least 72 hours in advance of the time and such inspection and/or direction is required.

D. Any necessary re-excavation or alterations to the system needed because of failure of the "Contractor" to have the required inspections, in the opinion of the Landscape Architect, shall be performed at the "Contractor's" own expense.

1.8 Testing

A. Notify the engineer/landscape architect/owner's representative three days in advance of testing.

B. Pipelines jointed with rubber gaskets or threaded connections may be subjected to a pressure test at any time after partial completion of backfill.

Pipelines jointed with solvent-welded PVC joints shall be allowed to cure at least 24 hours before testing.

C. Subsections of mainline pipe may be tested independently, subject to the review of the engineer/landscape architect/owner's representative.
D. Furnish clean, clear water, pumps, labor, fittings, and equipment necessary to conduct test or retests.
E. Volumetric Leakage Test:
    1. Cap riser of mainline components for volumetric pressure tests. Backfill to prevent pipe from moving under pressure. Expose coupling and fitting.
    2. Purge all air from the pipeline before test.
    3. Subject mainline pipe to the anticipated operating pressure of the system. Maintain constant pressure. Test complete system under full line pressure. Pressure must be maintained with less than 2lbs loss in the system for 4 hours. If the system does not hold pressure, repair leaks and retest system until the system maintains pressure.
    4. All necessary testing equipment shall be furnished by CONTRACTOR.
    5. Cement or caulking to seal leaks is prohibited.
F. Operational Test:
    1. Activate each control valve in sequence from controller. The engineer/ landscape architect/owner's representative will visually observe operation, water application patterns, and leakage.
    2. Replace defective control valve, solenoid, wiring, or appurtenance to correct operational deficiencies.
    3. Replace, adjust, or move water emission devices to correct operational or coverage deficiencies.
    4. Replace defective pipe, fitting, joint, valve, sprinkler, or appurtenance to correct leakage problems. Cement or caulking to seal leaks is prohibited.
    5. Repeat test(s) until each lateral passes all tests. Repeat tests, replace components, and correct deficiencies at no additional cost to the owner.

1.9 Construction Review

A. The purpose of on-site reviews by the engineer/landscape architect/owner's representative is to periodically observe the work in progress, the "Contractor's" interpretation of the construction documents, and to address questions with regard to the installation.
B. Scheduled reviews such as those for irrigation system layout or testing must be scheduled with the engineer/landscape architect's/owner's representative as required by these specifications.
C. Impromptu reviews may occur at any time during the project.
D. A review may occur at the completion of the irrigation system installation and project record (as-built) drawing submittal.

1.10 Guarantee/Warranty And Replacement

A. It shall be the "Contractor's" responsibility to ensure and guarantee satisfactory operation of the entire system and the workmanship and restoration of the area. The entire system shall be guaranteed to be complete and perfect in every detail for a period of one year from the final acceptance

and he hereby agrees to repair or replace any such defects occurring within that year, free of expense to the Owner

B. Minor maintenance and adjustment shall be by the Owner.

C. For a period of one year from commencement of the final acceptance, fill and repair depressions or settling more than one inch (1”). Restore landscape or structural features damaged by the settlement of irrigation trenches or excavation. Repair damage to the premises caused by a defective item.

D. Make repairs with in seven (7) days of notification from the engineer/landscape architect/owner’s representative.

E. Contract documents govern replacements identically as with new work. Make replacements at no additional cost to the contract price.

F. Guarantee/warranty applies to originally installed materials, equipment, and replacements made during the guarantee/warranty period. Equipment salvaged and re-used shall not be warranted unless the original warranty is still in effect. The workmanship shall be warranted.

1.11 Start-Up And Seasonal Maintenance

A. Coordinate the start-up with the Owner’s landscape maintenance personnel.

B. “Contractor” shall provide seasonal maintenance of the system for a period of two years as part of this contract and will provide written instructions to the Owner for future service and maintenance

C. The seasonal maintenance begins after final acceptance of the irrigation system.

D. Return to the site during the subsequent spring season and demonstrate to the Owner the proper procedures for the system start-up, operation and proper maintenance. Repair any damage caused within the warranty period, adjust pressures, and adjust nozzles at no additional cost to the owner

E. After completion, testing and acceptance of the system, the “Contractor” will instruct the Owner’s personnel in the operation and maintenance of the system.

1.12 Project Conditions

A. Protection of Property

1. Preserve and protect all trees, plants, monuments, structures, and paved areas from damage due to Work of this Section. In the event damage does occur, all damage to inanimate items shall be completely repaired or replaced to satisfaction of Owner, and all injury to living plants shall be repaired by Contractor. All costs of such repairs shall be charged to and paid by Contractor.
2. Protect buildings, walks, walls, and other property from damage. Flag and barricade open ditches. Damage caused to asphalt, concrete, or other building material surfaces shall be repaired or replaced at no cost to Owner. Restore disturbed areas to original condition.

B. Existing Trees:

1. All trenching or other Work under limb spread of any and all evergreens or low branching deciduous material shall be done by hand or by other methods so as to prevent damage to limbs or branches.

