

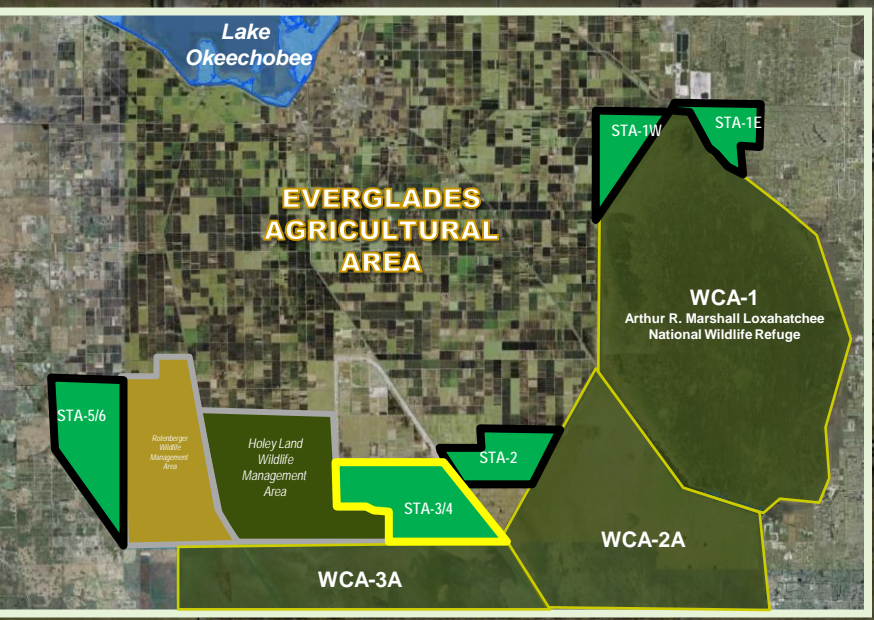


STA-3/4 Periphyton-Based Stormwater Treatment Area Project Update

Tracey Piccone, P.E.,
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Water Quality Treatment Technologies Section

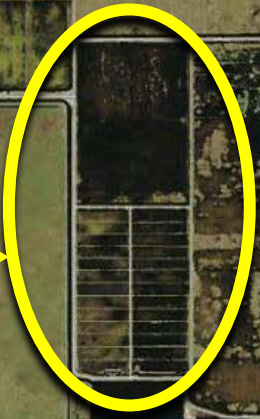
Quarterly Long-Term Plan Communications Meeting

