THE CITY OF KEY WEST
1300 White St
Key West, FL 33040

ADDENDUM NO. 1
ITB 18-030
Resod Poinciana and Horace O'Bryant Fields

This addendum is issued as supplemental information to the bid package for clarification of certain matters of both a general and a technical nature. The referenced bid package is hereby addended in accordance with the following items:

1. **Is Vendor responsible for removal and disposal of dirt**

   The Vendor will be responsible for the removal of dirt/soil/sand from fields and also responsible for the disposal

2. **The water line at Poinciana field and pump**

   The City will not be changing to a 2-inch water line. The water line will remain a 1-inch line and the City will be adding an additional storage tank to bring the total tank storage there to 5,000 Gallons. The City will also be upgrading to a 7.5Hp booster pump

3. **Killing of old grass**

   The Vendor will need to do 2 treatments of Round-Up to kill the old grass before removal

4. **Irrigation System**

   All zones must be a direct run back to the pump station. All solenoids must be above ground at the pump station.

5. **Soil Sample Results**

   The soil sample results are included. The vendor is responsible for following the specifications provided in the soil sample results.

All Bidders shall acknowledge receipt and acceptance of this Addendum No. 1 by submitting the addendum with their proposal. Proposals submitted without acknowledgement or without this Addendum may be considered non-responsive.

_____ _____

Signature Name of Business

Tifton Physical Soil Testing Laboratory, Inc.
1412 MURRAY AVENUE
TIFTON, GEORGIA 31794
Phone: (229) 382-7292
Fax: (229) 382-7992
www.tiftonsoillab.com

ACCREDITED
TESTING CERT #1014.01

Date Received: April 30, 2018
Date Reported: May 4, 2018
Sample Number: L123-18
Test Report For: City of Key West
627 Palm Avenue
Key West, FL 33040
Attn: Stephanie Johnson

RE: Poinciana Project
Compacted after 16 hrs at a 6" (15 cm) Depth

PHYSICAL ANALYSIS[1]

MIXES ANALYZED (% by Volume)			SATURATED HYDRAULIC CONDUCTIVITY in/hr	POROSITY (%)			BULK DENSITY g/cm³	WATER RETENTION AT FIELD CAPACITY %	CHEMICAL	
SOIL	SAND	AMENDMENT		NON-CAPILLARY (air-filled)	CAPILLARY (water-filled)	TOTAL			pH[2]	EC[3] mmhos/cm
Existing Soil			0.2	0.8	40.6	41.4	1.51	26.9	7.5	
General Recommendations for a SRM:			8 - 15 in/hr.	15 - 30	15 - 25	35 - 55				

PARTICLE DENSITY[4] 2.57 g/cm³

PARTICLE SIZE ANALYSIS

SAMPLES	GRAVEL 2 mm %	SAND FRACTIONS (% Retained)[5]					SAND[6] 0.05-2 mm %	SILT[6] 0.002-0.05 mm %	CLAY[6] <0.002 mm %	ORGANIC MATTER[7] % by wt.
		VERY COARSE 1 mm	COARSE 0.5 mm	MEDIUM 0.25 mm	FINE 0.15 mm	VERY FINE 0.05 mm				
Existing Soil	3.1	2.5	9.9	19.4	25.4	20.7	77.9	12.0	7.0	3.91
USGA Recommendations for a Rootzone Mix:	≤ 10% (≤3% gravel)		60% minimum		≤ 20%	≤ 5%		≤ 5%	≤ 3%	

Note: Total "fines" (very fine sand, silt, and clay) should be less than (<) 10% in a rootzone mix.

1. Determined at 30 cm tension by USGA testing protocol (ASTM F1815) 2. ASTM D4972 Method A (water only) 3. SSSA Soluble Salts 4. ASTM D854-98 5. ASTM C136 and F1632 6. Bouyoucos, 1962 7. ASTM F1647

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Recommendation Form (Version 1) - Effective Date: 5/17/10

Recommendations:

A complete physical analysis and particle size analysis, including organic matter and pH, were made on the Existing Soil Sample from City of Key West on May 3, 2018, to determine its suitability for use as a Sportsturf Rootzone Mix (SRM) for the Poinciana Project at a 6" (15 cm) depth. The condition of the sample as received was normal.

