

New View of Data: GPS Service Case Studies

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5th Golf Innovation Symposium

USGA®

Voice of the Customer: 2015

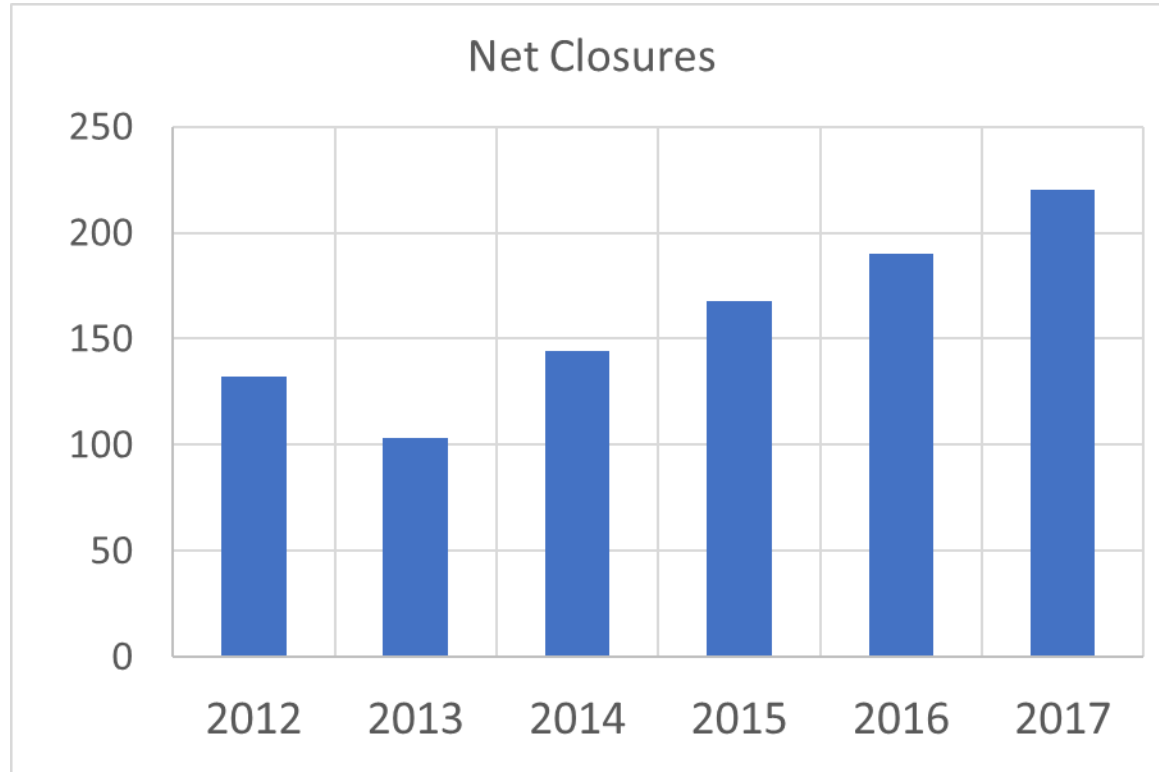
Thinking about the typical experience on the golf course you play most often, how satisfied are you with the overall experience:

69%

(Top-three box score)

Source: USGA Programmatic Tracker, Sports and Leisure Research Group, 2015

Pressures on Golf Facilities



Challenge Statement

By 2025,

golf will improve golfer satisfaction

BY 20 PERCENT

and

reduce our consumption of key resources

BY 25 PERCENT

Value

Since we introduced the tool in March 2017, we have added many features and tested the functionality with numerous users, including facility manager, course architects, regional golf associations, USGA championship directors and USGA agronomists. Features now include:



COURSE MAP

- Ability to edit all course features (greens, teeing grounds, fairways, rough, bunkers, etc.)
- Dynamic recalculation of costs based on geometry



RESOURCE MANAGEMENT

- Ability to customize all inputs required to maintain the course (labor, water, fertilizer, energy, etc.)



ADVANCED WEATHER

- Radar
- Evapotranspiration
- Growing Degree Days



HOLE LOCATION

- Actual green geometry
- Used in all USGA championships
- Used by several AGAs in their competitions



HEAT MAP

- Generated through GPS Service
- Identify the areas of high and low traffic by golfers during normal play
- Data can help allocation of resources and as potential redesigns



WATER BUDGET

- Based on historical data for planning purposes
- Updated through the year based on actual rainfall



PACE CALCULATOR

- Generated through GPS Service
- Hole times
- Cycle times
- Bottlenecks and delays



DASHBOARD

- Information is fully customizable
- Can be displayed by hole, by surface or by type of cost
- Easy-to-read charts and graphs

PRODUCTS

USGA Facility App

The collage displays several key features of the USGA Facility App:

- Site Map & Heatmap:** Aerial view of a golf course with overlaid green and yellow polygons representing different areas. A heatmap overlay shows temperature variations across the site.
- Cost Breakdown:** A detailed list of expenses categorized by type (Energy, Material, Labor, Equipment) and hole number.

