

Up-Flow Filter using Bold & Gold

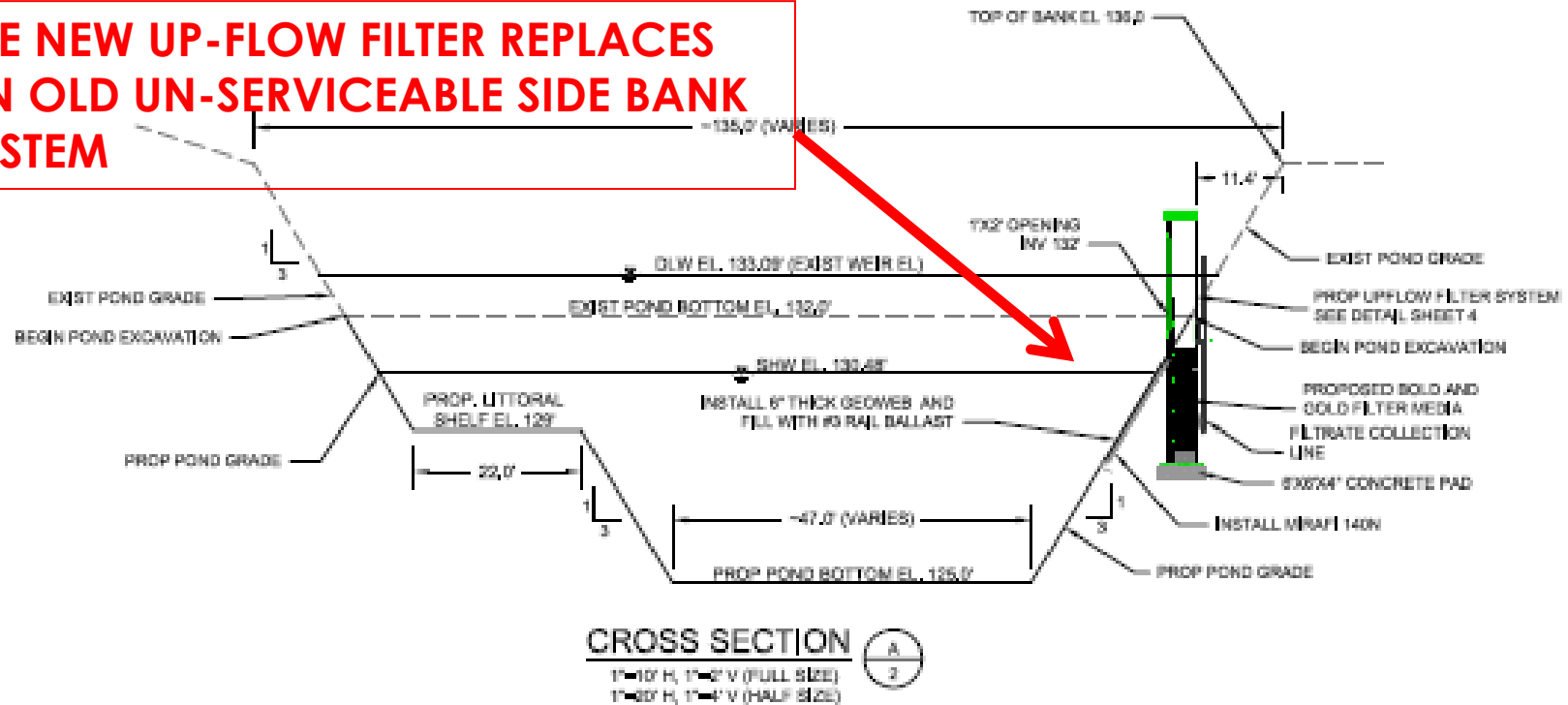
Lakeland Florida

Walgreen Store using ECT3 (expanded clay and tire chip media)

Distributed by ECS, Apopka Florida

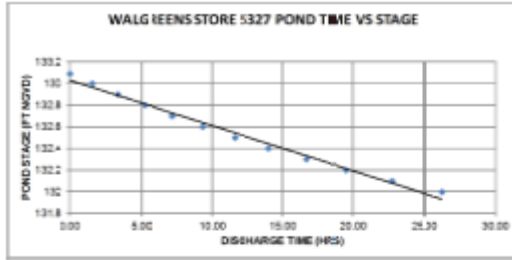
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THE NEW UP-FLOW FILTER REPLACES AN OLD UN-SERVICEABLE SIDE BANK SYSTEM