2. Where it is necessary to excavate adjacent to existing trees, use all possible care to avoid injury to trees and tree roots. Excavation, in areas where 2 inch and larger roots occur, shall be done by hand. Roots 2 inches or larger in diameter, except directly in the path of pipe of conduit, shall be tunneled under and shall be heavily wrapped with burlap to prevent scarring or excessive drying. Where a trenching machine is operated close to trees having roots smaller than 2 inches in diameter, wall of trench adjacent to tree shall be hand trimmed, making clean cuts through roots. Trenches adjacent to trees shall be closed within 24 hours, and when this is not possible, side of trench adjacent to tree shall be kept shaded with moistened burlap or canvas.

C. Protection and Repair of Underground Lines:
1. Request proper utility company to stake exact location (including depth) of all underground electric, gas, or telephone lines. Take whatever precautions are necessary to protect these underground lines from damage. If damage does occur, Utility Owner shall repair all damage. Contractor shall pay all costs of such repairs unless other arrangements have been made.
2. Contractor to locate all private utilities (i.e., electrical service to outside lighting) before proceeding with excavation. If Contractor damages staked or located utilities, they shall be repaired by Utility Owner at Contractor's expense unless other arrangements have been made.

D. Replacement of Paving and Curbs:
1. Where trenches and lines cross existing roadways, paths, curbing, etc., damage to these shall be kept to a minimum and shall be restored to original condition at no additional cost to the project.

F. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
1. Notify Owner and Engineer or Record no fewer than three days in advance of proposed interruption of water service.
2. Do not proceed with interruption of water service without local written permission.

2.0 MATERIALS

2.0 General

A. Use materials that are new and without flaws or defects of any type, and which are the best of their class and kind. All material overages at the completion of the installation are the property of the “Contractor” and are to be removed from the site.

B. Each major component of equipment shall have manufacturer’s name, address, catalog and serial number permanently attached in a conspicuous place.

C. The same brand or manufacturer shall be used for each specific application of valves, fittings, controls, and other equipment.

D. All materials shall be new and of the quality specified.

E. All equipment shall be listed, approved or rated by a nationally recognized testing and rating bureau of recognized manufacturer’s association

responsible for setting industry standards. All electrical equipment and apparatus shall be U.L. listed.

1. Acceptable irrigation manufacturers – As indicated on the drawings or approved equal.

2.1 Substitutions

A. Equipment Substitutions

1. Whenever a piece of equipment or material is identified by a manufacturer's trade name, catalog number, etc., it is intended merely to establish a standard; and any equipment of another manufacturer which will perform adequately the requirements of design and is of equal or greater quality than the specifications in the opinion of the LANDSCAPE ARCHITECT will be considered equally acceptable.
2. The specifications shall permit use of materials of any nationally recognized manufacturer so long as they are fully equal to quality and performance of named item in opinion of LANDSCAPE ARCHITECT. Materials or equipment of other manufacturers may be used upon following conditions.
   a. Proposed substitute is equal in design, materials, construction and performance in opinion of LANDSCAPE ARCHITECT. No compromise in quality level will be allowed.
   b. Service capabilities, availability of service parts, and stability of manufacturer are adequate in opinion of LANDSCAPE ARCHITECT.
   c. CONTRACTOR assumes responsibility for any modifications required for installation of substitute equipment and for accommodation of such substitution by work of other contractors. Any additional expense on part of other contractors or OWNER due to substitution of equipment shall be borne by CONTRACTOR making such substitution.
   d. Substitute equipment shall fit into space provided with adequate provisions for service and maintenance.

B. The Contractor shall use materials as specified. Material other than specified will be permitted only after written application by the "Contractor" and written approval by the Landscape Architect. Substitutions will only be allowed when in the best interest of the Owner. Substitutions shall be approved equal prior to bidding.

2.2 Sleeving

A. Install separate sleeve beneath paved areas to route each run of irrigation pipe or wiring bundle.

1. All sleeving shall be SDR21 PVC Class 200 pipe with solvent welded joints.
2. Sleeving diameter: equal to twice that of the pipe or as indicated on drawings. Minimum wire sleeve to be 2" unless indicated.
3. Sleeve pipe and wire separately.
4. For 90 angles use 24" radius long sweep ells on electrical conduit.
5. All piping in sleeves are to be glued, no gasketed pipe will be allowed in the sleeve.

6. Contractor to coordinate sleeving with other trades for the landscaping, building penetrations and interior irrigation piping runs.

2.3 Pipe And Fittings

A. Mainline Pipe and Fittings ; Large Rotor Lateral Pipe and Fittings

1. Use rigid, unplasticized polyvinyl chloride (PVC) 1120, 1220 National Sanitation Foundation (NSF) approved pipe, extruded from material meeting the requirements of Cell Classification 12454-A or 12454-B, ASTM Standard D1784, with an integral belled end.
2. Use Class 200, SDR-21, rated at 200 PSI, conforming to the dimensions and tolerances established by ASTM Standard D2241. Use PVC pipe rated at higher pressures than Class 200 in the case of small nominal diameters that are not manufactured in Class 200.
3. Use rubber-gasketed pipe equipped with Reiber Gasket System for mainline pipe with a nominal diameter 3 inches and greater. Contractor may also use gasketed pipe on 2.5” if desired. Use rubber-gasketed deep bell ductile iron fitting conforming to ASTM A-536 and ASTM F-477 by LEEMCO or approved equal for all fittings 4” and larger. Use lubricant approved by the pipe manufacturer. Size slip fitting socket taper to permit a dry unsoftened pipe end to be inserted no more than halfway into the socket. Saddle and cross fittings are not permitted. Mainline pipe going through sleeves shall be solvent weld. No gasketed pipe is allowed in sleeves.
4. Use solvent weld pipe for mainline pipe with a nominal diameter 1.5”, 2”, 2.5” and 3” and less or where a pipe connection occurs in a sleeve.