May 23, 2012



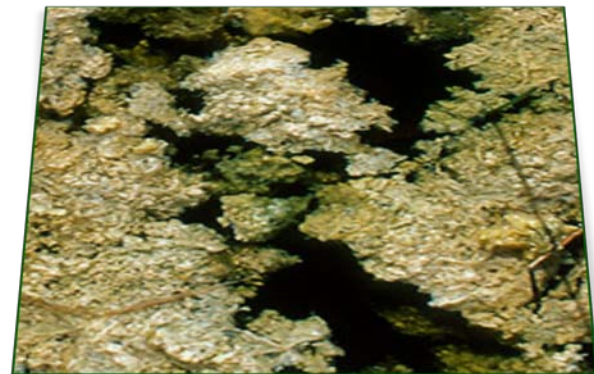
STA-3/4

PSTA Project →

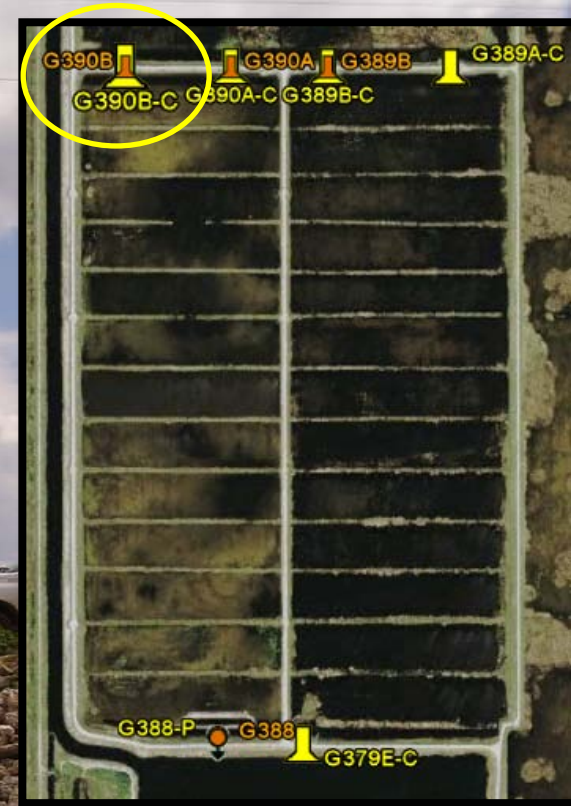


PSTA Project Update

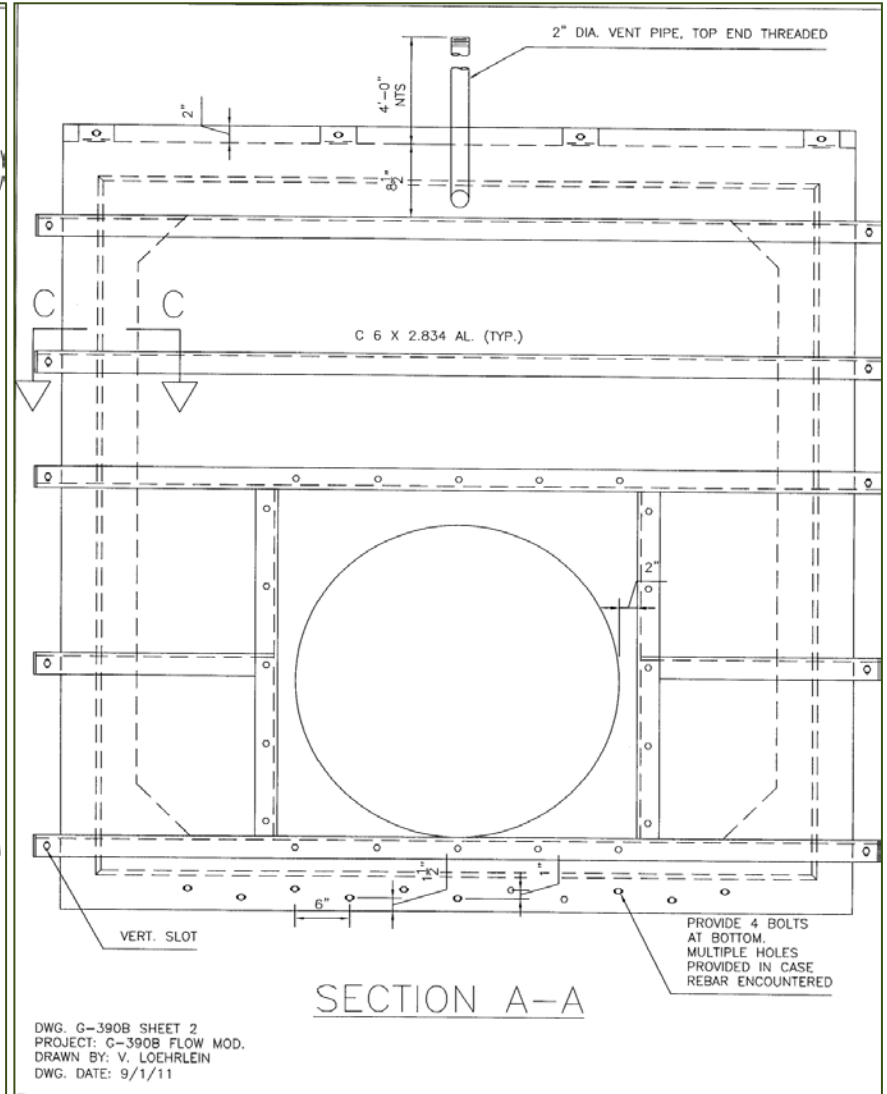
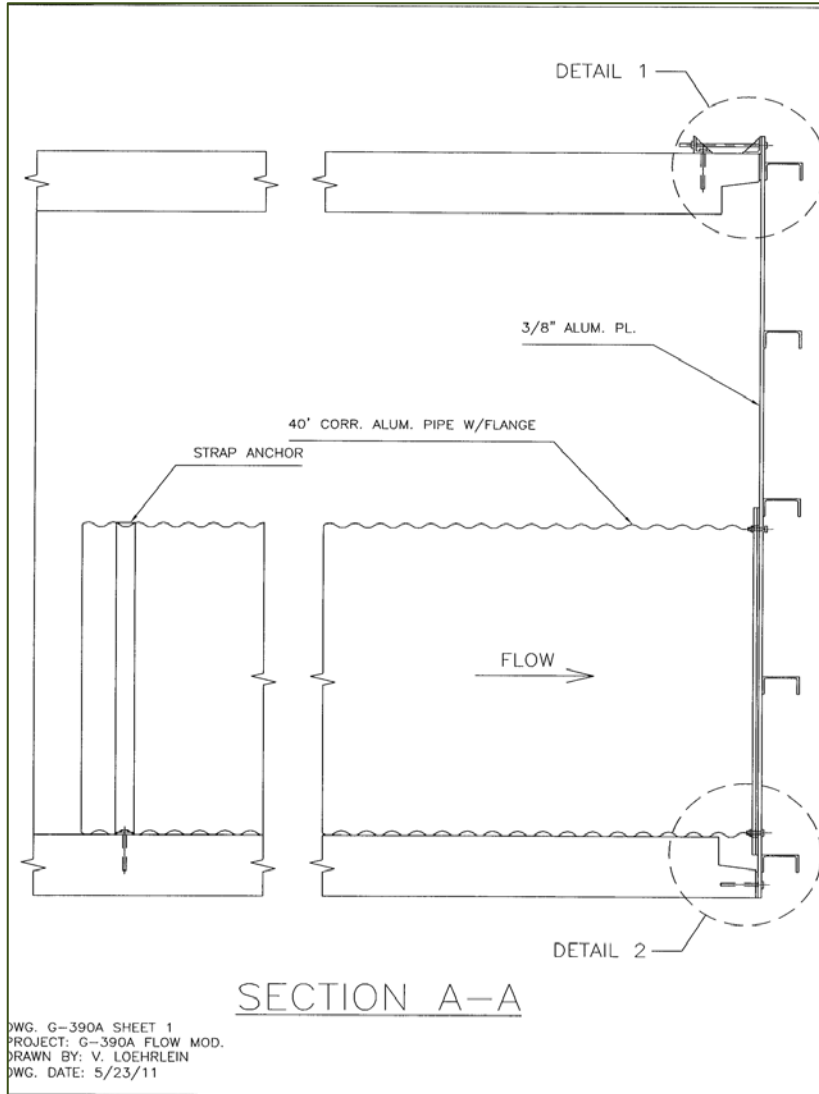
- **Structural Modifications to improve flow and load estimates**
 - Modified G-390B to improve flow measurements
 - Modified one pump at G-388 pump station to reduce flow rate
 - Modified vegetation strips
 - Seepage estimates and water budget improvements
 - Proposed HW sensor at G-378E and TW sensor at G-379E
- **PSTA Project Research Plan**



