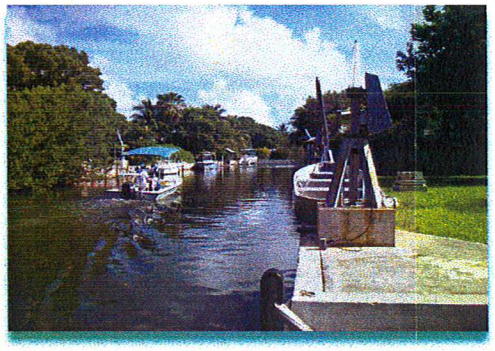
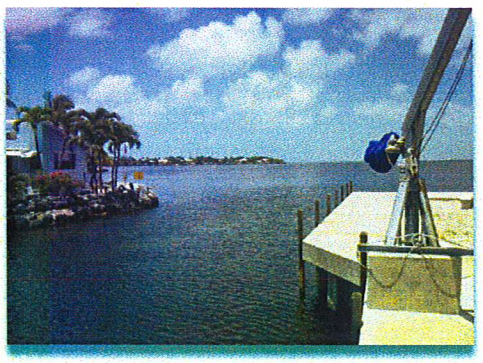


#286 Big Pine

#459 Geiger

MONROE COUNTY
SELECTION OF DEMONSTRATION CANALS FOR WATER QUALITY IMPROVEMENTS

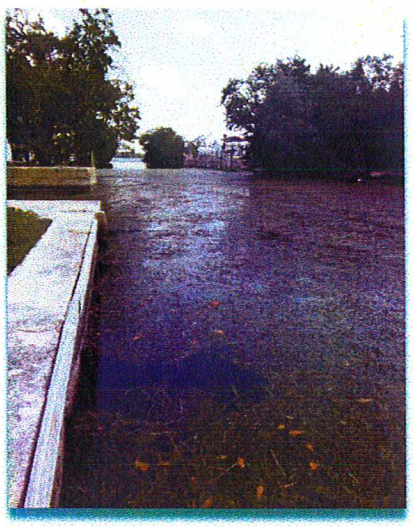
#277 Big Pine



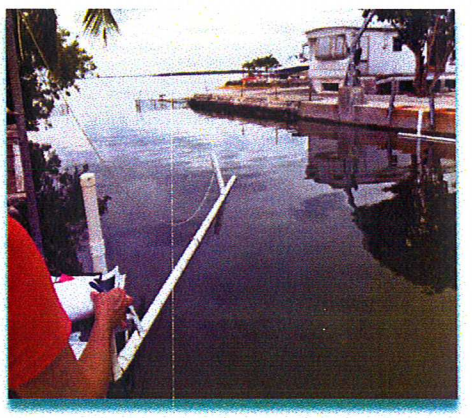
#29 Key Largo

#278 Big Pine

#288 Big Pine



#266 Big Pine



#290 Big Pine

PREPARED FOR:
MONROE COUNTY

PREPARED BY:
AMEC Environment & Infrastructure, Inc.

AMEC Project No. 6783-13-2507
November 8, 2013

TABLE OF CONTENTS

1.0 INTRODUCTION

Monroe County plans on implementing canal restoration techniques that are designed to improve the water quality of the Florida Keys canals and thus near shore waters affected by canal outflow. The Monroe County Board of County Commissioners (BOCC) has set aside $5,000,000 for completion of a 5 technology demonstration project for residential canal restorations. The canal restoration demonstration testing is the initiation of a County wide program to improve canal water quality. Implementing canal restorations that address dissolved oxygen will also provide reasonable assurance to the Florida Department of Environmental Protection (DEP) that these impairments are being corrected and that water body specific Total Maximum Daily Loads (TMDLs) will not be required.

The first task in the implementation of the demonstration projects is the selection of the most suitable canals for inclusion in the program. AMEC Environment & Infrastructure (AMEC) was awarded a task order by Monroe County in May 2013 to develop an objective process to select the demonstration canals.

1.1 OBJECTIVE(S)

The first step to implement demonstration projects of various restoration techniques is the selection of the residential canals for each of the identified technologies. Once the specific canals are selected, detailed scopes of services for the final design/permitting and construction of the canal restoration demonstrations can be completed.

The objective of the canal restoration demonstrations is to verify the applicability, feasibility, effectiveness, and costs in real time on Keys canals. The demonstration canal restoration results will assist in modifying, if required, the restoration designs, and will provide costs that can be utilized for future restoration planning. The demonstration testing will allow for future 'shovel ready' proposals to be prepared to obtain grant funding, particularly from Restore Action 2012 sources, where 'shovel ready' is a high priority for funding approval.

1.2 OVERVIEW OF SCOPE

A screening and ranking process was developed by AMEC to select the canal restoration demonstration projects to be funded by Monroe County. Monroe County stated that AMEC shall use a selection and ranking process approved by the County and the Water Quality Protection Program (WQPP) Canal Restoration Advisory Subcommittee. Monroe County has also indicated that only canals located within Unincorporated Monroe County shall be considered at this time as the source of the restoration funds is Unincorporated Monroe County Infrastructure tax funds.

This report presents the list of top ranked canals by restoration technology that were selected to be included in the demonstration program, as well as the screening and ranking process utilized to select the demonstration canals.

2.0 METHODOLOGY

AMEC was tasked with working closely with Monroe County to select at least 5 canal restoration technology demonstration sites that will be constructed using County funds that will be used to obtain realistic permitting, scheduling, and cost information for future restoration planning and grant application purposes. The technologies under current consideration which have already been permitted and tested and presented in the Canal Management Master Plan[1] (CMMP) and include:

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

Other technologies have been proposed by interested parties, and may be considered at a later time as directed by Monroe County.

There are currently 332 canals in AMEC's canal inventory which are located in Unincorporated Monroe County. In order to select 5 demonstration sites from the list of 332, AMEC developed a screening and ranking process utilizing criteria that had been identified as important by the WQPP Canal Restoration Advisory Subcommittee.

The selection process consisted of 3 Phases. In **Phase 1**, AMEC utilized the CMMP water quality rankings to select the most impaired canals and the GIS Canal Inventory database to group the canals by applicable technology. This process allowed the selection of a reduced number of the highest priority canals for each technology (a minimum of 3 canals per technology) that was then submitted for detailed **Phase 2** engineering evaluation.

[1] AMEC Environment & Infrastructure 2013. Monroe County Canal Management Master Plan

Phase 2 included site visits to obtain necessary information to complete a ranking sheet to score the canals. At the conclusion of **Phase 2**, AMEC provided at least 3 top recommended canals for each of the above 5 identified technologies (total of 15 canals) to Monroe County for their review.

Phase 3 consisted of the WQPP Canal Restoration Advisory Subcommittee final selection of the top 5 sites to be included as canal restoration demonstrations. The list of the top 5 recommended canals was then presented to the Monroe County BOCC for final funding approval.

A technical memorandum detailing the selection process methodology is included in **Appendix A**. This methodology was presented to the WQPP Canal Restoration Advisory Subcommittee and approved at the July 26, 2013 meeting. Each of the criteria included in the three phases are discussed below.

Phase 1 of the Selection and Ranking Criteria for the Demonstration Projects:

The canal characteristics selected for the Phase 1 grouping process were:

- Water quality
- CMMP Ranking, and
- Applicable technology.

Criterion #1: Water Quality

A methodology to define the water quality of the residential canals in the Keys, ranging from Good, to Fair, to Poor, was developed as part of the CMMP process based upon field assessments. The methodology is included in attachment #1 of the Selection Process Methodology included as **Appendix A**. Only canals with Poor Water Quality were considered in the demonstration canal selection.