TYPE	HOLE	AMOUNT
Bunker	1	
TOTAL COST:	TOTAL SIZE:	
		\$4,488.24 0.1109 AC
Energy		\$60.29
Material		\$22.18
Labor		\$4,393.58
Equipment		\$12.20
Handrake		\$1,247.39
Machine Rate		\$198.60
Edge		\$346.50
Mow Grass Faces		\$1,039.49
Level and Pack		\$346.50
Clean Debris		\$1,247.39
Chemical Application		\$22.72
- Weather Forecast:** A 5-day weather forecast showing temperature, precipitation, and wind speed.

Day	High	Low	Wind	Clouds
Tue	68	52	14	0%
Wed	64	47	14	0%
Thu	64	47	14	0%
Fri	64	47	14	0%
Sat	64	47	14	0%
Sun	64	47	14	0%
- Accumulated Growing Degree Days:** A line graph showing the progression of growing degree days over a 12-month period.

Month	Accumulated GDD
Jan	0
Feb	~100
Mar	~200
Apr	~400
May	~800
Jun	~1200
Jul	~1600
Aug	~2000
Sep	~2400
Oct	~2800
Nov	~3200
Dec	~3600
- Water Budget:** A summary of irrigation water usage for a specific course.

Course	Water Budget	Actual Usage
Cottonwood Baseline	64,329,096.18	197.13
- Stoke Play Round 1 - Saturday, August 26th, 2017:** A grid of 18 hole diagrams showing hole layouts and green locations.
- User Management:** A form for adding new users, including fields for name, email, and assigned roles (e.g., Superintendent, Assistant Superintendent).
- Weather Station Data:** A detailed view of weather station data, including wind direction, speed, and temperature.

Poll Question

What information do you wish you had more of at your facility?

- 1 / Golfer traffic patterns and pace of play
- 2 / Weather conditions impacting the course
- 3 / Resource productivity

Map Video

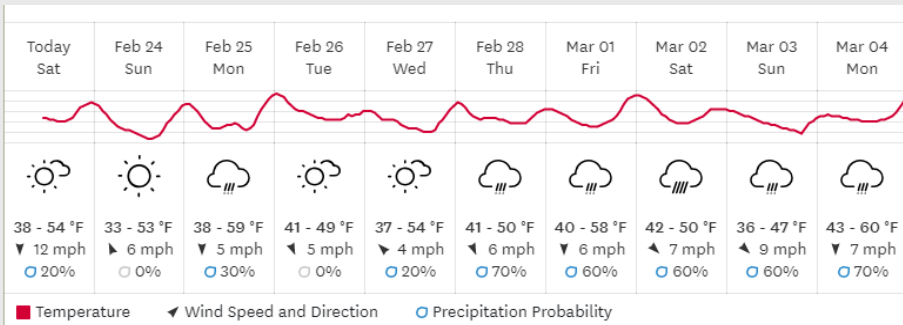
Dashboard Video



FACILITY

WEATHER

PACE OF PLAY



☀ 45 °F, clear

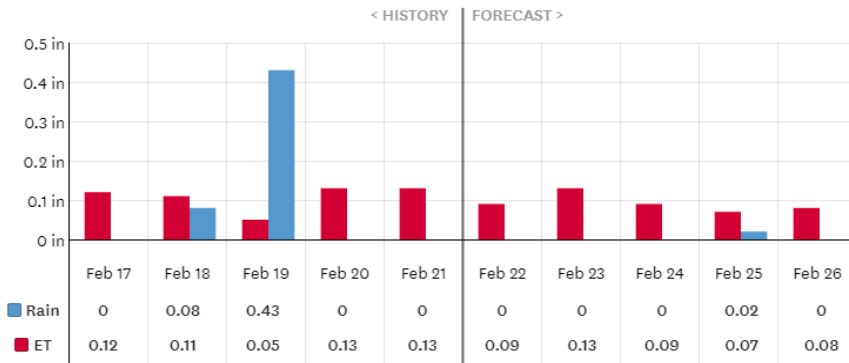


Wind Direction: ESE
 Wind Speed: 5 mph
 Peak Wind: 8 mph
 Peak Wind at: 9:00 am
 Peak Temp.: 54 °F
 Peak Temp. at: 11:00 pm
 Precipitation: 20%
 Forecast Precip.: 0 in
 Accumulated Precip.: 0 in
 Humidity: 48%
 Dew Point: 26 °F
 GDD: 0 °F

EVAPOTRANSPIRATION VS RAIN



■ Evapotranspiration
 ■ Rain
 Both
 02/22/19



USGA® GPS Service

WHERE ARE YOUR GOLFERS GOING?

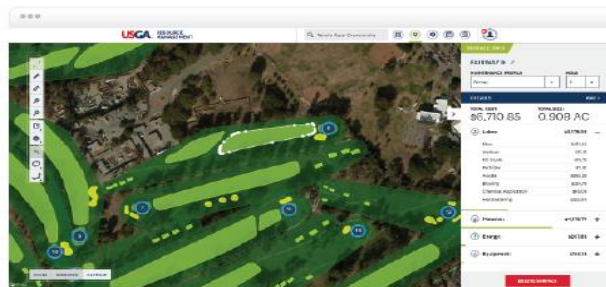
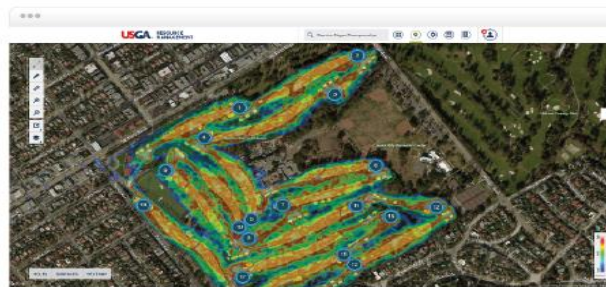
Why spend money maintaining areas that aren't used? Golfer heatmaps on the USGA Facility tool can tell you where your players are going – *and more importantly* - where they are not going. You can prioritize the areas that most impact golfer experience and save money on the areas that get less play.