B. Use Schedule 40, Type 1, PVC solvent weld fittings conforming to ASTM Standard D2466 and D1784. Use primer approved by the pipe manufacturer. Solvent cement to conform to ASTM Standard D2564. S-40 fitting may be used on 3” diameter and less. Use ductile iron fittings on 4” and greater.

1. Provide pipe homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, wrinkles and dents.
2. Provide pipe continuously and permanently marked with manufacturer’s name and trademark, size schedule and type of pipe working pressure at 73 degrees F. and (NSF) approval.
3. Pipe sizes referenced in the construction documents are minimum sizes and may be increased at the option of the “Contractor” at no cost to the Owner.
4. All pipes damaged or rejected because of defects shall be removed from the site at the time of said rejection.
5. All mainlines and sleeves are to have a metallic tracer tape placed 6” from the surface. The tape shall be 3” wide and indicate “Buried water below”. Sleeves shall have tape brought just below the surface at the ends for ease of locating or terminated in valve boxes. Loop tape into and out of all valve boxes.
6. Contractor is to run a #14 gauge direct bury UL-listed wire along the mainline and loop into each gate valve, quick coupler, or other mainline component valve box. Label all wire loops in valve boxes. Use a purple jacketed wire for mainline runs. Tape tracer wire to the pipe every 15 feet.

C. Specialized Pipe and Fittings:

1. Assemblies calling for threaded pipe connections shall use PVC Schedule 80 nipples and PVC Schedule 40 threaded fittings. All fittings shall be by LEEMCO.
2. Joint sealant: Use only Teflon-type tape on plastic threads.
3. Ductile iron fittings: Joint Restraints – all isolation valves shall have a joint restraint system by LEEMCO or approved equal. All ductile iron fittings shall be slanted, deep bell, gasketed style made in accordance with ASTM-A-536, Grade 65-45-12. Fittings shall have four lugs to accommodate joint restraints and other fittings. Bell sections shall allow 5-degree freedom of pipe deflection within the bell end. Gasket design shall be rib-enforced "U-Cup" configuration to seal and assist in restraining pipe at all pressures. Fittings shall be manufactured by LEEMCO or approved equal.
4. Use joint restraints on gasketed tees and 90 ells gasketed joints by LEEMCO or approved equal in addition to concrete thrust blocks.
5. Contractor may substitute joint restraints in place of thrust blocks. If joint restraints were to be used, a joint restraint plan must be submitted for approval prior to construction.

D. Thrust Blocks:

1. Use thrust blocks for fitting on pipe utilizing a rubber gasket pipe.
2. Use 3,000 – PSI concrete.
3. Use 2-mil plastic to encapsulate the fitting or valve.
4. Follow pipe manufacturers' requirements for thrust blocking.

2.4 Sprinkler Components

A. Sprinkler Assembly: As presented in the drawings and installation details. When required use the sprinkler manufacturer's pressure compensating screens or bodies to achieve operating conditions on each spray head sprinkler and to control excessive operating pressures.

2.5 Control System Components

A. Irrigation Controller: Hunter Industries A2C-75D-SS Stainless Steel Wall Mount, Decoder Controller. EXISTING

1. Hunter A2C Series controller factory mounted in a stainless steel enclosure. (#A2C-75D-SS). The controller shall be mounted on the inside of the well equipment fenced area as per the details.
2. Use Hunter single station decoders (#ICD-100) as required.

B. Control Wire:

1. 2-wire path
2. 2-wire decoder wire shall be Hunter wire ID1RED #14 gauge twisted pair wire by Hunter Industries or Paige Wire.
3. Color: Wire color shall be continuous over its entire length. Refer to drawings for jacket colors.
4. Splices: Use 3m DBR/Y-6 wire connector with waterproof sealant. Wire connector to be of plastic construction.
5. Wire Markers: Pre-numbered or labeled with indelible non-fading ink, made of permanent, non-fading material.
6. All wiring to be install following existing local and state codes.

C. Electric Control Valves

1. All valves shall be of globe or globe/angle configuration with a female pipe thread inlet and outlet connections. Diaphragm assembly shall be sonically welded to form a solid-piece component. The diaphragm shall be of rubber construction to retain flexibility and provide maximum sealing throughout its area.
2. Electric valves shall be Hunter PGV, 1.5", and 2" series electric valves. The valve shall have a manual flow control with a hand-operated, rising-type flow control stem with control wheel/handle and an internal manual bleed assembly. Size per plan. All valves shall have the accu-sync adjustable pressure regulation.
3. All parts shall be serviceable without removing valve from line. Valve may be installed at any angle without affecting valve operation.
4. 22" solenoid lead wires shall be attached to a 24 VAC solenoid with waterproof molded coil capable of being removed by turning coil. Valve shall be held normally closed by internal water pressure with manual bleed screw.
5. The legend and flow arrow shall be applied at all valve locations. Valve numbering shall be located so as to be conspicuous and legible. The controller and valve numbering can be engraved in black on a yellow plastic tag, by Christy's Enterprise or equal. The tag size shall be standard size of 2.25" x 2.66". An additional ID tag is to be attached by plastic zip tie to the electric valve.

