
LITTLE HAITI SOCCER PARK

EXISTING SOCCER PRACTICE FIELD IMPROVEMENTS AND ASSOCIATED AMENITIES

PROJECT MANUAL & SPECIFICATIONS

BID DOCUMENTS

PROJECT NO. B-40516
6301 NE 2nd AVE
MIAMI, FLORIDA 33138

CITY OF MIAMI
CAPITAL IMPROVEMENTS AND
TRANSPORTATION PROGRAM - CIP

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STATEMENT OF COMPLIANCE

To the best of my knowledge, these drawings and the project manual area complete and comply with the current edition of the Florida Building Code.

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Geotechnical Report

SECTION 02 30 00
SUBSURFACE INVESTIGATION

PART 1 GENERAL

1.1 SUMMARY

- A. Geotechnical Report: A copy of the geotechnical report and boring logs is attached to this specification package.

- B. Information Not Guaranteed: Information on the Drawings and in the Project Manual relating to subsurface conditions and existing utilities and structures is from information available from sources available to the Owner's engineering consultants. Such information is furnished only for the information and convenience of the Contractor, and the accuracy or completeness of this information is not guaranteed.

PART 2 PRODUCTS - Not Applicable To This Section

PART 3 EXECUTION - Not Applicable to This Section

END OF SECTION

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

- A. Perform selective demolition activities. Demolitions of existing exercise equipment stations, designated sections of the existing asphalt path and compacted subbase and additional items that may be required.

1.2 SUBMITTALS

- A. Schedule: Submit for review a selective demolition schedule of salvage items to be returned to Owner, including methods for capping utilities to be abandoned and maintaining existing utility service.

1.3 QUALITY ASSURANCE

- A. Codes and Regulations: Comply with governing codes and regulations. Use experienced workers.

1.4 PROJECT CONDITIONS

- A. Occupancy: Surrounding areas of the work will not be occupied during selective demolition. The public may occupy adjacent areas.
- B. Existing Conditions: No responsibility for buildings and structures to be demolished will be assumed by the Owner.

PART 2 PRODUCTS

2.1 DEMOLITION APPLICATIONS

- A. Structure Demolition:
 - 1. Application: Demolition of 10 existing exercise equipment stations.
 - 2. Application: Demolition of designated sections of the existing asphalt path and compacted subbase.
 - 3. Application: Protection of site work and adjacent structures.
 - 4. Application: Disconnection, capping, and removal of utilities.
 - 5. Application: Pollution control during building demolition, including noise control.
 - 6. Application: Removal and legal disposal of materials.
 - 7. Protection: Designated site improvements and adjacent construction.
 - 8. Utilities: Interruption, capping or removal as applicable.
 - 9. Hazardous Materials: Notify owner if encountered.

PART 3 EXECUTION

3.1 SELECTIVE DEMOLITION

- A. Demolition Operations: Do not damage site elements and improvements indicated to remain. Items of salvage value, not included on schedule of salvage items to be returned to Owner, from the project site. Storage or sale of items at project site is prohibited.
- B. Utilities: Locate, identify, disconnect, and seal or cap off utilities in buildings to be demolished.
- C. Occupied Spaces: Do not close or obstruct streets, walks, drives or other occupied or used

spaces or facilities without the written permission of the Owner and the authorities having jurisdiction. Do not interrupt utilities serving occupied or used facilities without the written permission of the Owner and authorities having jurisdiction. If necessary, provide temporary utilities.

- D. Operations: Cease operations if public safety or remaining structures are endangered. Perform temporary corrective measures until operations can be continued.
- E. Security: Provide protection against accidental trespassing. Secure project after work hours.
- F. Restoration: Restore areas occupied by the demolished exercise equipment stations and the demolished asphalt path to match existing grade, and install sod to match the surrounding areas.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE-CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Provide cast-in-place concrete, reinforcing and accessories for the proposed exercise equipment concrete pad and the proposed metal frame storage building concrete pad and field edge and water fountain.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction. Shop drawings must be signed and sealed by a qualified engineer licensed in the jurisdiction of the project.
- C. Mix Design: Submit for review mix design proposed for use.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products that have been in use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Testing: Employ an independent testing agency approved by Owner to design concrete mixes and to perform material evaluation tests. Provide 7 and 28 day cylinder tests. Comply with ASTM C 143, C 173, C 31 and C 39.
- C. Standards:
 - ACI 301, Specifications for structural Concrete for Buildings.
 - ACI 318, Building Code Requirements for Reinforced Concrete, and CRSI Manual of Standard Practice.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Cast-In-Place Concrete:
 - Application: Foundations and footings.
 - Application: Exterior site concrete and pads.
 - Finish for Exterior Concrete Slabs and pads: Non-slip broom finish.
 - Cast-In-Place Concrete Reinforcing and Accessories:
- A. Concrete Design Mixes: ASTM C 94, 28 day compressive strength suitable for project requirements and site conditions.
- B. Formwork: Plywood or metal panel formwork sufficient for structural and visual requirements.
- C. Reinforcing Bars: ASTM A 767, Class II, galvanized.
- D. Steel Wire: ASTM A 82.
- E. Steel Wire Fabric: ASTM A 497, welded, deformed.
- F. Concrete Materials: ASTM C 150, Type I, Portland cement; potable water.
- G. Concrete Admixtures: Containing less than 0.1 percent chloride ions.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with ASTM C 94. Do not change mix design without approval. Calcium chloride admixtures are not permitted.
- B. Chamfer exposed edges/corners to provide straight lines.
- C. Tolerance: Plus 1/8 inch in 10 inch for grade, alignment, and straightness.
- D. Construction Joints: Use keyways, continue reinforcement through joint.
- E. Expansion Joints: For exterior work locate at appropriate locations. Provide smooth dowels across joint that permit 1 inch horizontal movement and no vertical shear movement.
- F. Isolation Joints: Provide between slabs and vertical elements such as columns and structural walls.
- G. Control Joints: Provide sawn; depth equal to 1/4 slab thickness. Spacing as shown in the plans.
- H. Slab Finishes: Obtain sample approval before work.
 - Wood float: Hard, smooth, uniform surface for the proposed metal frame storage building concrete pad.
 - Broom: After trowel finishing, roughen surface by fine brooming perpendicular to longitudinal direction for the proposed exercise equipment concrete pad.
- I. Cure and protect work. Report defective work in writing.

END OF SECTION

SECTION 08 33 23
OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: overhead rolling doors.

1.2 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Doors: Meet Miami Dade County maximum wind load requirements.

1.3 SUBMITTALS

- A. Submittal Procedures:
 - 1. Product Data.
 - 2. Shop Drawings: Include special conditions not detailed in Product Data. Show interface with adjacent work.
 - 3. Quality Assurance/Control Submittals:
 - a. Provide proof of manufacturer and installer qualifications.
 - b. Provide manufacturer's installation instructions.
 - 4. Closeout Submittals:
 - a. Operation and Maintenance Manual.
 - b. Certificate stating that installed materials comply with this specification.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer Qualifications: A minimum of five years experience in producing doors of the type specified.
 - 2. Installer Qualifications: Manufacturer's approval.

1.5 DELIVERY STORAGE AND HANDLING

- A. Follow manufacturer's instructions.

1.6 WARRANTY

- A. Standard Warranty: Two years from date of shipment against defects in material and workmanship.
- B. Maintenance: Submit for owner's consideration a maintenance service agreement for installed products.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer: Best Rolling Manufacturer Inc. or approved equal. 9770 NW 79th Ave, Hialeah Gardens FL, 33016 Telephone (305) 698-3550 Fax: (305) 698-3552 Web: BESTROLLNGDOORS.COM
- B. Model: ESD10

C. Substitutions: Product Substitution Procedures.

2.2 MATERIALS

A. Curtain:

1. Slats: ASTM A 653 galvanized steel zinc coating.
2. Bottom Bar: Two 2x2x1/8 inch GALVANIZED steel angles.
3. Provide windlocks as required to meet specified wind load.
4. Slat Finish:
 - a. An ASTM A 653 galvanized base coating treated with dual process rinsing agents in preparation of a chemical bonding, [light gray] [tan] [white] - owner to choose color- baked-on polyester base coat and a [light gray] [tan] [white] baked-on polyester finish coat.
5. Curtain Configuration:
 - a. Standard Curtain configuration.
6. Bottom Bar Finish:
 - a. Steel: Phosphate treatment followed by a [light gray] [tan] [white] baked-on polyester powder coat; minimum 2.5 mils cured film thickness - owner to choose color.
7. Bottom Bar Configuration:
 - a. Standard Galvanized Bottom Bar Configuration.

B. Guides: Fabricate with Galvanized steel angles. Provide windlock bars of same material when windlocks are required to meet specified wind load. Top of inner and outer guide angles to be flared outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar.

1. Finish:
 - a. Standard finish on guides to be Zinc galvanized (electroplated).
2. Guide Configuration:
 - a. Standard Guide Configuration.

C. Counterbalance Shaft Assembly:

1. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot of width.
2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs. Provide wheel for applying and adjusting spring torque.

D. Brackets: Fabricate from minimum 3/16 inch steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures.

1. Finish:
 - a. Steel: Phosphate treatment followed by a [light gray] [tan] [white] – owner to choose color- baked-on polyester powder coat; minimum 2.5 mils cured film thickness.

E. Hood: 24 gauge galvanized steel with reinforced top and bottom edges. Provide minimum 1/4 inch steel intermediate support brackets as required to prevent excessive sag.

1. Finish:

- a. An ASTM A 653 galvanized base coating treated with dual process rinsing agents in preparation of a chemical bonding, [light gray] [tan] [white] baked-on polyester base coat and a [light gray] [tan] [white] - Owner to choose color-baked-on polyester finish coat.

F. Weatherstripping:

- 1. Bottom Bar: Replaceable, bulb-style, compressible EDPM gasket extending into guides.

2.3 ACCESSORIES

A. Locking:

- 1. Padlockable slide bolt on [fascia] side of bottom bar at each jamb extending into slots in guides.

B. Door opening size per model specified.

- C. Breakaway Curtain Bottom Section: Bottom 25 inch of door curtain to be constructed of a reinforced vinyl laminated woven polyester fabric panel with a breakaway bottom bar constructed of back to back structural steel angles.
Color of assembly to be safety orange. Design section to release upon impact avoiding most damage from accidents involving forklift trucks or other vehicles.

- D. Operator [and Bracket Mechanism] Cover: Provide 24 gauge galvanized steel sheet metal cover to enclose exposed moving operating components at coil area of unit. Finish to match door hood.

2.4 OPERATION

- A. Manual Push-Up: Provide lift handles on bottom bar and pole with hook.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings.
- B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.
- C. Start of work by installer is acceptance of substrate.

3.2 INSTALLATION

- A. General: Install door and operating equipment with necessary hardware, anchors, inserts, hangers and supports.
- B. Follow manufacturer's installation instructions.

3.3 ADJUSTING

- A. Following completion of installation, including related work by others, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion.

3.4 CLEANING

- A. Clean surfaces soiled by work as recommended by manufacturer.

B. Remove surplus materials and debris from the site.

3.5 DEMONSTRATION

A. Demonstrate proper operation to Owner's Representative.

B. Instruct Owner's Representative in maintenance procedures.

END OF SECTION

SECTION 10 73 16
CANOPY

PART 1 GENERAL

1.1 SUMMARY

- A. Provide USA Shade & Fabric Structure or equal, meeting ADA requirements.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
- C. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data, including operating instructions, list of spare parts and maintenance schedule.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Notify Owner before construction of conflicts.

PART 2 PRODUCTS

2.1 MATERIALS

- A. USA Shade and Fabric Structures, Inc., 8505 Chancellor Row, Dallas, Texas 75247
Phone: 214-905-9500 Fax: 214-905-9514, www.usa-shade.com
- B. Shade structure or approved equal. Model: Superspan AIMII3410_Rev A
Color: Post Blue
Color: Fabric – Laguna Blue

EXECUTION

2.2 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Coordinate with work of other sections. Comply with applicable regulations and building code requirements.

END OF SECTION

SECTION 11 66 13
EXERCISE EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Provide Greenfields Outdoor Fitness equipment or equal, meeting ADA requirements.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
- C. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data, including operating instructions, list of spare parts and maintenance schedule.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Notify Owner before construction of conflicts.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Exercise Equipment: Manufacturers: Greenfields Outdoor Fitness or approved equal. Meeting the following specifications and layout: http://www.gfoutdoorfitness.com/images/stories/SamplePDFS/greenfields_2013_sample_packages_medium.pdf
- B. Color: Standard Green and Tan.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Coordinate with work of other sections. Comply with applicable regulations and building code requirements.

END OF SECTION

SECTION 13 34 19
METAL BUILDING SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Gulf States Manufacturers or equal building system, manufactured by an AISC certified manufacturer (classification MB) and must include columns, rafters, endwall columns, purlins, girts, struts, clips, bracing, exterior metal covering, flashing, fasteners, and miscellaneous items necessary for a complete and weather tight structure.

- B. Building geometry-
 - 1. Building Width: The horizontal distance between the outside faces of the eave struts.
 - 2. Building Height: The vertical distance from the base of the sidewall columns to the outside top corners of the eave struts.
 - a. Building Length: The horizontal distance between the outside flanges of the endwall girts.
 - b. Bay Spacing: The horizontal distance between the centerlines of adjacent interior frames. The end bay: the horizontal distance from the centerline of the first interior frame to the outside flanges of the endwall girts.

- C. Design-
 - 1. Design Authorities:
 - a. Structural Steel: Structural steel sections and welded plate members: designed in accordance with the allowable stresses and design requirement sections of the 9th edition of the American Institute of Steel Construction's Manual of Steel Construction (Allowable Stress Design).
 - b. Cold-Formed: Cold-formed members, including exterior covering: designed in accordance with the allowable stresses and design requirement sections of the 2001 edition of the American Iron and Steel Institute's Cold-Formed Steel Design Manual with 2004 Addendums.
 - c. Design Loads: Snow, Wind, Live and Collateral Loads
Loads and the application of loads as specified by the Architect or Engineer of Record, and not less than those recommended by the 2002 MBMA Metal Building Systems Manual.
 - d. Dead Load: The weight of the structure.
 - e. Load Combinations: The design load combinations for buildings: as specified by the Architect or Engineer of Record, and not less severe than specified in the 2002 MBMA Metal Building Systems Manual.
 - f. Anchor Bolts: Sized to resist loads induced by the structure and be less than the diameters, material specifications and quantities shown by the metal building manufacturer. Anchor bolts: unpainted to bond to the concrete and set in accordance with the metal building manufacturer's drawings.

1.2 SUBMITTALS

A. Drawings and certifications

- 1. Drawings:
 - a. Anchor Bolt Setting Plans-
Building manufacturer, must furnish Anchor Bolt Setting Plans showing the diameters, locations and material specifications for the building anchor bolts and reaction schematics showing the rigid frame reactions.

- b. Erection Drawings-
Building manufacturer must furnish Erection Drawings including the elevations and details necessary to erect the building.
- 2. Certifications:
 - a. Letter of Certification -
Building manufacturer must submit a letter sealed by a professional engineer stating that the loads were applied and the building was designed in accordance with the specified building code and/or purchase order documents.
 - b. Design Calculations -
Subsequent to the awarding of the contract, the building manufacturer must submit design calculations sealed by a Florida Registered Professional Engineer.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Structural Plate, Sheet and Bar:
Structural plate, sheet and bar: minimum yield strength of 55,000 psi.
- B. Cold-Formed:
Cold-formed structural material: minimum yield strength of 55,000 psi.
- C. Hot Rolled Sections:
Hot rolled sections: minimum yield strength of 36,000 psi.
- D. Pipe:
Structural pipe sections: minimum yield strength of 36,000 psi.
- E. Rod:
Rod used as structural bracing: minimum yield strength of 36,000 psi.
- F. Cable:
Cable used as structural bracing: extra high strength galvanized ("A" Coat) wire strand (left-hand lay).
- G. Covering:
26 gauge cold-formed panel material: minimum yield strength of 80,000 psi. 24 gauge cold-formed panel material: minimum yield strength of 80,000 psi except for 24 gauge and thicker material used for ridge flashing minimum yield strength of 50,000 psi.
 - 1. High Strength Bolts:
Bolts used in primary structural connections: ASTM A325 Bolts.
 - 2. High Strength Nuts:
High strength nuts: ASTM 194 Grade 2H. Approved substitutes are ASTM 563 Grade C, C3, D, DH, DH3.
- H. Standard Bolts:
Bolts used in secondary structural connections: ASTM A307 Bolts.
- I. Standard Nuts:
ASTM A563 Grade A or Grade 2.

2.2 COMPONENT DESCRIPTION AND USAGE

A. Primary Framing:

1. Columns

Primary frame columns either prismatic or tapered sections composed of shop welded steel bar and plate. Wall columns may have either exterior or flush mounted girts. The depth and flange width of columns as dictated by the specified design criteria.

2. Rafters

Primary frame rafters either prismatic or tapered sections composed of shop welded steel bar and plate. Rafters must have exterior mounted purlins. The depth and flange width of rafters as dictated by the specified design criteria.

3. Interior Modular Columns

Interior modular columns supporting primary frame rafters either round structural pipe or prismatic sections composed of shop welded steel bar and plate. Columns must have the necessary connections for field bolting to the rafters and to the anchor bolts. The diameter or depth and flange width of welded sections as dictated by the specified design criteria.

B. Secondary Structural Members:

1. Cold-Formed Purlins and Girts

Purlins and girts either 8 inch, 9 ½ inch or 12 inch "Z" sections, precision cold-formed from material with design thickness of 0.058 inch to 0.102 inch. Exterior mounted simple span purlins and girts must have 4 ½ inch nominal end laps for alignment purposes. Continuous span purlins and girts must have minimum end laps of 2 foot to develop continuity. Girts on buildings with flush girts mounted so that the outside flanges of the girts are flush with the exterior face of the controlling outside flange of the columns. Purlins and girts attached to the primary framing with ½ inch diameter bolts and nuts. Continuous purlins must have four ½ inch diameter bolts and nuts through the webs to interlock the sections for continuity.

2. Bar Joist Purlins

Bar joist purlins as required to comply with the specified design criteria. Bar joists field welded to the rafters, except that bolted connections provided at critical locations required for stability during erection.

3. Eave Struts

Eave struts either 8 inch, 9 ½ inch or 12 inch "C" sections, precision cold-formed from material with design thickness of 0.075 inch to 0.102 inch. The upper and lower flanges must slope at the building roof slope and the webs vertical to receive the sidewall covering. Eave struts connected to the primary framing with standard ½ inch diameter bolts.

4. Wind and Seismic Bracing

Wind and seismic bracing as shown on the building manufacturer's erection drawings and accomplished by diagonal cable bracing, rod bracing, or other means necessary to resist roof and wall wind and seismic loads. Diagonal cable and rod bracing must include necessary hardware for installation and adjustment of lengths.