G-390B PSTA Cell Inflow Structure Upstream Side



G-390B Modification Design



G-390B Modification Installation – October 2011



G-388 Outflow Pump Station Modifications



G-388 Outflow Pump Station Modifications

- Pump Speed of Pump #2 changed from 350 rpm to 224 rpm on August 11, 2011
- Revised flow rating equation is now being used to compute flow through Pump #2

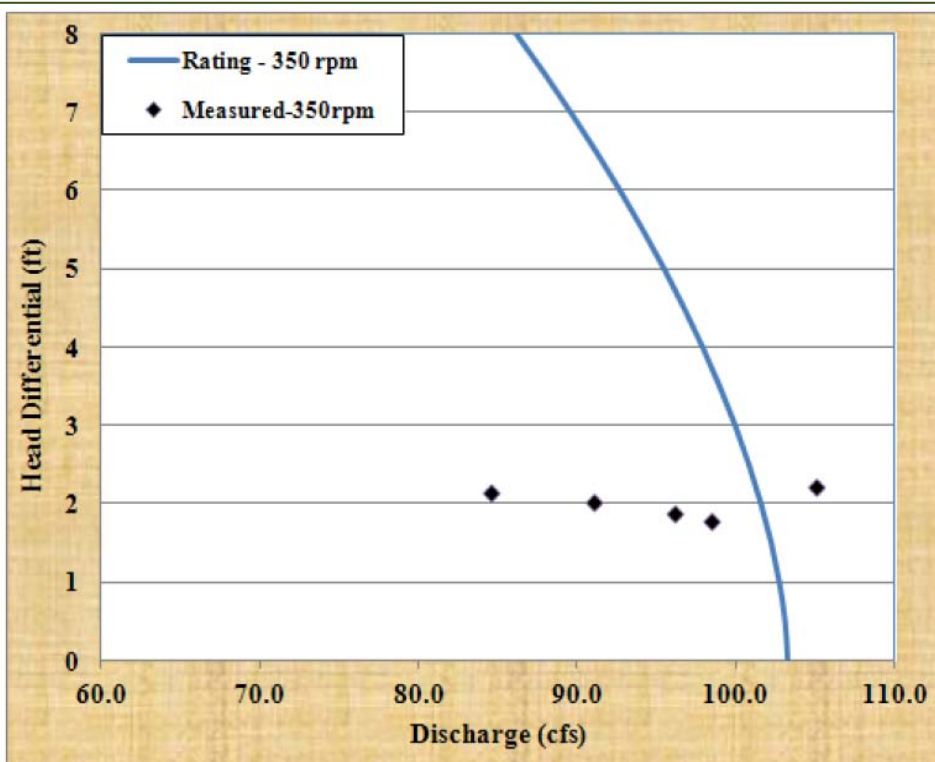


Figure 2. Current rating curve for Pump #1

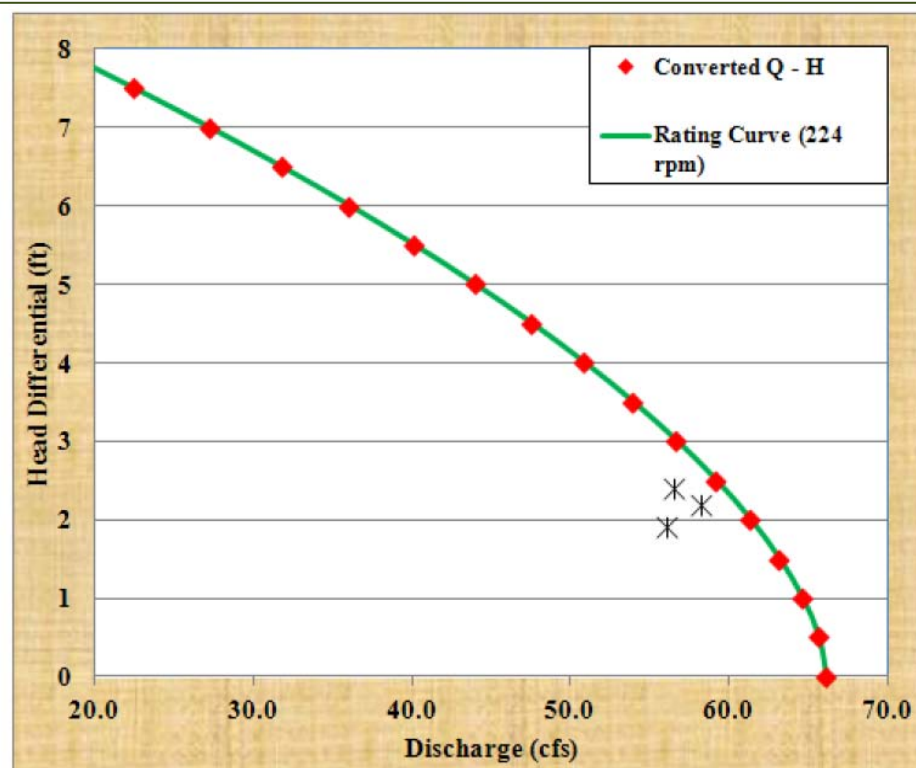


Figure 3. New flow rating curve for Pump #2 with pump speed of 224 rpm

Reference: FLOW RATING ANALYSIS FOR PUMP UNIT 2 AT PUMP STATION G388 (Sheng Yue and Emile Damisse, February 2012)

G-388 Outflow Pump Station Modifications



Figure 2. Discharge pipes shown with Pump #2 operating under 222 RPMs.



Figure 3. Making tachometer reading on Pump #2 impeller shaft.