D. Valve Boxes

1. Valve boxes shall be manufactured by Rain Bird VB series or approved equal and shall be rectangular, 12" /w 6" extension or 6" and 10" round and have locking "T" lid tops. Valve box lids in turf areas to be green; valve box lids in plantings to be brown or black.
2. Valve box shall be of a size that provides adequate space for valve repairs. For decoder systems and valve boxes with the decoder, two valves per 12" rectangular box, other wise 1 electric valve per smaller valve box. A 10" round valve box may be used for isolation valves, quick couplers and wire drops only.
3. The valve box cover shall have the component markings heat stamped into the cover with minimum 1.5" high, maximum 2" high lettering. Use the following symbols for corresponding components in the valve box.

   GV – for Gate Valves
   EV – for Electric Valves
   WS – for Wire Splice
   QC – for Quick Coupler
   GRD – for grounding splice and rod locations
   Valve numbering – for each zone
   Other – Label as needed

   The final valve numbering shall also be branded into the tops with electric valves. Contractor may find an example of the branding tool at Brand New Industries Inc., Product # VB2x3.

4. Contractor to coordinate location of valve boxes that are ganged together in clusters of three or more in planting beds with the Landscape Architect. Receive his approval of locations prior to installation.

E. Quick Coupler Valves
1. Valves shall be 1” Hunter HQ44-LRC with yellow cover series valves or approved equal. The quick coupling shall have a yellow locking vinyl cover. Provide matching key and 1” hose swivel.
2. Quick coupler valves are to be mounted on a LASCO joint with brass MIPT threads and placed in a 10” round valve box. The valve box is to be filled with 3/8” clear chip gravel, compacted as detailed. Ensure proper quick coupler height when backfilling.

F. Swing Joints
1. Triple Joint Swing Joints riser assemblies shall have a working pressure rating of 315 psi @ 73F. The swing joint shall have O-rings at each swivel joint. The inlet and outlet sockets and threads conforming to ASTM standards D 2467 and D 2464, respectively. The body wall thickness of all components conforming to ASTM D 2464.
2. The swing joint riser assemblies will be molded of Rigid Poly (vinyl) Chloride (PVC) Type 1, Cell Classification 12454-B per ASTM Standard D 1784. It shall be manufactured in such a way, that both the male and female O-ring sealing areas be free from mold parting lines. The burst pressure tested per ASTM D2467 and the long-term pressure tested at 1,000psi for 1,000 hours.
3. The swing joint shall have a five-year warranty for the swing joint. The large sprinkler swing joint shall have a minimum length 12” riser and quick coupler swing joints shall have a minimum length 12” and be by LASCO or approved equal. The threads shall correlate to sprinklers, quick couplers and related components. Quick Coupler Swing Joints are to have a brass male threaded outlet 90 ell outlet to enter the bottom of the quick coupler.
4. Contractor is responsible for final lay length of the riser to ensure a 45-degree lay angle. If longer or shorter risers are needed, they will need to provide them.
5. The swing joint is to have the Snap-Loc fitting with a 1” PVC pipe horizontal stabilizer, 24” in length.
6. Swing Joints are to be by Lasco.

G. Sprinkler Heads – Gear Drives 6” Hunter I-40-06-SS-ON and Hunter I-40-06-SS part circle heads
1. The large diameter gear drive sprinklers shall be a Hunter Industries I-40 stainless-steel with check valve, pop-up sprinkler or approved equal. Sprinkler shall be mounted flush with final grade.
2. Retraction shall be achieved by a heavy-duty steel retraction spring. Sprinkler housing shall be of high impact molded plastic. Sprinkler shall have a large strainer so as to prevent nozzle clogging. Sprinkler shall be constructed such that it is serviceable from top in that drive assembly, screen, and all internal components are accessible throughout top of sprinkler without disturbing case installation. The drive shall be water lubricated and have a drain check valve for up to 7 feet. Radius reductions

shall be adjustable by up to 25% by means of adjustment screws accessible from the top of the cap when the sprinkler is properly installed.

3. Type and location of heads shall be as shown on plan. Sprinkler heads shall be mounted on a double swing S-80 PVC swing joint by Lasco or approved equal. Riser length of pipe to be minimum of 10". Contractor is responsible to verify lay length and provide the correct riser length for the pipe depth.
4. Coordinate head set height with grounds / landscape architect.