5. Flange Bracing

Flange bracing steel angles attached to the purlins and/or girts and to the inner flanges of the primary framing. The quantity and location of brace angles as dictated by the building design and located as shown on the metal building manufacturer's erection drawings

6. Gable Angles

Gable angles provide a surface for attaching endwall panels to the rake of a building. Gable angles 4 inch x 4 inch angles precision cold-formed from material with a minimum design thickness of 0.058 inch. Gable angles attached to the purlins along the building rake.

7. Connection Clips

Connection clips provided by the building manufacturer, as necessary, to facilitate the assembly of the building components. Connection clips located as shown by the building manufacturer's erection drawings.

8. Base Options

a. Base Angles

Base angles 3 inch x 2 inch angles precision cold-formed from galvanized steel with a minimum design thickness of 0.046 inch. Base angles attached to the concrete foundation with ¼ inch x 1 ¼ inch minimum Metal Hit Anchors or equivalent at 2 foot maximum spacing.

b. Base Angle Trim

Base angle trim optional in lieu of Base Angles. Base angle trim 0.046 inch minimum thickness galvanized steel with factory applied Bronze paint. Base angle trim attached to the concrete foundation with ¼ inch x 1 ¼ inch minimum Metal Hit Anchors or equivalent at 2 foot maximum spacing. Base angle trim optional to replace base angles and eliminate the necessity for a concrete notch.

c. Base Girts

Base girts optional in lieu of Base Angles or Base Angle Trim. Base girts located 8 inch above the finished floor elevation.

2.3 END FRAMES

1. Rigid Frame End Frames

Non-expandable rigid frame end frames must consist of a primary frame designed to support one half of the end bay loadings. Endwall column-to-rafter connections must transmit shear loads only.

2.4 COVERING

A. Material

1. Painted G-60 Galvanized Steel

G-60 Galvanized Steel used as a substrate for factory applied baked on paint must conform to ASTM A792 with a coating class of AZ 50 or heavier, minimum spangle, as specified by the coater. 26 gauge painted G-60 Galvanized Steel used for roof and wall applications grade 80. 26 gauge painted G-60 Galvanized Steel used for trim grade 50B.

24 gauge painted G-60 Galvanized Steel used for roof and wall applications grade 80, except for 24 gauge and thicker used for ridge flashing grade 50B.

The paint system applied as follows: Top coat primer .20-.25 mil thick and a top coat .70-.80 mil thick, for total film thickness of 1 mil. The reverse coat primer .20-.25 mil thick and a wash coat backer .30-.40 mil thick, for a total film thickness of .50-.65 mil.

B. Roof and Wall Covering Data

PANEL	DIMENSIONS	GA YIELD	MIN.	FACTORY SIDELAP	CONCEALED FASTENERS
		KSI		SEALANT	
Roof:					
Shadow High Rib	36 x 1 5/16	26	80	NO	NO
Mechanical Panel	24 x 3	24	50	YES	YES
Snap Panel	24 x 3	24	50	YES	YES
Panel	16 x 2	24	50	YES	YES
Panel	16 x 2	24	50	YES	YES
Wall:					
Shadow High Rib	36 x 1 5/16	26	80	NO	NO
Centennial	36 x 1 5/16	26	80	NO	NO
Panel	16 x 3	24	50	NO	YES
Soffit/Liner:					
Shadow High Rib	36 x 1 5/16	26	80	NO	NO
Traditional	12 x 1 1/2	26	50	NO	YES

C. Shadow High Rib Panel Ridge Panels

Shadow high rib panel ridge panels 3 foot long one piece panels die-formed to match the configuration of the roof panels and formed to the roof slope (maximum slope = 4 on 12). Ridge panels the same gauge as the roof panels. The ridge panel finish G-60 Galvanized steel or G-60 Galvanized steel with factory baked on paint to match the color and finish of the roof panels. Ridge panels installed with end lap and side lap mastic to provide a continuous weather tight seal at the building ridge.

D. Ridge Flashing

Ridge flashing formed to match the roof slopes and provided in widths to extend over the panel outside closures located on both sides of the ridge. Ridge flashing provided with fasteners and tape mastic for the sides and end-laps to provide a continuous weather tight seal at the building ridge.

E. Sliding Connection Clips

Sliding connection clips factory assembled multi-piece units. Each unit consists of a 12 gauge (minimum) galvanized base clip which connects to the purlin and a 24 gauge upper clip which is seamed into the panel side lap. Sliding connection clips are factory assembled to allow the upper portion to move 1 inch in either direction (relative to the base) to compensate for the thermal expansion and contraction of the roof panels.

F. Ridge Flashing

Ridge flashing formed to the roof slope (maximum slope = 4 on 12). Ridge flashing, when required and used with sliding clips, must provide a 1 inch movement in each direction to compensate for thermal expansion and contraction. Ridge flashing provided with fasteners and tape mastic for the side and end laps to provide a continuous weather tight seal at the building ridge.

G. Sliding Connection Clips

Sliding connection clips factory assembled multi-piece units of 22 gauge (minimum) galvanized material which connect to the purlin and are seamed into the panel side lap. Sliding connection clips are factory assembled in a manner that allows the upper portion to move 1 inch minimum in either direction (relative to the base) to compensate for thermal expansion and contraction of the roof panels.

2.5 COVERING FASTENERS

A. Material

1. Exposed Roof Fasteners

Exposed roof fasteners must have a zinc aluminum cast hex washer head fixed over the head of a carbon steel plated fastener. Each fastener must have a neoprene washer fitted and protected under the hex washer head.

2. Non-exposed Roof Fasteners

Fasteners for non-exposed roof applications made of carbon steel with zinc electroplating finish with or without bonded neoprene washer.

3. Wall Fasteners

Wall fasteners made of carbon steel with zinc electroplating without bonded neoprene washer.

B. Fastener (Screw) Finish

1. Long-life Finish

Long-life finish consist of composite fluorocarbon combined with organic polymers to form a plastic-alloy finish which is applied to the entire fastener and washer assembly by means of a DIP/SPIN/CURE process, providing exceptional corrosion protection.

2. Paint

Painted fasteners provided to match the wall and roof panel color. Paint a factory applied baked on finish.

3. Zinc Aluminum

The zinc aluminum finish of the exposed roof fasteners formulated to be corrosion resistant and to never red rust.

C. Covering Fastener Types

ULTIMATE STRENGTHS

TYPE

PULL

DESIGNATION	SIZES	PULLOUT	OVER	SHEAR
Exposed Self- Drilling Roof	#12-14 x 1 ¼ inch #12-14 x 1 ½ inch	770# to 1850#	794# to 1647#	2050 #
Exposed Self- Drilling Roof-lap Screw	¼ inch-14 x 7/8 inch	256# to 688#	794# to 1647#	2850 #
Non- Exposed Self-Drilling Clip Screw	#12-14 x 1 ¼ inch	770# to 1850#		2050 #
Self- Drilling Wall Screw	#12-14 x 1 ¼ inch #12-14 x 1 ½ inch	770# to 1850#	501# to 649#	2050 #
Self-Drilling Wall-lap Screw	¼ inch-14 x 7/8 inch	256# to 688#	501# to 649#	2850 #

2.6 BUILDING TRIM

A. General

Formed G-60 Galvanized steel flashing with factory baked on paint provided at corners, endwall rakes, eaves, and openings to insure a neat, weather tight structure.

B. Eave Trim Options

Junction of the roof panels and sidewall panels flashed with formed G-60 Galvanized Steel with factory baked on paint. Eave flashing one of the following:

1. Eave gutters with downspouts.
2. Eave box trim. Eave box trim which resembles the configuration of the endwall flashing is recommended for northern regions where ice and snow make eave gutters impractical.
3. Sidewall flashing. Sidewall flashing formed to the roof slope and capped over the top of the sidewall panels.
4. Combination of A and C.

C. Eave Gutters

Eave gutters suspended box sections supported at 3 foot on center (maximum) and formed to match the configuration of the endwall flashing. Eave gutters must have a minimum cross-sectional area of 24 square inches for water flow. Pop rivets, hanger clips and sealant used to secure the gutter and seal the gutter end laps.

D. Eave Gutter Downspouts

Downspouts a minimum of 5 inch x 4 inch rectangular sections. Spacing of the downspouts will be dictated by the building width and the local rainfall intensity. Locations shown on the manufacturer's erection drawings. Eave gutter outlets provided to connect the downspouts to the eave gutters. Field connected downspout elbows provided to divert water away from the building.

E. Corner Flashing

Juncture of sidewall panels and endwall panels flashed to ensure weather tightness and neat appearance. The flashing designed to complement the wall panel used and shall match the wall panel color.

F. Accessory Flashing

Accessories which penetrate the wall or roof panels flashed and caulked as necessary to ensure weather tightness and neat appearance.

PART 3 EXECUTION

3.1 SHOP FABRICATION

A. Scope:

Fabricated members sheared, formed, punched, welded, and painted in the plant of the manufacturer. Holes and clips required to facilitate the attachment of secondary framing provided by the metal building manufacturer.

B. Welding:

Shop welding in accordance with the American Welding Society and the American National Standards Institute Structural Welding Code (ANSI/AWS D1.1). Dimensional tolerances of fabricated components must comply with the Metal Building Manufacturers Association (MBMA) Metal Building Systems Manual, Section 9 – "Fabrication and Erection Tolerances". Welding done by welders certified in accordance with AWS Code. Flanges and webs of "I" sections joined by a continuous automatic submerged arc welding (SAW) process or a semi-automatic gas metal arc welding (GMAW) process. Flange-to-web welds applied on only one side of the web unless load transfer requirements dictate that welds be applied to both sides.

1. Structural Primer:

Fabricated members other than G-60 Galvanized steel or prepainted panel and flashing material shall receive a factory applied coat of rust inhibiting primer. The primer a universal anti-corrosive, lead and chromate free, fast drying, modified alkyd primer.

2. Identification:

Fabricated items must have an identifying mark which corresponds to the mark shown on the erection drawings. The mark stamped, stenciled, or printed on or attached to the items or to their containers.

3.2 FRAMED OPENINGS

Framed openings must consist of cold-formed headers and jambs of a sufficient depth designed and located to allow flush framing of the wall girts. Flashing provided to ensure weather tightness and neat appearance.

3.2 CANOPIES

A. Eave Line Flush Sidewall Canopy:

Eave line flush canopies must consist of structural rafters of shop welded steel plate cantilevered to support flush mounted purlins and eave struts. Rafter depths must match purlin depths so that the top and bottom flanges of the rafters are flush with the top and bottom flanges of the purlins and eave struts. Canopy roof panels an extension of the main

building roof panels. As an option, canopies may be soffited with panels attached to the bottom flanges of the purlins and eave struts. Canopies flashed at the eaves and ends to conceal the purlins and structural rafters.

B. Below Eave Line Flush Canopy:

Below eave line flush canopies must consist of structural rafters of shop welded steel plate to support flush mounted purlins and eave struts. Rafter depths must match purlin depths so that the top and bottom flanges of the rafters are flush with the top and bottom flanges of the purlins and eave struts. Canopy roof panels flashed to the building wall panels. As an option, canopies may be soffited with panels attached to the bottom flanges of the purlins and eave struts. Canopies flashed at the eaves and ends to conceal the purlins and structural rafters.

C. Eave Line Structural Canopy:

Eave line structural canopies must consist of structural rafters of shop welded steel plate cantilevered to support purlins and eave struts. Rafters tapered sections mounted below the bottom flanges of the canopy purlins. Canopy roof panels an extension of the main building roof panels. As an option, canopies may be soffited with panels attached to the bottom flanges of the purlins and eave struts. Canopies flashed at the eaves and ends to conceal the purlins.

D. Below Eave Line Structural Canopy:

Below eave line structural canopies must consist of structural rafters of shop welded steel plate cantilevered to support purlins and eave struts. Rafters tapered sections mounted below the bottom flanges of the canopy purlins. Canopy roof panels flashed to the building wall panels. As an option, canopies may be soffited with panels attached to the bottom flanges of the purlins and eave struts. Canopies flashed at the eaves and ends to conceal the purlins.

E. Purlin Extension (Endwall Overhang):

Purlin extensions projections of the end bay purlins and roof panels beyond the endwall steel reference line. As an option, purlin extensions may be soffited with panels attached to the bottom flanges of the purlins and eave struts. Flashing provided at the eaves and the rakes of the purlin extensions to match the main building flashing and to ensure weather tightness and neat appearance.

3.4 FACADE SYSTEM

A. Structural Facades:

Structural facades field assembled and consist of outriggers and stanchions of shop welded steel plate which support 8 inch cold-formed struts top and bottom. Facades must project a minimum of 2 foot from the building wall and extend a minimum of 2 foot below the building eave. Facades may be either vertical or sloped toward the building 2 inch per 12 inch of vertical height. Facade face panels included. Soffit panels, back panels and valley gutters optional. Endwall facades with back panels must project a minimum of 8 inch above the roof line. Flashing provided to trim facades at the top, bottom, corners and ends.

3.5 PARTITIONS

Partitions must include columns, girts, panels, flashing and fasteners necessary for a complete installation. Partition girts may be exterior or flush mounted. Partitions may be sheeted on one or both sides.

3.6 ROOF MODIFICATION

A. UL 90 Wind Uplift Classified Roof:

Upon written request, the metal building manufacturer must provide UL labeled components and details to construct a roof which meets the requirements for an Underwriters Laboratories Classified Roof.

3.7 WINDOWS

A. Horizontal Slide Windows:

Aluminum horizontal slide windows must have extruded aluminum structural sections in mill finish and bronze. Window jambs weather stripped with 3/16 inch x ¼ inch pressure sensitive butyl sealant. Sashes factory glazed clear glass. Sliding sections must have cam or sweep interior locks and exterior screens. Windows furnished complete with framing, fasteners, flashing and sealant necessary to ensure weather tightness and neat appearance.

B. Slim Line Accent Windows:

Aluminum slim line accent windows 2 foot wide x 7 foot high with fixed glass. Frame members tubular construction no less than 2 ½ inch in depth with a wall thickness no less than 0.062 inch. Joints of frames neatly fitted and secured in a manner to utilize the full strength of the members connected. Members sealed. Windows designed to accept glazing of 1/8 inch tempered gray glass. Windows factory glazed with outside aluminum snap-in glazing beads with vinyl seals. Glazing leg rebates aluminum, ¾ inch in height. Exposed surfaces of aluminum cleaned and etched, followed by a baked on dark bronze enamel finish. Windows furnished complete with framing, fasteners, flashing and sealant necessary to ensure weather tightness and neat appearance.

3.8 SWING DOORS

A. Door Frames:

Swing door frames fabricated from 16 gauge galvanized or G-60 Galvanized Steel with strike and hinge reinforcements. Door frames bonderized and cleaned to provide paint adhesion. Door frames given one coat of primer and one finish coat of white enamel (1.7 to 2.1 mils dry film).

B. Door Leaves:

Swing door leaves fabricated from hot-dip galvanized G-60, or 20 gauge, mill bonderized, embossed steel with a stretcher level degree of flatness. After cleaning, exterior surfaces given a primer coat followed by a finish coat of white enamel (0.9 to 1.1 mils dry film). Internal construction of swing door leaves expanded polystyrene core with closed-cell rigid thermoplastic material with a U factor of 0.16.

C. Lockset Options:

Swing doors provided with one of the following locksets:

1. Cylindrical locksets with 2 ¾ inch backset with lever handles and satin chrome finish. Locksets reversible for right or left hand operations.

2. Heavy duty mortise locksets with 2 ¾ inch backset with lever handles and satin chrome finish.
Field reversible locksets furnished for right or left hand operation.
3. Rim type exit panic devices must attach to doors prepared for cylindrical locksets. Push bars furnished 32 inch in length. Panic hardware furnished in a dull finish.

D. Thresholds:

Aluminum thresholds sealed beneath and anchored to the concrete floor with countersunk fasteners. Thresholds, used in conjunction with door bottoms, must provide a weather tight seal at the bottom of the door.

E. Door Bottoms:

Swing door bottoms face mounted assemblies consisting of drip strips with vinyl insert sweeps to seal the bottoms of the doors to the thresholds.

F. Trim:

Trim flashing provided for the heads and jambs of door frames when door frames are located at sheeted walls.

G. Swing Door Closer:

Door closers of rack and pinion construction. The rack and pinion made of heat treated steel and mounted in a cast hydraulic iron case. Closing of the doors controlled by dual needle valves which concealed against unauthorized adjustment. Closers surface applied with projections not over 2 ¾ inch and capable of being applied on 1 ¾ inch top rails or top jambs for inverted mounting.

3.9 VENTILATORS, FANS, LOUVERS, CURBS, AND JACKS

A. Round Ventilators

Round ventilators with galvanized bird screens and dampers furnished in unpainted G-60 Galvanized Steel or G-60 Galvanized Steel painted white. Ventilators must have minimum throat clearances of 20 inch. Ventilator dampers factory installed, one piece types, designed to operate in position from fully open to fully closed. Round ventilators equipped with 12 foot of plated sash chain. Kits containing 50 foot of additional chain available.

Ventilators, for mounting at the ridges or on the roof slopes, complete with bases which must match the roof slopes. Ventilators furnished complete with closure strips, sealant and fasteners necessary to ensure weather tightness and neat appearance. (Note: Ridge mounted ventilators are not recommended for some roof panel profiles.)

B. Continuous Ridge Ventilators:

Continuous ridge ventilators with galvanized bird screens and dampers furnished in unpainted G-60 Galvanized Steel or G-60 Galvanized Steel painted white. Ventilators must have smooth transitional entrances to the throats to assure maximum discharge and air transmission efficiency. Ventilators fabricated and may be used in 10 foot lengths; however, splice joints furnished to allow continuous installation of ventilators. Each 10 foot section of continuous ridge ventilator equipped with a galvanized damper and damper operator. Continuous ridge ventilators equipped with 12 foot of plated sash chain. Kits containing 50 foot of additional chain available.

Continuous ridge ventilators factory mounted in flat sheet bases formed to match the roof slopes. Continuous ridge ventilators furnished complete with closure strips, sealant

and fasteners necessary to ensure weather tightness and neat appearance.(Note: Continuous Ridge Ventilators are not recommended for some roof panel profiles.)

C. 'Low Profile' Ridge Ventilators:

'Low profile' ridge ventilators with ventilation core furnished in unpainted G-60 Galvanized Steel or G-60 Galvanized Steel painted to match roof panel color. The ventilation core must have no obstructions to assure maximum discharge and air transmission efficiency. 'Low Profile' ridge ventilators factory assembled and ready to install in nominal 10 foot lengths. For continuous runs of 'low profile' ventilators, splice joint trim furnished to trim ventilators together thus allowing the entire perimeter of each ventilator to be completely sealed to the roof system.

'Low profile' ridge ventilators must have flat sheet flange bases furnished complete with panel closures, sealant and fasteners necessary to ensure weather tightness and a neat appearance.

'Low profile' ridge ventilators are not recommended for roof slopes less than two in twelve (2:12).