WHY IT'S IMPORTANT

- Course conditioning is the most important factor in the golfer experience. The USGA's GPS Service shows you the traffic patterns of your golfers so you know precisely where you need to allocate more resources in order to provide better playing conditions.
- For golfers, pace of play is nearly as important as course conditioning. The GPS Service provides in-depth pace information – hole and round times for each group, gaps between groups, where the bottlenecks are. This information will allow you to focus on the players or the areas of the course that are causing delays.

HOW IT WORKS

Simply hand out loggers to your golfers prior to their rounds for several days, being sure to collect them at the end of their rounds. You will then receive a year-long subscription to the USGA Facility Tool, where you will access the heatmaps and the pace report, as well as other features such as advanced real-time weather and map customization. In addition, you will receive an hour-long phone consultation with a USGA agronomist.



USGA GPS Service



INTRODUCTION →



DATA COLLECTION →



SHIP LOGGERS BACK →



ANALYZE →



HEATMAPS →

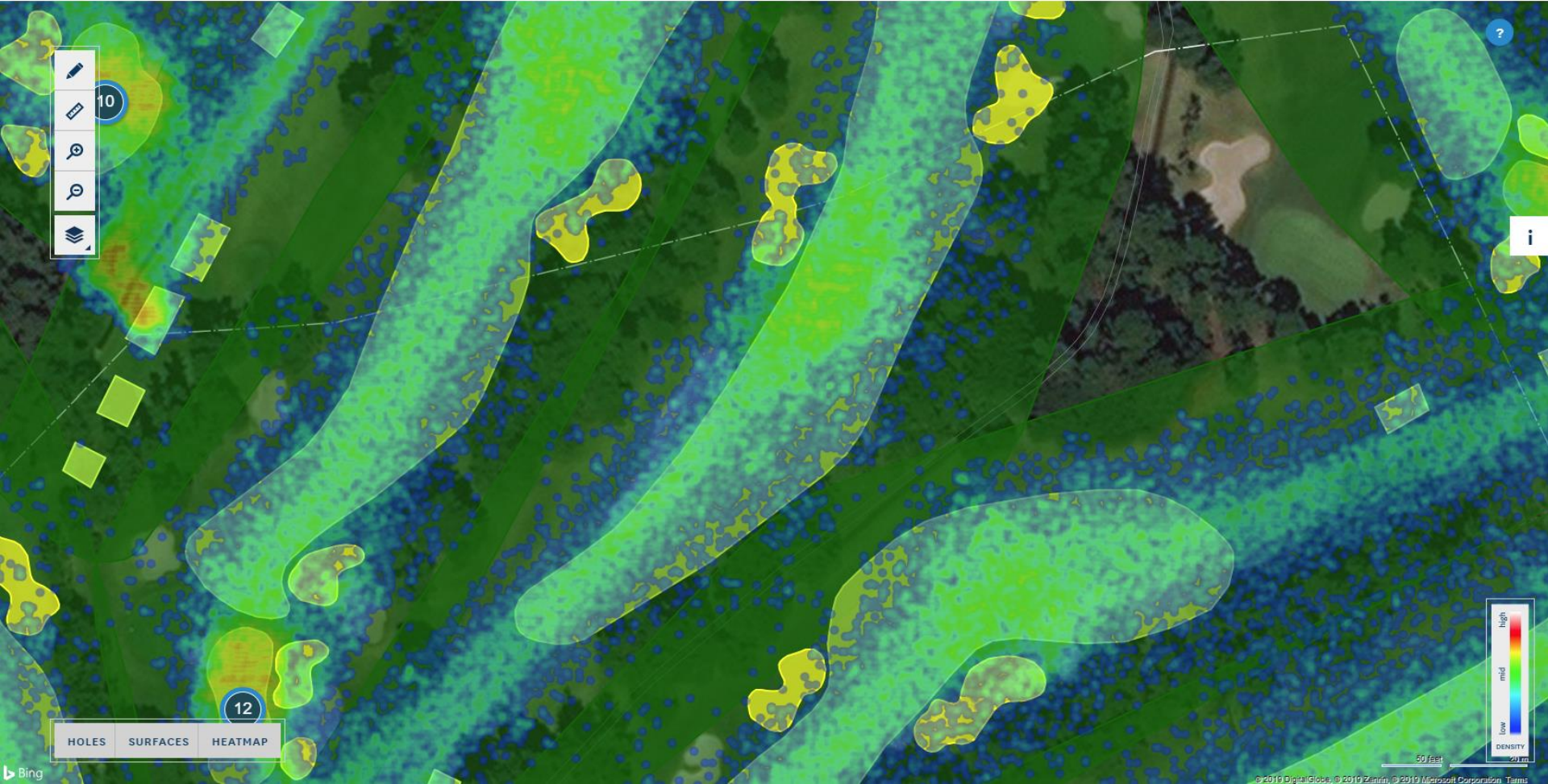


CONSULTING SERVICES