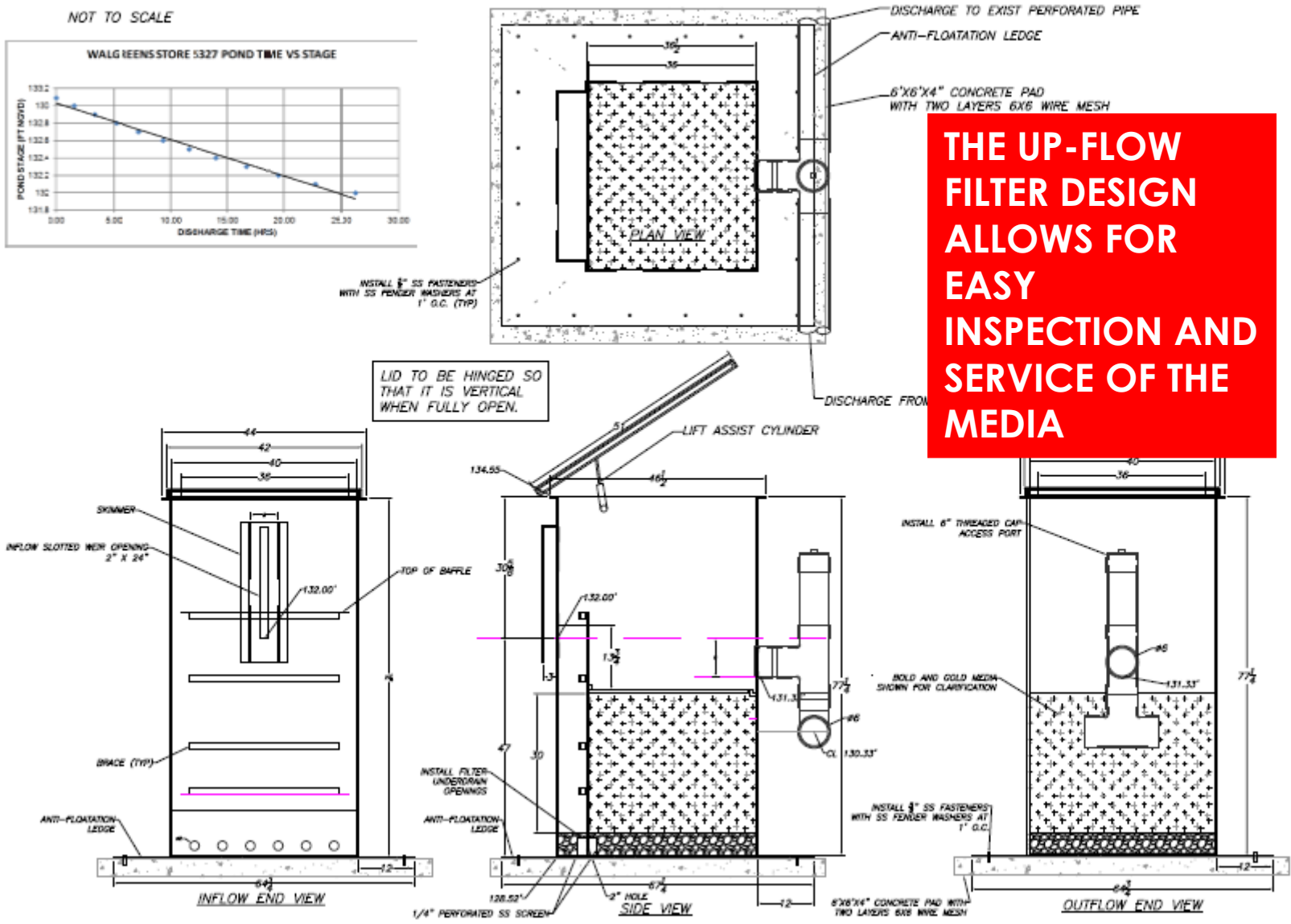
Example Pond Retrofit Design for Upflow Filter

NOT TO SCALE



INSTALL 1/2" SS FASTENERS WITH SS FENDER WASHERS AT 1' O.C. (TYP)

LID TO BE HINGED SO THAT IT IS VERTICAL WHEN FULLY OPEN.