D. Fixed Louvers:

Fixed louvers self-flashing, welded units of galvanized steel flanges and blades, bonderized and painted white. Fixed louvers nominal 48 inch wide x 48 inch high x 4 inch deep. Louver blades placed in the louvers at angles to assure maximum air transmission efficiency and formed with longitudinal brakes for rigidity and strength. Fixed louvers equipped with galvanized insect screens painted white. Fixed louvers furnished complete with framing, flashing, sealant and fasteners necessary to ensure weather tightness and neat appearance.

E. Adjustable Louvers:

Adjustable louvers nominal 48 inch x 48 inch high and 4 inch deep. Adjustable louver frames fabricated from 18 gauge galvanized steel and self-flashing and self-framing. Blades 20 gauge galvanized steel with $\frac{3}{8}$ inch x $\frac{1}{4}$ inch weather stripping applied to ensure air tightness in a closed position. After fabrication, a white polyester baked on paint applied to a film thickness of 4 mils. Operators reinforced cast aluminum hand cranks. Adjustable louvers furnished complete with framing, flashing, sealant and fasteners necessary to ensure weather tightness and neat appearance. Optional 110V motor driven operators are available for use with GSM adjustable louvers.

F. Automatic Louvers (Panel Shutters):

Automatic louvers 54 inch square x 4 inch deep, shrouded, water resistant, metal units with reinforced corners. Automatic louvers forced-air activated units recommended for use in conjunction with 48 inch exhaust fans. Automatic louvers must contain counter-balanced blades set in polyethylene bearings for free operation and maximum air movement. Automatic louvers furnished complete with framing, flashing, sealant and fasteners necessary to ensure weather tightness and neat appearance.

G. Exhaust Fans:

Exhaust fans for use with automatic louvers 52 inch square x 13 $\frac{1}{2}$ inch units with 48 inch blades. Fan motors $\frac{3}{4}$ H.P. 110/220 volt motors. Fans capable of moving 20,100 CFM at 335 rpm with a static pressure of 0.

H. Round Roof Jacks:

Round roof jacks must consist of pleated resilient rubber sleeves bonded to corrosion resistant aluminum rings. The rubber sleeves field cut and fitted around pipes penetrating the roof. The aluminum bases field formed to fit the roof panels. Round roof jacks available to accommodate round pipes from ¼ inch to 1 foot 1 inch in diameter. Roof jacks furnished with sealant and fasteners necessary to ensure weather tightness and neat appearance.

I. Roof Curbs:

1. Shadow Panel Curbs

Shadow panel roof curbs galvanized or G-60 Galvanized Steel, welded construction, available standard unpainted or upon request painted. Roof curbs must have flat bases with loose rib plugs and caps for field installation. Roof curbs must have 15 inch front flange including an integral cricket water diverter, 6 inch rear flange and 3 inch side mounting flanges. Roof curbs slope corrected, except for use with skylight and smoke vents, unless otherwise noted. Roof curbs must have 1 ½ inch equipment support flanges at the top to provide a smooth, level surface for attachment of the roof top unit. Roof Curbs for HVAC units may be constructed to match duct supports and pans as required by the HVAC equipment manufacturer. Roof Curbs shipped with required installation accessories: 2-1/2 inch triple bead butyl mastic, polyurethane tube caulk and long life fasteners.

2. Panel Curbs

Panel roof curbs galvanized steel, welded construction, available standard unpainted or upon request painted. Roof curbs must have flat bases with loose rib plugs and caps for field installation. Roof curbs must have 15 inch front flange including an integral cricket water diverter, 6 inch rear flange and 3 inch side mounting flanges. Roof curbs slope corrected, except for use with skylight and smoke vents, unless otherwise noted. Roof curbs must have 1 ½ inch equipment support flanges at the top to provide a smooth, level surface for attachment of the roof top unit. Roof Curbs for HVAC units may be constructed to match duct supports and pans as required by the HVAC equipment manufacturer. Roof Curbs shipped with required installation accessories: 2-1/2 inch triple bead butyl mastic, polyurethane tube caulk and long life fasteners.

3. Panel Curbs

Panel roof curbs galvanized or steel, welded construction, available standard unpainted or upon request painted. Roof curbs must have flat bases with loose rib caps on the eave side for field installation. Roof curbs must have 15 inch front flange including an integral cricket water diverter, 6 inch rear flange and 3 inch side mounting flanges. Roof curbs slope corrected, except for use with skylight and smoke vents, unless otherwise noted. Roof curbs must have 1 ½ inch equipment support flanges at the top to provide a smooth, level surface for attachment of the roof top unit. Roof Curbs for HVAC units may be constructed to match duct supports and pans as required by the HVAC equipment manufacturer. Roof Curbs shipped with required installation accessories: 2-1/2 inch triple bead butyl mastic, polyurethane tube caulk and long life fasteners.

4. Structural Supports

a. Shadow Panel Curbs

Structural supports for shadow panel roof curbs provided to support the weight of the roof top equipment load and roof curb. If roof top equipment weight exceeds standard purlin capacity, manufacturer must add additional structural members as required.

b. Sliding Clip Curbs

Floating Structural curb support system for roof curbs must attach to purlin members by a Stirrup with sliding clip assembly. Curb support factory raised to match the elevation of the roof panel. This Structural floating curb support must support the weight of the roof top equipment load and roof curb. The structural supports must also be designed to allow 1 inch thermal movement of the roof curbs in either direction relative to the building purlins. If roof top equipment weight exceeds standard purlin capacity, manufacturer must add additional structural members as required and roof curb type a Floating Double Curb.

c. Sliding Clip Curbs

Floating Structural curb support system for roof curbs must attach to purlin members by a Stirrup with sliding clip assembly. Curb support factory raised to match the elevation of the roof panel. This Structural floating curb support must support the weight of the roof top equipment load and roof curb. The structural supports must also be designed to allow 1 inch thermal movement of the roof curbs in either direction relative to the building purlins. If roof top equipment weight exceeds standard purlin capacity, manufacturer must add additional structural members as required and roof curb type a Floating Double Curb.

d. Double Floating Curb Assembly

Double Floating Curbs used at the manufacturer discretion with Sliding Clip or Sliding Clip panels for one or more of the following reasons:

- Y The roof top unit weight can not be supported by purlins and loads must be transferred to the main frames with I-Beams.
- Y Roof top unit weight would not allow thermal movement of the standing seam roof system if the units were placed on standard curbs attached to the roof.
- Y Framed Opening or HVAC ductwork requirements are larger than the purlin spacing.

Typically the framed opening is boxed out with secondary members, hot rolled or cold formed channels connected to I-Beams supported by the main frames. Purlins are terminated and supported by the secondary members, with standard angle clip connections, forming the framed opening.

A Double Curb System includes the following components:

- Y Inner Structural Curb. Supports the weight of the HVAC unit. The Inner Curb is attached to the structural support framing.
- Y Outer Floating Curb. The roof panel is attached to the Outer Curb. This allows the roof to move (float) with thermal expansion and contraction, while the inner curb remains stationary.
- Y Flashing Collar. The flashing collar provides a weather tight seal between the Inner Curb and the Outer Floating Curb.
- Y Necessary rib plugs, rib caps, 2 ½ inch triple bead mastic, polyurethane tube caulk and Long Life fasteners.

4.0 WALL AND ROOF LIGHTS

A. General:

1. Shadow Panel and Centennial Panel

Wall lights, roof lights and insulated roof lights either fiberglass reinforced modified acrylic or fiberglass reinforced polyester translucent material. Wall and roof lights furnished in the configuration of the wall or roof panels as applicable. Each wall and roof light sized to replace one panel width and must lap the building panel at the ends.

Wall and roof lights furnished with the sealant and fasteners necessary for the installation.

2. Roof Lights

Roof lights and insulated roof lights mat fiber reinforced 8 ounce per square foot modified acrylic translucent material. The translucent material factory connected to metal ribs on both sides. Each roof light must replace one 10 foot roof panel and the sidelaps machine seamed. Roof lights furnished with the sealant and fasteners necessary for the installation.

B. Wall Lights:

Wall lights chopped fiber reinforced, 6 ounce per square foot modified acrylic translucent material with a smooth finish. Wall lights furnished white, in 5 foot and 7 foot lengths only. Wall lights must have light transmission factors of 0.46 and heat transmission factors of 0.37. Wall lights furnished for wall installation only and under no circumstances installed in building roofs.

C. Roof Lights (Shadow Panel):

Roof lights mat fiber reinforced, 8 ounce per square foot modified acrylic translucent material with a smooth finish. Shadow panel roof lights furnished white, in 11 foot lengths only. Roof lights furnished white, in 10 foot-6 lengths only. Roof lights must have light transmission factors of 0.46 and heat transmission factors of 0.64. Roof lights must comply with the Underwriters Laboratories UL 90 Wind Uplift Classification when labeled and erected in accordance with UL 90 Roof Construction requirements.

D. UL 25 Flame Spread Rated Roof Lights (Shadow Panel):

UL 25 roof lights mat fiber reinforced, 8 ounce per square foot, fire retardant (Underwriters Laboratories UL 25 Flame Spread Classification) polyester translucent material with a smooth finish. UL 25 roof lights for Shadow panel furnished white, in 11 foot lengths only. UL 25 roof lights furnished white, in 10 foot 6 lengths only. UL 25 roof lights must have light transmission factors of 0.46 and heat transmission factors of 0.64. UL 25 roof lights must comply with the Underwriters Laboratories UL 90 Wind Uplift Classification when labeled and erected in accordance with the UL 90 Roof Construction requirements.

E. Insulated Roof Lights:

1. Shadow Panel Insulated Roof Lights

Insulated roof lights factory assembled units consisting of white roof lights and 4 ounce per square foot translucent pans which create a ¼ inch dead air space. Each roof light and pan sealed with contact adhesive and pressure sensitive tape mastic. Insulated roof lights must comply with the Underwriters Laboratories UL 90 Wind Uplift Classification when labeled and erected in accordance with UL 90 Roof Construction requirements. Insulated roof lights furnished in 11foot lengths only.

2. Insulated Roof Lights

Insulated roof lights factory assembled units consisting of white roof lights and factory installed 0.06 inch thick clear acrylic pans which create a 1 inch dead air space. Each roof light and pan sealed with pressure sensitive tape mastic. Roof lights must comply with the Underwriters Laboratories UL 90 Wind Uplift Classification when labeled and erected in accordance with UL 90 Roof Construction requirements. Insulated roof lights furnished in 10 foot-6 lengths only.

4.1 MARQUEE DOOR CANOPY

Marquee door canopies either 4 foot 6 inch or 8 foot-6 inch wide x 3 foot projection factory assembled, field located accessories consisting of white prepainted steel perimeter frames, roof panels and angle support bracing. Marquee door canopies furnished with materials necessary for complete erection.

4.2 SEALANT

A. Tube Sealant:

Tube sealant a one-component, moisture curing polyurethane multi-purpose sealant. The sealant must exhibit extreme stability in the presence of ultra-violet radiation, atmospheric contamination and infrared radiation.

B. Tape Sealant (Bead Mastic):

Tape sealant a cross-linked isobutylene / isoprene copolymer tape that will not lose shape due to storage or transportation. Tape sealant available in the following size rolls: ¼ inch x 3/16 inch x 40 foot rectangular, 7/8 inch x 3/16 inch x 40 foot rectangular and 1½ inch x 3/32 inch x 45 foot rectangular.

4.3 CLOSURE STRIPS AND PLUGS

A. Closure Strips:

Closure strips made of semi-rigid cross-linked polyethylene foam sheets fused together in plywood-like lamination. Foam closure strips formed to fit the contour of the ribbed panels.

B. Inside Closure Plugs:

Inside closure plugs made of steel stamped into the configuration of the rib. Material G-60 galvanized steel.

C. Outside Metal Closures:

Outside metal closures made of panel material stamped into a configuration to match the panel profile on one edge with the opposite edge having a flat surface for the attachment of flashing.

END OF SECTION

SECTION 22 00 00
PLUMBING

PART 1 GENERAL

1.1 SUMMARY

- A. Plumbing systems to provide potable water service for the proposed drinking fountain installed inside the proposed metal frame storage building.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
- C. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data, including operating instructions, list of spare parts and maintenance schedule.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of approved manufacturers, which have been used in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Coordinate location of plumbing systems to avoid interference with location of structure and other building systems. Notify Owner of conflicts before construction, and potential resolutions.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Plumbing Systems:
 - Application: Facility water distribution.
 - Application: Modifications to existing plumbing systems.
 - Type: Plumbing pipes and pumps.
- A. Water distribution piping.
- B. Domestic water piping.
- C. Sanitary sewerage.
 - Components: Suitable for service.
- D. Piping, Valves and Fittings.
- E. Sleeves and escutcheons.
- F. Meters and gages.
- G. General-duty valves and strainers.
- H. Cleanouts, traps, and interceptors.
- I. Sealants.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Extend the existing $\frac{3}{4}$ inch PVC water service line to the proposed metal frame storage building.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials in proper relation with adjacent construction and with uniform appearance for exposed work. Coordinate with work of other sections. Comply with applicable

regulations and building code requirements.

- C. Install shutoff valves on each piece of equipment on the water supply.
- D. Label valves and components.
- E. Sterilize water distribution system. Flush and test systems for proper operation. Adjust system to prevent water hammer.
- F. Restore damaged finishes. Clean and protect work from damage.
- G. Instruct Owner's personnel in proper operation of systems.

END OF SECTION

SECTION 22 47 13
DRINKING FOUNTAINS

PART 1 GENERAL

1.1 SUMMARY

- A. Provide Hi-Lo Drinking Water Fountain with chiller or equal, meeting ADA requirements.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
- C. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data, including operating instructions, list of spare parts and maintenance schedule.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Coordinate location of plumbing systems to avoid interference with location of structure and other building systems. Notify Owner before construction of conflicts.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Hi Lo Drinking Water Fountain with chiller: Manufacturers: Elkay, Inc., Model LK4420BF1U. or approved equal. Meeting the following specifications:
<http://www.elkay.com/lk4420bf1u> <http://www.elkay.com/lk4420bf1u>
- A. Color: evergreen.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Coordinate with work of other sections. Comply with applicable regulations and building code requirements.
- B. Flush new or existing supply lines before installation.
- C. Sterilize water distribution system. Flush and test systems for proper operation. Adjust system to prevent water hammer.
- D. Instruct Owner's personnel in proper operation of systems.

END OF SECTION

SECTION 26 01 00
ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Furnish labor, materials, equipment and incidentals required for a complete electrical system as hereinafter specified and shown on the Drawings.
 - 1. Provide and install equipment, conduit, and wiring for the electrical work indicated on the electrical drawings in accordance with the specifications.
- B. Includes testing of equipment and wiring at the completion of the work and making adjustments necessary for the proper functioning of the system and equipment.
- C. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Division.
- D. Before bidding visit areas of the site in which work under this Section is to be performed and inspect the existing conditions.
- E. Material and installation in accordance with the latest edition of the National Electrical Code and applicable national, local and state codes.

1.2 SEQUENCING AND SCHEDULING

- A. Coordinate with the Owner power interruptions at least 48 hours in advance and obtain permission from the Owner before to interrupting the power.

1.3 SUBMITTALS

- A. Submit shop drawings of materials, equipment, apparatus, and other items as required by the Engineer.
- B. Engineer's review is only for conformance with the design concept of the project and compliance with the Specifications and Drawings.
- C. Order no material or start work until the Engineer's approval of shop drawings is given.
- D. As the work progresses, legibly record field changes on a set of project Contract Drawings. When the project is complete, furnish a complete set of "as-built" drawings for the Project Record Documents.

1.5 GUARANTEE

- A. Guarantee equipment furnished and installed, and work performed against defects of workmanship, materials, and proper installation for a minimum period of one year from date of acceptance. This time increased to the periods stated within individual specification sections as required.

1.6 TESTS

- A. Test systems in the presence of the Engineer and repair or replace defective work. Make necessary adjustments to the systems and instruct the Owner's personnel in the proper operation of the systems.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Equipment and material U.L. listed.
- B. The materials used in systems must be new, unused. Submit samples of materials or Manufacturer's Specifications for review as required by the Engineer.
- C. Materials and equipment used Underwriters Laboratories, Inc. listed.
- D. Protect electrical equipment during construction. Do not store electrical equipment out-of-doors.
- E. Electrical panels, enclosures, raceways, conduits, wireways, boxes, cabinets, etc., fabricated of metal, Non-metallic substitutes are not approved. This does not apply to buried work.

PART 3 EXECUTION

3.1 TEMPORARY ELECTRICAL FACILITIES

- A. Furnish, install, and maintain materials and equipment required to provide temporary light and power to perform the work of trades during construction until work is completed. Adequate lighting and receptacle outlets for operation of hand tools provided throughout the project, including trailers, field offices, etc. and extended as construction progresses.
- B. Protect workers and the public from shock and fire hazards.
 - 1. Ground fault circuit interrupters employed in accordance with codes.
 - 2. Ground wires are required in circuits. Ground poles are required on outlets. Metallic cases grounded.
 - 3. Raintight cabinets used for equipment in wet locations.

3.2 COMPONENT INTERCONNECTIONS

- A. Component equipment furnished under this Specification will not be furnished as integrated systems.
- B. Analyze systems components and their shop drawings; identify terminals and prepare drawings or wiring tables necessary for component interconnection.

3.3 INSTALLATION – GENERAL

- A. Drawings do not show exact locations of conduit runs.

- B. Three-phase circuits run in separate conduits unless otherwise shown on the Drawings.
- C. Unless otherwise approved by the Engineer conduit shown exposed installed exposed; conduit shown concealed installed concealed.
- D. Where circuits are shown as "home-runs" necessary fittings and boxes provided for a complete raceway installation.
- E. Wire, conduit, circuit breaker, and motor starter sizes shown on the drawings are indicative of the sizes required based upon the equipment shown. These may vary depending upon the actual equipment furnished. Make adjustments as required to meet the installation requirements of equipment.
- F. Locations of equipment and devices shown on the Drawings are approximate only. Exact locations as approved by the Engineer during construction. Obtain in the field information relevant to the placing of electrical work and in case of interference with other work, proceed as directed by the Engineer and furnish labor and materials necessary to complete the work in an approved manner.
- G. Circuit layouts to not show the number of fittings, or other installation details. Furnish labor and materials necessary to install lighting, and other electrical systems. Additional circuits installed whenever needed to conform to the specific requirements of the equipment.
- H. Floor mounted electrical equipment, including motor control centers, transformers, control panels, etc., placed on a 4 inch concrete housekeeping pad.
- I. Connections to equipment made as shown, specified, and directed and in accordance with the approved shop drawings.
- J. Provide and place sleeves for conduits penetrating floors, walls, partitions, etc. Locate necessary slots for electrical work and form before concrete is poured.

END OF SECTION

SECTION 31 10 00
SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

- A. Provide selective clearing and grubbing and demolition activities. Demolition of existing exercise equipment stations, designated sections of the existing asphalt path and compacted subbase, and additional items that may be required.

1.2 SUBMITTALS

- A. Clearing and Grubbing activities based on the Demolition Plan: Submit list of proposed operations, and identify site improvements and features to remain. Include proposed location for stockpiles.
- B. Schedule: Submit for review a selective demolition schedule of salvage items to return to Owner, including methods for capping abandoned utilities and maintaining existing utility service.