H. Sprinkler Heads – Small Rotor Hunter I-20 PRB Sprinkler Heads

1. The small diameter gear drive sprinklers shall be 6" Hunter I-20 PRB series w/ check and pressure regulation pop up sprinkler top or approved equal. Sprinkler shall be mounted flush with final grade.
2. Retraction shall be achieved by a heavy-duty steel retraction spring. Sprinkler shall have a rubber cover. Sprinkler housing shall be of high impact molded plastic. Sprinkler shall have a large strainer so as to prevent nozzle clogging. Sprinkler shall be constructed such that it is serviceable from top in that drive assembly, screen, and all internal components are accessible throughout top of sprinkler without disturbing case installation. The sprinkler shall be capable of stopping water flow through the head without turning off the entire zone. The drive shall be water lubricated and have a drain check valve for up to 10 feet. Radius reductions shall be adjustable by up to 25% by means of adjustment screws accessible from top of cap when sprinkler is properly installed.
3. Type and location of heads shall be as shown on plan.
4. Sprinkler heads shall be mounted using funny pipe. Pipe length cannot be longer than 18". Insert fittings are to be used on all small rotor to lateral connections.

I. Solvent Weld Fittings

1. Solvent weld PVC fittings shall be Schedule 40, ASTM D-2466 and ASTM D-1784. PVC Schedule-40 fittings shall be produced from PVC Type 1, Cell Classification 1245B. Fittings shall be manufactured by LASCO or approved equal. All solvents and cements shall be that recommended by the manufacturer.
2. S-80 PVC fittings may be used and may be threaded or solvent weld.
3. S-80 TOE Nipples with S-80 couplings for plastic to metal connections. (S-80 nipples cut in half will not be allowed)

J. Gate / Isolation Valves

1. Isolation valves 2", 2.5" and 3" shall be ductile iron resilient seated globe valves. Valve body and restraint clamps shall be constructed of ductile iron per ASTM A-536, Grade 65-42-12. Epoxy coating on all interior and exterior surfaces shall be fusion bonded epoxy, 10-12 mil thickness. Valve mechanism and hardware shall be made of 100% 304-series stainless steel. The valve stem shall be fine threaded stainless steel, O-ring sealed for ease of operation. Valve outlet shall be deep bell gasket and equipped with integrally cast joint restraint clamps to securely fasten pipe to the valve. Restraint shall have blunt cast serrations. Valves shall be made by LEEMCO or approved equal.

2. Valves shall be LEEMCO LGV-BB Series.

K. Thrust Blocks

1. Thrust blocks will be installed at all gasketed tees, bends, reducer fittings and ends of pipelines. Thrust blocks will be poured in forming material, placed between undisturbed soil and the fitting to be thrust blocked. Preformed Concrete blocks will not be allowed. Concrete materials will be the Contractor's responsibility to provide.
2. Size of thrust block will be determined by the soil type, size of pipe and pipe/fitting manufacturers thrust block charts.

L. Grounding

1. The contractor will be responsible to provide earth grounding of 2 –wire ohm reading of not more than 10 ohms. The contractor is to provide the Paige Electric equipment part # 182201IC for the grounding plate assemble 4" x 36" plate with #10 gauge wire lead, part # 182000IC6 for the a pre-welded wire to rod 5/8" x 8' with #6 wire, and part #1020058 for the PowerSet earth contact material, #50lb on top of the plate and #50lbs below. This equipment shall be installed by the contractor per the Paige Electric instructions. The irrigation distributor supplying the controller to check all ohm readings with a megger and provide a document signed by the distributor that all readings are under 10ohms. Contractor is responsible for making adjustments to achieve this reading.
2. All grounding connections to the plate, rods, decoder fusing devices and surge are to be completed with a re-enterable connector # 270RCx by Paige or approved equal.

2.6 Other Components

A. Tools and Extra Equipment

1. The contractor is to provide to the Owner, (2) sets of tools to repair and work on all equipment specified in this irrigation section.
2. The contractor is to provide the Owner with (2) sprinkler heads and nozzles of each type specified and used, (1) electric valve of each size used.
3. The contractor shall provide to the Owner, two (2) keys and two (2) hose swivel matching the quick coupling valve installed.
4. One (1) 5' valve wrenches for all gate valves are to be provided.
5. Twenty (20) 3m DBR/Y-6 wire connectors
6. One (1) S-80 swing joint used for quick couplers with Brass MIPT.
7. Two (2) S-80 swing joint used for sprinkler heads.
8. Two (2) Hunter ICD-100 Single Station Decoders

B. Other Materials: Provide imported fill material as required to complete this work. Provide other materials or equipment shown on the drawings or installation details, which are part of the irrigation system, although such items may not have been referenced in these specifications.

3.0 EXECUTION

3.1 Inspection And Reviews

A. Site Inspections:

1. The bidder acknowledges that he has examined the site, plans and specifications, and the submission of a proposal shall be considered evidence that examination has been made.

2. Verify construction site conditions and note irregularities affecting work of this section. It shall be the contracting installer's responsibility to report to the Owner's authorized representative any deviations between drawings, specifications and the site. Failure to do so before the installing of equipment and resulting in replacing and/or relocation of equipment shall be done at the "Contractor's" expense.
    a. Examine final grades and installation conditions. Do not start irrigation system work until unsatisfactory conditions are corrected.
    b. Beginning work of this section implies acceptance of existing conditions.

B. Utility Locations:
1. The exact location of all existing utilities and structures and underground utilities are not indicated on the drawings; their locations shall be determined by the "Contractor", and he shall conduct his work so as to prevent interruption of service or damage to them.
2. Arrange for and coordinate with local authorities the location of all underground utilities.
3. Repair any underground utilities damaged during construction. Make repairs at no additional cost above the contract price.
4. The "Contractor" shall protect existing structures and utility services and be responsible for their replacement if damaged by him.