Criterion #2: Canal Management Master Plan Ranking

The poor water quality canals were ranked by their CMMP ranking number. This ranking process included all identified priority issues for the canal restorations. The CMMP ranking

process was approved the Canal Restoration Advisory Subcommittee as part of the CMMP oversight process. The CMMP details the CMMP ranking process and contains the ranking forms.

Criterion #3: Applicable Technology

The goal of the demonstration projects is to implement different technologies. In order to ensure that there were at least 3 canals in each technology group in the final list, the canals were sorted by applicable technology prior to any further ranking. The GIS Canal Inventory database and CMMP contain information on the most applicable technologies for each canal and the basis for the selection. All the Poor Water Quality canals ranked by their CMMP ranking numbers were retained and sorted by the most applicable technology for restoration of each canal.

Special Condition Elimination Final Selection

The last step in the **Phase 1** process was reviewing the canal information to determine if there was a special condition that would eliminate the canal from consideration, such as being plugged, which involves permitting beyond the scope of the demonstration projects.

Final Selection

At the completion of **Phase 1** the canals with Poor Water Quality and the highest CMMP rankings were selected for each technology (a minimum of 3 canals for each technology) and subjected to a **Phase 2** detailed field engineering evaluation and ranking.

Phase 2 of the Selection and Ranking Criteria for the Demonstration Projects:

Phase 2 consisted of a detailed field engineering evaluation and ranking that consisted of the following:

- Performance of a site visit at each of the canals selected at the conclusion of Phase 1 to evaluate permitting requirements, access, utility impacts, and other factors that would affect the ease of implementation and cost of the canal restoration.
- Completion of a selection criteria ranking form.

The ranking form is included as Attachment #1 in the Selection Process Methodology included in **Appendix A.** An overview of the ranking criteria and scoring points are presented below.

Ranking Criterion #1: Ease of Permitting (50 points)

Scoring was based upon an identification of site conditions that were likely to have the least permit issues. Sites anticipated to have the least complex permitting requirements received the highest score.

Ranking Criterion #2 Ease of Implementation (50 points)

Scoring was based upon the ease in implementing the proposed restoration. Sites anticipated to have the least complex permitting requirements received the highest score.

Phase 3 of the Selection and Ranking Criteria for the Demonstration Projects:

Phase 3 consisted of the final selection of the top 5 (minimum) sites to be included in the canal restoration demonstration program. The WQPP Canal Restoration Advisory Subcommittee approved the selection. The list of the top recommended canals was then presented to the Monroe County BOCC for final funding approval.

Additional information that was utilized by the WQPP Canal Advisory Subcommittee and the BOCC in the selection of the canals to be included in the demonstration program includes:

- Number of homeowners and public that will benefit from the restoration
- Homeowner support of the project.

3.0 RESULTS

3.1 TOP 15 RANKED CANALS

Table 1 presents the top 15 ranked canals sorted by applicable technology selected for evaluation in the canal demonstration project program developed by implementing Phase 1 of the methodology described in Section 2. **Figures 1-15** show the site locations of each of the 15 canals. Please note that some canals were included under more than one applicable technology. These 15 canals were then subjected to the Phase 2 ranking process detailed in Section 2.

3.2 RANKING OF CANALS FOR SELECTION AS DEMONSTRATION PROJECT

Tables 2-6 show the results of the Phase 2 ranking methodology by technology. The canal ranking forms are included in **Appendix B**. Pertinent information on each canal is included in **Appendix C**. The WQPP Canal Restoration Advisory Subcommittee approved the selection of the entire ranking process at the September 27, 2013 meeting and the following canals for inclusion in the Monroe County demonstration program:

- #1 Weed Barriers: #266 Doctor's Arm Big Pine Key
- #1 Organic Removal: #266 Doctor's Arm Big Pine Key
- #2 Organic Removal: #290 between Avenues I and J Big Pine Key
- #1 Culvert: #459 Boca Chica Ocean Shores Geiger Key
- #1 Pumping: #286 Whispering Pines Big Pine Key
- #1 Backfilling: #29 Sexton Cove Estates Key Largo.

The tables provide the rationale for the selections.

3.3 FINAL BOCC SELECTION OF THE CANALS TO BE INCLUDED IN THE DEMONSTRATION PROGRAM

The list of September 27, 2013 WQPP Canal Restoration Advisory Subcommittee approved canals recommended to be included in the Demonstration Program were presented to the BOCC at the October 16, 2013 meeting for approval. The BOCC approved the list and in additional approved the funding of the #2 ranked canal for a culvert, #277 Tropical Bay Big Pine Key.

At the October 18, 2013 Canal Restoration Advisory Subcommittee meeting, it was additionally approved to include the #2 ranked canal for a weed barrier, #288 Hollerich Big Pine Key, in order to include a canal in the demonstration project with only this technology. The request for BOCC to approve this additional canal for inclusion in the canal demonstration program is scheduled for November 20, 2013.

Table 7 shows the canals selected for the demonstration program in yellow highlight.

4.0 PRELIMINARY RESTORATION DESIGNS AND CONSTRUCTION COST ESTIMATES

Information on each of the top 15 canals ranked for the demonstration program is included in **Appendix C**. This includes the following:

- Informational Sheets
- Conceptual Designs with conceptual layout
- System components
- Construction Cost Estimates
- Permits Needed
- Access

TABLES

TABLE 1

TOP 15 CANALS EVALUATED FOR CANAL DEMONSTRATION PROJECTS

WEED BARRIER	ORGANIC REMOVAL	CULVERT INSTALLATION	PUMPING	BACKFILLING
#266 Big Pine **Doctor's Arm Subdivision** between Witters and Bailey Lanes	**#266 Big Pine** **Doctor's Arm Subdivision** between Witters and Bailey Lanes	**#459 Geiger** **Boca Chica Ocean Shores Subdivision** between Boca Chica Road and Jay Lane	**#286 Big Pine** **Whispering Pines Subdivision** between Sands Road and Hibiscus Drive	**#29 Key Largo** **Sexton Cove Estates Subdivision** between Bunting and Pigeon Drives
#288 Big Pine **Hollerich Subdivision** between Hollerich and Hibiscus Drives	**#290 Big Pine** between Avenue I and Avenue J	**#277 Big Pine** **Tropical Bay Subdivision** between Watson and Sunset Roads	**#278 Big Pine** **Eden Pines Colony Subdivision** Pine Ave	**#27 Key Largo** **Sexton Cove Estates Subdivision** Sexton Cove Road
#297 Big Pine **Ross Haven Subdivision** between Avenues F and G	**#297 Big Pine** **Ross Haven Subdivision** between Avenues F and G	**#472 Geiger** **Geiger Mobile Homes Subdivision** between Caribbean Drive and Venus Lane	**#47 Key Largo** **Bermuda Shores Subdivision** between Shaw Drive and Bowie Lane	**#37 Key Largo** **Key Largo Mobile Homes Subdivision** Taylor Drive
#287 Big Pine **Atlantic Estates Subdivision** between Hollerich and Atlantis Drives	**#287 Big Pine** **Atlantic Estates Subdivision** between Hollerich and Atlantis Drives			**#92 Tavernier** **Hammer Point Park Subdivision** between Fairwich and Guilford Courts
	#288 Big Pine **Hollerich Subdivision** between Hollerich and Hibiscus Drives			

TABLE 2: Demonstration Canal Selection for Weed Barriers

	Canal_Name	Subdivsion Name/Location	Noted Weed Wrack Problem	WQ_SUMMARY	CMMP Ranking No (Max Score 140)	PARCELS	Public Use	Demonstration Ranking Score	Comments
1	**266 BIG PINE KEY**	Doctor's Arm/ MM 31 Bayside between Witters & Bailey Lns	X	Poor	115	37		**74**	**Selected over #288 due to homeowner communications indicating interest in the project**
2	**288 BIG PINE KEY**	Hollerich/ MM 31 Between Hollerich and Hibiscus Drs	X	Poor	112	37		74	Being presented to BOCC for approval for funding so that the demonstration projects have a stand alone weed barrier project
3	297 BIG PINE KEY	Ross Haven/ MM 31 Between Aves F & G	X	Poor	115	15		64	
4	287 BIG PINE KEY	Atlantic Estates/ MM 31 Between Hollerich and Atlantis Drs	X	Poor	112	26	X	33	

REFERENCE: The inventory is a listing of the residential canals indentified in the 2013 GIS Database prepared by AMEC Environment Infrastructure, Inc.