The particle size analysis showed that the Soil is a loamy sand (81-12-7% sand-silt-clay, including the 3.1% fine gravel in the sand fraction). This Soil has 39.7% fines (total of very fine sand, silt, and clay) which are too many for a SRM.

The Soil has 3.91% organic matter by weight (ASTM F1647), which is a high amount for this athletic field soil.

The physical analysis showed that the SRM has a low water permeability rate of 0.2 in/hr. when compacted by the ASTM F1815 procedure to simulate a compacted athletic field at a 6" (15 cm) depth. For a SRM, our lab recommends an initial rate of 8-15 in/hr. for developing an athletic field. The initial rate is the rate of the rootzone mix before grass is established. Once grass is established the rate should decrease and slowly decline over the years as organic matter accumulates due to root and thatch decomposition.

The other physical properties show that the Soil has a severe imbalance in the percent non-capillary (air-filled) and capillary (water-filled) pore space.

The Soil tested positive as calcareous and has a soil water pH of 7.5, which is higher than the optimum pH range of 6.0 to 6.5 for turfgrass. No limestone needs to be applied to this Soil until the pH decreases to less than 6.0, then apply approximately 25 lbs per 1000 sq. ft. (6 inch depth).

Conclusion: This Soil is a loamy sand with too many fines (39.7%) and too much organic matter (3.91%) for a SRM. To improve the physical properties of this soil for an athletic field the soil needs to be amended with at least 70% of a coarse sand with a majority of the particles in the coarse and medium sand fractions to reduce the fines and organic matter.

Powell Gaines

Sportsturf Rootzone Mix (SRM) Sands

By Powell Gaines, Tifton Physical Soil Testing Laboratory, Inc.

A Sportsturf Rootzone Mix (SRM) Sand for athletic field construction should have more fines (total of very fine sand, silt and clay) than a USGA golf green construction sand because it has to withstand the heavy mechanical stress associated with the rigors of athletic competition. For example, a football scrimmage on a USGA golf green would be quickly destroyed because the players' cleats would rip through the canopy of the green. Fines are needed in a SRM to allow the field to set up firm, not loose, to ensure good footing.

Coarse sands should not be used for SRM Sands because they would cause the field to set up loose with unstable footing and would be a slow track. Also the field would require more unnecessary maintenance to overcome drought and fertilizer leaching. If a coarse sand is used, it should be amended with 10-20% soil to develop a SRM with optimum physical properties.

Optimum physical properties for a SRM for athletic field construction would be a water permeability rate of about 8-15 in/hr., a good balance in the non-capillary (air-filled) and capillary (water-filled) porosities, and water retention of 12-18% to reduce fertilizer leaching.

Rototilling 80-90% sand into an old existing loamy soil sports field to develop a SRM with optimum physical properties is not a very exact or practical way to develop a SRM with optimum physical properties. For an 8" cap, this would be removing about 6-7" of the existing field, rototilling 6.4 - 7.2" of sand into only 0.8 - 1.6" of soil, which would not be a very exact or realistic way to establish a good uniform 8" cap. Instead, using 8" of a straight "dirty" fine sand with about 6-10% silt and clay would serve the same purpose and would involve a lot less work, be less expensive, and would be a better, more uniform sand cap.

To eliminate the need of mixing a large amount of sand with a small amount of soil to develop a SRM with optimum physical properties for an athletic field, a fine "dirty" sand could be used instead. Such a sand could be used straight with no soil amendment because such a sand already has an adequate amount of fines to allow the field to set up firm, not loose, to ensure good footing. Also a dirty fine sand with about 6-10% silt and clay (<5% clay) would have a water permeability rate of about 8-15 in/hr., a good balance in air-filled and water-filled porosities, and adequate water retention of 12-18%. Dirty fine sands can be local unwashed creek bank sands which typically fit this description. Such sands usually are considered low quality sands because of the 6-10% silt and clay (mostly silt), and would be expected to be relatively less expensive than higher quality washed sands. Dirty fine sands can be the "finished product", and are good Sportsturf Rootzone Mix (SRM) Sands that our lab recommends for athletic field construction.