C. Irrigation System Layout Review:
1. Irrigation system layout review will occur after the staking has been completed unless specifically waived by the Landscape Architect. Notify the engineer/landscape architect one week in advance of review.
2. The engineer/landscape architect at this review will identify modifications.

3.2 Static Pressure Verification

A. Contractor shall field verify the static pressure at the project site, prior to commencing work or ordering irrigation materials, and submit findings, in writing, to Consultant. If Contractor fails to verify static water pressure prior to commencing work or ordering irrigation materials, Contractor shall assume responsibility for all costs required to make system operational and the costs required to replace any damaged landscape material. Damage shall include all required material costs, design costs and plant replacement costs.

3.3 Layout Of Work

A. Stake out the irrigation system. Items staked include: Sprinklers, pipe, control valves, manual drains, quick coupling valves, controller, isolation valves and any misc. components.
B. Install all mainline pipe and mainline components inside of project property lines.
C. Minor adjustments in system layout will be permitted to clear existing fixed obstructions. Final system layout shall be acceptable to the Landscape Architect.

3.4 Excavation, Trenching, And Backfilling

A. Excavating shall be considered unclassified and shall include all materials encountered, except materials that cannot be excavated by normal mechanical means.
B. Excavate to permit the pipes to be laid at the intended elevations and to permit workspace for installing connections and fittings.
C. Minimum cover (distance from top of pipe or control wire to finish grade):
    1. 18-inch over top of pipe, mainline pipe.
    2. 18-inch over top of pipe, lateral pipe
    3. 12-inch over control wire, follow local and state requirements if they dictate a deeper bury depth.
D. PVC lateral pipes 2 1/2" and smaller may be pulled into the soil using a vibratory plow device specifically manufactured for pipe pulling, if in the opinion of the Landscape Architect that conditions are suitable. Minimum burial depths equal minimum cover listed above provided soil moisture content and other conditions are suitable to allow for full depth of the right to determine suitability or conditions.
E. Backfill only after lines have been reviewed and tested.
F. Excavated material is generally satisfactory for backfill. Backfill shall be free from rubbish, vegetable matter, and stones larger than 2 inches in maximum dimension. Remove material not suitable for backfill. Backfill placed next to pipe shall be free of sharp objects, which may damage the pipe.
G. Backfill unsleeved pipe by depositing the backfill material equally on both sides of the pipe in 6-inch layers and compacting each layer to 90% Standard Proctor Density, ASTM D698-78. Use of water for compaction, "puddling," will not be permitted.
H. Enclose pipe and wiring beneath roadways, walks, curbs, etc., in sleeves. Minimum compaction of backfill for sleeves shall reference geotechnical report for compaction requirements. Use of water for compaction around sleeve, "puddling," will not be permitted.
I. Dress backfilled areas to original grade. Incorporate excess backfill into existing site grades.
J. Where utilities conflict with irrigation trenching and pipe work, contact the engineer / landscape architect for trench depth adjustments.
K. Provide approved fine-grained earth fill or sand to point 4" above the top of pipe, where soil conditions are rocky or otherwise objectionable.
L. Excavate trenches and install piping and backfill during the same working day. Do not leave open trenches or partially-filled trenches open overnight.
M. The CONTRACTOR will be responsible for all finish and fine grading of trenches, disturbed areas around sprinklers heads, electric valves and any other excavated or disturbed areas by the CONTRACTOR. Contractor will also be responsible for all trench settling throughout the project during the one-year warranty period. If settling occurs, the contractor will repair and bring back to originally set grade.
N. When additional backfill material is needed to replace the unsuitable materials, it will be the CONTRACTOR'S responsibility and expense to supply such material.
O. It will also be the CONTRACTOR'S responsibility to dispose of the unsuitable material.

P. Clearances:

1. Piping 3 Inches and Larger - Make trenches of sufficient width to properly assemble and position pipe in trench. Minimum clearance of piping 3 inches or larger shall be 2 inches horizontally on both sides of the trench.
2. Piping Smaller than 3 Inches - Trenches shall have a minimum width of 6 inches.
3. Line Clearance - Provide not less than 6 inches of clearance between each line and not less than 12 inches of clearance between lines of other trades.
   a. PVC Piping - Snake pipe in trench as much as possible to allow for expansion and contraction. Do not install pipe when air temperature is below 40~F. Place manual drain valves at low points and dead ends of pressure supply piping to insure complete drainage of system. When pipe installation is not in progress, or at end of each day, close pipe ends with tight plug or cap. Perform Work in accordance with good practices prevailing in piping trades.
   b. Solvent Weld PVC Pipe - Lay pipe and make all plastic to plastic joints in accordance with manufacturer's recommendations.

   c. Gasketed End Pipes
   d. Lay pipe and make pipe to fitting or pipe to pipe joint, following OR70 recommendations (Johns-Manville Guide for Installation of Ring-Tite Pipe), or pipe manufacturer's recommendations.
   e. Construct concrete thrust blocks on gasketed pipe behind all gasketed fittings, tees, bends, reducers, line valves, and caps in accordance with pipe manufacturer's recommendations. Contact Landscape Architect prior to placing thrust blocks, for observation of thrust block excavation and initial placement. Thrust block bearing surface shall be calculated based on tables below. All bearing surfaces shall be undisturbed soil:

THRUST BLOCK SIZING GUIDE

Thrust developed per 100 PSI pressure (lbs. force) for various fitting configurations.

