Stirrup Key Homeowners Association

Board Meeting

Tuesday, March 31, 2015 6 PM at the Rodriguez residence

Board Members Present: Marv Schinder, Barbara Cavanah, Sergio Rodriguez, Hal Leftwich, Teny Deane, Rick Bisson, Steve Levine

Residents Present: Dusti Jones, Gail Schindler, Bill Smith, Gayle Teget, John Teget, Bob Jones, Mike Katz, Joni Katz, Maria Rodriguez, Carol Later, Fran Meares, Scott Cavanah, Bob Belcaster, Carolyn Belcaster

Single item agenda: Bridges

The meeting was called to order by SKHOA president Marv Schindler. Marv explained that the purpose of tonight's meeting was to share information regarding the bridges in the community. The initial evaluation of the bridges by Solaria (now K2M) indicated that the bridges were reaching the limit of their life expectancy and needed attention. It is not the intent to make any motions or take any votes during tonight's meeting, as decision-making information regarding bridge replacement is still being gathered.

Marv turned the meeting over to Bob Jones. Bob has done extensive research regarding the bridge project and shared his findings.

Bob reported that the vertical bridge supports were in good shape, but the bridge spans were spalling underneath. He explained the findings by Solaria (these reports had been posted previously on the SKPOA website) and information regarding water flow through the canal at the first bridge, referencing both the Lin study and the Biosurvey report. Bob's report will be attached to the minutes from this meeting and posted on the Bridges page of the SKPOA website.

Sergio suggested that Bob continue to explore options regarding the bridges. Marv agreed that Bob has demonstrated that he is the best person to head up the effort. The consensus is to keep the canal open rather than closing it. Possibilities for grant funding for improving flow through the flushing canal were discussed as well.

Question: do we work on the bridges, then the canals, or vice versa? Does order matter?
Answer: TBD

Question: do we need to meet city standards or our own standards?
Answer: Army Corps of Engineers will likely be involved at some point. The engineering firm will manage the permitting.

Marv reminded everyone that information about the bridge project is posted on the website. If anyone has a question, don't hesitate to ask! When the time comes to make a decision about paying for this project, and should there be the need for an assessment, the association will meet and vote on such a matter at the appropriate time.

The suggestion was made to move ahead with clearing the canal as soon as possible. Bob has contacted a local company regarding mangrove trimming.

Bob has agreed to continue with the project and will work with Marv as the project moves forward. Sergio volunteered to assist as well.

Respectfully Submitted,

Barbara Cavanah
SKHOA Secretary

Dr. & Mrs. Robert D Jones
326 Stirrup Key Blvd.
Marathon, Fl. 33050
443-480-1023 bjones@dmv.com

SKHOA Board, President March 16 2015
Re: South Bridge Replacement Planning

Solaria Engineering (Steve Grasley) conducted a structural evaluation of our bridges and submitted a report (see SKHOA web site) recommending from best to worst 1. **BEST** Removing one lane at a time and replacing it with a precast span. This would be the easiest and quickest to permit with no permanent alteration to the water flow or sea floor. 2. **SECOND BEST** Installing precast box culverts to support concrete or fill placed over the culvert then pavement. Culvert walls down to cap rock, some restriction in flow, little chance of fill erosion. 3. Attempting to pass smaller precast culverts under the existing bridges, risky and old bridge structure deterioration would continue in the supporting material, 4. Place precast concrete planks over the current bridges, requires alterations to adjacent residential properties, would have deterioration of the underlying old bridge. 5. Design an esthetically pleasing custom architectural bridge. **Please note that NONE of the options involved closing a flushing canal.**

Our president suggested that just filling in the flushing canal, driving over it for compaction then paving would be the cheapest route. We were all concerned about the possibility of outrageous bridge replacement costs and our president was trying to offer options to keep our dues low, which we appreciate. Subsequently the engineer, Steve Grasley, came under the impression that the association wanted this cheaper fill option. He recognized that permanently closing the flushing canal would eliminate current flushing and prevent future options to clear the canal and re-establish enhanced flushing. This option would be in direct opposition to recommendations adopted by environmental authorities for Stirrup Key harbor in the Monroe County Canal Master Management Plan (CMMP). Even though it would be a poor choice environmentally, he thought he thought he might be able to get the fill option permitted.

Regarding costs and assessments, Solaria reported a total project cost (tentative) of $50,000 to $100,000 including both bridges. Our reserves are at about this level, and have been increasing significantly since we passed an assessment increase from $350 to $500 per building lot. It may be possible to fund the bridges over an extended replacement schedule with little or no member assessment. At the other extreme, an assessment of $1,000 per lot would cover the total high end projections. Our cost risk may not be as severe as we imagined initially and serious there are other serious issues that have not been properly addressed.

A comprehensive analysis of canals throughout the Keys has been conducted for the county by AMEC in an extensive partnership with federal, state and local environmental agencies. The driving force behind the analysis is to meet DEP Chapter 62-302, DEP Class III Marine Dissolved Oxygen Standards in Keys canals.* For Stirrup Key the specific recommendations are to increase canal flushing, employ weed gates, and remove biomass sediment.** These recommendations are supported by EPA, Army Corps of Engineers, SFWMD, FDEP, FDH, NOAA, FKNMS (all of the environmental & regulatory agencies)*** and the recommendations are published in the Monroe County Canal Management Master Plan (CMMP). To close our flushing canal would be in direct opposition to these official recommendations and to close a flushing

canal would require a biologist's report that puts spin within the report's language to try to get the project thru permitting. Biosurveys report is absolutely NOT, and does not hold itself out, to be a recommendation about which bridge option is BEST from an environmental perspective. It does not reference DEP DO legal requirements, FKRAD, Monroe County CMMP, the documented consensus of all environmental agencies involved in the CMMP to increase flushing in Stirrup Key. Quoting Harry DeLashmut in the Biosurvey's report, *"The preferred option of the design engineer is to use a solid support system or fill and contain the basin water separate from the eastern bay."*, in plain talk, **Biosurveys report is written to support the engineer's stated predetermined choice to fill in the canal and the report omits extensive scientific evidence as well as overwhelming consensus among environmental agencies calling for enhanced canal flushing for Stirrup Key.**