1.3 QUALITY ASSURANCE

- A. Codes and Regulations: Comply with governing codes and regulations. Use experienced and qualified workers.

1.4 PROJECT CONDITIONS

- A. Occupancy: Surrounding areas of the work will not be occupied during selective clearing and grubbing. The public may occupy adjacent areas.
- B. Existing Conditions: No responsibility for structures to be demolished is assumed by the Owner.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Site Clearing and Grubbing Includes:
 - 1. Clearing of designated existing site improvements and landscaping.
 - 2. Demolition of 10 existing exercise equipment stations.
 - 3. Demolition of designated sections of the existing asphalt path and compacted subbase, and additional items that may be required.
 - 4. Protection of site work and adjacent structures.
 - 5. Disconnection, capping, and removal of utilities as required.
 - 6. Pollution control during building demolition, including noise control.
 - 7. Removal and legal disposal of materials.
 - 8. Tree protection, erosion control, siltation control, and dust control materials suitable for site conditions.
 - 9. Designated site improvements and adjacent construction.
 - 10. Interruption, capping or removal as applicable.
 - 11. Hazardous Materials: Notify owner if encountered.

PART 3 EXECUTION

3.1 SITE CLEARING AND GRUBBING OPERATIONS

- A. Selective Demolition Operations: Do not damage site elements and improvements indicated to remain. Remove items of salvage value, not included on schedule of salvage items to be

returned to Owner. Storage or sale of items at project site is prohibited.

- B. Utilities: Locate, identify, disconnect, and seal or cap off utilities impacted by selective demolition.
- C. Occupied Spaces: Do not close or obstruct streets, walks, drives or other occupied or used spaces or facilities without the written permission of the Owner and the authorities having jurisdiction. Do not interrupt utilities serving occupied or used facilities without the written permission of the Owner and authorities having jurisdiction. If necessary, provide temporary utilities.
- D. Operations: Cease operations if public safety or remaining structures are endangered. Perform temporary corrective measures until operations can be continued.
- E. Security: Provide protection against trespassing. Secure project after work hours.
- F. Install temporary erosion control, siltation control, and dust control.
- G. Temporary protection of adjacent property, structures, benchmarks, and monuments.
- H. Removal and disposal of cleared materials.
- I. Restoration: Restore areas occupied by the demolished exercise equipment stations and the demolished asphalt path to match existing grade, and install sod to match the surrounding areas.

3.2 SELECTIVE CLEARING OF VEGETATION

- A. Protect existing trees with construction barricade, vegetation, landscaping, and site improvements not scheduled for clearing and grubbing.
- B. Trim existing trees and vegetation as necessary by a certified arborist during construction activities.
- C. Water vegetation as required to maintain health during construction activities. Cover exposed roots with wet burlap and backfill.
- D. Remove and disposal of stumps and vegetation, debris, rubbish, designated trees, and site improvements.
- E. Topsoil stripping and stockpiling.
- F. Stump grind roots 12 inch below finish grade.

END OF SECTION

SECTION 31 20 00
EARTH MOVING

PART 1 GENERAL

1.1 SUMMARY

- A. Provide earthwork operations.

1.2 SUBMITTALS

- A. Test Reports: Submit test reports, list of materials and gradations proposed for use.

1.3 QUALITY ASSURANCE

- A. Compaction:
 - Under structures, metal frame storage building concrete pad, exercise equipment concrete pad, pavements, and walkways, 95 percent maximum density, ASTM D 1557.
 - Under lawns or unpaved areas, 90 percent maximum density, ASTM D 1557.
- B. Grading Tolerances Outside proposed Concrete Pads Lines:
 - Lawns, unpaved areas, and walks, plus or minus 1 inch.
 - Pavements, plus or minus ½ inch.
- C. Grading Tolerance for fill under proposed concrete pads: Plus or minus ½ inch measured with 10-foot straightedge.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Earthwork:
 - Application: Excavation, filling, compacting and grading operations both inside and outside building limits as required for below-grade improvements and to achieve grades and elevations indicated. Provide trenching and backfill for mechanical and electrical work and utilities.
 - Application: Subbase materials, drainage fill, common fill, and structural fill materials for concrete pads, pavements, and improvements.
 - Application: Suitable fill.
 - Subbase Material: Graded gravel or crushed stone.
 - Bedding Course: Graded crushed gravel and sand.
 - Borrow Soil: Off-site soil for fill or backfill.
 - Drainage Fill: gravel or crushed stone.
 - Common Fill: Mineral soil free from unsuitable materials.
 - Structural Fill: Graded gravel.
 - Impervious Fill: Gravel and sand mixture.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Excavation is unclassified and includes excavation to subgrade regardless of materials encountered. Repair excavations beyond elevations and dimensions indicated as follows:
 - At Structure: Concrete or compacted structural fill.
 - Elsewhere: Backfill and compact as directed.
- B. Prevent surface and subsurface water from accumulating in excavations. Stockpile materials for reuse, allow for drainage and do not stockpile materials within drip line of trees to remain.

- C. Compact materials at the optimum moisture content as determined by ASTM D 1557 by aeration or wetting to the following percentages of maximum dry density:
 - Structures, Pavement, Walkways: Subgrade and each fill layer to 95% of maximum dry density to suitable depth.
 - Unpaved Areas: Top 6 inch of subgrade and each fill layer to 90% maximum dry density.
- D. Place materials in layers not more than 8 inch loose depth for materials compacted by heavy equipment and not more than 4 inch loose depth for materials compacted by hand equipment to subgrades indicated as follows:
 - Structural Fill: Use under foundations, slabs on grade in layers as indicated.
 - Drainage Fill: Use under designated building slabs, at foundation drainage and elsewhere as indicated.
 - Common Fill: Use under unpaved areas.
 - Subbase Material: Use under pavement, walks, steps, piping and conduit.
- E. Grade to within ½ inch above or below required subgrade and within a tolerance of ½ inch in 10 foot.
- F. Protect newly graded areas from traffic and erosion. Recompact and regrade settled, disturbed and damaged areas as necessary to restore quality, appearance, and condition of work.
- G. Control erosion to prevent runoff into sewers or damage to sloped or surfaced areas.
- H. Control dust to prevent hazards to adjacent properties and vehicles. Repair or remedy damage caused by dust including air filters in equipment and vehicles. Clean soiled surfaces.
- I. Dispose of waste and unsuitable materials off-site in a legal manner.

END OF SECTION

SECTION 31 25 00
EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.1 SUMMARY

- A. Provide erosion and sedimentation control.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used, including:
 - Types of stone and sizes.
 - Types of fabrics and erosion control matting.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of manufacturers that have been in use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Erosion and Sedimentation Control:
 - Application: Control of water erosion and sediment deposition.
 - Type: High-density polypropylene reinforcing geogrids.
 - Type: Turf reinforcement mat.
 - Type: High-strength geotextiles.
 - Type: Crushed stone bedding with filter fabric and stone riprap.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections.

END OF SECTION

SECTION 31 31 00
SOIL TREATMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Provide soil treatment for termite control around the proposed metal frame building concrete pad.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Warranty: Submit manufacturers standard warranty. Include labor and materials to repair or replace defective materials.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label.
- B. Comply with governing codes and regulations. Provide products of approved manufacturers that have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- C. Environmental Limitations: Do not treat soil under water. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Soil Treatment:
 - Application: Site termite control.
 - Materials: U.S. EPA registered.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label.
- B. Mix wood treatment borate solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of borate, according to manufacturer's EPA-Registered Label.
- C. Post signs and other warnings indicating that soil poisoning has been applied. Protect persons and property from injury or damage from soil treatment work.

END OF SECTION

SECTION 32 12 16
ASPHALT PAVING

PART 1 GENERAL

1.1 SUMMARY

- A. Provide hot-mixed asphalt paving for asphalt paths.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Test Reports: Submit for review test reports.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of approved manufacturers that have been in satisfactory use in similar service for three years. Use experienced and certified installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Construction Tolerances:
 - Limerock Base Course Thickness: 4" minimum; LBR 100.
 - Surface Course Thickness: 1".
 - Base Course Surface Smoothness: Within 1/4".
 - Surface Course Surface Smoothness: Within 3/16". No ponding is allowable.
 - Crowned Surfaces: Within 1/4" from template.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Hot-Mixed Asphalt Paving:
 - Application: Paths.
 - Asphalt-Aggregate Mixture: Plant-mixed, hot-laid asphalt-aggregate mixture, Type S-III ASTM D 3515, complying with FDOT and DPW regulations.
 - Prime Coat: Cut-back asphalt, ASTM D 2027.
 - Tack Coat: Emulsified asphalt, ASTM D 977.
 - Herbicide Treatment: EPA registered chemical for weed control.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Asphalt/Aggregate Mixture Type S-III, one lift: Comply with FDOT or DPW Standard Specifications for Highways and Bridges. Class as required by loading and use.
- B. Remove loose material from compacted subbase. Proof roll and check for areas requiring additional compaction. Report unsatisfactory conditions in writing. Beginning of work means acceptance of subbase.
- C. Apply prime coat to prepared subbase. Apply tack coat to previous laid work and adjacent in-place concrete surfaces.
- D. Place asphalt concrete at minimum temperature of 225 degrees F in strips not less than 10' wide overlapping previous strips. Complete entire base course before beginning surface

course.

- E. Begin rolling when pavement can withstand weight of roller. Roll while still hot to obtain maximum density and to eliminate roller marks.
- F. Test in-place asphalt work for thickness and smoothness. Remove and replace defective work and patch to eliminate evidence of patching.

END OF SECTION

SECTION 32 18 23.29
SYNTHETIC FIELD SPORT SURFACING

PART 1 GENERAL

1.1 SUMMARY

- A. Provide synthetic turf athletic surface system.
- B. Furnish labor, materials, tools and equipment necessary to install monofilament artificial grass FieldTurf or approved equal, as indicated on the plans and as specified; including components and accessories required for a complete installation including an acceptance of prepared sub-base.

Coordinate with related trades to ensure a complete, integrated, installation:

Aggregate base course, sub-base material (tested for permeability), grading and compacting, piping and drain components (when required); as provided under its respective trade section.

1.2 REFERENCE STANDARDS

- A. FM Factory Mutual
 - 1. P7825 - Approval Guide; Factory Mutual Research Corporation; current edition
- B. ASTM – American Society for Testing and Materials.
 - 1. D1577 - Standard Test Method for Linear Density of Textile Fiber
 - 2. D5848 - Standard Test Method for Mass Per Unit Area of Pile Yarn Floor Covering
 - 3. D1338 - Standard Test Method for Tuft Bind of Pile Yarn Floor Covering
 - 4. D1682 - Standard Method of Test for Breaking Load and Elongation of Textile Fabrics
 - 5. D5034 - Standard Test Method of Breaking Strength and Elongation of Textile Fabrics (Grab Test)
 - 6. F1015 - Standard Test Method for Relative Abrasiveness of Synthetic Turf Playing Surfaces
 - 7. D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity
 - 8. D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials
 - 9. F355 - Standard Test Method for Shock-Absorbing Properties of Playing Surfaces.
 - 10. F2117 – Standard Test Method for Vertical Rebound Characteristics of Sports Surface Systems: Acoustical Measurements (Soccer)
 - 11. BS7044, Section 2.2 Methods for Determination of Person/Surface Interaction Method 1: Determination of Traction (Rotational Resistance)
 - 12. F1551-03 Suffix: DIN 18-035, Part 6: Water Permeability of Synthetic Turf Systems
 - 13. ASTM F355-10, Procedure A: Testing Services Inc test number TSI 1202

1.3 SUBMITTALS

- A. Comply with Submittals Procedures. Submit for approval before fabrication.
- B. Shop Drawings:
 - 1. Indicate field layout; field marking plan and details for the specified sports; i.e., NCAA Football; roll/seaming layout; methods of attachment, field openings and perimeter conditions.
 - 2. Show installation methods and construction indicating field verified conditions, clearances, measurements, terminations, drainage.
 - 3. Provide joint submission with related trades when requested by Architect.
- C. Product Data:
 - 1. Submit manufacturer's catalog cuts, material safety data sheets, brochures, specifications; preparation and installation instructions and recommendations; storage, handling requirements and recommendations.
 - 2. Submit fiber manufacturer's name, type of fiber and composition of fiber.
 - 3. Submit data in sufficient detail to indicate compliance with the contract documents.
 - 4. Submit manufacturer's instructions for installation.
 - 5. Submit manufacturer's instructions for the care and maintenance of the synthetic turf system, including painting and markings.
- D. Samples: Submit samples, 9 x 12 inches, illustrating details of finished product.
- E. Product Certification:
 - 1. Submit manufacturer's certification that products and materials comply with requirements of the specifications.
 - 2. Submit test results indicating compliance with Reference Standards.
- F. Project Record Documents: Record actual locations of seams, drains and other pertinent information in accordance with Specifications, General Requirements.
- G. List of existing installations: Submit list including respective Owner's representative and telephone number.
- H. Warranties: Submit warranty and ensure that forms have been completed in Owner's name and registered with approved manufacturer.
- I. Submit Bills of Lading/Material Delivery Receipts for synthetic turf infill materials. Bills of lading shall bear the name of the project/delivery address, quantity of materials delivered, source/location of origin of infill materials and/or manufacturer, and date of delivery.
- J. Testing Certification: Submit certified copies of independent (third-party) laboratory reports on ASTM testing:
 - 1. Pile Height, Face Weight & Total Fabric Weight, ASTM D5848.
 - 2. Primary & Secondary Backing Weights, ASTM D5848.
 - 3. Tuft Bind, ASTM D1335.
 - 4. Grab Tear Strength, ASTM D1682 or D5034.
 - 5. Water Permeability, ASTM D4491

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section. The turf contractor and the turf manufacturer:
 - 1. Experienced in the manufacture and installation of infilled spined and ridged

monofilament grass system for a minimum of three years. This includes use of a spined and ridged monofilament fiber, backing, the backing coating, and the installation method.

2. Manufacturer must own and operate its own manufacturing plant. Manufacturing the fiber, tufting of the field fibers into the backing materials and coating of the turf system must be done in-house by the turf manufacturer.
 3. Manufacturer must have ISO 9001, ISO 14001 and OHSAS 18001 certifications demonstrating its manufacturing efficiency with regards to quality, environment and safety management systems.
 4. Must have 500 fields in play for at least two years with a spined and/or ridged monofilament fiber. Fields 65,000 ft² or more.
 5. Must have a minimum of 500 fields that are at least 8 years old, which is equal to the respective warranty period.
 6. Must have a minimum of 60 installations in the State/Province of Florida.
 7. Must have a minimum of 1 FIFA 2-Star recommended field in North America.
 8. Must have a minimum of 5 NFL game and/or practice fields in play for the previous year.
 9. Must have minimum of 50 NCAA Division 1 game and/or practice fields installed for (football or soccer).
 10. Must have a minimum of 1000 installations in North America, each of 65,000 ft² or more. Fields 65,000 ft² or more of the specified infill material and a spined and/or ridged monofilament fiber.
 11. Must provide third party certification confirming minimum requirement of 9 lbs tuft bind.
 12. Must provide third-party laboratory testing proving heat reduction qualities of the same infill used in the proposed turf system.
- B. Installer: Company must specialize in performing the work of this section. Provide competent workmen skilled in this specific type of synthetic grass installation.
1. The designated Supervisory Personnel on the project certified, in writing by the turf manufacturer, as competent in the installation of specified monofilament material, including sewing seams and proper installation of the infill mixture.
 2. Installer certified by the manufacturer and licensed.
 3. The installer supervisor must have a minimum of 5 years' experience as either a construction manager or a supervisor of synthetic turf installations.
- C. Pre-Installation Conference: Conduct conference at project site at time to be determined by Owner. Review methods and procedures related to installation including, the following:
1. Inspect and discuss existing conditions and preparatory work performed under other contracts.
 2. In addition to the Contractor and the installer, arrange for the attendance of installers affected by the Work, The Owner's representative, and the Architect.
- D. The Contractor must verify special conditions required for the installation of the system.
- E. The Contractor must notify the Owner of discrepancies.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with Section 01 60 00, Product Requirements.
- B. Prevent contact with materials that may cause dysfunction.
- C. Deliver and store components with labels intact and legible.
- D. Store materials/components in a safe place, under cover, and elevated above grade.
- E. Protect from damage during delivery, storage, handling and installation. Protect from damage by other trades.
- F. Inspect delivered materials and products to ensure they are undamaged and in good condition.
- G. Comply with manufacturer's recommendations.

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate the Work with installation of work of related trades as the Work proceeds.
- B. Sequence the Work in order to prevent deterioration of installed system.

1.7 GUARANTEE

- A. The Contractor shall provide a guarantee to the Owner that covers defects in materials and workmanship of the turf for a period of eight years from the date of substantial completion. The turf manufacturer must verify that their representative has inspected the installation and that the work conforms to the manufacturer's requirements. The manufacturer's guarantee include general wear and damage caused from UV degradation. The guarantee must specifically exclude vandalism, and acts of God beyond the control of the Owner or the manufacturer. The fully third party insured; pre paid for the entire 8 year term and be non-prorated. Owner must provide a warranty to the Owner that covers defects in the installation workmanship, and further warrant that the installation was done in accordance with both the manufacturer's recommendations and written directives of the manufacturer's representative. Before final payment for the synthetic turf, submit to owner notification in writing that the field is officially added to the annual policy coverage, guaranteeing to the Owner. The insurance policy must be underwritten by an "AM Best" A rated carrier and must reflect the following values:

1. Pre-Paid 8-year insured warranty.
2. Insured Warranty Coverage must be provided in the form of 1 single policy.
3. Maximum per claim coverage amount of \$32,000,000.
4. Minimum of \$32,000,000 annual aggregate.
5. Must cover full 100% replacement value of total square footage installed, minimum of \$7.00 per sq ft. (in case of complete product failure, which will include removal and disposal of the existing surface)
6. Policies that include self insurance or self retention clauses will not be considered.
7. Policy cannot include form of deductible amount.

8. Sample policy must be provided at time of bid to prove that policy is in force. A letter from an agent or a sample Certificate of Insurance will not be acceptable.