Pipe Size	Fitting 90 deg. Elbow	Fitting 45 deg. Elbow	Valves, Tees Dead Ends
3	1,000	600	800
4	1,800	1,100	1,300
6	4,000	2,300	4,900
8	7,200	4,100	7,100

Approximate bearing strength of typical soils.

Soil Type	Lbs/ft 2
Mulch, Peat, etc.	0
Soft Clay	500
Sand	1,000

Sand and Gravel	1,500
Sand and Gravel with Clay	2,000
Sand and Gravel Cemented with Clay	4,000
Hard Pan	5,000

Example Calculation: 6 inch 90 degree elbow in sand and gravel soil
Bearing Surface Area (square feet) = 4,000 lbs / 1,500 lbs/ ft 2
= 2.67 square feet bearing surface area on undisturbed soil

Flexible Plastic (Polyethlene) Pipe – Lay pipe and assemble fittings following manufacturer's recommendations.

3.5 Workmanship

A. All work shall be done by qualified irrigation installers that are knowledgeable and experienced in operations they are performing. Installation methods, procedures and materials shall be in accordance with accepted industry practice and with standards of manufacturing and contracting associations applicable to the work. All work shall be neatly done with special emphasis on appearance of work exposed to view.

3.6 Sleeving And Boring

A. Install sleeving at a depth that permits the encased pipe or wiring to remain at the specified burial depth.
B. Extend sleeve ends 2 feet beyond the edge of the paved surface. Cover pipe ends and mark with stakes. Place a small chiseled "X" on the hard surface to mark the location of the sleeve.
C. Bore for sleeves under obstructions that cannot be removed. Employ equipment and methods designed for horizontal boring.

3.7 Assembling Pipe And Fitting

A. General
   1. Keep pipe free from dirt and pipe scale. Cut pipe ends square and deburr. Clean pipe ends.
   2. Keep ends of assembled pipe capped. Removed caps only when necessary to continue assembly.
   3. All mainline and continuously pressurized pipe is to be installed using open trenches. Lateral pipe may be installed by "plowing" if soil conditions permit, and soils do not contain gravel, rock, construction debris, or other potential damaging material.
   4. Trenches may be curved to change direction or avoid obstructions within the limits of the curvature of the pipe.
B. Mainline, lateral piping and Fittings:
   1. Use only strap-type friction wrenches for threaded plastic pipe.
   2. PVC Rubber-Gasketed Pipe:
      a. Use pipe lubricant. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.

b. Epoxy-coated steel fittings shall not be struck with a metallic tool. Cushion blows with a wood block or similar shock absorber.

3. PVC Solvent Weld Pipe:
   a. Use a primer and solvent cement. Join pipe in a manner recommended by the manufacturer and in accordance with accepted industry practices.
   b. Cure for 30 minutes before handling and 24 hours before allowing water in pipe.
   c. Snake pipe from side to side within the trench.
4. Fittings: the uses of cross type fittings are not permitted.
5. Install thrust blocks on the mainline pipe work in accordance with pipe manufacturer's written instructions.

C. Specialized Pipe and Fitting:
1. Low-Density Polyethylene Hose: Install per manufacturer's recommendations.
2. PVC Threaded Connections:
   a. Use only factory-formed threads. Field-cut threads are not permitted.
   b. Use only Teflon-type tape.
3. Threaded Connections:
   a. Make metal-to-metal, threaded connections with Teflon-type tape applied to the male threads only.

D. Thrust Blocks:
1. Use cast-in-place concrete bearing against undisturbed soil.
2. Orientation and placement shall be as shown on the installation details, size per manufacturer's recommendations.
3. Wrap fitting with plastic to protect bolts, joint and fitting from concrete.

3.8 Installation Of Sprinkler And Irrigation Components

A. Remote Control Valve (RCV) Assembly:
1. Flush mainline before installation of RCV assembly.
2. Install where indicated on the drawing. Wire connectors and waterproof sealant shall be used to connect control wires to remote control valve wire.
3. Install connectors and sealant per the manufacturer's recommendations.
4. Install only one RCV to a valve box. Locate valve box at least 12 inches from and align with nearby walls and edges of paved areas. Group RCV assemblies together where practical. Arrange grouped valve boxes in rectangular patterns. Allow at least 12 inches between valve boxes.
5. Adjust RCV to regulate the downstream operating pressure.
6. Attach ID tag with controller station number to control wiring.

B. Sprinkler Assembly:
1. Flush lateral pipe before installing sprinkler assembly.
2. Install per the installation details at locations shown on the drawings.
3. Locate rotor sprinklers 6 inches from adjacent walls, fences or edges of paved areas.
4. Locate spray sprinklers 3 inches from adjacent walls, fences or edges of paved areas.
5. Install sprinklers perpendicular to the finish grade.

6. Supply appropriate nozzle or adjust arc of coverage of each sprinkler for best performance.
7. Adjust the radius of throw of each sprinkler for best performance.