Heatmaps Video



-
-
-
-
-



12

HOLES SURFACES HEATMAP





AVERAGE TIME



VIEW MODE

Cycle time per hole

8/30/18



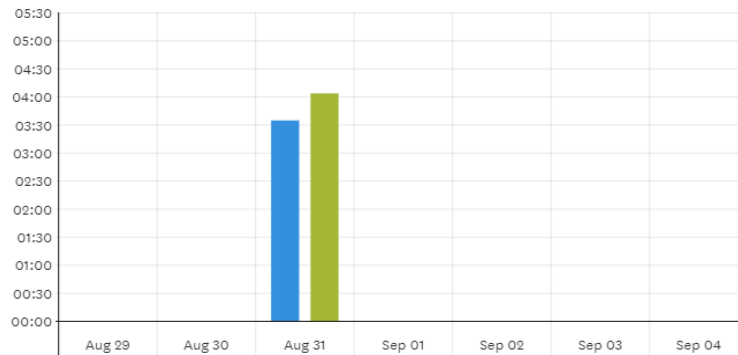
HOLE	1	2	3	4	5	6	7	8	9
TIME	0:25	0:13	0:14	0:15	0:13	0:14	0:00	0:26	0:17
MEDIAN	0:15	0:08	0:08	0:16	0:09	0:07	0:00	0:15	0:18
HOLE	10	11	12	13	14	15	16	17	18
TIME	0:17	0:05	0:14	0:11	0:10	0:08	0:07	0:07	0:08
MEDIAN	0:18	0:05	0:17	0:15	0:13	0:13	0:13	0:14	0:14

ROUND TIME



Average Median

8/31/18



AVERAGE GROUP TIME



VIEW MODE

All carts

8/30/18



HOLE	TIME	MEDIAN
1	0:12	0:11
2	0:06	0:06
3	0:12	0:11
4	0:08	0:09
5	0:09	0:09
6	0:12	0:13
7	0:17	0:17
8	0:07	0:07
9	0:12	0:12
10	0:14	0:14
11	0:07	0:07
12	0:09	0:11
13	0:08	0:08
14	0:32	0:10
15	0:06	0:06
16	0:29	0:16
17	0:12	0:13
18	0:12	0:12



TOP

GPS SERVICE CASE STUDY

Kasumigaseki Country Club



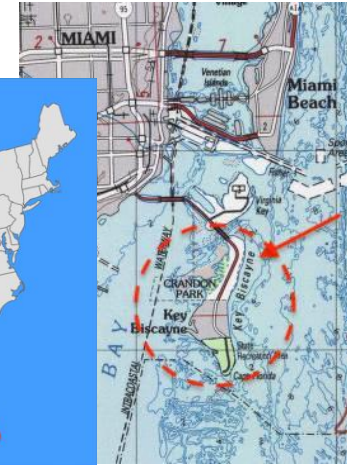


WELCOME TO
CRANDON GOLF
AT KEY BISCAIYNE



Crandon Park History

- Located on Key Biscayne, 10 minutes from downtown Miami
- Land was once the largest US coconut plantation
- Donated to Miami in 1940
- 800-acre public including nature center, marina, ATP tennis center, beach, trails, amusement center, picnic shelters, ball fields and golf course