C. The artificial grass system must maintain a G-max of less than 200 for the life of the Warranty as per ASTM F1936.

1.8 MAINTENANCE SERVICE

- A. Train the Owner's facility maintenance staff in the use of the turf manufacturer's recommended maintenance equipment.
- B. Manufacturer must provide maintenance guidelines and a maintenance video to the facility maintenance staff.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Synthetic turf Athletic Surfacing Systems:
 Manufacturer: FieldTurf USA Inc or approved equal
 175 N. Industrial Blvd
 Calhoun, GA 30701
 P: 800-724-2969
 Application: Multiuse practice field.
 Type: Monofilament Synthetic Turf Model: FieldTurf Revolution 360 CoolPlay

2.2 MATERIALS AND PRODUCTS

- A. Artificial grass system materials shall consist of the following:
 Carpet made of "spined and/or ridged" monofilament polyethylene fibers tufted into a fibrous, non-perforated, porous backing.
 Infill: Controlled mixture of graded sand and cryogenic rubber crumb that partially covers the carpet. A top infill layer of granulated cork is mandatory.
 Glue, thread, paint, seaming fabric and other materials used to install and mark the artificial grass monofilament.
- B. The installed artificial grass monofilament shall have the following properties:

<u>Standard</u>	<u>Property</u>	<u>Specification</u>
ASTM D1577	Fiber Denier	10,800
	HALS UV Stabilizer	10,000ppm
	Inner Face Support Ridges	≥6
	Outer Face Support Ridges	≥10
ASTM D5823	Pile Height	2 ¼ inch
ASTM D5793	Stitch Gauge	¾ inch
ASTM D5848	Pile Weight	40oz/square yard
ASTM D5848	Primary Backing	7+oz/square yard
ASTM D5848	Secondary Backing	14+oz/square yard
ASTM D5848	Total Weight	61+oz/square yard
ASTM D1335	Tuft Bind (Without Infill)	8+ lbs

ASTM D5034	Grab Tear (Width)	200 lbs/force
ASTM D5034	Grab Tear (Length)	200 lbs/force
ASTM D4491	Carpet Permeability	>40 inches/hour
ASTM F1936	Impact Attenuation (Gmax)	<200
	Infill Material Depth	1.5 inches
	Sand Infill Component	6.2lbs/square foot
	SBR Rubber Infill Component	1.8lbs/square foot
	Granulated Cork Component	0.2lbs/square foot
	Total Product Weight	1238oz/square yard

- C. Carpet: spined and/or ridged monofilament fibers tufted into a primary backing with a secondary backing.
- D. Carpet Rolls 15 foot wide rolls.
Rolls long enough to go from field sideline to sideline.
Where the playing field is for football, the perimeter white line tufted into the individual sideline rolls.
- E. Backing:
Primary backing: a double-layered polypropylene fabric
Secondary backing: an application of porous, heat-activated urethane to permanently lock the fiber tufts in place.
Perforated (with punched holes), backed carpet are unacceptable.
- F. Fiber 10,800 denier, low friction, and UV-resistant fiber measuring not less than 2 ¼ inch high.
Systems with less than a 2 ¼ inch fibers are unacceptable.
- G. Infill materials approved by the manufacturer.
Infill a resilient layered granular system, comprising selected and graded sand and cryogenically hammer-milled SBR rubber crumb with a top layer of granulated cork.
Artificial Grass products without cryogenically processed SBR rubber and a top layer of granulated cork will not be acceptable.
The sand component of the infill must represent a minimum of 51% or more of the total infill, by weight.
Granulated cork must be pre-washed by the cork supplier before arrival at the field(s).
Granulated cork must have a bulk density of 0.19 g/cm³ +/- 15%.
- H. The sand infill must comply within the following characteristics:
1. Average Particle size between 20 and 30 mesh [calculated based on summing the midpoint of sieve pan fractions times the % retained on given screen fractions]
 2. Average Particle shape > 0.4 on the Krumbein scale
 3. Particle structure predominantly single grain

4. Produce < 0.4%, -50M in API crush test at 80psig
- I. Non-tufted or inlaid lines and markings painted with paint approved by the synthetic turf manufacturer.
- J. Thread for sewing seams of turf as recommended by the synthetic turf manufacturer.
- K. Glue and seaming fabric for inlaying lines and markings as recommended by the synthetic turf manufacturer.

2.3 QUALITY CONTROL IN MANUFACTURING

- A. The manufacturer must own and operate its own manufacturing plant. Manufacturing the fiber, tufting of the field fibers into the backing materials and coating of the turf system must be done in-house by the turf manufacturer. Outsourcing of these major processes is unacceptable.
- B. The manufacturer must have full-time certified in-house inspectors at their manufacturing plant that are experts with industry standards.
- C. Primary backing inspected by the manufacturer's full-time certified in-house inspectors before tufting begins.
- D. The manufacturer's full-time in-house certified inspectors shall verify "pick count", yarn density in relation to the backing, to ensure the accurate amount of face yarn per square inch.
- E. The manufacturer's full-time, in-house, certified inspectors must perform turf inspections at levels of production including during the tufting process and at the final stages before the turf is loaded onto the truck for delivery.
- F. The manufacturer must have its own, in-house laboratory where samples of turf are retained and analyzed, based on standard industry tests, performed by full-time, in-house, certified inspectors.
- G. The manufacturer must have ISO 9001, ISO 14001 and OHSAS 18001 certifications demonstrating its manufacturing efficiency with regards to quality, environment and safety management systems.

2.4 QUALITY CONTROL IN FIBER MANUFACTURING

- A. The master batch formula must include a UV stabilizer package added to its polymer base.
- B. The LLDPE used to make the artificial grass fiber must to be "C6" LLDPE.
- C. UV protection must include: (1) primary antioxidants; (2) secondary antioxidants; and

(3) UV stabilizers.

- D. Each finished fiber must have at least 6 inner face support ridges and 10 outer face support ridges.

2.5 FIELD GROOMER & SWEEPER

Deliver to the Owner:

1. Field Groomer shall include a towing attachment compatible with a field utility vehicle.
2. Field Sweeper shall include a towing attachment compatible with a field utility vehicle.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that sub-base leveling is complete before installation.
- B. Examine the surface to receive the synthetic turf and accept the sub-base planarity in writing before installation.
 1. Acceptance is dependent upon the Owner's test results indicating compaction and planarity are in compliance with manufacturer's specifications.
 2. The surface accepted by Installer as "clean" as installation commences and maintained in that condition throughout the process.
- C. Compaction of the aggregate base 95%, in accordance with ASTM D1557 (Modified Proctor procedure); and the surface tolerance shall not exceed 0-1/4 inch over 10 feet and 0-1/2 inch from design grade.
- D. Correct conditions detrimental to proper completion of Work.
- E. Do not proceed until unsatisfactory conditions are corrected.
- F. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Before the beginning of installation, inspect the sub-base for tolerance to grade.
- B. Sub-base acceptance subject to receipt of test results (by others) for compaction and planarity that sub-base is in compliance with manufacturer's specifications and recommendations.
- C. Verify dimensions of the field and locations for markings measured by a registered surveyor to verify conformity to the specifications and applicable standards. A record of the finished field as-built measurements made.

- D. When requested by Architect, installed sub-base tested for porosity before the installation of the monofilament turf. A sub base that drains poorly is an unacceptable substrate.

3.3 INSTALLATION – GENERAL

- A. Only trained technicians, skilled in the installation of athletic caliber synthetic turf systems working under the direct supervision of the approved installer supervisors, shall undertake cutting, sewing, gluing, shearing, topdressing or brushing operations.
- B. The designated Supervisory personnel on the project must be certified, in writing by the turf manufacturer, as competent in the installation of this material, including sewing seams and proper installation of the Infill mixture.
- C. Designs, markings, layouts, and materials must conform to currently applicable National Collegiate Athletic Association rules, NFHS rules, and/or other rules or standards that may apply to this type of synthetic grass installation.

3.4 INSTALLATION

- A. Install at location(s) indicated, to comply with final shop drawings, manufacturers’/installer’s instructions.
- B. Install carpet rolls directly over the properly prepared aggregate base. Extreme care taken to avoid disturbing the aggregate base, both in regard to compaction and planarity.
 - 1. Repair and compact disturbed areas of the aggregate base as recommended by manufacturer.
- C. Full width rolls laid out across the field.
 - 1. Turf of sufficient length to permit full cross-field installation from sideline to sideline.
 - 2. No cross seams will be allowed in the main playing area between the sidelines.
 - 3. Each roll attached to the next roll utilizing standard art sewing procedures.
 - 4. When the rolls of the playing surface have been installed, the sideline areas installed at right angles to the playing surface.
- D. Artificial turf panel seams sewn along the selvedge edging flap of the turf roll. Seams secured by other means including gluing are unacceptable. Installation 99% sewn.
 - 1. Minimum gluing will only be permitted to repair problem areas, corner completions, and to cut in logos or inlaid lines as required by the specifications.
 - 2. Seams flat, tight, and permanent with no separation or fraying.
 - 3. In the case of lines and logos, turf carpet/field fibers must be sheared to the backing (do not cut the backing) and adhered using hot melt adhesives.

- E. Infill Materials:
 1. Infill materials applied in numerous thin lifts. The turf brushed as the mixture is applied. The infill material installed to a depth determined by the manufacturer.
 2. Three-layered infill installed in a systematic order.
 3. Infill materials installed to fill the voids between the fibers and allow the fibers to remain vertical and non-directional. The Infill installation consists of a base layer of sand followed by a homogenous mixture of the sand and the cryogenically processed rubber. A final application of specifically sized granulated cork completes the system. The Infill installed to the depth of 1 ½ inch. Infill density consist of no more than 6.2 pounds of sand, 1.8 pounds of rubber, and 0.2lbs or cork per square foot. The Infill placed so that there is a void of ¾ inch to the top of the fibers.

- F. Non-tufted or inlaid lines and markings painted in accordance with turf and paint manufacturers' recommendations. Number of applications will be dependent upon installation and field conditions.

- G. Synthetic turf attached to the perimeter edge detail in accordance with the manufacturer's standard procedures.

- H. Upon completion of installation, the finished field inspected by the installation crew and an installation supervisor.

3.5 BASE/DRAINAGE GENERAL SPECIFICATIONS

A. GENERAL

Comply with the installation procedures outlined under this section.

B. SUB-GRADE PREPARATION AND DESIGN

- (e) Standard proctor on sub base layer¹
- (f) Soil unconfined compressive strength at different depths.¹

¹ASTM Test Method D2487

¹ASTM Test Method C566

¹ASTM Test Method D2434 or D3385

¹ASTM Test Method D422

ASTM Test Method D698

1. The soil bed or sub-grade must have a minimum slope of 0.5% or more, depending on the soil analysis, from the longitudinal center of the field towards the sidelines.

2. The soil bed or sub-grade must be compacted in both directions to attain the specified compaction rate, which is generally 95% standard, Proctor.
3. The soil bed or sub-grade must be prepared to tolerances of not more than ½ inch from design grade to allow for even drainage.
4. After the existing sub-grade has been graded, contoured and sloped as required, it compacted using 10 ton vibrating roller, as close as possible to 95% Proctor density.
5. Install geo-textile fabric to cover the soil bed. A porous non-woven polypropylene stabilization fabric (Mirafi 140 NL, or equal). Place over the base aggregate overlapping the seams properly. Depending on the result of the soil analysis, a moisture barrier may be substituted for the permeable geo-textile liner. If a moisture barrier is to be installed, a minimum 20 mil thick.

D. INSTALLATION OF PERIMETER COLLECTORS

1. Excavate perimeter drainage collector trenches minimum 20 inch wide and 20 inch deep. The construct trenches with a minimum 0.5% slope.
2. Backfill and compact trenches to a minimum 95% of the maximum density.
3. Place fabric in the perimeter trench first. Install a separate fabric from the fabric on the field. Overlap field and trench liners at least 18 inch in the direction of runoff flow.
4. Overlap seams a minimum of eight inches. When overlapping fabric, lap in direction the runoff flows.
5. Weight down the fabric with ballast to prevent fabric movement by wind.
6. Perimeter Collector Pipe: Place 8-12 inch O.D corrugated, perforated plastic pipes in the collector trenches. Make the centerline of the pipe coincide with the centerline of the trench. Collector headers must be drained to an approved, storm sewer, or approved discharge outlet. Use pre-manufactured fittings for connections into the collector drainage network.
7. Install a minimum of 2 inch clean, drainable crushed stone aggregate placed in the bottom of the collector trenches, on top of the geotextile. The crushed aggregate must be compacted.
8. Place a minimum of 4 inch clean, crushed aggregate on the sides of the underdrain pipes and headers, and 6 inch minimum of the aggregate on top of the pipe network, compacted.

E. INSTALLATION OF THE PREFABRICATED COMPOSITE (FLAT) FIELD DRAIN SYSTEM

1. Install minimum 1 inch x 12 inch prefabricated under-drain system in herringbone design as shown on drawings with lines approximately 20 foot on center and connect to perimeter drains.
2. Install according to the manufacturer's specifications, 1 inch x 12 inch Horizontal Strip Drain (Horizontal Drain) by American Drainage Systems, or equal, prefabricated flat composite under drain lines to perimeter drain lines according the manufacturer's specifications.
3. Supply related materials.
4. Tape the under drains every 15 foot to the fabric using suitable tape.
5. Do not crush or otherwise damage the strip drains when applying aggregate.

F. INSTALLATION OF THE OPEN GRADE CRUSHED STONE BASE COURSE

1. The crushed base stone must be laid without damaging or disturbing the soil bed, geotextile liner or membrane, or the underlying flat composite drains. Do not to create depressions in the sub-grade with heavy equipment. The specified stone or aggregate supplied must conform to the recommended specifications, as noted above. The finished crushed stone or aggregate base supplied must be stable and permeable. The stone damp when transported to site and kept damp during installation, to minimize segregation of the materials.
2. If the required compacted depth of the base course exceeds 6 inch, constructed in 2 or more layers or lifts of approximate equal thickness. Each layer must be compacted in both directions to attain the specified compaction rate.
3. The open graded aggregate base course must be sloped 0.5% from the center longitudinal axis towards the sidelines or as specified on the Plans.
4. The grade of the base course must not vary from the specified grade by more than ½ inch from design grade.
5. The base course must be compacted in both directions to attain the specified compaction rate, which is generally 95% standard, Proctor.

G. INSTALLATION OF THE CRUSHED STONE FINISHING LAYER

1. The final lift of aggregate layer must not be more than 2 inch deep.
2. The final lift material must be sloped 0.5% from the center longitudinal axis towards the sidelines unless otherwise specified.

3. The final grade must be compacted in both directions to attain the specified compaction rate, of 95% standard.

4. The final grade of the finishing stone must not vary from the specified grade by more than ¼ inch from design grade, nor by more than ¼ inch when measured under a 10 foot straightedge, in directions. Laser guided fine grading is mandatory. This tolerance is required over the entire field. Check the tolerance-to-grade by means of an orbital laser once the stone is fine graded and compacted to proper density. The turf installation company must not begin work until the base has been tested for compaction, tolerance to grade, and porosity.

3.6 FIELD MARKINGS

- A. Field markings installed in accordance with approved shop drawings. If football is designated as the primary sport, five yard lines will be tufted-in.
- B. Balance of sports markings will be inlaid or painted in accordance with the Drawings.
- C. Center field logo either painted or inlaid according to artwork indicated on Drawings and in accordance with manufacturer's standard palette of turf colors.
- D. End-zone letters and logos either painted or inlaid according to artwork and fonts indicated on the Drawings, and in accordance with manufacturer's standard palette of turf colors.

3.7 FIELD MAINTENANCE – ALTERNATE

- A. Perform regularly scheduled periodic maintenance twice per year. The maintenance will include a complete inspection and repair including materials and cleaners of areas of the field including: Fiber fibrillation analysis, Seam analysis, Perimeter anchoring, Excessive wear analysis, UV fade inspection, Infill – consistency in depth, Infill – migration analysis, Glued inlay analysis, Base stability analysis, Painted marking inspection, Debris removal, Brushing, Aerating, Grooming, Removal of weeds and moss, Removal of stains, Keeping the infill level.
- B. The inspection and maintenance will be performed by a FieldTurf Authorized Maintainer, if the person is not the same as the previous visit, then credentials must be submitted for approval before the visit.
- C. Approximate number of times is 2 times per year for 8 years through the warranty period.

3.8 ADJUSTMENT AND CLEANING

- A. Do not permit traffic over unprotected surface.

- B. Provide the labor, supplies, and equipment as necessary for final cleaning of surfaces and installed items.
- C. Usable remnants of new material is the property of the Owner.
- D. Keep the area clean throughout the project and clear of debris.
- E. Surfaces, recesses, enclosures, and related spaces cleaned as necessary to leave the work area in a clean, immaculate condition ready for occupancy and use by the Owner.

3.9 PROTECTION

- A. Protect installation throughout construction process until date of final completion.

END OF SECTION

Section 32 32 23
SEGMENTAL RETAINING WALLS

PART 1 GENERAL

1.1 SUMMARY

- A. Work consists of designing, furnishing and construction of a KEYSTONE Compac III Unit Retaining Wall System or equal in accordance with these specifications and in conformity with the lines, grades, design, and dimensions shown on the plans. Provide signed and sealed shop drawings.
- B. Work includes preparing foundation soil, furnishing and installing leveling pad, unit drainage fill and backfill to the lines and grades shown on the construction drawings.
- C. Work includes furnishing and installing geogrid soil reinforcement of the type, size, location, and lengths designated on the construction drawings.

1.2 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C140 Sampling and Testing Concrete Masonry Units
 - 2. ASTM C1372 Specification for Dry-Cast Segmental Retaining Wall Units
 - 3. ASTM D422 Particle-Size Analysis of Soils
 - 4. ASTM D698 Laboratory Compaction Characteristics of Soil -Standard Effort
 - 5. ASTM D1557 Laboratory Compaction Characteristics of Soil -Modified Effort
 - 6. ASTM D3034 Polyvinyl Chloride Pipe (PVC)
 - 7. ASTM D4318 Liquid Limit, Plastic Limit and Plasticity Index of Soils
 - 8. ASTM D4475 Horizontal Shear Strength of Pultruded Reinforced Plastic Rods
 - 9. ASTM D4476 Flexural Properties of Fiber Reinforced Pultruded Plastic Rods
 - 10. ASTM D4595 Tensile Properties of Geotextiles - Wide Width Strip
 - 11. ASTM D5262 Unconfined Tension Creep Behavior of Geosynthetics
 - 12. ASTM D5818 Evaluate Installation Damage of Geosynthetics
 - 13. ASTM D6637 Tensile Properties of Geogrids – Single or Multi-Rib
 - 14. ASTM D6638 Connection Strength - Reinforcement/Segmental Units
 - 15. ASTM D6706 Geosynthetic Pullout Resistance in Soil
 - 16. ASTM D6916 Shear Strength Between Segmental Concrete Units
- B. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. AASHTO M 252 Corrugated Polyethylene Drainage Pipe
 - 2. AASHTO M 288 Geotextile Specification for Highway Applications
- C. National Concrete Masonry Association (NCMA)
 - 1. NCMA SRWU-1 Test Method for Determining Connection Strength of SRW
 - 2. NCMA SRWU-2 Test Method for Determining Shear Strength of SRW

1.3 SUBMITTALS

- A. Submit a Manufacturer's certification, before work, that the retaining wall system components meet the requirements of this specification and the structure design.
- B. Submit construction drawings and design calculations for the retaining wall system prepared and stamped by a Professional Engineer registered in the state of the project.