TABLE 3: Demonstration Canal Selection for Organic Removal

	Canal_Name	Subdivsion Name/Location	Greater than 0.75' sediment thickness and has a seaweed loading issue	AVERAGE ORGANIC THICKNESS (ft)	WQ_SUMMARY	CMMP Ranking No (Max Score 140)	PARCELS	Public Use	Demonstration Ranking Score	Comments
1	**266 BIG PINE KEY**	Doctor's Arm/ MM 31 Bayside between Witters & Bailey Lns	X	0.86	Poor	115	37		94	**#1 Ranked site, organic removal proposed to be done concurrently with installation of a weed barrier in this canal.**
2	**290 BIG PINE KEY**	MM 31 South of Ave J	X	1.02	Poor	106	13		92	**Also selected for organic removal so that five different technologies would be tested in 5 different canals. This canal already has an operational weed barrier system.**
3	297 BIG PINE KEY	Ross Haven/ MM 31 Between Aves F & G	X	1.26	Poor	115	15		92	
4	287 BIG PINE KEY	Atlantic Estates/ MM 31 Between Hollerich and Atlantis Drs	X	0.83	Poor	112	26	X	67	
5	288 BIG PINE KEY	Hollerich/ MM 31 Between Hollerich and Hibiscus Drs	X	0.84	Poor	112	37		52	

REFERENCE: The inventory is a listing of the residential canals indentified in the 2013 GIS Database prepared by AMEC Environment Infrastructure, Inc.

TABLE 4: Demonstration Canal Selection for Culverts

	Canal_Name	Subdivsion Name/Location	Culvert Location Observed on Aerials	WQ_SUMMARY	CMMP Ranking No (Max Score 140)	PARCELS	Public Use	Demonstratiion Ranking Score	Comments
1	**459 GEIGER KEY**	Boca Chica Ocean Shores/ MM 10 Boca Chica Rd and Jay Ln	X	Poor	86	7		**64**	**#1 top ranked canal for a culvert; although federal land ownership may require this canal to be removed from consideration**
2	277 BIG PINE KEY	Tropical Bay/ MM 31 Watson Blvd and Sunset Rd	X	Poor	111	88		63	**Also selected by the BOCC due to homeowner request and only 1 point difference**
3	472 GEIGER KEY	Geiger Mobile Homes/ MM 10 Caribbean Drive and Venus Lane	X	Poor	100	21		51	

REFERENCE: The inventory is a listing of the residential canals indentified in the 2013 GIS Database prepared by AMEC Environment Infrastructure, Inc.

TABLE 5: Demonstration Canal Selection for Pumping

	Canal_Name	Subdivsion Name/Location	Pumping (Degree of Stagnation greater than 1)	Degree of Stagnation	WQ_SUMMARY	CMMP Ranking No (Max Score 140)	PARCELS	Public Use	Demonstration Ranking Score	Comments
1	**286 BIG PINE KEY**	Whispering Pines/ MM 31 Between Sands and Hibiscus	X	1.2	Poor	86	71	X	**58**	**#1 Ranked site; howerver homeowner association president at meeting indicated objection to pump installation.**
2	278 BIG PINE KEY	Eden Pines Colony/ MM 30 Pine Ave	X	5.7	Poor	91	494		35	**#1 Alternate site. Homeowners very interested.**
3	47 KEY LARGO	Bermuda Shores/ MM 103 Between Shaw Drive and Bowie Ln	X	3.3	Poor	79	182		26	

REFERENCE: The inventory is a listing of the residential canals indentified in the 2013 GIS Database prepared by AMEC Environment Infrastructure, Inc.

TABLE 6: Demonstration Canal Selection for Backfilling

	Canal_Name	Subdivsion Name/Location	Backfilling(greater than -15' average elevation)	MIN_EL	AVE EL	WQ_SUMMARY	CMMP Ranking No (Max Score 140)	PARCELS	Demonstration Ranking Score	Comments
1	**29 KEY LARGO**	Sexton Cove Estates/ MM 106 Between Bunting & Pigeon Drs	X	-32.33	-19.44	Poor	92	26	**64**	**#1 Ranked site**
2	27 KEY LARGO	Sexton Cove Estates/ MM 106 Sexton Cove Rd	X	-42.07	-29.77	Poor	90	17	56	
3	37 KEY LARGO	Key Largo Mobile Home/ MM 105 Taylor Drive	X	-21.64	-17.05	Poor	84	26	54	
4	92 TAVERNIER	Hammer Point Park/ MM 93 Between Fairwich & Guilford Cts	X	-27.08	-23.66	Poor	78	21	52	

REFERENCE: The inventory is a listing of the residential canals indentified in the 2013 GIS Database prepared by AMEC Environment Infrastructure, Inc.

TABLE 7

TOP 15 CANALS EVALUATED FOR CANAL DEMONSTRATION PROJECTS WITH THE IDENTIFIED CANALS SELECTED FOR INCLUSION IN THE DEMONSTRATION PROJECT PROGRAM SHOWN IN YELLOW HIGHLIGHT

WEED BARRIER	ORGANIC REMOVAL	CULVERT INSTALLATION	PUMPING	BACKFILLING
#266 Big Pine **Doctor's Arm Subdivision** between Witters and Bailey Lanes	**#266 Big Pine** **Doctor's Arm Subdivision** between Witters and Bailey Lanes	**#459 Geiger** **Boca Chica Ocean Shores Subdivision** between Boca Chica Road and Jay Lane	**#286 Big Pine** **Whispering Pines Subdivision** between Sands Road and Hibiscus Drive	**#29 Key Largo** **Sexton Cove Estates Subdivision** between Bunting and Pigeon Drives
#288 Big Pine **Hollerich Subdivision** between Hollerich and Hibiscus Drives	**#290 Big Pine** between Avenue I and Avenue J	**#277 Big Pine** **Tropical Bay Subdivision** between Watson and Sunset Roads	**#278 Big Pine** **Eden Pines Colony Subdivision** Pine Ave	**#27 Key Largo** **Sexton Cove Estates Subdivision** Sexton Cove Road
#297 Big Pine **Ross Haven Subdivision** between Avenues F and G	**#297 Big Pine** **Ross Haven Subdivision** between Avenues F and G	**#472 Geiger** **Geiger Mobile Homes Subdivision** between Caribbean Drive and Venus Lane	**#47 Key Largo** **Bermuda Shores Subdivision** between Shaw Drive and Bowie Lane	**#37 Key Largo** **Key Largo Mobile Homes Subdivision** Taylor Drive
#287 Big Pine **Atlantic Estates Subdivision** between Hollerich and Atlantis Drives	**#287 Big Pine** **Atlantic Estates Subdivision** between Hollerich and Atlantis Drives			**#92 Tavernier** **Hammer Point Park Subdivision** between Fairwich and Guilford Courts
	#288 Big Pine **Hollerich Subdivision** between Hollerich and Hibiscus Drives			

FIGURES

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
27 KEY LARGO (MM-106)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 1
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

Monroe County Canal Demonstration Project

29 KEY LARGO (MM-106)

Drawn	Date
JAM	08/20/2013
Checked	Date
WCB	08/20/2013

amec

Project# 6783-13-2507

Figure 2

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
37 KEY LARGO (MM-105)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 3
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
47 KEY LARGO (MM-103)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 4
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project