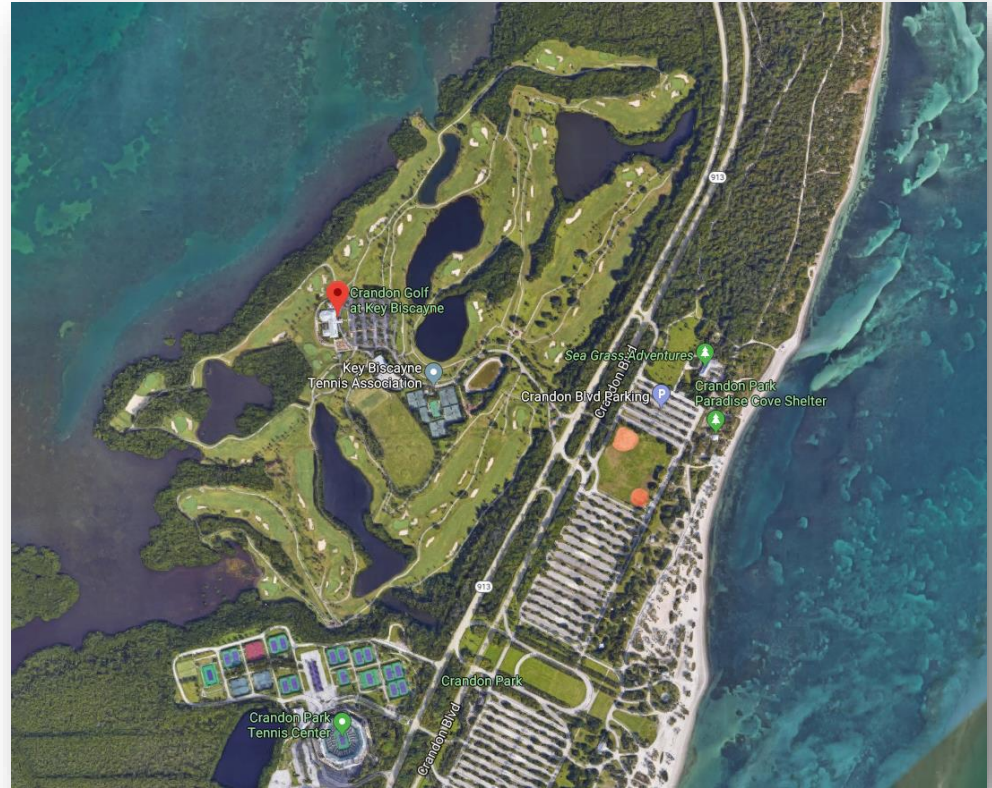
Crandon Park History

- Designed by Devlin and Von Hagge in 1972
- Hosted PGA Champions Tour for 18 years
- Former top 75 golf courses in America (Golf Digest)
- Top 10 public golf courses in Florida (visitflorida.com)



Course Facts

- Owned by Miami-Dade County
- Operated by the County Parks and Recreation Department
- Open to the public
- Economically self sustaining
- Capital improvements paid from operation profits
- 18-hole golf course/practice facilities
par 72 /7354 yards
- 130 acres of turf
- \$1.1 million for water/year



Purpose

- 1 / Identify turf reduction areas
- 2 / Define tidally influenced area
- 3 / Reduce maintenance of playable area
- 4 / Enhance the aesthetic of the golf course
- 5 / **Realize substantial reductions in irrigation costs**



Process

1

Existing Conditions Analysis

- Site Conditions Analysis
- Course Inventory

2

Alternatives Development

- Turf Conversion Alternatives
- Course Accessibility and Sustainability

3

Concept Plan Development

- Concept Development
- Statement of Probable Cost Estimate
- Design Program Summary Report

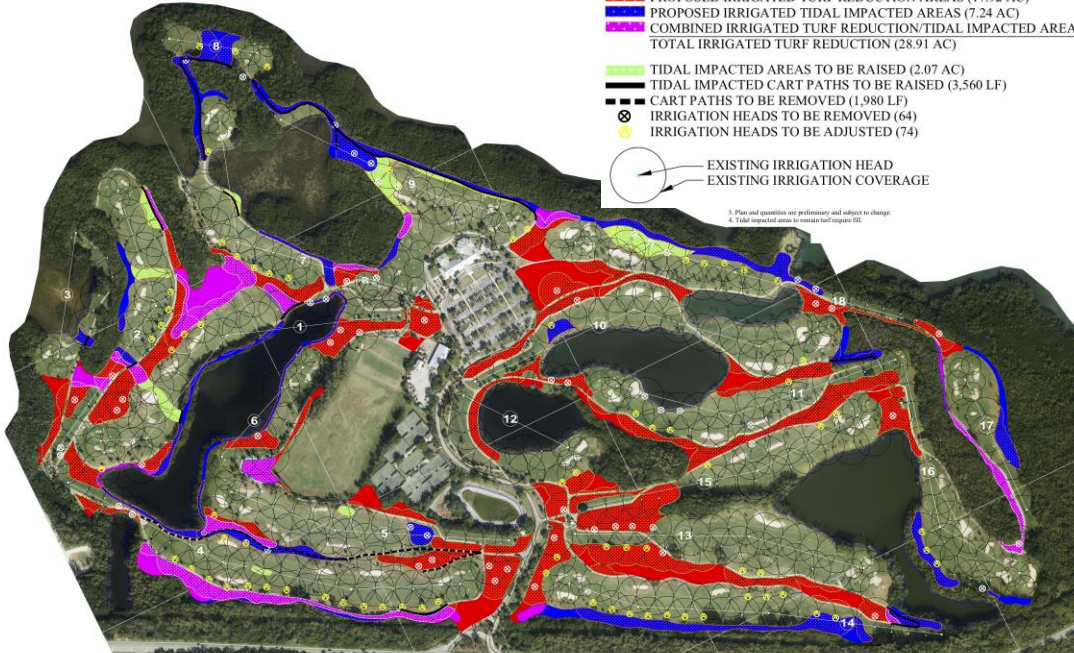
Site Analysis

LEGEND/TABULAR DATA

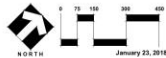
- PROPOSED TURF REDUCTION AREAS (21.37 AC)
- EXISTING TIDAL IMPACTED AREAS (9.44 AC)
- COMBINED TURF REDUCTION/TIDAL IMPACTED AREAS (5.23 AC)
- TOTAL TURF REDUCTION (36.04 AC)
- PROPOSED IRRIGATED TURF REDUCTION AREAS (17.92 AC)
- PROPOSED IRRIGATED TIDAL IMPACTED AREAS (7.24 AC)
- COMBINED IRRIGATED TURF REDUCTION/TIDAL IMPACTED AREAS (3.75 AC)
- TOTAL IRRIGATED TURF REDUCTION (28.91 AC)
- TIDAL IMPACTED AREAS TO BE RAISED (2.07 AC)
- TIDAL IMPACTED CART PATHS TO BE RAISED (3,560 LF)
- CART PATHS TO BE REMOVED (1,980 LF)
- IRRIGATION HEADS TO BE REMOVED (64)
- IRRIGATION HEADS TO BE ADJUSTED (74)