1.4 QUALITY ASSURANCE

- A. Submit a list of 5 previously constructed projects of similar size and magnitude by the wall installer where the Compac retaining wall system has been constructed successfully. Include contact names and telephone numbers listed for each project.
- B. Provide evidence that the design engineer has a minimum of five years of documental experience in the design for reinforced soil structures. The design engineer shall provide proof of current professional liability insurance with an aggregate coverage limit of not less than \$2,000,000.
- C. Provide quality control testing and inspection.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Check materials upon delivery to assure that the proper type, grade, color, and certification have been received.
- B. Protect materials from damage due to jobsite conditions and in accordance with manufacturer's recommendations.

PART 2 PRODUCTS

2.1 DEFINITIONS

- A. Structural Geogrid - a structural element formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, rock, or earth and function primarily as reinforcement.
- B. Unit Drainage Fill - drainage aggregate that is placed within and behind the concrete units.
- C. Reinforced Backfill - compacted soil that is placed within the reinforced soil volume as outlined on the plans.

2.2 CONCRETE RETAINING WALL UNITS

- A. Concrete units must conform to the following architectural requirements:
 - 1. Face color - concrete gray, unless otherwise specified. The Owner may specify standard manufacturers' color.
 - 2. Face finish - hard split in angular tri-plane or straight face configuration. Other face finishes will not be allowed without written approval of Owner.

3. Bond configuration - running with bonds nominally located at midpoint vertically adjacent units, in both straight and curved alignments.
 4. Exposed surfaces of units free of chips, cracks or other imperfections when viewed from a distance of 10 feet under diffused lighting.
- B. Concrete materials must conform to the requirements of ASTM C1372 - Standard Specifications for Segmental Retaining Wall Units.
- C. Concrete units must conform to the following structural and geometric requirements measured in accordance with ASTM C140 Sampling and Testing Concrete Masonry Units:
1. Compressive strength: ≥ 3000 psi;
 2. Absorption: $\leq 8\%$ for standard weight aggregates;
 3. Dimensional tolerances: $\pm 1/8$ inch from nominal unit dimensions not including rough split face;
 4. Unit size: 8 inch (H) x 18 inch (W) x 12 inch (D) minimum;
 5. Unit weight: 67 -lbs/unit minimum for standard weight aggregates.
- D. Concrete units shall conform to the following performance testing:
1. Inter-unit shear strength in accordance with ASTM D6916 (NCMA SRWU-2): 600-plf minimum at 2-psi normal pressure;
 2. Geogrid/unit peak connection strength in accordance with ASTM D6638 (NCMA SRWU-1): 500-plf minimum at 2-psi normal force.
- E. Concrete units must conform to the following constructability requirements:
1. Vertical setback: $1/8$ inch \pm per course (near vertical) or 1 inch + per course per the design;
 2. Alignment and grid positioning mechanism - fiberglass pins, two per unit;
 3. Maximum horizontal gap between erected units $\leq 1/2$ inch.

2.3 SHEAR AND REINFORCEMENT PIN CONNECTORS

- A. Shear and reinforcement pin connectors 1/2-inch diameter thermoset isophthalic polyester resin-pultruded fiberglass reinforcement rods to provide connection between vertically and horizontally adjacent units and geosynthetic reinforcement, with the following requirements:
1. Flexural Strength in accordance with ASTM D4476: 128,000 psi minimum;
 2. Short Beam Shear in accordance with ASTM D4475: 6,400 psi minimum.
- B. Shear and reinforcement pin connectors capable of holding the geogrid in the proper design position during grid pre-tensioning and backfilling.

2.4 BASE LEVELING PAD MATERIAL

- A. Compacted crushed stone base or non-reinforced concrete as shown on the construction drawings.

2.5 UNIT DRAINAGE FILL

- A. 1 inch minus crushed stone or crushed gravel meeting the following gradation tested in accordance with ASTM D-422:

<u>Sieve Size</u>	<u>Percent Passing</u>
1 inch	100
3/4-inch	75-100
No. 4	0 - 10
No. 50	0 - 5

- B. Drainage fill placed within the cores of, between, and behind the units as indicated on the design drawings. Not less than 1.3 cubic foot, of drainage fill used for each square foot of wall face unless otherwise specified.

2.6 REINFORCED BACKFILL

- A. Reinforced backfill free of debris and meet the following gradation tested in accordance with ASTM D-422:

<u>Sieve Size</u>	<u>Percent Passing</u>
2 inch	100
3/4-inch	100-75
No. 40	0-60
No. 200	0-35

Plasticity Index (PI) <15 and Liquid Limit <40 per ASTM D-4318.

- B. The maximum aggregate size limited to 3/4 inch unless installation damage tests have been performed to evaluate potential strength reductions to the geogrid design due to damage during construction.
- C. Material can be site-excavated soils where the above requirements can be met. Unsuitable soils for backfill must not be used in the backfill or in the reinforced soil mass.
- D. Submit reinforced fill sample and laboratory test results for approval before the use of proposed reinforced fill material.

2.7 Geogrid Soil Reinforcement

- A. Geogrids manufactured specifically for soil reinforcement applications and manufactured from high tenacity polyester yarn or high density polyethylene. Polyester geogrid made from high tenacity polyester filament yarn with a molecular weight exceeding 25,000 g/m and a carboxyl end group values less than 30. Polyester geogrid coated with an impregnated PVC coating that resists peeling, cracking, and stripping.
- B. Ta, Long Term Allowable Tensile Design Load, of the geogrid material determined as follows:

$$Ta = Tult / (RFcr * RFd * RFid * FS)$$

Ta evaluated based on a 75-year design life.

1. Tult, Short Term Ultimate Tensile Strength determined in accordance with ASTM D4595 or ASTM D6637.
Tult is based on the minimum average roll values (MARV).
 2. RFcr, Reduction Factor for Long Term Tension Creep
RFcr determined from 10,000-hour creep testing performed in accordance with ASTM D5262. Reduction value = 1.45 minimum.
 3. RFd, Reduction Factor for Durability
RFd determined from polymer specific durability testing covering the range of expected soil environments. RFd = 1.10 minimum.
 4. RFid, Reduction Factor for Installation Damage
RFid determined from product specific construction damage testing performed in accordance with ASTM D5818. Test results provided for each product to be used with project specific or more severe soil type. RFid = 1.05 minimum.
 5. FS, Overall Design Factor of Safety
FS 1.5 unless otherwise noted for the maximum allowable working stress calculation.
- C. The maximum design tensile load of the geogrid must not exceed the laboratory tested ultimate strength of the geogrid/facing unit connection divided by a factor of safety of 1.5. The connection strength testing and computation procedures in accordance with ASTM D6638 Connection Strength between Geosynthetic Reinforcement and Segmental Concrete Units (NCMA SRWU-1).
- D. Soil Interaction Coefficient, Ci
Ci values determined per ASTM D6706 at a maximum 0.75-inch displacement.
- E. Manufacturing Quality Control
The geogrid manufacturer must have a manufacturing quality control program that includes QC testing by an independent laboratory.
The QC testing shall include:
- Tensile Strength Testing
 - Melt Flow Index (HDPE)
 - Molecular Weight (Polyester)

2.8 Drainage Pipe

- A. If required, the drainage pipe perforated or slotted PVC pipe manufactured in accordance with ASTM D-3034 or corrugated HDPE pipe manufactured in accordance with AASHTO M252.

2.9 Geotextile Filter Fabric

- A. When required, geotextile filter fabric a needlepunched, nonwoven fabric that meets the requirements of AASHTO M288.

PART 3 EXECUTION

3.1 Excavation

- A. Contractor shall excavate to the lines and grades shown on the construction drawings. Owner's or Contractors QA/QC representative must inspect the excavation and approve before placement of leveling material or fill soils. Proof roll foundation area as directed to determine if remedial work is required.

3.2 Base Leveling Pad

- A. Leveling pad material placed to the lines and grades shown on the construction drawings, to a minimum thickness of 6 inches and extend laterally a minimum of 6 inch in front and behind the wall unit.
- B. Soil leveling pad materials compacted to a minimum of 95 % Standard Proctor density per ASTM D-698 or 92% Modified Proctor Density per ASTM D1557.
- C. Leveling pad prepared to insure full contact to the base surface of the concrete units.

3.3 Unit Installation

- A. First course of units placed on the leveling pad at the appropriate line and grade. Alignment and level checked in directions and insure that units are in full contact with the base seated.
- B. Place the front of units side-by-side. Do not leave gaps between adjacent units. Layout of corners and curves in accordance with manufacturer's recommendations.
- C. Install shear/connecting devices per manufacturer's recommendations.
- D. Place and compact drainage fill within and behind wall units. Place and compact backfill soil behind drainage fill. Follow wall erection and drainage fill closely with structure backfill.
- E. Maximum stacked vertical height of wall units, prior to unit drainage fill and backfill placement and compaction, shall not exceed two courses.

3.4 Structural Geogrid Installation

- A. Geogrid oriented with the highest strength axis perpendicular to the wall alignment.
- B. Geogrid reinforcement placed at the strengths, lengths, and elevations shown on the construction design drawings or as directed by the Engineer.
- C. The geogrid laid horizontally on compacted backfill and attached to the wall pins and within 1 inch of the face of the units. Place the next course of concrete units over the geogrid. The geogrid pulled taut, and anchored prior to backfill placement on the geogrid.
- D. Geogrid reinforcements continuous throughout their embedment lengths and placed side-by-side to provide 100% coverage at each level. Spliced connections between shorter pieces of geogrid or gaps greater than 2 inches between adjacent pieces of geogrid are not permitted.

3.5 Reinforced Backfill Placement

- A. Reinforced backfill placed, spread, and compacted in such a manner that minimizes the development of slack in the geogrid and installation damage.
- B. Reinforced backfill placed and compacted in lifts not to exceed 6 inches where hand compaction is used, or 8 - 10 inches where heavy compaction equipment is used. Lift thickness decreased to achieve the required density as required.
- C. Reinforced backfill compacted to a minimum of 95 % Standard Proctor density per ASTM D-698 or 92% Modified Proctor Density per ASTM D1557. The moisture content of the backfill material before and during compaction uniformly distributed throughout each layer and dry of optimum, + 0%, - 3%.
- D. Only lightweight hand-operated equipment allowed within 3 feet from the tail of the concrete unit.
- E. Tracked construction equipment must not be operated directly upon the geogrid reinforcement. A minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Tracked vehicle turning should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.
- F. Rubber tired equipment may pass over geogrid reinforcement at slow speeds, less than 10 MPH.
- G. At the end of each day's operation, slope the last lift of reinforced backfill away from the wall units to direct runoff away from wall face. Do not allow surface runoff from adjacent areas to enter the wall construction site.

3.6 Cap Installation

- A. Cap units glued to underlying units with an all-weather concrete construction adhesive.

3.7 As-built Construction Tolerances

- A. Vertical alignment: ± 1.5 inch over 10 foot distance.
- B. Wall Batter: within 2 degrees of design batter.
- C. Horizontal alignment: ± 1.5 inch over 10 foot distance.
Corners, bends & curves: ± 1 foot to theoretical location.
- D. Maximum horizontal gap between erected units $\leq 1/2$ inch.

3.8 Field Quality Control

- A. Quality Assurance includes foundation soil inspection. Verification of geotechnical design parameters, and verification that the contractor's quality control testing is adequate as a minimum. Quality assurance also includes observation of construction for general compliance with design drawings and project specifications.
- B. Quality Control – Engage inspection and testing services to perform the minimum quality control testing described in the retaining wall design plans and specifications.
- C. Quality Control testing includes soil and backfill testing to verify soil types and compaction and verification that the retaining wall is being constructed in accordance with the design plans and project specifications.

END OF SECTION

SECTION 32 80 00
IRRIGATION

PART 1 GENERAL

1.1 SUMMARY

- A. Provide modifications and additions to the existing irrigation system as indicated in the plans.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.
- C. Warranty: Submit manufacturers standard warranty. Include labor and materials to repair or replace defective materials.
- D. Operation and Maintenance Data: Submit manufacturers operation and maintenance data, including operating instructions, list of spare parts and maintenance schedule.

1.3 QUALITY ASSURANCE

- A. Use experienced installers.

PART 2 PRODUCTS

2.1 MATERIALS

- A. As Indicated in the Plans:

PART 3 EXECUTION

3.1 INSTALLATION

- A. Protect existing landscaping from damage. Repair and repave cut paving to match paving in original condition.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections.
- C. Restore damaged components and test for proper operation. Clean out system and protect work from damage.
- D. Instruct Owner's personnel in proper operation and maintenance procedures.

END OF SECTION

SECTION 32 90 00
PLANTING

PART 1 GENERAL

1.1 SUMMARY

- A. Includes furnishing and installing landscape materials as described in Contract Documents.

1.2 SUBMITTALS

- A. Samples
 - 1. Sample of mulch for approval before delivery to site.
 - 2. Sample of Planting Mix for approval before delivery to site.

1.3 QUALITY ASSURANCE

- A. Pre-Installation Meeting
 - 1. Meet with Landscape Architect on-site before work operations to delivery, preparation, and installation of plant materials.
 - 2. Participate in installation meetings as required.

1.4 SEQUENCING

- A. Do not install trees, palms, shrubs, and ground cover after major construction operations are completed.

1.5 WARRANTY

- A. Guarantee from date of Final Written Acceptance
 - 1. Plantings for one year.
 - 2. Maintain plant materials in Florida Number 1 condition or better.
- B. Provide written instructions on maintenance requirements, from completion of guarantee period, from conclusion of Contractor's required maintenance.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Plants
 - 1. Conform to requirements on Construction Drawings.
 - 2. Quality -
 - a. Florida Number 1 or better.
 - b. Container stock free of root-bound conditions.
 - c. Plant materials subject to approval by Landscape Architect .
 - d. Provide plant materials from a licensed nursery.
- B. Planting Mix - See Section 02921
- C. Mulch-
 - 1. "Florimulch" or approved equal.
 - 2. Cypress mulch is prohibited.

PART 3 EXECUTION

3.1 VERIFICATION

- A. Before work, check and verify dimensions and quantities. Report variations between Drawings and site to the Landscape Architect.

3.2 PREPARATION

- A. Protection
 - 1. Avoid conditions which will create hazards. Post signs or barriers as required.
 - 2. Repair or replace damaged areas.
- B. Layout
 - 1. Identify and mark individual tree and palm locations, and areas for multiple plantings of shrubs and ground cover. Stake locations and outline areas.
 - 2. Secure Landscape Architect's approval before planting.
 - 3. Make minor adjustments as may be necessary or requested.

3.3 INSTALLATION

- A. Planting
 - 1. After placing balled and burlapped pull back top 1/3 of burlap from around root ball, pushing downward into planting hole.
 - 2. Center plant in hole and backfill with specified planting mix making saucer of mounded excavated soil around hole's perimeter to form watering basin.
 - 3. During backfilling and planting operations, add Agriform planting tablets evenly spaced around and half-way between the top and bottom of the root ball, as follows:
 - 4. Settle by firming and watering to bring root ball to proper level.
 - 5. Make adjustments in positions of plants as directed by Landscape Architect.
 - 6. Water after planting.
 - 7. At base of each tree leave 24 inch diameter circle free of any grass, and mulch to loose measure depth of 3".
- B. Guying for Trees and Palms
 - 1. In planting, include placement of adequate support for trees and palms 2 ½" or greater in caliper.

Mulching

- 1. After application of herbicide, mulch shrub and ground cover planting areas with loose measure 2 inch deep layer of approved mulch.
- 2. Place mulch to uniform depth and rake to neat finished appearance.

END OF SECTION

SECTION 32 92 33
SODDING

PART 1 GENERAL

1.1 SUMMARY

- A. Includes Sodding indicated on Drawings and specified in this section.

1.2 SUBMITTALS

- A. Samples
1. Sample of Sod before delivery to site.
 2. Written analysis prepared by a certified agricultural laboratory.

1.3 QUALITY ASSURANCE

- A. Pre-Installation Meeting
1. Meet with Landscape Architect on-site before work operations to delivery, preparation, and installation of plant materials.
 2. Provide name of contact, phone number, email address, and name and address of
 3. Comply with quarantine requirements relative to insects, pests, and fungi and provide appropriate certifications in compliance with Florida Department of Agriculture requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver and install sod within 48 hours of cutting and field loading.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Sod soil: By volume, 60% coarse ("sharp edged") sand; 20% organic Everglades (inland) muck; 10% decomposed pine bark or wood chips; and 10% Canadian Peat Moss. Batch in a commercial mechanical blender or equivalent, to create a blended Sodding Soil of uniform composition and mix.
1. Soil components: proportioned by volume only.
 2. No mixing on site.
 3. Free of silt and sludge.
 4. Free of rocks, limbs, roots, clods, clumps, litter, debris, and other deleterious matter.
- B. Solid Sod:
1. St. Augustine Sod (*Stenotaphrum secundatum*);
 - b. free of pernicious weeds;
 - c. 1 ½ inch minimum root structure;
 - d. Delivered to the site and installed within 48 hours of field cutting;
 - e. Reject sod showing discoloration, wilting, dryness.
 2. 12-4-8 Fertilizer;
 - a. Total nitrogen, not less than 12.00%.
 - b. Nitrate nitrogen, not less than 1.5%.
 - c. Ammoniacal nitrogen, not less than 5.7%.
 - d. Specifications for granular blend:
 - 1) Water soluble organic nitrogen, not less than 1.3%.
 - 2) Water insoluble organic nitrogen, not less than 3.5%.
 - 3) Available Phosphoric Acid, not less than 4.0%.
 - 4) Water Soluble Potash, not less than 8.0%.
 - 5) Total primary plant food, not less than 24.0%.

- 6) Chlorine, not more than 6.0%.
- 7) Secondary Plant Foods:

<u>OXIDE</u>		<u>ELEMENTAL</u>
Magnesium 2	or	Mg 1.20%
Manganese 1	or	Mn .70
- 8) From F.T.E. 504 - 30 lbs. per ton to be composed of the following elements:

<u>ELEMENTAL</u>				
Boron	B2O3	.1845%	B	.05%
Copper	CuO	.1312%	Cu	.10%
Iron	Fe2O3	.3360%	Fe	.26%
Manganese	MnO	.1372%	Mn	.10%
Molybdenum	MoO3	.0015%	Mo	
Zinc	ZnO	.1312%	Zn	.10%
- 9) Derived from the following source materials:
 - a) Ammonium nitrate
 - b) Sulfate of ammonia
 - c) Ureaform or I.B.D.U.
 - d) Triple superphosphate
 - e) Muriate of potash
 - f) Sulfa-mag
 - g) Manganese sulfate
- 10) Materials: prilled or granular except the Manganese Sulfate.

3. Statement of Analysis: Submit with each container the producer's statement of analysis, or producer's Certificate of Compliance upon delivery of fertilizer to job site.

PART 3 EXECUTION

3.1 VERIFICATION

- A. Proceed with the work of this section when conditions favorable to the completion of the work exist, and when unacceptable conditions have been corrected.
- B. Plant totals are for convenience of Contractor are not guaranteed. Verify quantities as shown on Construction Drawings.

3.2 DEMOLITION AND REMOVAL OF EXISTING SOD

- A. Remove turf and supporting vegetative structure within designated areas including turf, roots, clods, and any deleterious materials.
- B. Place Sodding Soil in a 1-2 inch layer over area to receive new sod, to achieve a uniform, even and level surface on which to install new sod. Provide incidental slopes in the as necessary to ensure positive drainage.