In crafting such a report, Biosurvey's includes language like "There would be a possible decrease in organic nutrient load into the basin from the mangrove forest during tidal flow." Since there is minor nutrient loading in Florida Bay and mangrove waters, this statement can probably be made, recognizing that it is very misleading. Here is why. Blocking the canal would stop Florida Bay's and the mangrove forest's minimal nutrient content from entering the harbor. At the same time, the harbor waters contain much more nutrient load from seaweed than is found in the flushing waters from Florida Bay and mangrove forest. So keeping the canal open and keeping exchange of water between Florida Bay and the harbor would actually decrease nutrient load in the harbor. FDEP publications and other official reference sources point out that mangroves REMOVE nutrient and bind carbon. The mangrove forests are referenced as essential "water cleaning machines" not a source of eutrofication. (Senior Inshore Water Scientist AMEC).

Arguments for closing the flushing canal also seem to be accompanied by some widely disseminated **misconceptions** as well as an apparent willingness to utilize **substandard bridge construction** methodologies. The implications for both should be understood. Since bids have not been submitted we are early enough to change the plan.

1. Misconception number one: There is little or no flow in the first canal. Based at least in part on this misconception, Biosurveys states that closing the canal would not adversely affect water quality in our harbor. However, **the Biosurveys report and the 2002 Lin & Associates Hydrographic Engineering Evaluation BOTH measured flow rates in the flushing canal and their measurements agree** at 0.3 feet per second. That both studies report the same flow rate might be unexpected because we presume mangrove roots would have grown into the canal since the Lin Study and slowed flow. However the congruence in flow measurements can be explained in 2. below. In any case a single hour of this flow rate produces about 135,000 gallons of water exchange but only at PEAK flow. (Lin table 3 & 7)). Lin also plots flow over an extended time frame (Table 7) and an estimate of flow volume (section 3.5). Based on Lin's flow volumes we get a 6 hour tidal flow volume of 400,000 gallons. **So a flow volume of between 100,000 and 400,000 gallons per tide direction seems unassailable and is quite worthwhile in terms of flushing the harbor of organic nutrient and providing dissolved oxygen critical for sea life.**
2. Misconception number two: There is little or no flow at mid to low tide because the Florida Bay end of that canal is blocked and the canal is overgrown with mangrove roots preventing significant flow at least at mid to low tide. Observation seems to verify this. It should be noted however, that one entire side of the canal has no

canal wall. That side of the canal is continuous with the mangrove forest. **Florida Bay water floods into the mangrove forest, thru the entire length of the open mangrove side of the flushing canal and into the harbor, then back out, twice a day,** most prominently between mid and high tide. There is so much lateral flow thru the side of the flushing canal that mangrove roots and sediment down the center of the canal do not the dictate flow during much of the tidal cycle. (Biosurveys) This may explain why Lin and Biosurveys reports, conducted about twelve years apart, measured the same consistently good peak flow rate.

3. Misconception number three: Mangroves and sediment in our flushing canal can not be trimmed or cleared to re-establish historic flow volumes. Actually **both Property Doctors, a certified mangrove trimmer, and George Garrett, Director Planning & Zoning state that permitting for clearing flushing canals is relatively easy.** A preliminary written estimate of $2,500 to clear mangrove roots was obtained a year ago. We will not hang our hat on that number. Proprety Doctors further mentioned that there are multiple available levels of mangrove removal and permitting.
   It should be noted here that both **the Biosurveys report and the Lin Study point out that based on hydrologic factors and tidal measurements, flushing thru this canal could be improved by clearing the canal.** The Lin report also made fascinating recommendations on how to not only re-establish natural flow but how to inexpensively enhance that flow and keep the canal clear with a small economical thruster.**** Similar technology is recommended and being permitted in a CMMP demonstration project at this time. This is exciting.

4. Misconception number four: According to Biosurveys, closing this flushing canal could "POSSIBLY" decrease nutrient flow into the canal from mangrove nutrient loads. This statement is offered with obvious reservations and is made without any supporting hard nutrient measurement data. **Authorities document that in stagnant harbor extensions subject to extreme seaweed nutrient loading like ours, the nutrient levels in Florida Bay waters that continuously flush thru mangrove forests are extremely dilute in nutrient load compared to the harbor waters.** When the lead AMEC scientist for inshore water quality on the CMMP project, Greg Corey, was asked about mangroves contributing to canal nutrient loading, he said mangroves are actually "water cleaning machines." When asked what he thought about closing our flushing canal he said "DO NOT CLOSE IT." **The ramp end of our harbor is subject to extreme nutrient loading, overwhelmingly and almost exclusively from seaweed not the mangrove forest.***** ^

5. Misconception number four: Filling the flushing canal would be the quickest and cheapest bridge replacement method. There is a major caveat in this statement. Standard construction practices using fill, call for removing the existing bridge, excavating about 1.5 feet of muck under the bridge down to cap rock, forming each side, pumping water out of the canal, applying fill in shallow layers, compacting each layer with powered equipment, and using an accepted erosion prevention method down to cap rock. **Cheaper canal fill options skip much of the standard construction practices and may have long-term, high cost consequences.** We currently have gross evidence of fill erosion from substandard construction technique behind the seawall when entering the flushing canal from the harbor,

where recent sewer pipes were installed, behind concrete supports for our bridge and extending up under the existing road. ^^