92 TAVERNIER (MM-93)

Drawn	Date
JAM	08/20/2013
Checked	Date
WCB	08/20/2013

amec

Project# 6783-13-2507

Figure 5

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
266 BIG PINE KEY (MM-31)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 6
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

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Monroe County Canal Demonstration Project				
277 BIG PINE KEY (MM-30)				
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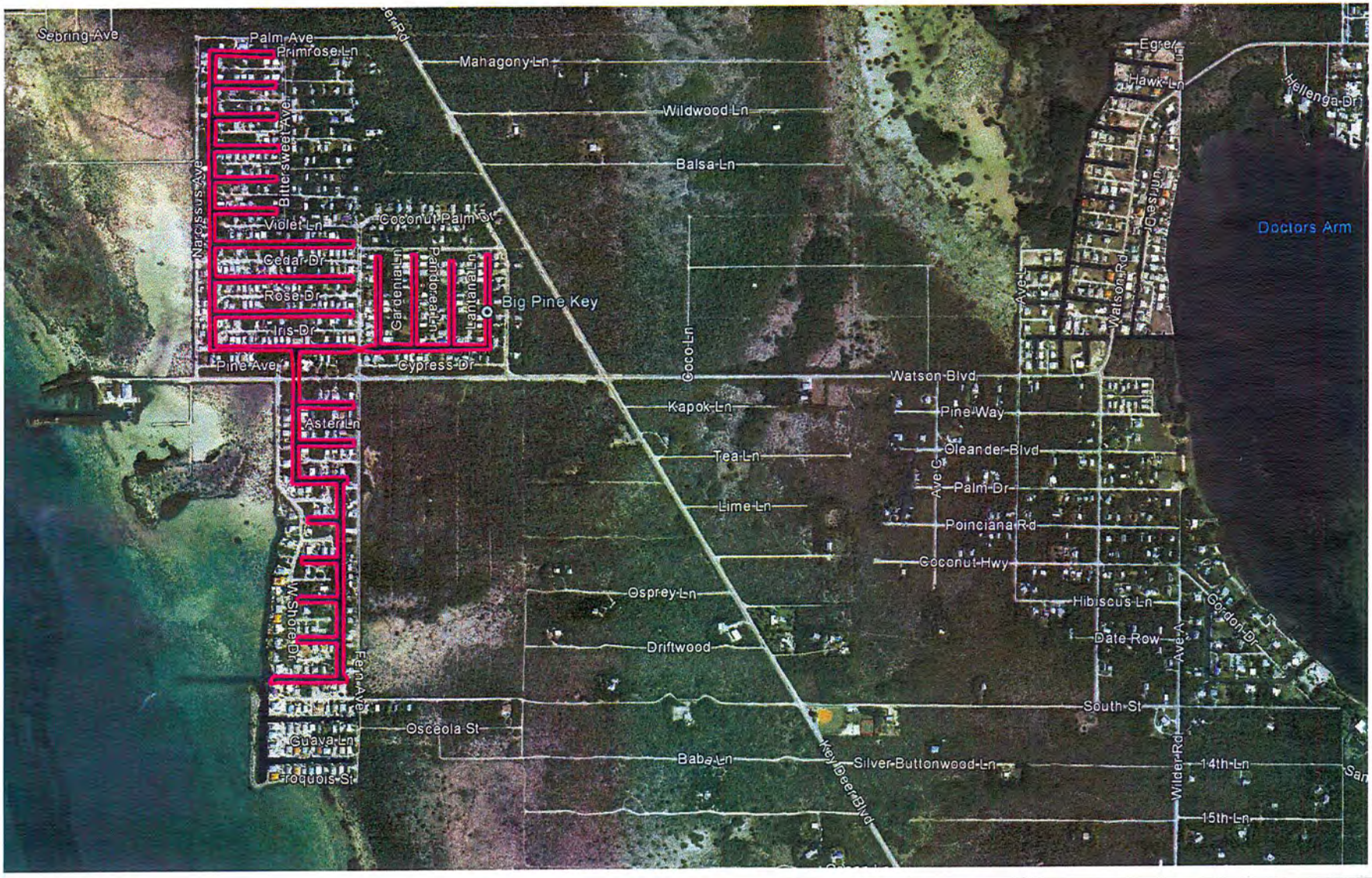
WCB	08/20/2013			



Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project

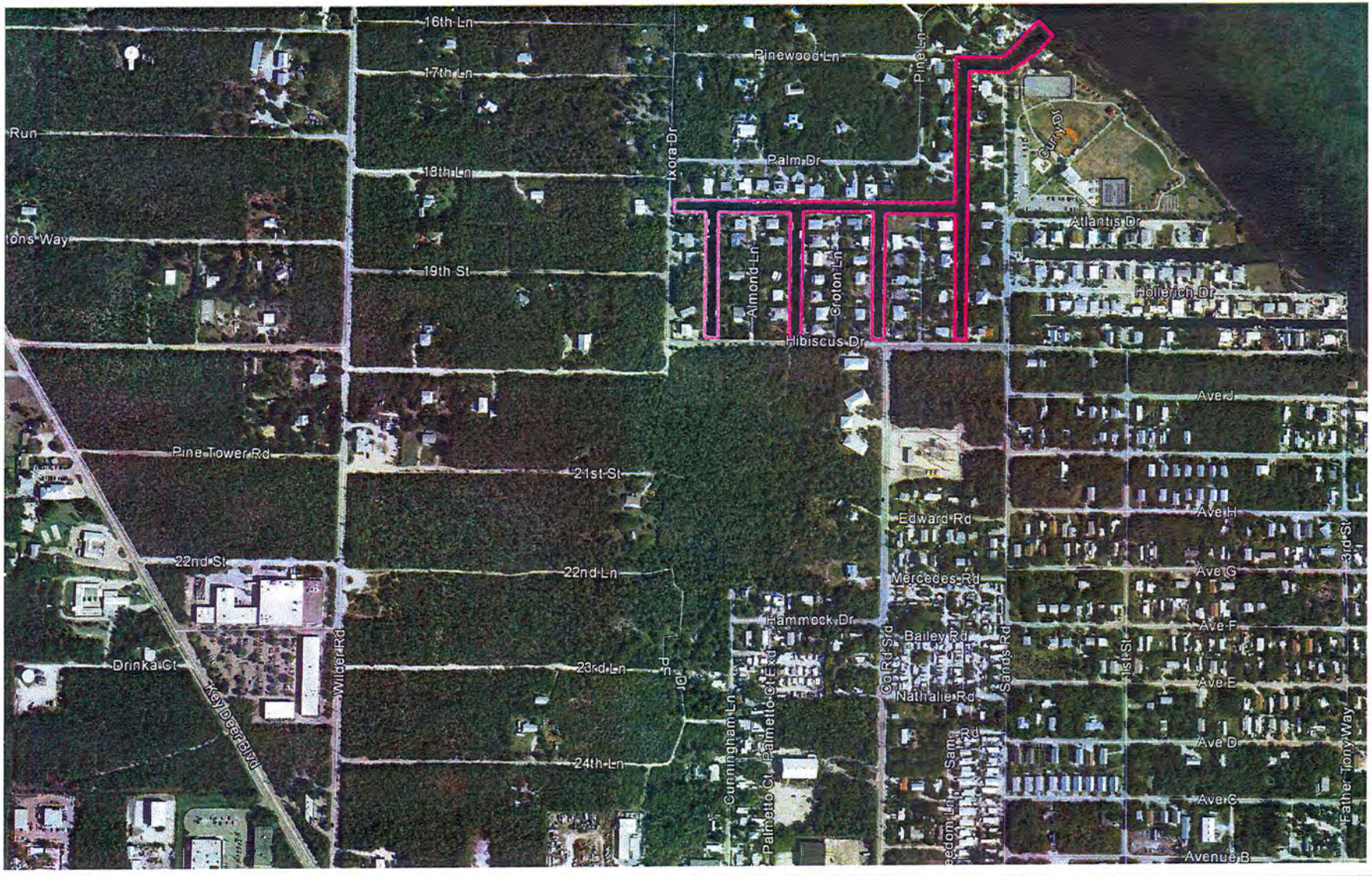
278 BIG PINE KEY (MM-30)