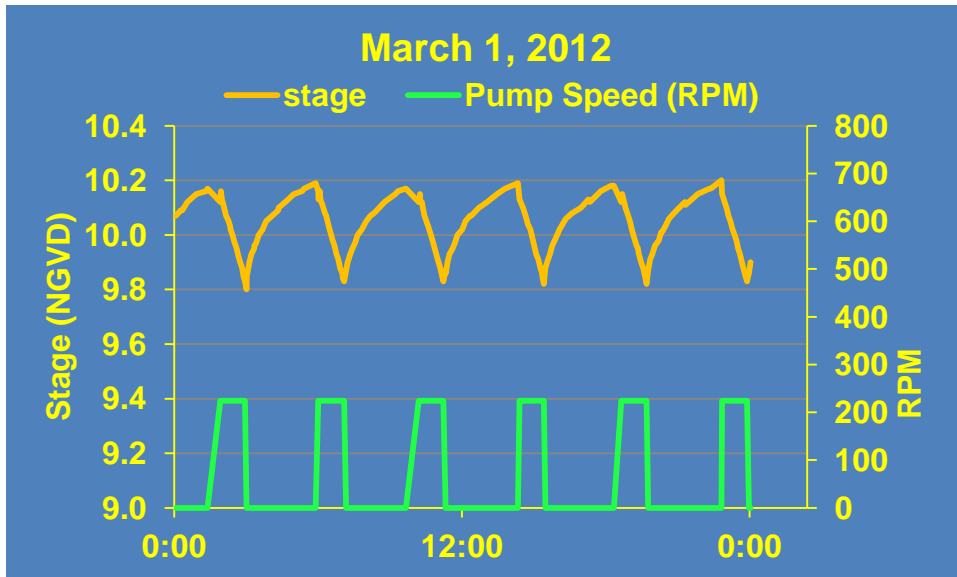
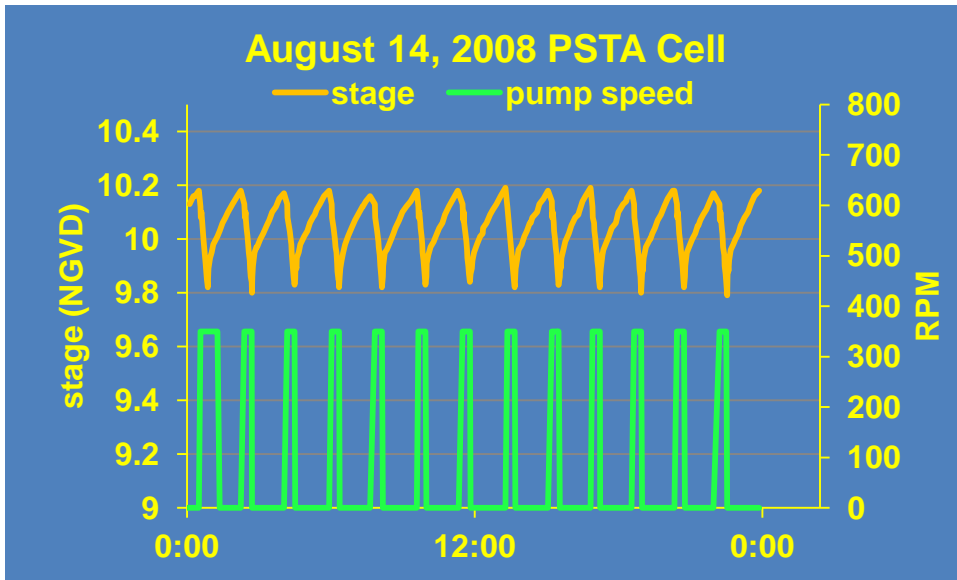
Figure 4. Showing channel cross-section where flow was measured.



Figure 5. Close-up of tachometer display for Pump #2.

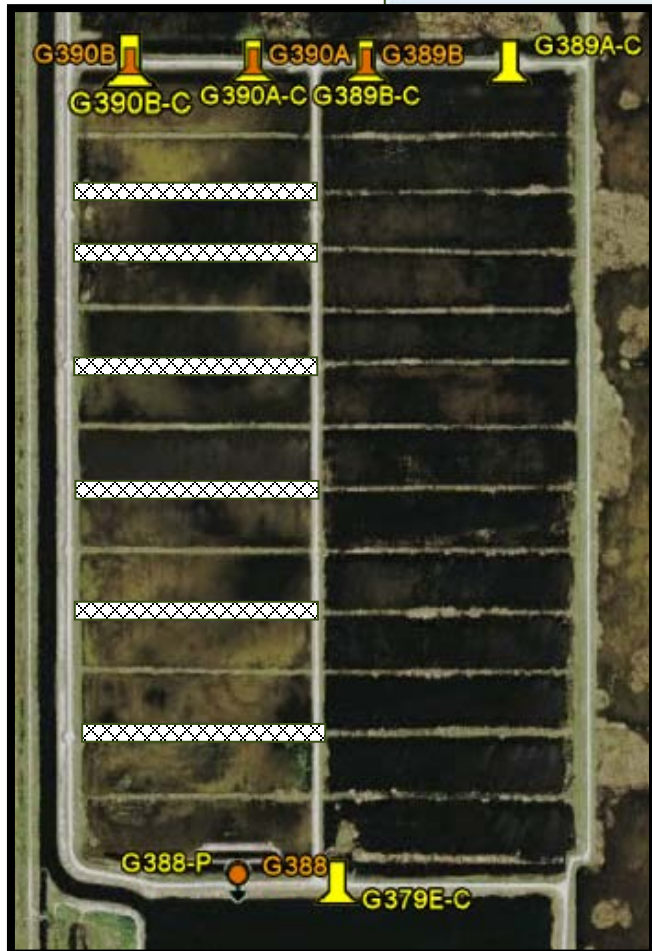
Reference: ADCP Streamflow Measurement Report for G-388 Pump Station - August 31, 2011