Solaria's inspection showed however that the supporting concrete walls for both existing bridges are sound, resting on cap rock and reusable. **Replacing our small spans with precast units was Solaria's BEST rated option. The small precast bridge slabs are easy to install, and importantly, may rival the cheapest alternative, including properly done fill, in initial cost. Using the precast plank option should avoid a plethora of permitting problems and related costs because we would not alter or permanently impact, sea life, sea bottom, waterway or water flow.**

Our family business was road construction. So I was exposed constantly to roadway, bridge and culvert problems from settling and erosion of fill when engineers hired by developers cut costs in construction specifications. Roads settled, pavement cracked, water intruded causing erosion under the pavement, sides of fill eroded under inadequately extended erosion prevention ("cement armor"). Constant repairs and eventually rebuilds were common. Legal actions were common. Everyone loses. **We should obtain good faith written cost estimates, including permitting costs, life cycles, and scope of construction technique, reflecting use of accepted industry standards or substandard techniques.**

What we need to know:

1. **Dissolved oxygen (DO) is the most important measure of Keys residential canal water quality per the Florida Department of Environmental Protection (FDEP) and CMMP scientific consensus.*** The Florida Department of Environmental Protection in a consensus position with the Florida Keys National Marine Sanctuary, NOAA, FIU, UF, etc. set DO target levels for Florida Keys canals to approach background DO levels found in the adjacent Florida Bay. These agencies all agree that flushing canals are critical to providing Florida bay oxygen levels to canals. (Monroe County CMMP) **Closing the flushing canal eliminates DO exchange. Closing the flushing canal would be an irreversible mistake.**
2. The **DO levels within water flushing into our harbor from Florida Bay THRU THE MANGROVE FOREST has actually been MEASURED and exceeds dissolved oxygen levels called for by FDEP** in Keys canals. This point is important to understand. Exchange of DO from Florida Bay to our harbor thru the flushing canal and mangrove forest is critical to inflow of DO as well as outflow of seaweed nutrients from our harbor.
3. Literally **all of the environmental agencies, research organizations**, and non-profit environmental groups with an interest in reef, inshore and canal water quality **list two top priority measures for harbor water quality improvement** in harbors like ours with northwest facing openings and southwest right angled extensions. , 1. **Most important is WEED GATES** to prevent seaweed from entering Keys canals, and 2. **Next most important,** is to **INCREASE THE AMOUNT OF FLUSHING** of canals with water from Florida Bay. *
4. Monroe County in cooperation with these agencies is right now in the process of major county wide initiatives to restore water quality in Keys canals under state and federal law mandates. (Monroe County Canal Management Master Plan, CMMP, FKRAD) Unincorporated Monroe County tax dollars, Restore Act funds, Amendment One funds and other funds flowing to the county from the Trans Ocean as well as BP Oil Spill

settlements, fines and penalties are all emerging as part of the funding stream for the Monroe County CCMP.

Please be warned that if we close our flushing canal with bridge fill we may never see it reopened.

As we move forward, we should be very much aware that the Monroe County CMMP is the county's attempt under Florida Keys Reasonable Assurance Document (FKRAD **to meet DEP Chapter 62-302, DEP Class III Marine Dissolved Oxygen Standards, as required by law. Failure to reach dissolved oxygen standards required by federal and state law places the us at risk for expensive federal and state interventions at local property owner's and tax payer's expense. Reopening the canal to meet FDEP DO levels later could be extremely costly.**

Regarding benefits to our association and its members, Realtors routinely warn clients to avoid buying on canals with dead ends and no flushing. Written comments have been submitted from realtors about pending sales falling thru and offers being reduced in Stirrup Key because of historically nasty harbor conditions. Good water quality in our harbor affects the values of our homes. With this and other considerations in mind, previous efforts to improve Stirrup Key harbor water quality have generated petitions of support signed by the majority of home owners.

We all live directly on the harbor, near or across from the harbor, stroll thru our community, drive by the harbor, have friends, family and guests who visit and are exposed to the harbor. Water quality in our harbor clearly affects the overall quality of life in Stirrup Key.

A discussion with many of our neighbors thru happenstance encounters finds that there is uniform support for keeping the flushing canal open. (see cc list)

In overview the best options for replacement bridges, without permanently closing the flushing canal, may not entail a member assessment. It is unlikely that any of the best options would cost over $20,000 more than the cheapest, the equivalent of $200 per lot. $200 dollars is the cost of a night out, and could be the most appropriate one time and best long term expenditures Stirrup Key could make.

With the well-researched and documented additional information presented here, the prudent step for our association is to redirect the engineering team (now K2M Design) away from a fill option and to request reasonable written estimates of the costs, life cycles, permitting issues and scope of work for the best alternatives to replace the bridges. That information should be subject to review, questions and appropriate discussion before committing to a final bridge replacement plan. I am willing to help in this effort if authorized to do so.

Please consider this a request for the board and officers to take these actions. We would be happy to convene a meeting to present and discuss the above findings if indicated.

Respectfully submitted on behalf of a substantial group of concerned Stirrup Key residents.