Drawn	Date
JAM	08/20/2013
Checked	Date
WCB	08/20/2013

amec

Project# 6783-13-2507

Figure 8



Source: Google Earth Pro
2013 (aerial), AMEC 2013

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Monroe County Canal Demonstration Project				
286 BIG PINE KEY (MM-31)				
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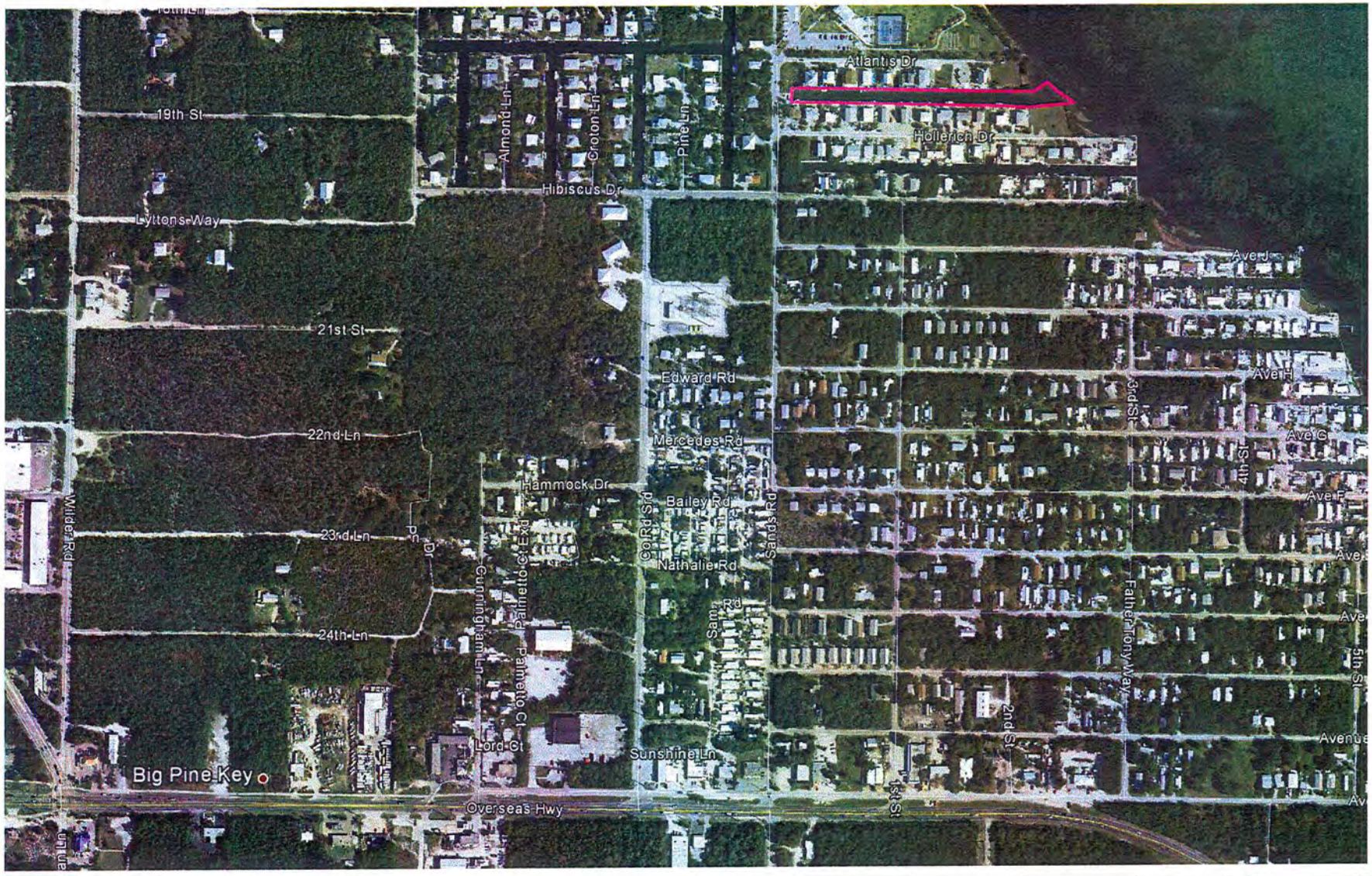
Checked	Date			
WCB	08/20/2013			



Source: Google Earth Pro
2013 (aerial), AMEC 2013

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Monroe County Canal Demonstration Project				
287 BIG PINE KEY (MM-31)				
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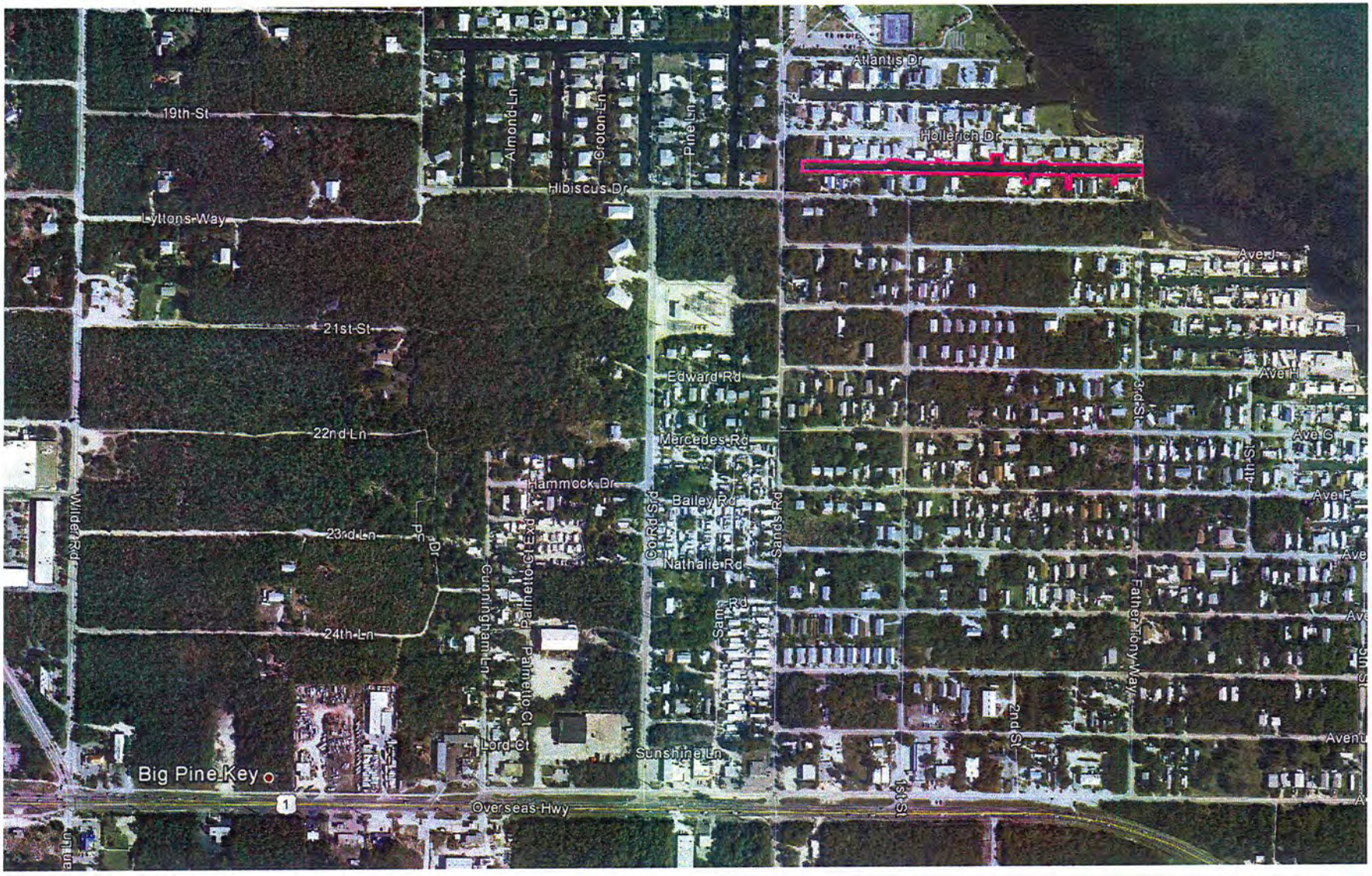
Checked	Date			
WCB	08/20/2013			