3. Plan and quantities are preliminary and subject to change.
4. Tidal impacted areas to remain and require fill.



Site Analysis Drawing
Crandon Golf Course
Key Biscayne, Florida



King Tides



Turf Conversion



LEGEND/TABULAR DATA

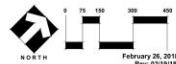
- PROPOSED AREAS TO BE RAISED (8.0 AC)
- PROPOSED REGRASSED AREAS (4.7 AC)
- TIDAL IMPACTED CART PATHS TO BE RAISED (3,560 LF)
- CART PATHS TO BE REMOVED (1,980 LF)
- PROPOSED NATURAL CRUSHED STONE AREAS (14.1 AC)
- PROPOSED PLANTING AREAS (9.6 AC)
- PROPOSED AQUATIC PLANTING AREAS (8.3 AC)
- TOTAL TURF REDUCTION (32.0 AC)
- TOTAL IRRIGATED AREA = 85.8 AC

NOTES:
 1. All plan work and quantities are based on site information provided by Miami-Dade County Parks, Recreation Department and Open Space Department.
 2. Any incorrect information provided by Miami-Dade County Parks, Recreation Department and Open Space Department could result in incorrect plan and quantity information.
 3. Plan and quantities are preliminary and subject to change.
 4. Tidal impacted areas to remain turf require fill.
 5. Includes cart paths to be raised.

LEGEND/TABULAR DATA

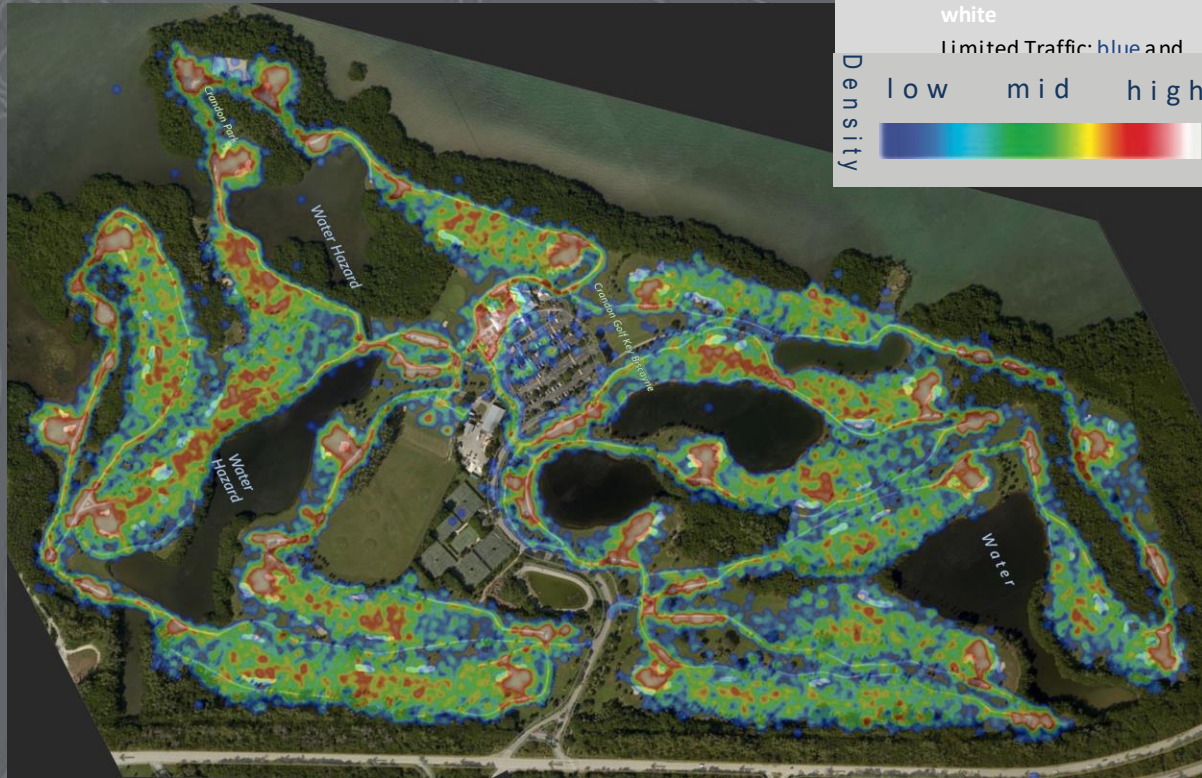
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- TOTAL IRRIGATED AREA = 85.8 AC

Turf Conversion Alternatives Plan
Crandon Golf Course
 Key Biscayne, Florida



SANFORD GOLF DESIGN
 271 BARBADOR DRIVE, APTER, FLORIDA 33408
 PHONE: (561) 891-8061 * FAX: (577) 825-7469

USGA Heat Map



“Finally, a GPS tracking system for golf that is going to save the facility money. Thank you USGA. Don’t guess where your players are spending their time on each hole, the USGA GPS tracking system maps it out for you by recording actual player routing and mapping out the patterns we needed to incorporate into our turf conversion”

*Steve Jablonowski,
General Manager*

Turf Conversion: Revised



LEGEND/TABULAR DATA

- PROPOSED AREAS TO BE RAISED (10.3 AC)
- PROPOSED RE-GRASSED AREAS (5.9 AC)
- TIDAL IMPACTED CART PATHS TO BE RAISED (3,560 LF)
- CART PATHS TO BE REMOVED (1,980 LF)
- PROPOSED NATURAL CRUSHED STONE AREAS (21.3 AC)
- PROPOSED PLANTING AREAS (12.5 AC)
- PROPOSED AQUATIC PLANTING AREAS (7.9 AC)
- TOTAL TURF REDUCTION (41.7 AC)
- TOTAL IRRIGATED AREA = 79.0 AC

NOTES:

1. All plan work and quantities are based on site information provided by Miami-Dade County Parks, Recreation Department and Open Spaces Department.
2. Any resource submissions provided by Miami-Dade County Parks, Recreation Department and Open Spaces Department could result in incorrect plan and quantity information.
3. Plan and quantities are preliminary and subject to change.
4. Total impacted areas to contain turf require fill.
5. Includes cart paths to be raised.