Robert D Jones 443-480-1023 bjones@dmv.com

Attachments:

*State Law requiring cleanup of Keys canals with focus on **DO** and **flushing**

**CMMP recommendations for SKHOA (Weed Gate, Flushing, Sediment Removal) and complete access to CMMP on web plus by free thumb drive

***List of partner agencies making recommendations found in Monroe County CMMP

**** Lin mechanically assisted flow recommendation

***** Photos seaweed masses with weed gate operational

^ Photo pre-weed gate seaweed in harbor

^^ One of several erosion areas around bridge from poor construction

Cc:
K2M Design
Katz
Sligar
Bisson
Bossert
Jones
Mears
Parenti
Rodriguez
Guerin
Bumbaugh
Teget
Chesser
Blake
Leo
Sevonty

The following are directly from the Monroe County CMMP Public Outreach Presentation, (P 8)

1. Many of the Keys canals are identified as impaired showing exceedances of DEP Chapter 62-302 Surface Water Quality Standards for nutrients and dissolved oxygen
2. Florida Keys Reasonable Assurance Document (FKRAD)
   - Developed in 2008 by the FDEP to address canal impairments
   - Alternative to establishment of Total Maximum Daily Loads (TMDL)
   - The FKRAD Update of 2011 outlined extensive waste water and storm water restoration activities to address the nutrient impairments
   - Stated additional canal restorations would be needed to achieve the DEP Class III Marine Dissolved Oxygen Standard, as required by regulation
3. Ramifications of continued impairment
   - State and Federal mandated management practices

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CMMP restoration techniques (*Presentation p. 30*)

focused on improving the canal water quality conditions related to reduced dissolved oxygen and associated lack of flushing

- **Removal of accumulated organics** from within canals
- **Weed gates, air curtains or other physical barriers** to minimize additional organic accumulation in the canals
- **Culverts and connections** to facilitate **flushing**
- **Backfilling** to prevent occurrence of deep stagnant zones
- **Pumping systems** to facilitate flushing

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Water Quality Summary Classification Criteria

DO Conditions	**Biological Conditions**	**Water Quality Summary**
> 4.0 mg/L	Positive	Good
> 4.0 mg/L	Negative	Fair
3.0 – 4.0 mg/L	Positive	Fair
3.0 – 4.0 mg/L	Negative	Poor
< 3.0 mg/L	N/A	Poor

To access CMMP web site: Search Monroe County Canal Restoration, click first web site click on Residents, click Planning & Environmental Resources, click on Marine Resources in left column, go to Studies, click MCRCIA Part 7 for text and several spread sheets

Monroe County CMMP Final 9-26-13.pdf (page 58 of 226)

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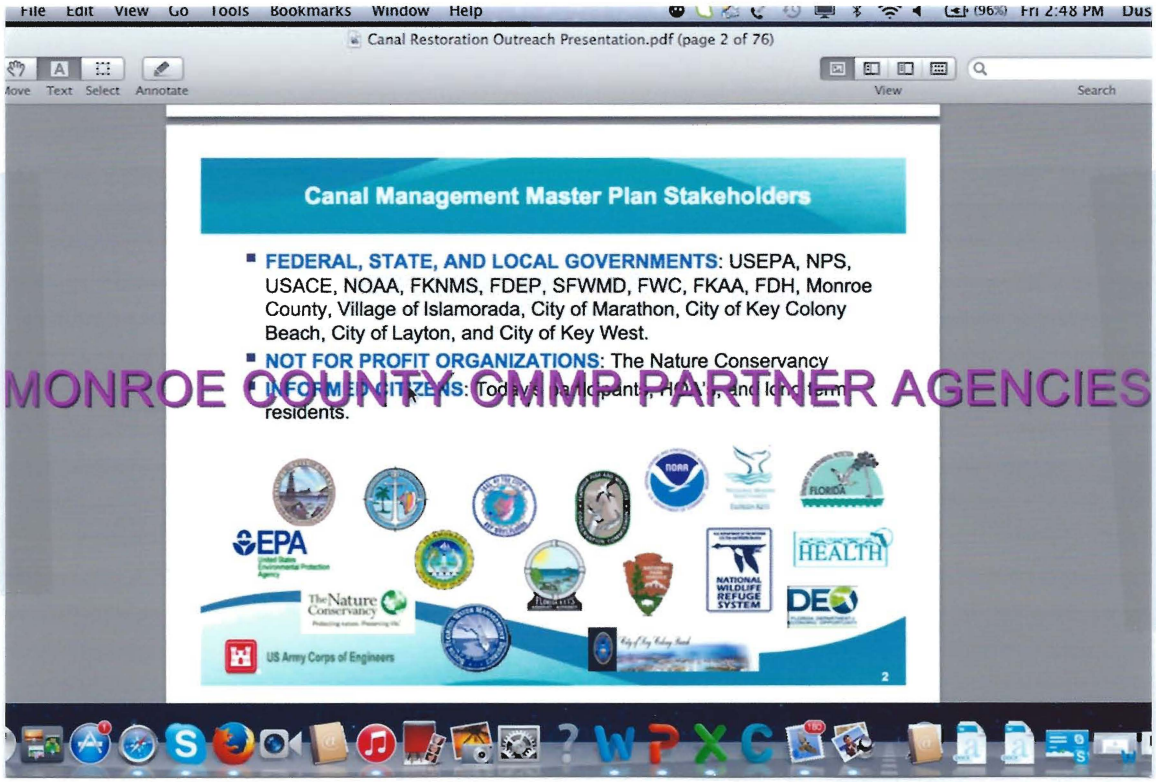
TABLE 1: RESIDENTIAL CANAL ATTRIBUTE TABLE