3.3 INSTALLATION OF SOD

- A. Install sod as soon as practical and site conditions permit.
- B. Uniformly broadcast 20 pounds of 12-4-8 fertilizer per 1,000 square feet over Sodding Soil, in areas to receive sod, and rake into the top 2 inches of Sodding Soil.
- C. Place Sod by hand with closed, butt joints, edge-to-edge with no overlapping sod or exposed sod edges.

1. Water sod after placement and roll and tamp to incorporate Sod with Sodding Soil and adjoining Sod.
2. Fill remaining voids with coarse sand and water to wash into voids.
3. Sod patches: minimum of 12 x 12 inches.
4. Conform to finish grades and establish an even and uniform surface flush with top surface of abutting walks, paving, concrete borders, catch basins and other site features and structures, with a minimum width of 12 inches in any direction from those site features.

D. SOD SOIL TESTING

1. Test one representative, mixed sample of Sodding Soil composed of materials taken from the on-site stockpile.
2. Test for pH; soluble salts; soil pollutants; primary and trace elements; and nutrients; and submit the written test results to accompanied by a recommendation for any amendments from the agricultural laboratory and identify appropriate soil amendments required to correct detrimental or deficient soil conditions.
3. Soil pH range: 6.0 to 6.5. Take samples of Sodding Soil and specified amendments, combined and mixed to produce a single, representative sample. Submit the representative sample to the County Extension Service Testing Laboratory or an independent agricultural laboratory for analysis. Provide pH and fertility levels of Sodding Soil along with recommended actions. Amend Sodding Soil per analysis recommendations by rototilling the amendments into the Sodding Soil layer. Submit a second Sodding Soil sample for analysis after amendments have been incorporated into the Sodding Soil. Submit final Sodding Soil testing analysis results.

END OF SECTION

SECTION 33 40 00
WATER UTILITIES

PART 1 GENERAL

1.1 SUMMARY

- A. Provide underground, exterior water service piping systems.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers that have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Testing: Hydrostatic tests at minimum 2 times working pressure for 2 hours.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Water Service Piping Systems:
 - Manufacturers: Refer to www.arcata.com/divs/sec/sec02510.html or approved equal.
 - Application: Water service piping for buildings.
 - Piping: Ductile iron.
 - Piping: PVC.
 - Piping: Fiberglass.
 - Piping: Copper.
 - Piping: Polybutylene.
 - Piping: Polyethylene.
 - Valves: Suitable for service.
 - Anchorage: Suitable for service.
 - Accessories:
 - A. Gray iron sleeve coupling assemblies.
 - B. Reinforced concrete valve pits with ladder and cast-iron manhole frame and cover.
 - C. Utility Company water meter.
 - D. Backflow preventers.
 - E. Vacuum breakers.
 - F. Free standing fire hydrants.
 - G. Free standing fire department connections.
 - H. Metallic-lined plastic underground identification tapes.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections.

B. Clean and disinfect system. Test for proper operation. Backfill and protect work from damage.

END OF SECTION

SECTION 33 40 00
STORM DRAINAGE UTILITIES

PART 1 GENERAL

1.1 SUMMARY

- A. Provide subdrainage systems for foundations and slabs.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions for each material and product used.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of approved manufacturers that have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Storm Drainage Systems:
 - Manufacturers: Invisible Structures, Inc.; MultiDrain Systems; U-drain; WaterFence. or approved equal.
 - Application: Water detention chambers and infiltration systems.
 - Application: Geotextile membranes and geogrid.
 - Application: Water retention cells.
 - Application: Pond and reservoir liners.
 - Pipe and Fittings: Perforated clay pipe.
 - Pipe and Fittings: Perforated concrete pipe.
 - Pipe and Fittings: Porous concrete pipe.
 - Pipe and Fittings: Clay drain tile.
 - Pipe and Fittings: Concrete drain tile.
 - Pipe and Fittings: Cast-iron pipe.
 - Pipe and Fittings: Polyethylene pipe.
 - Pipe and Fittings: PVC pipe.
 - Pipe and Fittings: Perforated PVC pipe.
 - Pipe and Fittings: ABS plastic pipe.
 - Geotextile: Nonwoven membrane.
 - Water Storage Cells: Injection molded plastic panels.
 - Accessories:
 - A. Open-joint screening, asphalt-or coal tar saturated roofing felt, copper mesh, or woven geotextile filter fabric.
 - B. Pipe couplings.
 - C. Cleanouts.
 - D. Sleeves.
 - E. Drainage conduits.
 - F. Prefabricated drainage panels with drainage core and filter fabric.
 - G. Composite drainage panels with insulating drainage core and filter fabric.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved

submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections. Provide cleanouts.

- B. Connect to above-grade and below-grade drainage systems. Drain system to approved location. Test for proper operation. Clean system out and protect work from damage.

END OF SECTION



December 17, 2015

Capital Improvements and Transportation Program - CITP
City of Miami
Miami Riverside Center
444 SW 2nd Avenue, 8th Floor
Miami, Florida 33130

Attention: Mr. Jose Otavio Caldeira
Project Manager

Subject: Report of a Geotechnical Exploration
Little Haiti Soccer Park
NE 62nd Street and NE 2th Avenue
City of Miami
Miami-Dade County, Florida
Project No. N/A
HRES Project No. HR15-1104R

Dear Jose:

HR Engineering Services, Inc. (HRES) is pleased to provide this Report of a Geotechnical Exploration for the subject project. This report presents our understanding of the project, outlines our exploratory procedures, and documents the field test data and provides geotechnical recommendations.

We have enjoyed assisting you on this project and look forward to serving as your geotechnical consultant on the remainder of this project and on future projects. If you have any questions concerning this report, please call our office at (305) 888-8880.

Sincerely,

HR ENGINEERING SERVICES, INC.

Nikhil D. Hegde, E.I.
Staff Geotechnical Engineer



Distribution: Addressee (3)
Mr. Javier Rodriguez, P.E. - R.J. Behar & Company, Inc. (1)
File (1)

7815 N.W. 72nd Avenue
Medley, FL 33166
Phone: (305) 888-8880
Fax: (305) 888-8770

APPENDIX A:

Site Location MapA-1
Field Exploration PlanA-2
Summary of Test Boring and Percolation Test LocationsA-3
Report of Core BoringsA-4
Summary of Percolation Test ResultsA-5
Field Exploration Testing ProceduresA-6

APPENDIX B:

Summary of Laboratory Test Results B-1
Laboratory Testing Procedures B-2
Laboratory Testing ResultsB-3 through B-6

Project Information

The project consists of the improvements of the Little Haiti Soccer Park at NE 62nd Street and NE 2nd Avenue, in Miami-Dade County, Florida. The work includes drainage improvements and the improvements at the exercise station.

As requested, HRES performed two test borings at the proposed exercise station and one percolation test approximately at the center of the soccer field as indicated on the field exploration plan.

Subsurface Conditions

Two (2) SPT borings and one (1) percolation test were performed at selected locations. The test borings were each drilled to a depth of 10 feet, measured from the existing ground surface and the percolation test to a depth of 15 feet.

The test borings and percolation test were performed by HRES. The test borings were conducted at the approximate locations shown on the Field Exploration Plan in Appendix A. The Report of Core Borings in Appendix A should be consulted for a detailed description of the subsurface conditions encountered at each boring location. When reviewing the Report of Core Borings, it should be understood that soil/rock conditions might vary even in short distances.

The following tables summarize the general conditions encountered by the test borings:

Summary of Subsurface Conditions – Test Borings SPT-1 and SPT-2

Average Range in Depth, feet	Soil/Rock Description
0 to 0.5	Topsoil
0.5 to 10.0	Medium Dense to Loose brown organic stained/fine Sand with traces of limestone lenses, SP

Percolation Testing

One (1) South Florida Water Management District constant head percolation test was performed on November 11, 2015 at the location shown on the Field Exploration Plan in Appendix A. The test location was marked in the field by HRES personnel using tape measurements from existing landmarks. The percolation test was performed in general accordance with the procedures shown below:

- The percolation test was performed in a 6.0-inch diameter borehole, drilled to a depth of 15 feet below the existing ground surface.

To perform the 0 to 15 feet percolation test, a 3.2-inch outside diameter PVC slotted casing was placed in the hole and then water was pumped out as an attempt to clean the borehole before testing. Prior starting the test, water was pumped into the hole as an attempt to raise the water level in the borehole to the ground surface. Once the inflow stabilized with the outflow rate, the average pumping rate and the maximum level of the water obtained in the borehole (with this stabilized flow) was recorded.

- The hydraulic conductivity value was then calculated and reported in units of cubic feet per second, per square foot, per foot of head (cfs/ft²-ft of head). The calculated hydraulic conductivity value is presented as follows:

0 to 15 feet: 2.9E-04 cfs/ft²-ft of head

This conductivity value is an ultimate value. An appropriate factor of safety should be employed in any storm water or other subsurface drainage design computations. The percolation test results are presented in Appendix A.

Laboratory Testing

In order to aid in classifying and estimate engineering characteristics of the subsurface materials encountered, laboratory classification tests were performed on representative soil samples obtained from the test borings. The laboratory testing program included the following:

- 3 Sieve Analyses
- 1 Organic content test

In addition, a total of 3 moisture content tests were performed on the samples. The soil laboratory test results were classified following the Unified Soil Classification System. The test results are presented in Appendix B.

Groundwater

The groundwater level was measured at the boreholes locations at the time of drilling. The groundwater was encountered at an approximate average elevation of 3.0 feet (NGVD29). A seasonal High Ground Water Table (SHGWT) of 4.0 feet, (NGVD29), is recommended for design (based on the USGS Average Yearly High Water Levels 1990-1999).

Fluctuation in the observed groundwater levels should be expected due to seasonal climatic changes, construction activity, rainfall variations and surface water runoff. Since groundwater level variations are anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based on the assumption that variations will occur.

Recommendations

Allowable Bearing Capacity

The following values can be considered for the allowable bearing capacity depending on the type of soil beneath the foundation:

$q_{all} = 2000$ psf, for *foundation bearing on compacted existing soils*

Subgrade Moduli

The subgrade modulus k_s indicates the relationship between soil pressure and deflection. The following values can be considered for the subgrade moduli depending on the type of soil beneath the foundation:

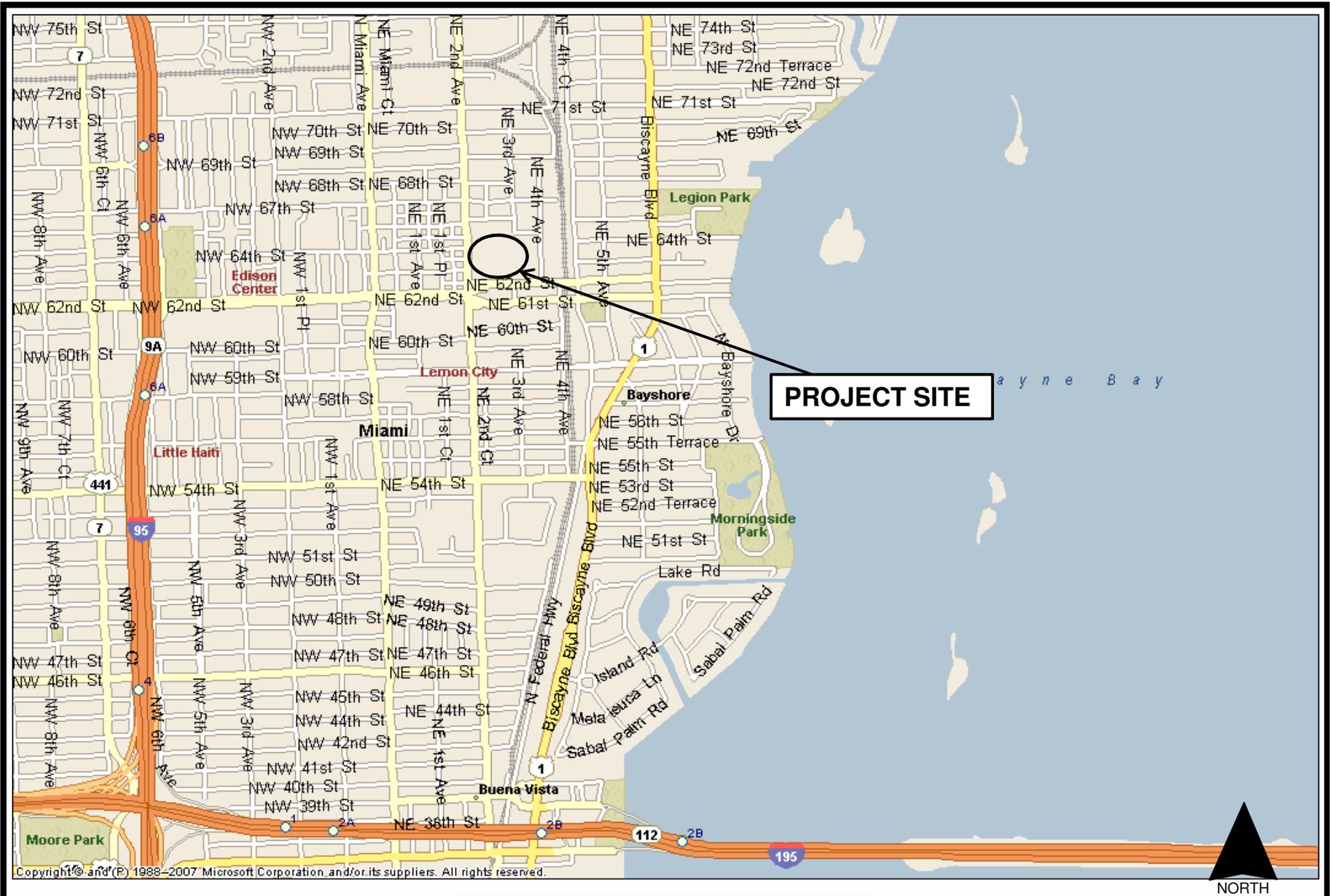
$k_s = 200$ kcf, for *foundation bearing on compacted existing soils*

Sample Storage

We shall retain the soil samples retrieved for this exploration program at our office for a period of 60 days from the date of this report. Following this period, the samples will be discarded.

APPENDIX A

SITE LOCATION MAP	A-1
FIELD EXPLORATION PLAN	A-2
SUMMARY OF TEST BORING AND PERCOLATION TEST LOCATIONS	A-3
REPORT OF CORE BORINGS	A-4
SUMMARY OF PERCOLATION TEST RESULTS	A-5
FIELD EXPLORATION TESTING PROCEDURES	A-6



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LITTLE HAITI SOCCER PARK
AT NE 62ND STREET AND NE 2ND AVENUE
CITY OF MIAMI
MIAMI-DADE COUNTY, FLORIDA

HRES
HR Engineering Services, Inc.

SITE LOCATION MAP

A-1

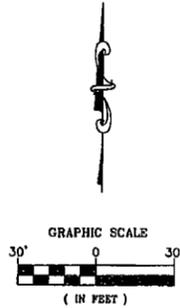
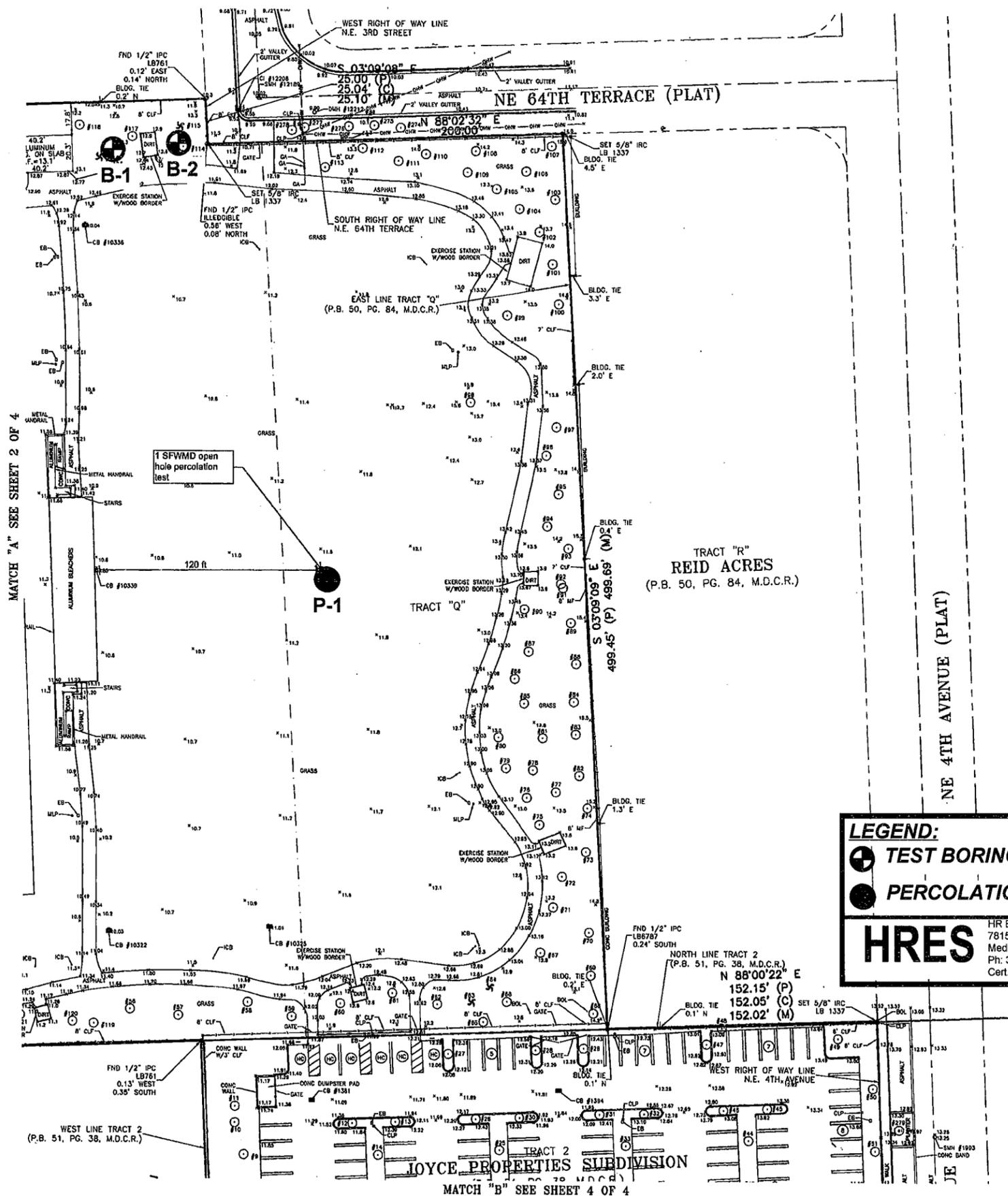
DRAWN BY: NH

DATE: 12/17/15

PROJECT No: HR15-1104R

SCALE: NTS

(SEE SHEET 1 OF 4 FOR LEGEND)



LEGEND:

- ⊕ TEST BORING LOCATION
- PERCOLATION TEST LOCATION

HRES HR ENGINEERING SERVICES, INC.
 7815 NW 72nd Avenue
 Medley, Florida 33166
 Ph: 305-888-8880/305-888-8770 Fax
 Cert. of Authorization No. 7991

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KEITH and SCHNARS, P.A.
ENGINEERS, PLANNERS, SURVEYORS

6500 NORTH ANDREWS AVENUE, FORT LAUDERDALE, FL 33309-2132 (954)776-1616

LB 1337

DATE	REVISIONS

DATE 6/22/2015
 SCALE AS SHOWN
 FIELD BOOK 1427
 DRAWN BY DS/JW
 CHECKED BY RKK

BOUNDARY AND TOPOGRAPHIC SURVEY
 LITTLE HAITI SOCCER PARK
 CITY OF MIAMI

TRACTS "J", "K", "N" AND "Q", REID ACRES (P.B. 50, PG. 84, M.D.C.R.)
 AND TRACT 2, JOYCE PROPERTIES SUBDIVISIONS (P.B. 51, PG. 38, M.D.C.R.)
 MIAMI-DADE COUNTY, FLORIDA

SHEET NO. 3
 OF 4 SHEETS
 PROJECT NO. 19004C

**SUMMARY OF TEST BORING AND PERCOLATION TEST LOCATIONS
LITTLE HAITI SOCCER PARK
CITY OF MIAMI
MIAMI-DADE COUNTY - FLORIDA
HR ENGINEERING SERVICES, INC.
HRES PROJECT No. HR15-1104R
DECEMBER 17, 2015**

TEST NO.	PLANE COORDINATES		STATION	OFFSET , ft.
	NORTHING	EASTING		
P-1	546349.964	922547.500	NA	NA
SPT-1	546592.843	922441.072	NA	NA
SPT-2	546592.706	922477.914	NA	NA

Notes:

Plane coordinates were taken using a hand-held GPS and are approximate within 10 feet.