3.9 Installation Of Control System Components:

A. Control Wire:

1. Bundle control wires where two or more are in the same trench. Bundle with pipe wrapping tape at 15-foot intervals.
2. Control wiring may be chiseled into the soil using a vibratory plow device specifically manufactured for pipe pulling and wire installation. Appropriate chisel must be used so that wire is fed into a chute on the chisel, and wire is not subject to pulling tension. Minimum burial depth must equal minimum cover previously listed.
3. Provide a 24-inch excess length of wire in an 8-inch diameter loop at 90-degree change of direction, at both ends of sleeves and at 100-foot intervals along continuous runs of wiring. Do not tie wiring loop. Coil 24-inch length of wire within each remote-control valve box.
4. If a control wire must be spliced, make splice with wire connectors and waterproof sealant, installed per the manufacturer's instructions. Locate splice in a valve box that contains an irrigation valve assembly, or in a separate 10-inch round valve box.
5. Use same procedure for connection to valves as for in-line splices.
6. Protect wire not installed with PVC mainline pipe with a continuous run of warning tape placed in the backfill six inches above the wiring.

3.10 Installation Of Other Components:

A. Tools and Spare Parts: Prior to the review at completion of construction, supply to the owner operating keys, servicing tools, spare parts, test equipment and any other items indicated in general notes on the drawings.

B. Other Materials: Install other materials or equipment shown on the drawings or installation details which are part of the irrigation system, even though such items may not have been referenced in these specifications.

3.11 Balancing And Adjusting

A. The Contractor will be responsible for the balancing and adjustments of the various components of the system so the overall operation of the system is the most efficient. Including, but not limited to, the synchronization of the controllers, adjustments to the pressure regulator valves and sprinkler adjustments. Coordinate controller setup with Landscape Architect.

3.12 Requirement For Substantial Completion

A. Cleaning Equipment and Premises

1. Thoroughly clean all parts of the piping, valves and equipment.
2. Remove all construction debris, excess materials and equipment.

B. Operating and Maintenance Manuals

1. CONTRACTOR shall furnish to LANDSCAPE ARCHITECT two operating manuals for furnished equipment. Information sheets shall be bound in standard three-ring binders labeled to show contractor's name, address,

regular business phone number, emergency phone number and date. Operating manuals shall be submitted prior to completion of work to allow time for review. Manual shall contain following information:

a. List (keyed with identification numbers used) each item of equipment which requires service, giving the name of the item, model number, manufacturer's name and address, and providing the name, address and phone number of the nearest representative of authorized service organization.
b. Cut sheets to be included for the following, but not limited to: electric valves, isolation valves, swing joints, valve boxes, controllers and sprinkler heads.

2. A copy of the shop drawing for each item.
3. A complete operating and maintenance manual, parts list, wiring diagrams, lubrication requirements, and service instructions for each major item.
4. Complete control diagrams with description of all operation sequences and control devices.
5. Properly executed registrations and registered manufacturer's warranties.
6. After completion of work and when OWNER has had sufficient time to examine operating manuals and become somewhat familiar with operation of equipment, a meeting will be arranged by the Contractor with the Owner for purpose of instructing OWNER in proper maintenance of system and to answer questions he/she may have regarding its operation. Prior to this meeting, contractor shall have programmed a base program for all stations and run times.
7. Contractor to complete the irrigation submittal for all irrigation systems to the IL State Public Health. Provide the owner with a copy of the submitted form.
8. The above listed items shall also be provided on two USB memory sticks.

3.13 Maintenance

A. Upon completion of construction and review by the engineer / landscape architect / owner's representative, maintain irrigation system for duration of 30 calendar days. Make periodic examinations and adjustments to irrigation system components to achieve the most desirable application of water.
B. Following completion of the "Contractor's" maintenance period, the owner will be responsible for maintaining the system in working order during the remainder of the guarantee/warranty period, for performing necessary minor maintenance, for trimming around sprinklers, for protecting against vandalism, and for preventing damage after the landscape maintenance operation.

3.14 Observation And Acceptance

A. Periodic site visits will be made by the Architect or Irrigation Consultant to review the quality and progress of the work. Work found to be unacceptable must be corrected within five (5) calendar days. Remove rejected materials promptly from the project.
B. Upon completion of the work, the Architect or Irrigation Consultant will issue a punch list for work to be corrected. Where work does not comply with requirements, replace rejected Work.

C. It will be the responsibility of the Irrigation Contractor to provide a reliable communication system (i.e.: Two-way radios or remote radio control activation system) for Substantial Completion, final acceptance and all periodic site visits. Once the controllers are operational, the contractor will be required to have a tablet devise on site to operate the system. This tablet is to be accessible to the designer for any walk troughs that are scheduled.

D. If a site visit to verify Substantial Completion and final acceptance has been scheduled and the Architect or Irrigation Consultant arrives at the site and determines that the irrigation system is not substantially complete or ready for final acceptance (all system components in place, operational and checked and arc and radius adjustments made) the Contractor shall be responsible for all costs incurred by the Architect or Irrigation Consultant to visit the site. Reimbursable expenses include but are not limited to the following: Mileage, airfare, consultants' time, parking fee, meals, rental car, etc. All incurred expenses will be deducted from the final contract amount.

3.15 Cleaning

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soils, debris and equipment. Repair damage resulting from sprinkler system installation.

END OF SECTION