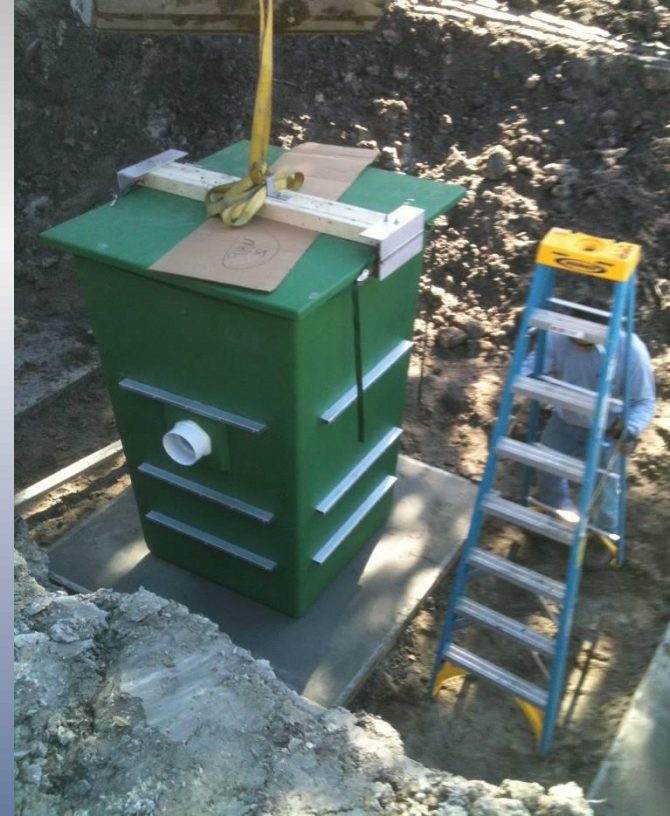
THE UP-FLOW FILTER DESIGN ALLOWS FOR EASY INSPECTION AND SERVICE OF THE MEDIA

DATE: 08/11/2011	SCALE: 1/8" = 1'-0"	PROJECT: WALGREENS STORE 5327
DRAWN: J. WATKINS	CHECKED: J. WATKINS	DATE: 08/11/2011
WALGREENS STORE 5327 6985 S. FLORIDA AVE LAKELAND, FL 33813		
WATERMARK ENGINEERING GROUP, INC. 100 MILLWOOD AVENUE, SUITE 200 LAKELAND, FL 33813		
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DESIGN by Watermark Engineering Group

Up-Flow Filter Installation



Improved Treatment Using An Up-flow Filter with Wet Pond

Observations

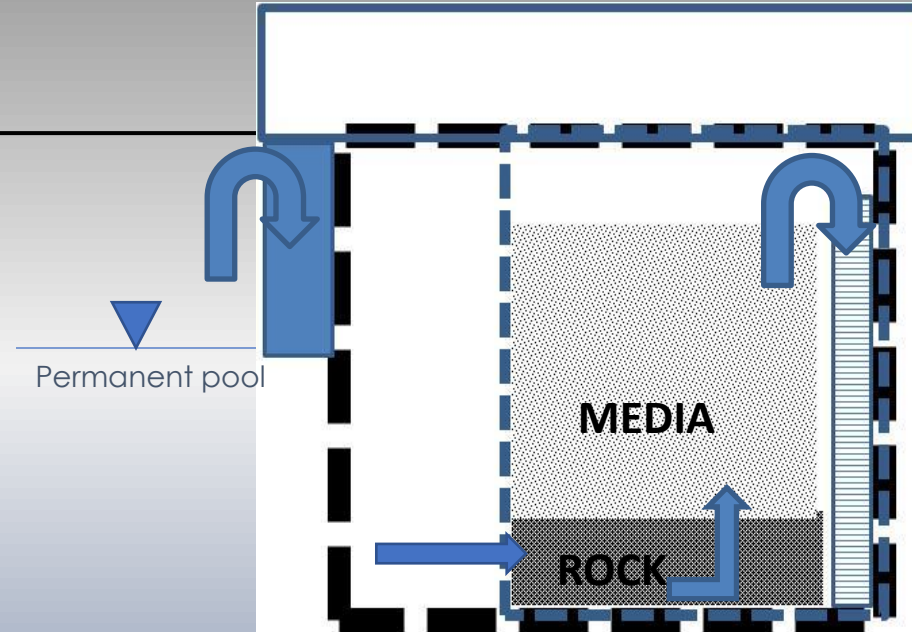
- Filters can be designed to remove nitrogen without media replacement
- For phosphorus, media replacement time is specified
- Can be easily cleaned
- Can be used in BMP Treatment Train
- Takes no more area



Up-Flow with Wet Detention Performance Data

• Summary Data

- Concentration data based
- Averages based on 6 events
- Construction cost less than under drains
- Average yearly based 1.0 inch design for filter



Parameter	TN	TP	TSS
Average Influent Concentration (mg/L)	1.83	0.73	42.7
Average Filter Removal (%)	22	25	60
Average Pond Removal (%)	62	63	79
Average Pond + Filter Removal (%)	70	72	91
Average Annual System Performance	67	70	89

Field Data

FIELD DATA

Date:	pH			Turbidity			DO			Temp
	Pond In SU	Filter In SU	Filter Out SU	Pond In NTU	Filter In NTU	Filter Out NTU	Pond In mg/L	Filter In mg/L	Filter Out mg/L	°C
3/25	7.14	7.25	7.05	10.5	2.50	2.25	7.20	6.09	0.61	22.5
4/8	7.20	7.40	7.30	39.0	5.47	4.52	7.08	4.09	1.14	24.0
4/14	7.15	7.20	7.05	4.40	1.19	1.12	7.13	7.54	0.27	25.2
4/15	6.90	6.85	6.8				6.23	7.10	0.59	27.0
4/28	6.76	6.67	6.45	32.5	2.85	1.96	5.29	5.80	0.36	29.1
AVG	7.03	7.07	6.93	21.6	3.00	2.46	6.59	6.10	0.74	25.6
% Change based on pond influent					86%	89%		7%	89%	
% Change due to filter						18%			88%	

USING 5 SAMPLES: NOx (mg/L) IN=0.77 OUT=0.025 97% removal