NA: Not Available

SUMMARY OF PERCOLATION TEST RESULTS
USUAL OPEN-HOLE - FDOT METHOD
LITTLE HAITI SOCCER PARK

CITY OF MIAMI

MIAMI-DADE COUNTY, FLORIDA
 HR ENGINEERING SERVICES, INC.
 HRES PROJECT NO. HR15-1104R

DECEMBER 17, 2015

TEST No.	TEST DATE	DEPTH TO WATER BEFORE TEST, H ft	DEPTH TO WATER DURING TEST ft	HEAD, Du ft	HOLE DEPTH ft	HOLE DIAMETER, d inches	RATE OF FLOW, P		k, HYDRAULIC CONDUCTIVITY cfs/ft ² -ft. Head
							gpm	cfs	
P-1	11/11/15	9.0	0.0	9.0	15.0	6.0	19.5	0.04345	2.9E-04

for 0 to 15 ft., $K_{15} = P / 3.1416 * d * Du \{ Du/2 + Ds \}$, where Ds = Hole Depth - H

Soil Conditions at Percolation test location:

0.0' - 0.5' Dark brown organic silty fine SAND (topsoil), SM-OL

0.5' - 2.7' Brown fine SAND with traces of limerock (fill), SP

2.7' - 11.0' Brown fine SAND with traces of limestone lenses, SP

11.0' - 15.0' Light brown porous sandy LIMESTONE and calcareous fine sand

FIELD EXPLORATION TESTING PROCEDURES

Test Borings - The test borings were made in general accordance with ASTM D-1586, "Penetration Test and Split-Barrel Sampling of Soils." The borings were advanced using a 3-inch ID casing and a rotary drilling process. At regular intervals, the drilling tools were removed and soil samples were obtained with a standard 1.4-inch I.D., 2-inch O.D., split-tube sampler. The sampler was first seated six inches and then driven an additional foot with blows of a 140-lb hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance". The penetration resistance, when properly interpreted, is an index to the soil strength and density.

Representative portions of the soil samples, obtained from the sampler, were placed in glass jars and transported to our laboratory. An engineer then examined the samples in order to confirm the field classifications.

APPENDIX B

**SUMMARY OF LABORATORY TEST RESULTS
LABORATORY TESTING PROCEDURES
LABORATORY TESTING RESULTS**

**B-1
B-2
B-3 THRU B-6**

SUMMARY OF LABORATORY TEST RESULTS

LITTLE HAITI SOCCER PARK
CITY OF MIAMI
MIAMI-DADE COUNTY, FLORIDA
HR ENGINEERING SERVICES, INC.
HRES PROJECT No. HR15-1104R
DECEMBER 17, 2015

Test No.	USCS Class.	Sample Depth (ft)	Grain Size Distribution - Percent Passing								Organic Loss of Ignition, %	Moisture Content %	Material in Sample, %		
			3/4"	3/8"	No. 4	No. 10	No. 40	No. 60	No. 100	No. 200			Gravel	Sand	Fines
SPT-1	SP	2.0-4.0	100	100	100	100	88	55	15	1	-	2	0	99	1
SPT-2	SP	0.5-2.0	100	89	84	81	68	49	23	4	1	5	16	80	4
SPT-2	SP	4.0-6.0	91	72	59	51	39	31	24	4	-	11	41	55	4

LABORATORY TESTING PROCEDURES

Grain Size Distribution – The grain size test was performed to determine the particle size and distribution of sample tested. The sample was dried, weighed, and washed over a # 200 mesh sieve. The dried sample was then passed through a standard set nested sieves to determine the grain size distribution of the soil particles coarser than the # 200 sieves. This test was conducted in general accordance with ASTM D-22.

Percent Organics (Organic Loss on Ignition) – The amount of organic material in a sample is determined in this test. The sample is first dried and weighed, then ignited and reweighed. The amount of organic material is expressed as a percentage.

Water Content – The water content is the ratio, expressed as a percentage of the weight of water in a given mass of soil to the weight of the soil particles. This test was conducted in general accordance with ASTM D-2216.

HR ENGINEERING SERVICES, INC.
 7815 N.W. 72nd Avenue - Medley, Florida 33166
 Phone (305) 888-8880, Fax (305) 888-8770

GRAIN SIZE DATA SHEET

Project Name: <u>Little Haiti Soccer Park</u>		Project No.: <u>HR15-1104R</u>	
Boring No.: <u>SPT-1</u>		Depth: <u>2.0'-4.0'</u>	
Date: <u>12/2/2015</u>		Tested By: <u>PSI, Inc.</u>	
Sample No.: <u>2</u>			

Sieve Size	Particle Size, mm.	Weight on Sieve, gr.	Accumulated Weight, gr.	Percent Retained	Percent Passing	REMARKS
1	25.70	-	-	0	100	
3/4"	19.00	-	-	0	100	
3/8"	9.51	-	-	0	100	
4	4.76	-	-	0	100	USCS Classification:
10	2.00	-	-	0	100	
40	0.420	-	-	12	88	SP
60	0.250	-	-	45	55	
100	0.149	-	-	85	15	
200	0.074	-	-	99	1	
PAN						

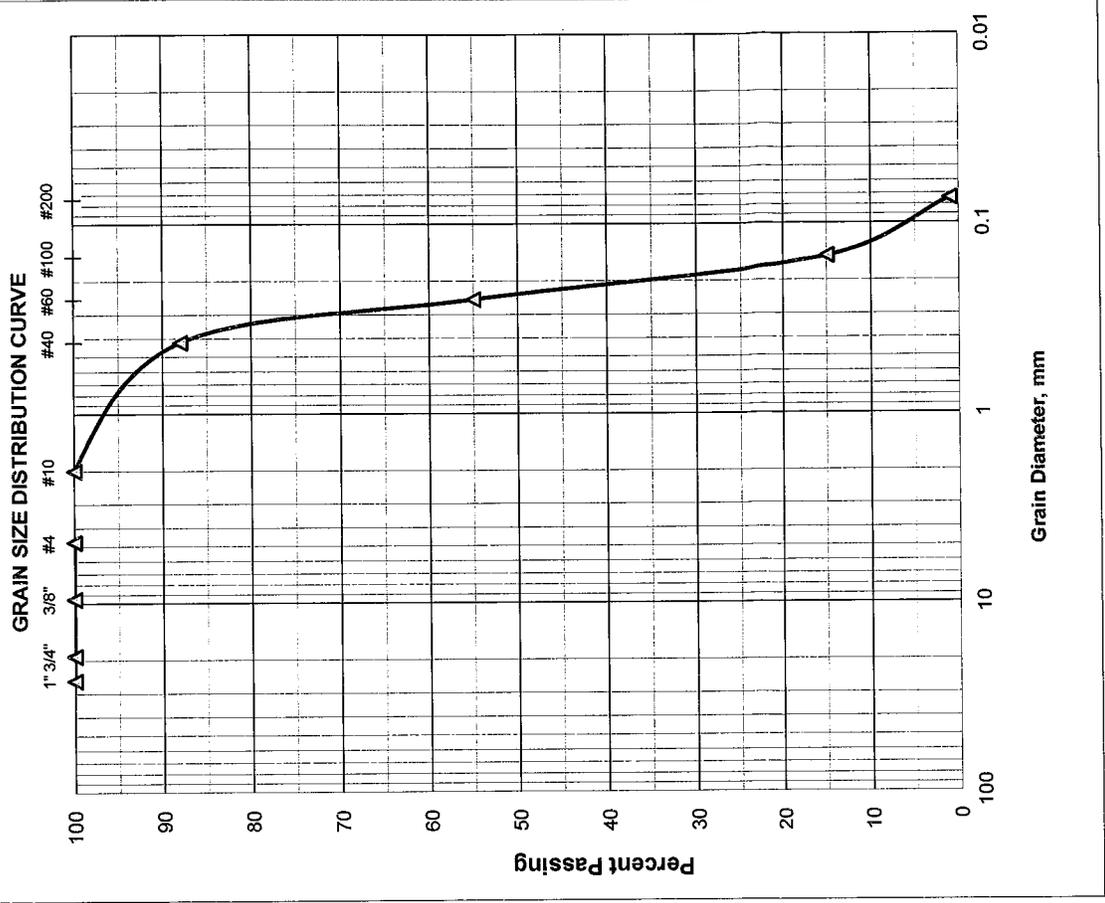
Total Dry Weight Before Wash, (gr) = -
 Percent Finer than No. 200 Sieve by Wash Method = 1%

Sieve Analysis Test performed in general accordance with ASTM C 136 (AASHTO T 27 or T 311)
 Moisture Content Test performed in general accordance with ASTM D 2216 (ASSHTO T 265)

Material in Sample (%)		
Gravel	≤ No. 4	0
Coarse Sand	>No. 4-≤ No. 40	12
Fine Sand	>No. 40-≤ No. 200	87
Silt and Clays	>No. 200	1
Water Content		2%

Respectfully Submitted,
HR Engineering Services, Inc.

Hernando R. Ramos, P.E.
 Florida Registration No. 42045



HR ENGINEERING SERVICES, INC.

7815 N.W. 72nd Avenue - Medley, Florida 33166

Phone (305) 888-8880, Fax (305) 888-8770

REPORT OF MOISTURE AND ORGANIC CONTENT BY LOSS ON IGNITION

Project Name: Little Haiti Soccer Park Project No.: HR15-1104R
Boring No.: SPT-2 Sample No.: 1B Depth: 0.5'-2.0'
Date: 12/01/15

Technician:	M.F. (PSI, Inc.)
Date Sample Placed in Oven:	12/01/2015
Time in / Out of Oven :	-
Wt. of Wet Soil + Can, grams	-
Wt. of Dry Soil + Can, grams	-
Wt. of Can, grams No. F	-
Wt. of Dry Soil, grams	-
Wt. of Moisture, grams	-
Water Content, w%	5%
Date Sample Placed in Furnace:	12/02/15
Time in / out of furnace (minimum 6 hrs):	-
Weight of Crucible & Oven-Dried Sample:	-
Weight of Crucible and Sample After Ignition:	-
Weight of Crucible: No. -	-
Weight of Oven-Dried Soil:	-
Weight Loss due to Ignition:	-
Percent Organics:	1%

Moisture Content Test performed in general accordance with ASTM D 2216

Organic Content Test performed in general accordance with ASTM D 2974

Respectfully Submitted,
HR Engineering Services, Inc.



Hernando R. Ramos, P.E.
Florida Registration No. 42045

USCS Classification:

SP

HR ENGINEERING SERVICES, INC.
 7815 N.W. 72nd Avenue - Medley, Florida 33166
 Phone (305) 888-8880, Fax (305) 888-8770

GRAIN SIZE DATA SHEET

Project Name: <u>Little Haiti Soccer Park</u>		Project No.: <u>HR15-1104R</u>	
Boring No.: <u>SPT-2</u>		Depth: <u>0.5'-2.0'</u>	
Date: <u>12/2/2015</u>		Tested By: <u>PSI, Inc.</u>	
Sample No.: <u>1B</u>			

Sieve Size	Particle Size, mm.	Weight on Sieve, gr.	Accumulated Weight, gr.	Percent Retained	Percent Passing	REMARKS
1	25.70	-	-	0	100	
3/4"	19.00	-	-	0	100	
3/8"	9.51	-	-	11	89	
4	4.76	-	-	16	84	USCS Classification:
10	2.00	-	-	19	81	SP
40	0.420	-	-	32	68	
60	0.250	-	-	51	49	
100	0.149	-	-	77	23	
200	0.074	-	-	96	4	
PAN						

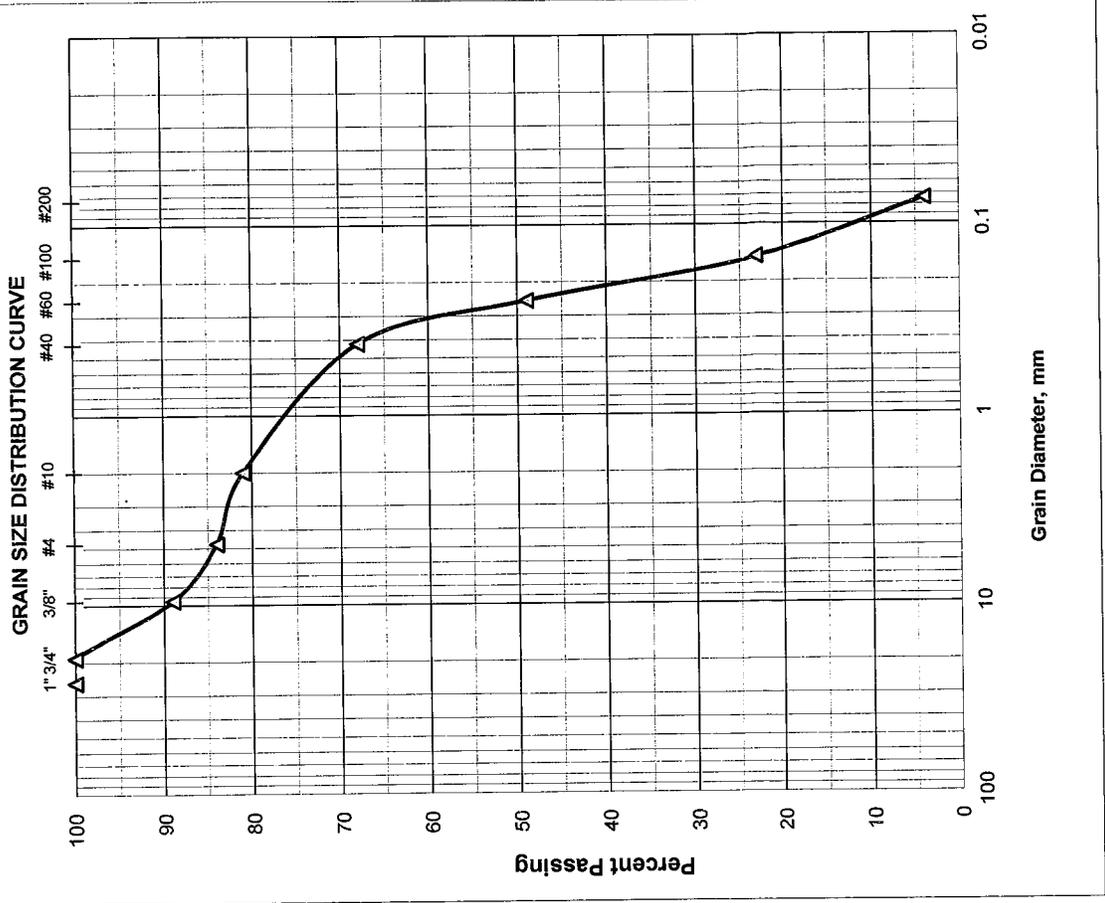
Total Dry Weight Before Wash, (gr) =	-
Percent Finer than No. 200 Sieve by Wash Method=	4%

Sieve Analysis Test performed in general accordance with ASTM C 136 (AASHTO T 27 or T 311)
 Moisture Content Test performed in general accordance with ASTM D 2216 (ASSHTO T 265)

Material in Sample (%)		
Gravel	≤ No. 4	16
Coarse Sand	>No. 4-≤ No. 40	16
Fine Sand	>No. 40-≤ No. 200	64
Silt and Clays	>No. 200	4
Water Content		5%

Respectfully Submitted,
HR Engineering Services, Inc.

Hemando R. Ramos, P.E.
 Florida Registration No. 42045



HR ENGINEERING SERVICES, INC.
 7815 N.W. 72nd Avenue - Medley, Florida 33166
 Phone (305) 888-8880, Fax (305) 888-8770

GRAIN SIZE DATA SHEET

Project Name: <u>Little Haiti Soccer Park</u>		Project No.: <u>HR15-1104R</u>	
Boring No.: <u>SPT-2</u>		Depth: <u>4.0'-6.0'</u>	
Date: <u>12/2/2015</u>		Tested By: <u>PSI, Inc.</u>	
Sample No.: <u>3</u>		USCS Classification: <u>SP</u>	

Sieve Size	Particle Size, mm.	Weight on Sieve, gr.	Accumulated Weight, gr.	Percent Retained	Percent Passing	REMARKS
1	25.70	-	-	0	100	
3/4"	19.00	-	-	9	91	
3/8"	9.51	-	-	28	72	
4	4.76	-	-	41	59	
10	2.00	-	-	49	51	
40	0.420	-	-	61	39	
60	0.250	-	-	69	31	
100	0.149	-	-	76	24	
200	0.074	-	-	96	4	
PAN						

Total Dry Weight Before Wash, (gr) =	-
Percent Finer than No. 200 Sieve by Wash Method=	4%

Sieve Analysis Test performed in general accordance with ASTM C 136 (AASHTO T 27 or T 311)
 Moisture Content Test performed in general accordance with ASTM D 2216 (ASSHTO T 265)

Material in Sample (%)		
Gravel	≤ No. 4	41
Coarse Sand	>No. 4-≤ No. 40	20
Fine Sand	>No. 40-≤ No. 200	35
Silt and Clays	>No. 200	4
Water Content		11%

Respectfully Submitted,
HR Engineering Services, Inc.

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