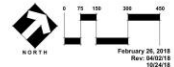
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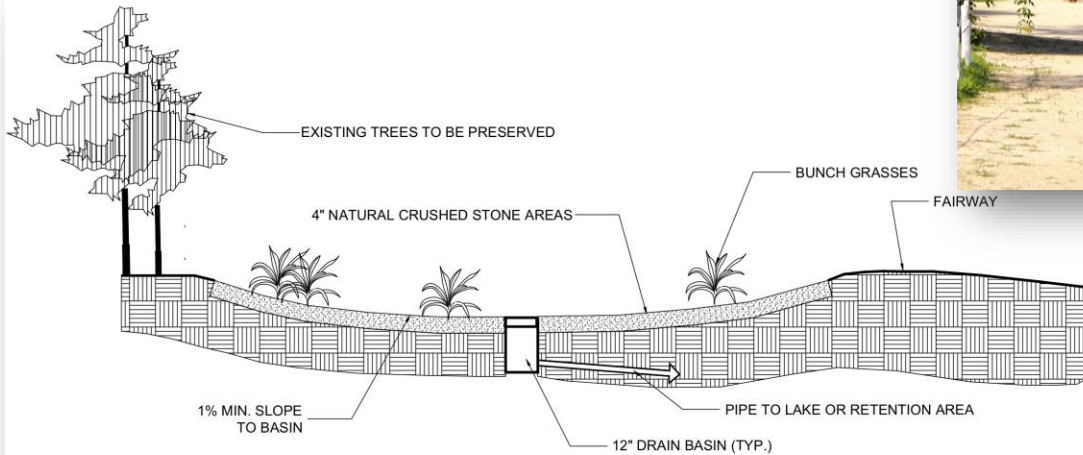
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- TOTAL TURF REDUCTION (41.7 AC)
- TOTAL IRRIGATED AREA = 79.0 AC

Turf Conversion Alternatives Plan
Crandon Golf at Key Biscayne
 Key Biscayne, Florida



SANFORD GOLF DESIGN
 211 BROADWAY, SUITE 1000, FORT LAUDERDALE, FL 33301
 PHONE: (561) 691-8661 • FAX: (577) 421-7589

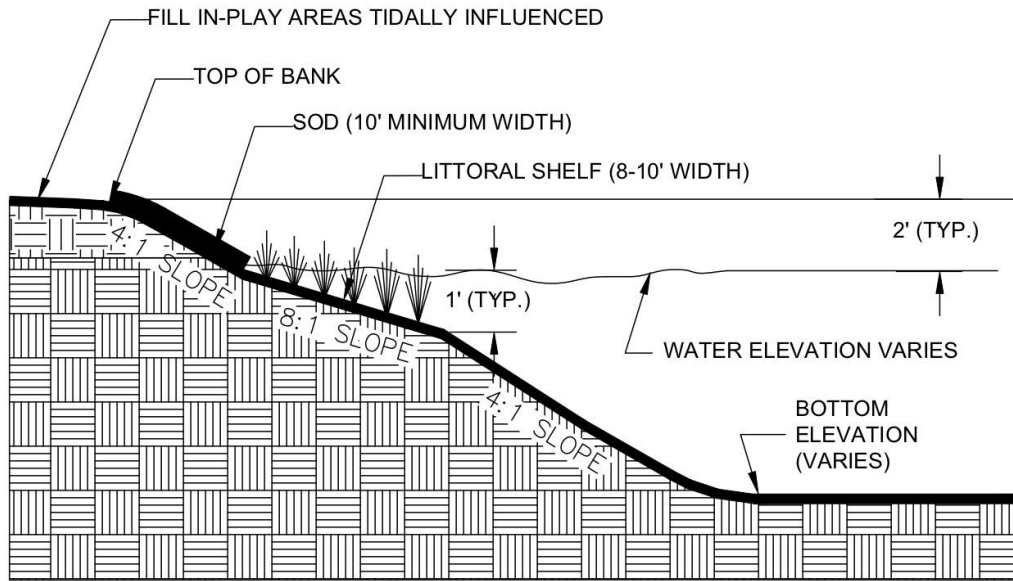
Turf Conversion Alternatives



NATURAL CRUSHED STONE AREAS

N.T.S.