Source: Google Earth Pro
2013 (aerial), AMEC 2013

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Monroe County Canal Demonstration Project				
288 BIG PINE KEY (MM-31)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 11
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
290 BIG PINE KEY (MM-31)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 12
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
297 BIG PINE KEY (MM-31)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 13
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
459/460 GEIGER KEY (MM-11)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 14
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
470/472 GEIGER KEY (MM-10)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 15
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

APPENDIX A

DEMONSTRATION CANAL SELECTION PROCESS

Revised August 15, 2013

TECHNICAL MEMORANDUM

Prepared For: Water Quality Protection Program Steering Committee

Prepared By: AMEC Environment & Infrastructure

Subject: **Criteria for Screening and Ranking Canals for Selection in Monroe County Canal Restoration Demonstration Projects**

Project: Monroe County Selection of Canal Demonstration Projects

This technical memorandum presents the screening and ranking process that AMEC proposes to utilize to select the canal restoration demonstration projects to be funded by Monroe County. Monroe County has stated that AMEC shall use a selection and ranking process approved by the County and the Water Quality Protection Program (WQPP) Canal Restoration Advisory Subcommittee. Monroe County has also indicated that only canals located within Unincorporated Monroe County shall be considered at this time as the source of the restoration funds is Unincorporated Monroe County Infrastructure tax funds.

Overall Approach

AMEC is tasked with working closely with Monroe County to select at least 5 canal restoration technology demonstration sites that will be constructed using County funds that will be used to obtain realistic permitting, scheduling, and cost information for future restoration planning and grant application purposes. The technologies under current consideration which have already been permitted and tested include:

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

Other technologies have been proposed by interested parties, and may be considered at a later time as directed by Monroe County.

There are currently 332 canals in AMEC's canal inventory which are located in Unincorporated Monroe County. In order to select 5 demonstration sites from the list of 332, AMEC has developed a screening and ranking process utilizing criteria that has been identified as important by the WQPP Canal Restoration Advisory Subcommittee.

The proposed selection process consists of 3 Phases. In **Phase 1**, AMEC will utilize the GIS Canal Inventory database to group the canals by selected characteristics as well as applicable technology. This process will allow the selection of a reduced number of the most suitable canals for each technology (estimated to be 4 canals per technology) that will then be submitted for detailed **Phase 2** engineering evaluation. **Phase 2** will include site visits to obtain necessary information to complete a ranking sheet to score the canals. At the conclusion of **Phase 2**, AMEC will provide 3 recommended canals for each of the above 5 identified technologies (total of 15 canals) to Monroe County for their review. **Phase 3** consists

of the WQPP Canal Restoration Advisory Subcommittee final selection of the top 5 sites to fund for canal restoration demonstrations. The list of the top 5 recommended canals will be presented to the Monroe County BOCC for final funding approval. Details of each of the criteria to be included in Phase 1 and Phase 2 are discussed below.

Phase 1 of the Proposed Selection and Ranking Criteria for the Demonstration Projects:

The canal characteristics selected for the Phase 1 grouping process are:

- Water quality
- Canal Management Master Plan Ranking, and
- Applicable technology.

Criterion #1: Water Quality

A methodology to define the water quality of the residential canals in the Keys, ranging from Good, to Fair, to Poor, was developed as part of the Canal Management Master Plan (CMMP) process based upon field assessments. The methodology is included in **Attachment 1. It is proposed that only canals with Poor Water Quality will be considered as a demonstration canal.**

Criterion #2: Canal Management Master Plan Ranking

The poor water quality canals will be ranked by their CMMP ranking number. This ranking process includes all identified priority issues for the canal restoration. The ranking process was approved the Canal Restoration Advisory Subcommittee as part of the CMMP process.

Criterion #3: Applicable Technology

The goal of the demonstration projects is to implement different technologies. In order to ensure that there are at least 3 canals for each technology in the final list to be provided to Monroe County for review, the canals will be grouped by applicable technology prior to any further ranking. The GIS Canal Inventory database contains information on the most applicable technologies for each canal and this will be the basis for the initial selection. All the Poor Water Quality canals ranked by their CMMP ranking numbers will be retained just sorted by the most applicable technology for restoration of each canal.

Special Condition Elimination Final Selection

The last step in the **Phase 1** process is reviewing the canal information to determine if there is a special condition that would eliminate the canal from consideration, such as being plugged, which involves permitting beyond the scope of the demonstration projects.

Final Selection

At the completion of **Phase 1** the canals with Poor Water Quality and the highest CMMP rankings will be selected for each technology (estimated to be the top ranked 4 canals for each technology) and subjected to a **Phase 2** detailed field engineering evaluation and ranking.

Phase 2 of the Proposed Selection and Ranking Criteria for the Demonstration Projects:

Phase 2 consists of a detailed field engineering evaluation and ranking that will consist of the following:

- Performance of a site visit at each of the canals selected at the conclusion of Phase 1 (estimated to be 20 canals) to evaluate permitting requirements, access, utility impacts, and other factors that will affect the ease of implementation and cost of the canal restoration.
- Completion of a selection criteria ranking form.

The proposed ranking criteria and proposed scoring points are presented below.

Ranking Criterion #1: Ease of Permitting (50 points)

Scoring is based upon an identification of site conditions that are likely to have the least permit issues. Factors that will be considered include:

- Will a dewatering permit need to be obtained?
- Will a ROW permit need to be obtained?
- Will canal specific sediment samples be required?
- Will additional surveys need to be acquired?
- Will mitigation credits need to be obtained?
- Will canal specific water quality sampling be required?
- Will Sovereign Submerged Lands need to be obtained?
- Will Archeological survey/permitting be required?
- Will hydrologic modeling be required?
- Will geotechnical investigation/report need to obtained?

The lowest score will be for sites anticipated to have the most complex permitting requirements.

Ranking Criterion #2 Ease of Implementation (50 points)

Scoring is based upon the ease in implementing the proposed restoration. Factors that will be considered include:

- Sewer, water, data lines, or overhead electric lines in the way of restoration construction
- Identification of a required Construction Staging Area
- Maintenance of Traffic
- Clearing and Grubbing
- Infrastructure Removal/Replacement

The lowest score will be for sites indicating significant difficulties in implementation and the highest score for sites indicating relative ease of implementation.

Phase 3 of the Proposed Selection and Ranking Criteria for the Demonstration Projects:

Phase 3 consists of the final selection of a minimum of the top 5 sites to fund for canal restoration demonstrations. The WQPP Canal Restoration Advisory Subcommittee will select the top 5 sites to fund for canal restoration demonstrations. The list of the top 5 recommended canals will be presented to the Monroe County BOCC for final funding approval.