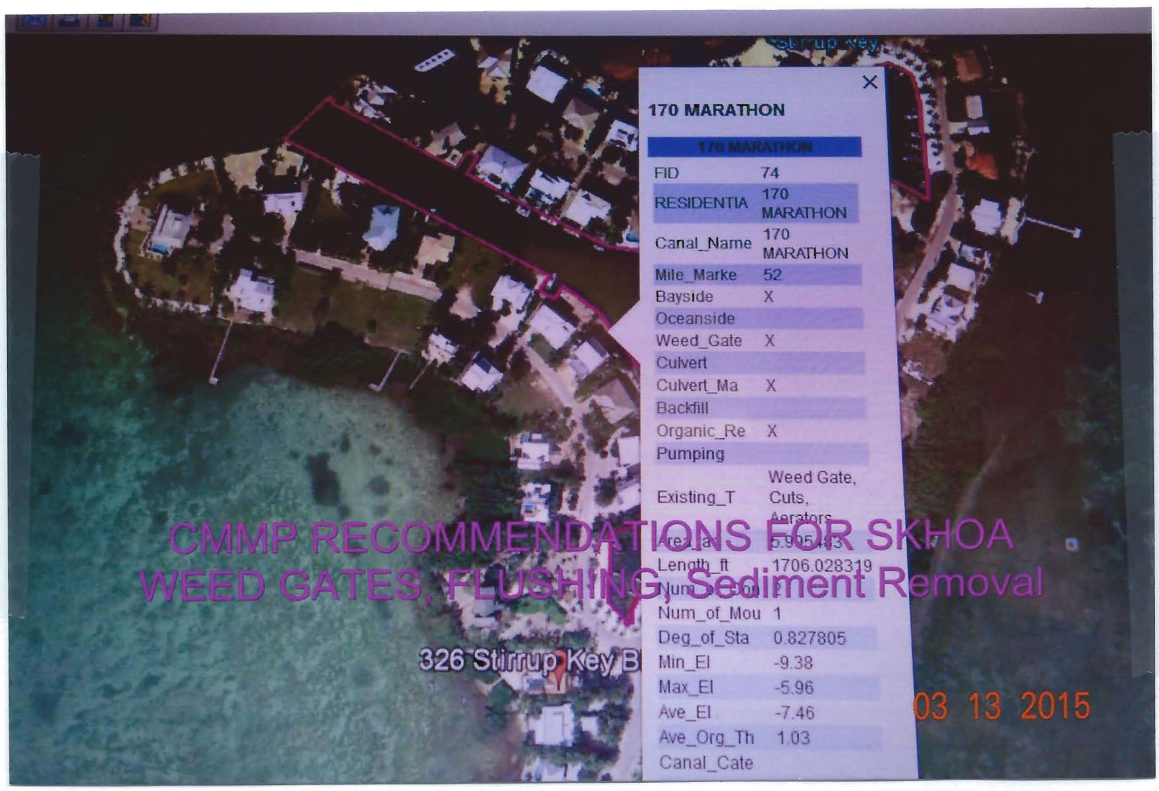
Canal_Name	Mile_Marker	Bays-side	Ocean-side	Island_Name_Community_Area	Weed Gate	Culvert	Culvert Maint	Backfill	Organic Ram	Pumping	Existing_Treat	Area_ac	Length_ft	Perimeter_ft	A_L_Ratio	Num_of_Convolutions	Num_of_Mouths	Deg_of_Step	Min_El	Max_El
*58 LOWER MATECUMBE KEY	74	X		LOWER MATECUMBE KEY	X				X			0.622547	295.2747	826.908427	9_5	0		0.8	-7.83	-7.36
*59 LONG KEY LAYTON	68		X	LONG KEY LAYTON							Several aerators throughout	5.232103	*738.8366*9	8137.332883	*31.1	4		0.6	-22.35	-7.73
*60 LONG KEY	68		X	LONG KEY								*15.88	*917.1573	2124.3582*8	49.3	0		-0.3	-10.0*	-6.63
*61 LONG KEY	68		X	LONG KEY								0.867602	72*.7733*92	*526.765*88	52.4	0		-0.4	-8*.3	-6.47
*62 LONG KEY LAYTON	66	X		LONG KEY LAYTON	X			X	X		Culvert	2.875436	*15*.10	4417.055869	*36.0	4	2	0.1	-26.72	-6.52
*63 LONG KEY LAYTON	66	X		LONG KEY LAYTON	X			X			Flushing channel	2.802926	*1*5.46	4205.594284	*39.4	4		0.1	-30.80	-6.76
*64 DUCK KEY	61		X	DUCK KEY							Cuts - Culverts	55.05317	9829.68	42849.25148	244.5	6	5	2.0	-22.66	-6.70
*64 CONCH KEY ADDED 2	63		X	CONCH KEY							Cut through jetty	0.8	562.00	*227.6028*8	65.0	0.2		-0.5	-9.60	-6.39
*64 CONCH KEY ADDED 1	63		X	CONCH KEY							None	1.3	518.00	*298.3468*5	*12.8	*		-0.2	*5.25	-6.52
*64 CONCH KEY ADDED	63	X		CONCH KEY	X		X		X		Culvert	2.2	1038.00	2738.8**277	93.*	2	2	-0.1	-14.5	-6.82
*65 GRASSY KEY	57	X		GRASSY KEY		X				X		5.8*984*	*968.498	*258.0*6904	28.8	4	0	CLOSED	NS	NS
*66 GRASSY KEY	57		X	GRASSY KEY		X				X		5.066944	*640.4*5	5969.963539	*34.5	3.6	0	CLOSED	NS	NS
*66 GRASSY KEY ADDED	60	X		GRASSY KEY	X	X		X	X		None	1.8	953	3000.450397	80.6	2		-0.3	-17.68	-7.04
*67 CRAWL KEY	56		X	CRAWL KEY							None	2.413206	951.4374*92	2*91.797935	*10.5	0	0	CLOSED	*10.*2	-7.66
*68 CRAWL KEY	56		X	CRAWL KEY							None	3.616004	*148.287219	2638.237518	*37.2	0	0	CLOSED	-9.76	-6.52
*69 MARATHON	52	X		MARATHON						X		0.866*45	360.8880*92	884.8834*05	*33.2	0	0	CLOSED	NS	NS
*70 MARATHON	52	X		MARATHON	X		X		X		Weed Gate, Cuts, Aerators	5.995483	*706.0283*9	4495.089088	*53.1	2		0.8	-9.38	-6.96
*71 MARATHON	55	X		MARATHON				X	X		Backfilled to 8 feet below surface	2.5*1803	*279.5204*9	2697.305426	85.5	2		0.7	-5.*43	-6.96
*72 MARATHON	55		X	MARATHON								0.444724	295.2747	60*.774847*	65.6	0		-0.4	-9.52	-6.63