G-388 Outflow Pump Station Modifications



Plots by Tom James (DBKEYS TZ220 and TZ221)

PSTA Cell Vegetation Strip Modifications Herbicide and Mash







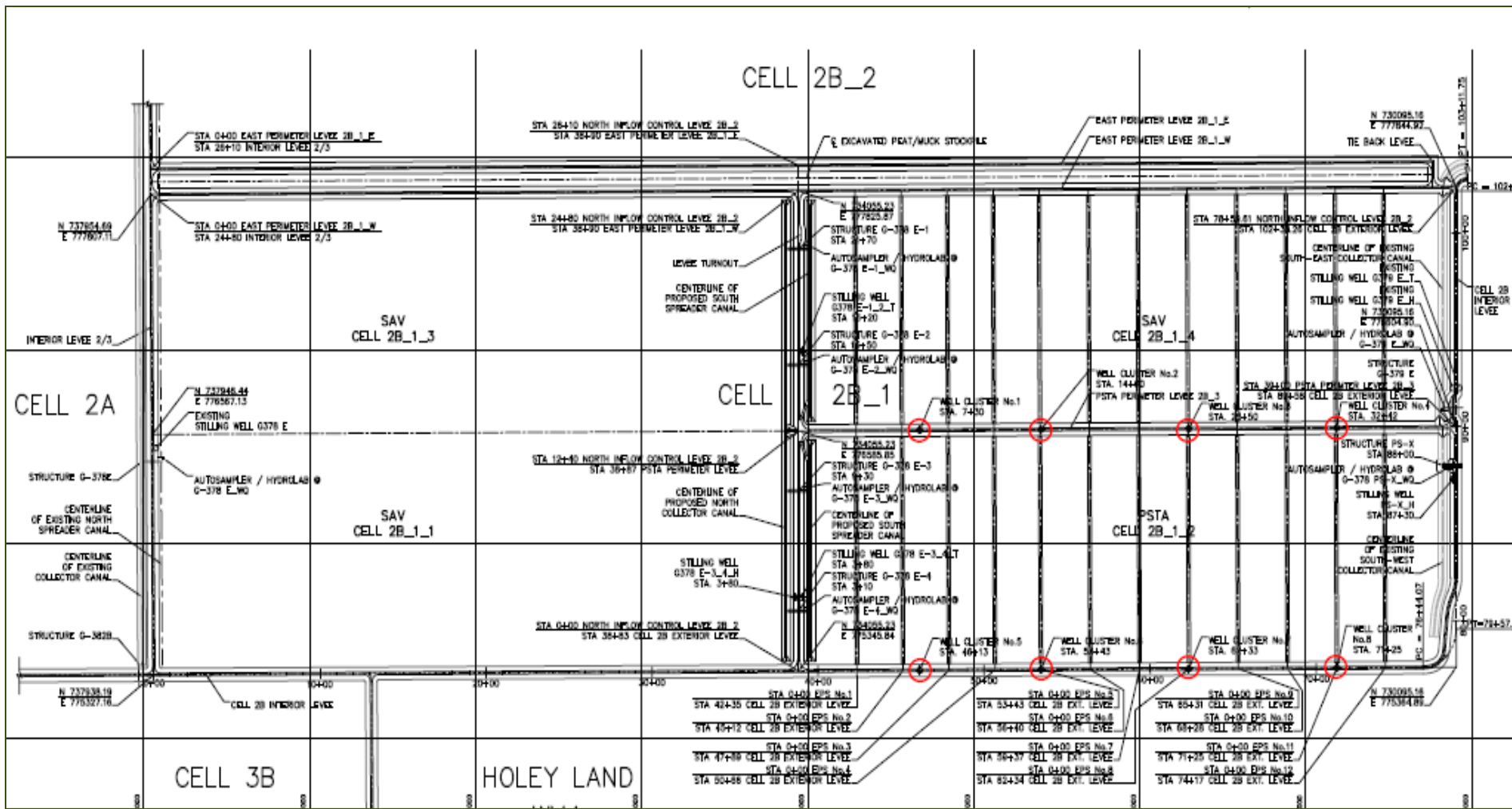
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 **MARSH MASTER**