Turf Conversion Alternatives

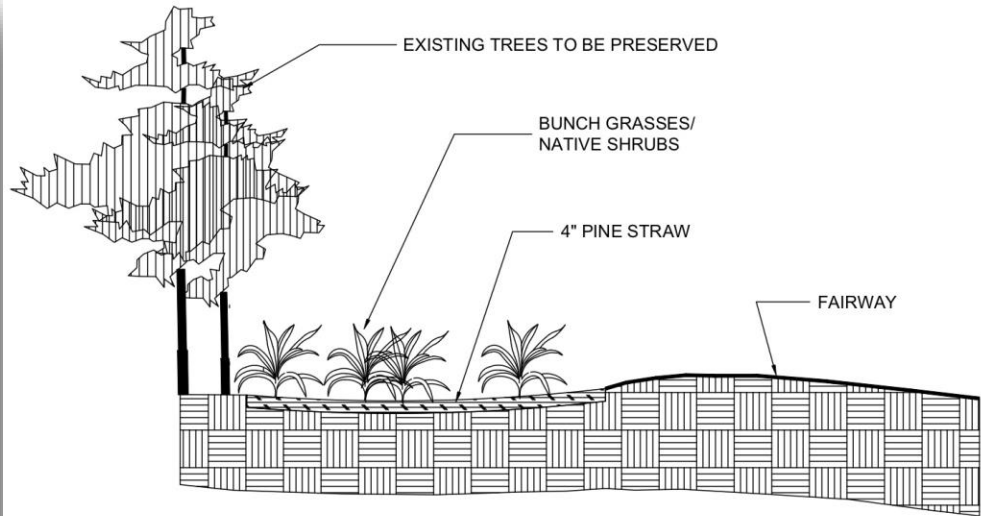


OPEN WATER / WETLAND PLANTINGS

N.T.S.



Turf Conversion Alternatives



RE-LANDSCAPED AREAS

N.T.S.

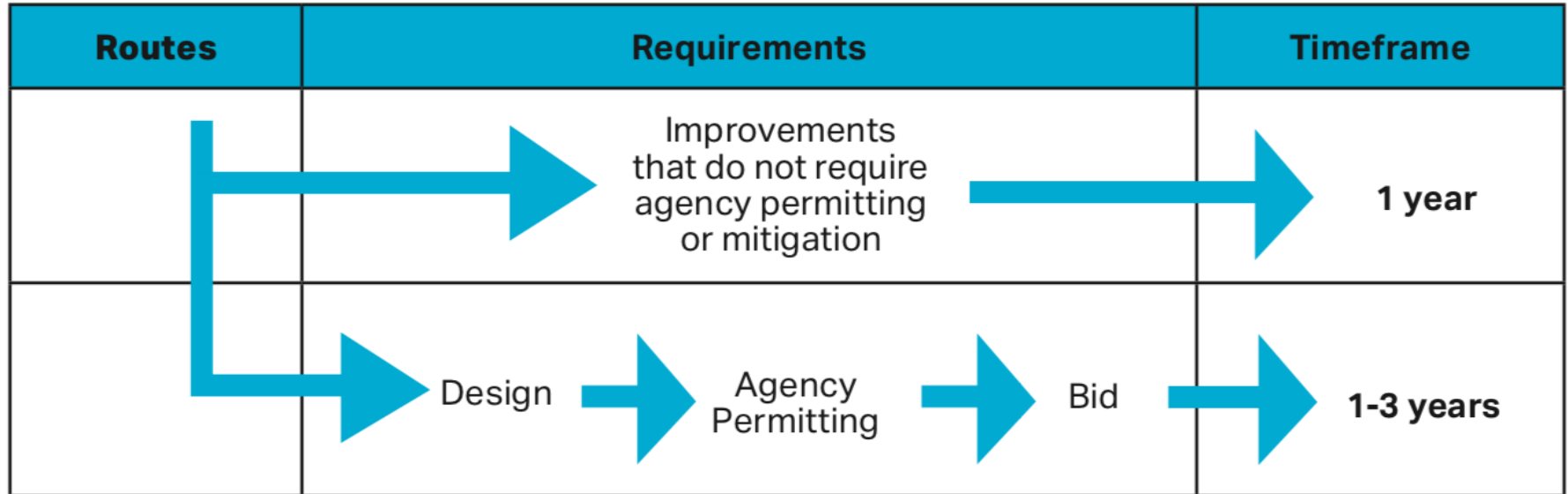
Probable Costs

ITEM	AMOUNT
Mobilization/Demo	\$322,372
Grading	\$161,400
Drainage	\$145,500
Hardscape/Landscape	\$1,347,075
Irrigation	\$83,100
Contingency	\$205,945
Direction Costs Subtotal	\$2,265,392
Soft Costs:	\$339,808
Total Costs:	\$2,605,200

Irrigation system upgrade not included.



Implementation



Summary

- Raise 10.3 ac to keep the course open during high tides
- Irrigation system changes to reduce water use has saved \$125,000 in 1st year
- Existing turf area 130 acres, proposed turf area 88 acres, a +/-35% reduction in water, fertilizers, pesticides, man hours
 - 21.3 ac natural crushed stone
 - 12.5 ac native areas
 - 7.9 ac aquatic plantings
- A net reduction of approx. **\$350,000** annually in water costs



“The combination of several sources of GPS information put together by the Team at Sanford Golf is invaluable to our efforts to reduce irrigation costs at Crandon Key Biscayne. The USGA Heat Map data, coupled with the irrigation pattern representations provided, clearly identifies areas where we can take immediate steps to improve our conservation efforts.”

*Steve Jablonowski,
General Manager*

Thank you!

5th Golf Innovation Symposium

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