Additional information that may be utilized by the WQPP Canal Advisory Subcommittee in the selection of the top 5 canals includes:

- Number of homeowners and public that will benefit from the restoration
- Homeowner support of the project
- Homeowner commitment to the operation and maintenance of the restoration
- Homeowner commitment to contribute funding to the installation of the restoration

ATTACHMENT 1

FIELD METHODOLOGY FOR SUMMARIZING WATER QUALITY

Field Methodology for Summarizing Water Quality

The Monroe County Canal Master Plan Phase II summarized the water quality within the assessed canals as the following: ***Good***, ***Fair***, and ***Poor***. Qualified field personnel utilized the following instruments and visual observations to preliminarily determine the aforementioned water quality summary for the assessed canals:

- The primary method for determining water quality within the assessed canals was the measurement of dissolved oxygen (DO). DO was measured at various intervals throughout the canal's water column with the use of a calibrated YSI 556. DO measurements were recorded in both mg/L and % saturation. The Florida Department of Environmental Protection (FDEP) states that a Class III surface water body that displays DO levels less than 4.0 mg/L should be classified as impaired.

- As part of the field assessment process, professional scientists recorded visual observations detailing the prevalence of biological indicators which can be used as an indication of water quality. The following biological indicators were used as a secondary tool for more precisely determining the canals water quality:

    a. The presence of blue-green algae (covered substrate or floating mats) as well as, brown macro-algae were used as modifier to indicate sub-standard water quality.
    b. Green macro-algae, which is an indicator of good water quality and is a positive habitat feature, was used as modifier to upgrade the water quality determination in the field.
    c. Additional modifiers of good water quality included the presence of sponges, seagrasses, and reef fish which are particularly sensitive to water quality.

- The third tool used to assist in the summarizing of water quality within the canal was "water clarity." Water clarity was determined through turbidity monitoring and visual observations through the use of high quality polarized sunglasses. Due to "water clarity's" potentially subjective nature, it was only utilized in instances where biological indicators were not observable.

Water Quality Summary Determination

- If a canal displayed DO readings above 4.0 mg/L and displayed no negative biological characteristics, the canal was field classified as having **Good** water quality.
- If a canal displayed DO readings above 4.0 mg/L but displayed negative biological characteristics, the canal was field classified as having **Fair** water quality.
- If a canal displayed DO readings between 3.0 and 4.0 mg/L but displayed positive biological characteristics, the canal was field classified as having **Fair** water quality.
- If a canal displayed DO readings between 3.0 and 4.0 and displayed negative biological characteristics, the canal was field classified as having **Poor** water quality.
- If a canal displayed DO readings less than 3.0 mg/L, the canal was field classified as having **Poor** water quality.

If all measured intervals of the profile were above the standard of 4.0 mg/L except the lowest measured depth, the canal was field classified as having **Fair** water quality.

ATTACHMENT 2

SELECTION CRITERIA RANKING FORM FOR DEMONSTRATION CANALS

Scoring Criteria for Potential Keys Canal Restoration Sites for WEED BARRIERS		Area Name			
(For a criterion that cannot be scored due to a lack of relevant information, a value of zero will be assigned)		Canal Number			
		Potential Restoration Technology	WEED BARRIER		
Items that Affect Permitting		Score	Weighting Factor	Total Score	Comments
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If there are no observed sensitive resources such as seagrass in the footprint of the proposed restoration system, the canal should receive a score of 5.	5	X 4	20	
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	
1C) Nearshore Water Concerns (scored from 0 to +5) Scoring is based on the potential for impacting nearshore waters with the installation of pilings.	Canals in which the pilings for the weed gate will not be installed within the excavated canal system, should receive a score of 0. Canals in which the pilings for the weed gate will be installed within the excavagted canal system, should receive a score of 5.	5	X2	10	
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of the mouth of canal and shoreline configuration.	Canals that have mouth widths greater than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 0. Canals that have mouth widths greater than 120 but less than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 3. Canals that have mouth widths less than 120 less and/or shoreline configuration promotes natural flow conditions, should receive a score of 5.	5	X3	15	
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of pilings, netting, and pumps, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 3	15	
2C) Demolition Concerns (scored from 0 to + 5) Scoring is based upon whether the site has an existing weed gate that needs to be removed.	Canals that have an existing weed gate that needs to be removed, should receive score of 0. Canals that do not have an existing weed gate that needs to be removed, should receive score of 5.	5	X 2	10	
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property, should receive score of 0. Canals that do have accessible electric hook up for the pump station on property, should receive score of 5.	5	X 2	10	
Overall Score				100	

Scoring Criteria for Potential Keys Canal Restoration Sites for ORGANIC REMOVAL		Area Name			
(For a criterion that cannot be scored due to a lack of relevant information, a value of zero will be assigned)		Canal Number			
		Potential Restoration Technology	ORGANIC REMOVAL		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 0.	5	X 4	20	
	If there are no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	5	X4	20	
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Bathymetric and Sediment Characterization Data (scored from 0 to +5) Scoring is based on the potential for additional data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has no sedimentation data, should receive a score of 0.	5	X2	10	
	Canals that require less than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has sedimentation data, should receive a score of 5.				
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 15 feet deep , should receive a score of 0.	5	X 3	15	
	Canals that have navigational widths(boat lift to boat lift) greater than 25, less than 20 boat lifts, less than 15 feet deep , should receive a score of 5.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to set up dewatering system.	Canals that do not have an empty lot for dewatering system, should receive score of 0.	5	X 4	20	
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Quantity of Material (scored from 0 to + 5) Scoring is based upon the approximate volume of material to be removed from the canal system.	Canals that have greater than approximately 1600 cubic yards of muck, should receive score of 0.	5	X 3	15	
	Canals that have greater than approximately 1050 but less than 1600 cubic yards of muck, should receive score of 3.				
	Canals that have less than approximately 1050 cubic yards of muck, should receive score of 5.				
Overall Score				100	

Scoring Criteria for Potential Keys Canal Restoration Sites for CULVERT INSTALLATION		Area Name			
		Canal Number			
(For a criterion that cannot be scored due to a lack of relevant information, a value of zero will be assigned)		Potential Restoration Technology	CULVERT		
Items that Affect Permitting		Score	Weighting Factor	Total Score	Comments
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as seagrass in the project footprint, the canal should receive a score of 0.	5	X 3	15	
	If there are no observed sensitive resources such as seagrass in the project footprint, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	5	X3	15	
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Survey Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require private property topographic survey due to removal/replacement, should receive a score of 0.	5	X3	15	
	Canals that do not require private property topographic survey due to removal/replacement, should receive a score of 5.				
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0.	5	X 1	5	
	Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5				
Items that Affect Ease of Implementation					
2A) Length of Culvert (scored from 0 to + 5) Scoring is based upon the length of culvert to connect the systems.	Canals that have a culvert connection greater than 200 feet, should receive a score of 0.	5	X 2	10	
	Canals that have a culvert connection less than 200 feet, should receive a score of 5.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0.	5	X 2	10	
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Traffic Impact Concerns (scored from 0 to + 5) Scoring is based upon the severity of traffic impacts to the existing roadway.	Canals that have a FDOT AADT greater than 2000 and is the main road system into the subdivision, should receive score of 0.	5	X 2	10	
	Canals that have a FDOT AADT less than 2000 and is not the main road system into the subdivision, should receive score of 5.				
2D) Existing Infrastructure Concerns (scored from 0 to + 5) Scoring is based upon whether or not the installation of the culvert would require removal/replacement of private property.	Canals that would require the removal/replacement of structures on private property, should receive score of 0.	5	X 2	10	
	Canals that do not require the removal/replacement of structures on private property, should receive score of 5.				
2E) Existing Utility Concerns (scored from 0 to + 5) Scoring is based upon whether or not the water, sewer, data, or electric utility lines will need to be removed/replaced.	Canals that require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 0.	5	X 2	10	
	Canals that do not require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 5.				
Overall Score				100	