*73 MARATHON	55		X	MARATHON								0.7365*8	459.3182	896.6710*24	69.8	0		-0.3	-8.73	-6.59
*74 MARATHON	55		X	MARATHON								1.140655	590.549*	*267.962*27	84.*	0		-0.2	-8.*3	-6.67
*75 MARATHON	54		X	MARATHON							None	1.886422	459.3*82	1458.34237*	*78.9	0		-0.2	-20.*4	-7.66
*76 MARATHON	55		X	MARATH								1.468975	*87.3959*92	*599.832534	8.*3	0		-0.*	-8.89	-7.06
*77 MARATHON	55		X	MARATH								4.043079	*049.8623*9	2253.*754*3	*67.8	0		0.*	-9.47	-6.79
*78 MARATHON	55		X	MARATHL								2.468828	9*8.6324	2541.5398	**7.*	0		0.0	-7.42	-7.00
*79 MARATHON	56		X	MARATHON								2.36228*	984.249	2750.36*268	104.*	0		0.0	-8.43	-7.06
*80 MARATHON	53	X		MARATHON		X			X		Culvert to 233 *	1.368346	524.9295*92	*153.358734	*27	0		-0.6	-8.98	-5.67
*81 MARATHON	54		X	MARATHON								5.*18827	*640.4*5	2775.297*59	*35.9	0		0.3	-8.24	-7.28
*82 MARATHON	54		X	MARATHON								1.620195	687.74*1	*323.546294	**8.7	0		0.2	-8.47	-6.13
*83 MARATHON	53	X		MARATHON	X			X	X			0.759889	492.*245	*084.2326*	67.3	0		-0.7	-14.57	-6.94
*84 MARATHON	53	X		MARATHON	X	X		X	X		None	5.536426	*640.4*5	6764.233446	*47.0	6		1.0	-2*.*9	-6.47
*84 MARATHON ADDED	52	X		MARATHON	X	X			X		Weed gate	0.2	355	79*.3028383	26.0	0.2		-1.0	-7.03	-6.35
*85 MARATHON	54		X	MARATHON							None	4.850089	*476.3702*9	3502.863409	*43.*	0		0.3	-*1.*0	-7.49
*86 MARATHON	52	X		MARATHON	X	X		X	X		None	0.592*97	492.*245	*145.365393	52.4	0		-0.8	-9.3*	-8.45
*87 MARATHON	53		X	MARATHON							Culvert to 233	1.*85929	393.6983.92	**3*.338408	*27.9	0		-0.3	-9.59	-6.84
*88 MARATHON	53		X	MARATHON								0.68752*	524.9295*92	*228.49*495	57.*	0		-0.3	-14.96	-7.76
*89 MARATHON	53		X	MARATHON								1.252684	623.3544*92	*401.036854	87.5	0		-0.2	-13.9*	-6.*6
*90 MARATHON	54		X	MARATHON							None	5.726097	*541.3868*9	3*14.04222*	*61.8	0		0.3	-15.9*	-7.65
9 MARATHON	52	X		MARATHON	X	X		X		X		*6.97676*	2263.7694*9	12667.80088	326.7	7		3.0	-28.5*	-5.92
*92 MARATHON	53		X	MARATHON							None	3.382017	295.2747	2834.4655*3	498.9	2		0.2	-20.87	-7.74
*93 MARATHON	54		X	MARATHON								5.526767	*443.5819*9	2909.064858	*66.8	0		0.3	-*1.89	-7.67
*94 MARATHON	54		X	MARATHON								2.*02454	787.3959*92	*702.799798	*16.3	0		-0.*	-*6.98	-*0.53
*95 MARATHON	54		X	MARATHON							None	5.77*06*	*443.5819*9	30*6.468982	*74.*	0		0.3	-19.75	-*0.56
*96 MARATHON	53		X	MARATHON							None	4.077468	*706.0283*9	4851.2*964	*54.*	2	4	0.*	-16.**	-6.**