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Date Received: April 30, 2018
Date Reported: May 4, 2018
Sample Number: L122-18
Test Report For: City of Key West
627 Palm Avenue
Key West, FL 33040
Attn: Stephanie Johnson

RE: HOB Project
Compacted after 16 hrs at a 6" (15 cm) Depth

PHYSICAL ANALYSIS[1]

MIXES ANALYZED (% by Volume)			SATURATED HYDRAULIC CONDUCTIVITY in/hr	POROSITY (%)			BULK DENSITY g/cm³	WATER RETENTION AT FIELD CAPACITY %	CHEMICAL	
SOIL	SAND	AMENDMENT		NON-CAPILLARY (air-filled)	CAPILLARY (water-filled)	TOTAL			pH[2]	EC[3] mmhos/cm
Existing SRM			1.1	9.3	27.0	36.3	1.68	16.1	7.7	
General Recommendations for a SRM:			8 - 15 in/hr.	15 - 30	15 - 25	35 - 55				

PARTICLE DENSITY[4] 2.63 g/cm³

PARTICLE SIZE ANALYSIS

SAMPLES	GRAVEL 2 mm %	SAND FRACTIONS (% Retained)[5]					SAND[6] 0.05-2 mm %	SILT[6] 0.002-0.05 mm %	CLAY[6] <0.002 mm %	ORGANIC MATTER[7] % by wt.
		VERY COARSE 1 mm	COARSE 0.5 mm	MEDIUM 0.25 mm	FINE 0.15 mm	VERY FINE 0.05 mm				
Existing SRM	26.2	14.9	14.1	15.1	14.1	7.1	65.3	5.0	3.5	0.64
USGA Recommendations for a Rootzone Mix:	≤ 10% (≤3% gravel)		60% minimum		≤ 20%	≤ 5%		≤ 5%	≤ 3%	

Note: Total "fines" (very fine sand, silt, and clay) should be less than (<) 10% in a rootzone mix.

1. Determined at 30 cm tension by USGA testing protocol (ASTM F1815) 2. ASTM D4972 Method A (water only) 3. SSSA Soluble Salts 4. ASTM D854-98 5. ASTM C136 and F1632 6. Bouyoucos, 1962 7. ASTM F1647

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The particle size analysis showed that the SRM is a fine sand (91.5 - 5.0 - 3.5% sand-silt-clay, including the 26.2% fine gravel in the sand fraction). This SRM has 15.6% fines (total of very fine sand, silt, and clay) which are too many for a SRM.

The SRM has 0.64% organic matter by weight (ASTM F1647), which is a moderate amount for this athletic field soil.

The physical analysis showed that the SRM has a low water permeability rate of 1.1 in/hr. when compacted by the ASTM F1815 procedure to simulate a compacted athletic field at a 6" (15 cm) depth. For a SRM, our lab recommends an initial rate of 8-15 in/hr. for developing an athletic field. The initial rate is the rate of the rootzone mix before grass is established. Once grass is established the rate should decrease and slowly decline over the years as organic matter accumulates due to root and thatch decomposition.

The other physical properties show that the Soil has a severe imbalance in the percent non-capillary (air-filled) and capillary (water-filled) pore space.

The SRM tested positive as calcareous and has a soil water pH of 7.7, which is higher than the optimum pH range of 6.0 to 6.5 for turfgrass. No limestone needs to be applied to this Soil until the pH decreases to less than 6.0, then apply approximately 25 lbs per 1000 sq. ft. (6 inch depth).

Conclusion: This SRM is a fine sand with too many fines (15.6%) and too much gravel (26.2%) for a SRM. To improve the physical properties of this soil for an athletic field the soil needs to be amended with at least 60% of a medium sand with the majority of the particles in the medium and coarse sand fractions to reduce the fines and gravel.

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Optimum physical properties for a SRM for athletic field construction would be a water permeability rate of about 8-15 in/hr., a good balance in the non-capillary (air-filled) and capillary (water-filled) porosities, and water retention of 12-18% to reduce fertilizer leaching.

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