PSTA Cell Monitoring Well Locations



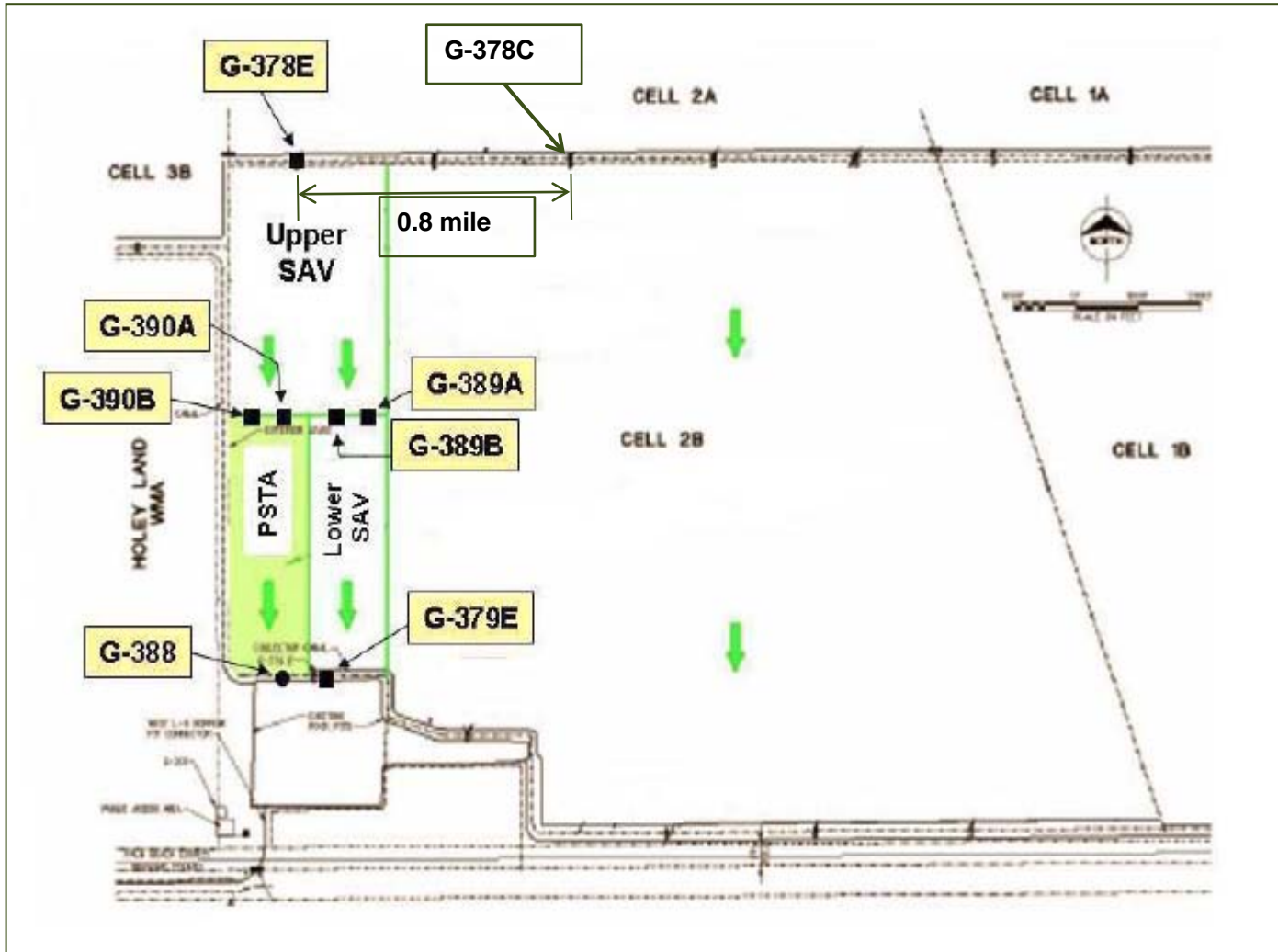
PSTA Cell Monitoring Well Sampling



Proposed HW and TW Sensors

- Sensors at G-378E HW and G-379E TW are needed because sensors at nearby “surrogate” structures are currently being used to estimate flow
- Differences in surface water elevation in treatment cells upstream and downstream of these structures as compared to the surrogates cause large errors in flow estimates and TP measurements
- Accuracy of water and phosphorus budgets for the overall PSTA project has been impacted, and as a result, confidence in the data associated with the PSTA project is not as good as it could be if more accurate flow data were available