Recommendations For Stirrup Key

This Slide Lists The Agencies That Are Partners In The Monroe County CMMP



Thumb Drives With Comprehensive Information On The CMMP Including Google Earth Zoom In Information & Analysis & Recommendations For Every Canal Are Free From AMEC or The County



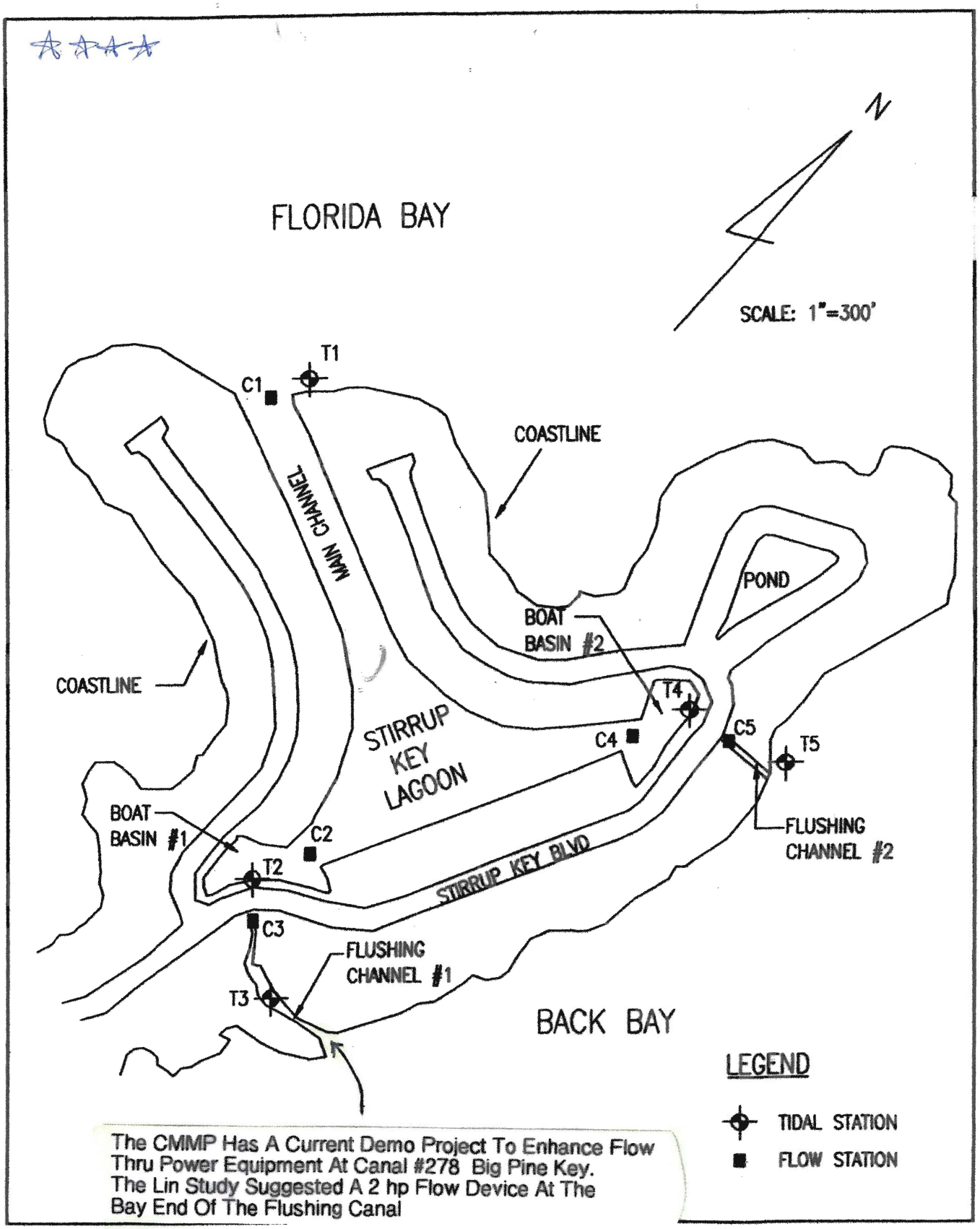
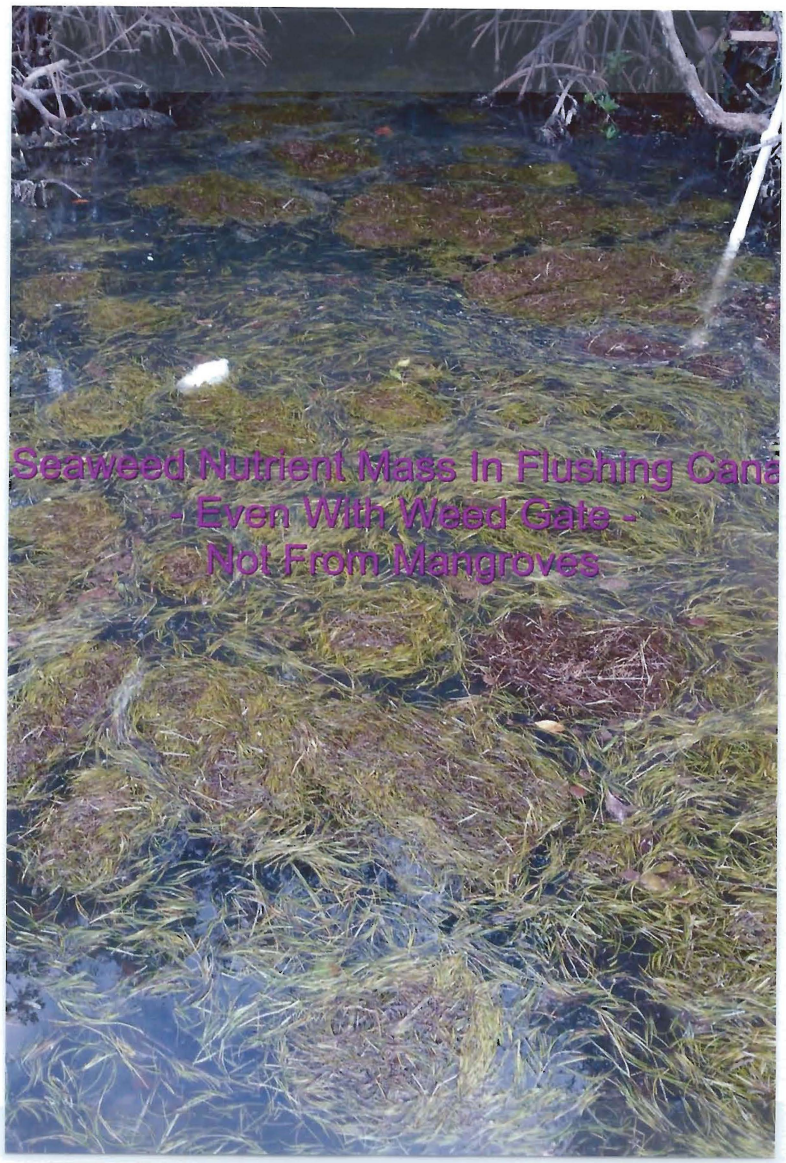


FIGURE 3

TIDE AND FLOW MEASURING STATIONS



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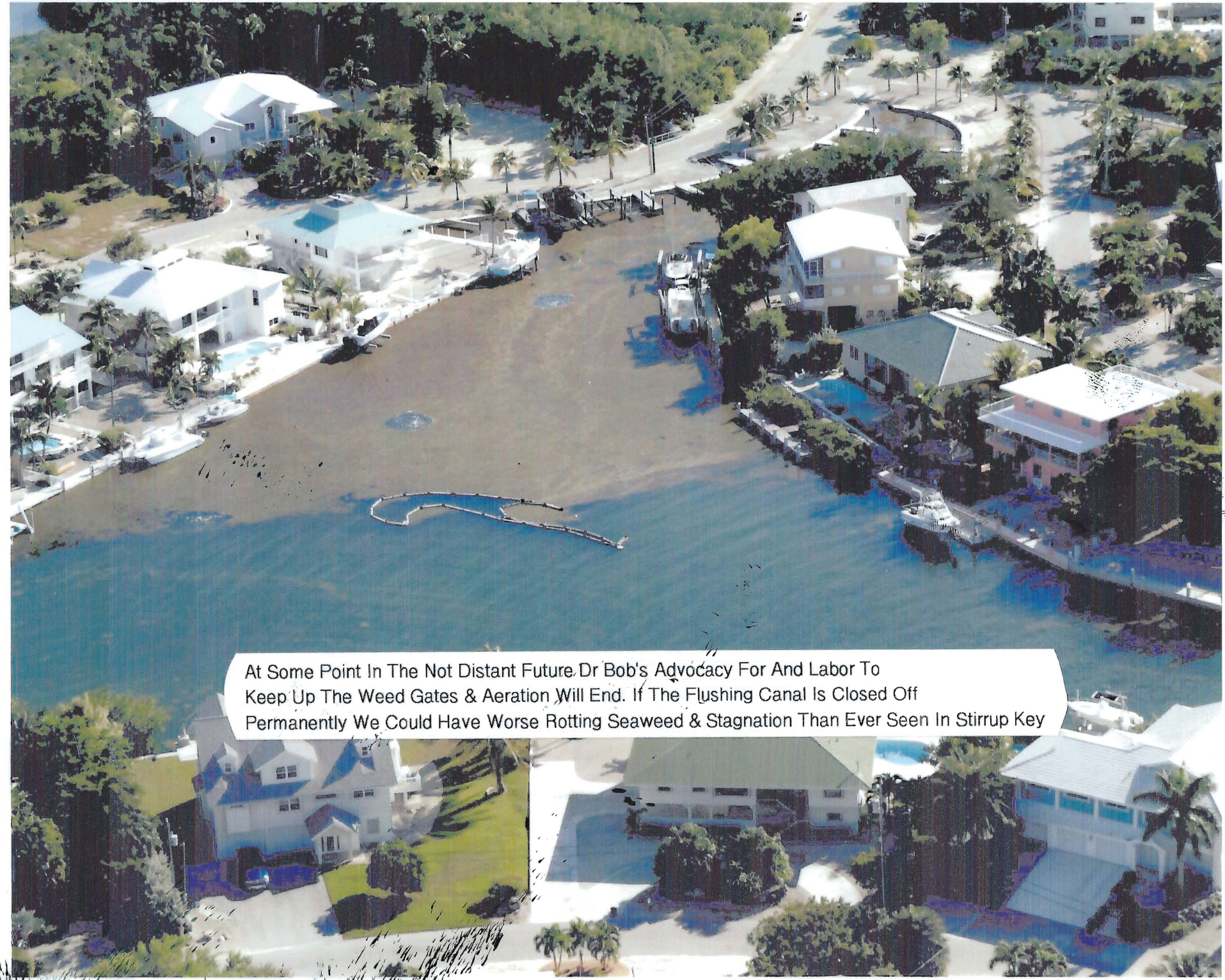
Masses of seaweed are commonly found near the boat ramp (shown), up into the flushing canal (shown), caught among pilings, around boats, and just outside of the inner weed gate between Mear's and Petit's docks, even when the main weed gate is working. Of course this is much worse when the weed gate is not operational. Similar masses of mangrove leaves are not seen in the mangrove forest or flushing canal or harbor. All environmental authorities in the CMMP agree that the overwhelming nutrient load in canals like ours is from seaweed and that mangrove forests are important for their role in cleaning the water of nutrients. Much of the seaweed we see now enters thru the second flushing canal which needs a more effective weed gate.


At Some Point In The Not Distant Future Dr Bob's Advocacy For And Labor To
Keep Up The Weed Gates & Aeration Will End. If The Flushing Canal Is Closed Off
Permanently We Could Have Worse Rotting Seaweed & Stagnation Than Ever Seen In Stirrup Key

AA

Fill Erosion From Substandard Construction Techniques

The photo above is from the opening into the flushing canal at the harbor seawall, showing extensive erosion behind the seawall and under the walkway, because erosion prevention was not extended down to cap rock. Erosion is also occurring under the cement "armor coating" of the fill in several other areas near the bridge, including under the sewer pipes installed about two years ago, and behind the bridge supports and under sides of the road.

It has been suggested that the cheapest way to replace the bridge is to remove one lane, dump fill in, drive over it to achieve compaction and coat the sides with cement. This method will almost certainly result in pavement settling, cracking, leaking water through the cracks and fill erosion from under the pavement plus erosion of the fill under the side cement coating if that does not go down to cap rock.

Properly done fill construction techniques include forming the canal lateral to both sides of the bridge, removing the muck under the bridge down to cap rock, pumping out water, applying fill in layers with power equipment compaction of each layer, and extending erosion prevention on each side wall down to cap rock. To assure adequate compaction both lanes may need to be closed at the same time. This is more time consuming and costly and is probably comparable in cost to installing precast replacement spans.