Proposed HW Sensor at G-378E



Proposed TW Sensor at G-379E



PSTA Research Plan

Research Plan Objective:

Provide more accurate assessment of PSTA technology performance; determine factors that contribute to the performance and replication options.

What are the important design elements and biogeochemical characteristics that enable the PSTA Cell to achieve ultra-low outflow TP levels?

Characteristics of major ecosystem components of the PSTA Cell

Substrate conditions (scraping/limerock addition/soil amendments)

Vegetation (SAV/periphyton conditions/role of vegetation strips)

What are the key operational ranges that enable the PSTA Cell to achieve ultra-low TP levels?

Hydraulic loading rate (HLR), pulsing, extreme events (dry-out and re-flood)

P loading rate (PLR) and concentrations

Range of water depths (maximum/UV light penetration)

What management practices are required to sustain the PSTA Cell's good performance?

Sediment stability (dry-out/re-flood/high flows events)

PSTA Research Plan Sampling locations

PSTA Cell Internal Sampling Locations

Surface Water

- TP, TSP, SRP, DOC, UV absorbance, alkaline phosphatase activity (APA), calcium, sulfate, NH₄-N, NOx, TKN,
- TP, TSP, SRP, DOC, UV absorbance
- Total P only
- ▲ Remote P analyzer

Vegetation and Sediment

- Monitoring for semi-quantitative SAV cover & floc depth
- Sediment, SAV and periphyton chemistry, SAV biomass, periphyton APA
- ★ Periphytometer deployment

Hydraulic and hydrology

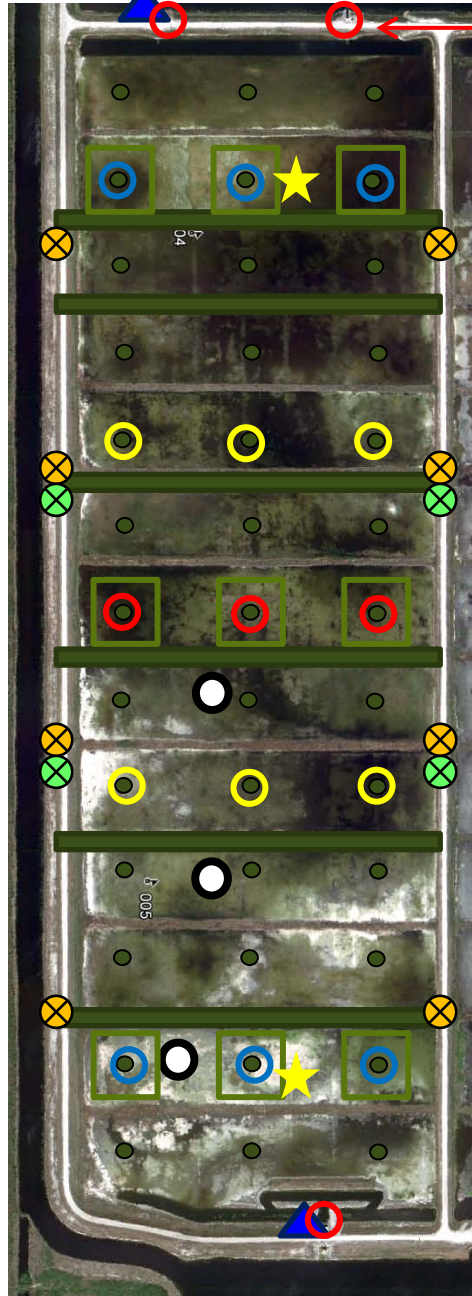
- Internal stage recorder
- ⊗ Seepage water level
- ⊗ Seepage water quality

Draft Date: 4/24/2012

Transect
Row &
Column

1 2 3

A
B
C
D
E
F
G
H
I
J
K
L
M



PSTA Inflow
(G-390A
sampled only
if flowing)

PSTA Outflow

Questions?

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