Scoring Criteria for Potential Keys Canal Restoration Sites for PUMPING		Area Name			
(For a criterion that cannot be scored due to a lack of relevant information, a value of zero will be assigned)		Canal Number			
		Potential Restoration Technology	PUMPING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 0.	5	X 3	15	
	If there are no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	5	X3	15	
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Bathymetric and Topographic Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0.	5	X3	15	
	Canals that require greater than 50 but less than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3.				
	Canals that require less than 50 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.				
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0.	5	X 1	5	
	Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5				
Items that Affect Ease of Implementation					
2A) Length of Pumping System (scored from 0 to + 5) Scoring is based upon the length of pumping system.	Canals that have a pumping system greater than 2500 feet, should receive a score of 0.	5	X 3	15	
	Canals that have a pumping system less than 2500 feet, should receive a score of 5.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0.	5	X 2	10	
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Depth of Pumping System (scored from 0 to + 5) Scoring is based upon the depth of canal.	Canals that have an average depth greater than 10 feet and a range in bottom elevations greater than 8 feet should receive a score of 0.	5	X 3	15	
	Canals that have an average depth less than10 feet and a range in bottom elevation of less than 8 feet should receive a score of 5.				
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether he site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property, should receive score of 0.	5	X 2	10	
	Canals that do have accessible electric hook up for the pump station on property, should receive score of 5.				
Overall Score				100	

Scoring Criteria for Potential Keys Canal Restoration Sites for BACKFILLING		Area Name			
(For a criterion that cannot be scored due to a lack of relevant information, a value of zero will be assigned)		Canal Number			
		Potential Restoration Technology	BACKFILLING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as seagrass in the project footprint, the canal should receive a score of 0.	5	X 4	20	
	If there are no observed sensitive resources such as seagrass in the project footprin, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	5	X4	20	
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Bathymetric Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0.	5	X2	10	
	Canals that require greater than 13 but less than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3.				
	Canals that require less than 13 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.				
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 35 feet deep and/or greater than 800 feet long, should receive a score of 0.	5	X 4	20	
	Canals that have navigational widths(boat lift to boat lift) greater than 25 but less than 35 feet, greater than 15 but less than 20 boat lifts, greater than 25 but less than 35 feet deep and greater than 650 but less than 800 feet long, should receive a score of 3.				
	Canals that have navigational widths(boat lift to boat lift) greater than 35 feet, less than 15 boat lifts, less than 25 feet deep and less than 650 feet long, should receive a score of 5.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile backfill.	Canals that do not have an empty lot for stockpiling of backfill, should receive score of 0.	5	X 4	20	
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Hauling Distance (scored from 0 to + 5) Scoring is based upon the distance from Florida City, Florida to the canal system.	Canals that have a hauling distance greater than 50 miles, should receive score of 0.	5	X 2	10	
	Canals that have a hauling distance greater than 30 but less than 50 miles, should receive score of 3.				
	Canals that have a hauling distance less than 30 miles, should receive score of 5.				
Overall Score				100	

APPENDIX B

DEMONSTRATION CANAL RANKING FORMS

Scoring Criteria for Potential Keys Canal Restoration Sites for WEED BARRIERS		Area Name	MM 31 Atlantic Estatates subdivision Bayside		
		Canal Number	287 Big Pine Key		
		Potential Restoration Technology	WEED BARRIER		
Items that Affect Permitting		Score	Weighting Factor	Total Score	Comments
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the proposed restoration system, the canal should receive a score of 5.	3	X 4	12	Although the project site contains a few mangroves, there is no obvious evidence of seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present at the mouth of a canal with such poor water quality.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X4	12	The weed barrier system installation will require the triming/removal of magroves.
1C) Nearshore Water Concerns (scored from 0 to +5) Scoring is based on the potential for impacting nearshore waters with the installation of pilings.	Canals in which the pilings for the weed gate will not be installed within the excavated canal system, should receive a score of 0. Canals in which the pilings for the weed gate will be installed within the excavated canal system, should receive a score of 5.	0	X2	0	Based on Monroe County Property Appraiser and google earth the pilings will be placed outside the extent of the excavated canal system.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of the mouth of canal and shoreline configuration.	Canals that have mouth widths greater than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 0. Canals that have mouth widths greater than 120 but less than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 3. Canals that have mouth widths less than 120 less and/or shoreline configuration promotes natural flow conditions, should receive a score of 5.	0	X3	0	The mouth of the canal based on google earth is approximately 231 feet. The configuration of the mouth does not promote natural flow and has pockets for seaweed accumulation.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of pilings, netting, and pumps, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 3	9	At the end of the canal system there is an empty lot that is cleared but has some mangroves that will have to be trimmed or removed for staging of material and pump placement.
2C) Demolition Concerns (scored from 0 to + 5) Scoring is based upon whether the site has an existing weed gate that needs to be removed.	Canals that have an existing weed gate that needs to be removed, should receive score of 0. Canals that do not have an existing weed gate that needs to be removed, should receive score of 5.	0	X 2	0	Based on field visits and google earth the canal system has an existing weed gate system that will need to be removed in order to place a new weed barrier system.
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property, should receive score of 0. Canals that do have accessible electric hook up for the pump station on property, should receive score of 5.	0	X 2	0	There is currently no electrical drop, therefore electrical will have to be dropped for the proposed weed barrier. The approximate distance to the nearest electrical pole is 140 feet.
Overall Score				33	

Scoring Criteria for Potential Keys Canal Restoration Sites for WEED BARRIERS		Area Name	MM 31 Hollerich subdivision Bayside		
		Canal Number	288 Big Pine Key		
		Potential Restoration Technology	WEED BARRIER		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the proposed restoration system, the canal should receive a score of 5.	5	X 4	20	**There is no obvious evidence of mangroves, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would not be present at the mouth of a canal with such poor water quality.**
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	**The weed barrier system installation is not anticpated to require mitigation.**
1C) Nearshore Water Concerns (scored from 0 to +5) Scoring is based on the potential for impacting nearshore waters with the installation of pilings.	Canals in which the pilings for the weed gate will not be installed within the excavated canal system, should receive a score of 0. Canals in which the pilings for the weed gate will be installed within the excavated canal system, should receive a score of 5.	5	X2	10	**Based on Monroe County Property Appraiser and google earth the pilings will be placed within the extent of the excavated canal system.**
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of the mouth of canal and shoreline configuration.	Canals that have mouth widths greater than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 0. Canals that have mouth widths greater than 120 but less than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 3. Canals that have mouth widths less than 120 less and/or shoreline configuration promotes natural flow conditions, should receive a score of 5.	5	X3	15	**The mouth of the canal based on google earth is approximately 40 feet. The configuration of the mouth promotes natural flow with no pockets for seaweed accumulation.**
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of pilings, netting, and pumps, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 3	9	**At the back end of the canal system there is an empty lot that is overgrown with vegetation but with triming it would be a good area for staging of material.**
2C) Demolition Concerns (scored from 0 to + 5) Scoring is based upon whether the site has an existing weed gate that needs to be removed.	Canals that have an existing weed gate that needs to be removed, should receive score of 0. Canals that do not have an existing weed gate that needs to be removed, should receive score of 5.	0	X 2	0	**Based on field visits and google earth the canal system has an existing weed gate system that will need to be removed in order to place a new weed barrier system.**
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property, should receive score of 0. Canals that do have accessible electric hook up for the pump station on property, should receive score of 5.	0	X 2	0	**There is currently no electrical drop, therefore electrical will have to be dropped for the proposed weed barrier. The approximate distance to the nearest electrical pole is 110 feet.**
Overall Score				74	

Scoring Criteria for Potential Keys Canal Restoration Sites for WEED BARRIERS		Area Name	MM 31 Ross Haven subdivision Bayside		
		Canal Number	297 Big Pine Key		
		Potential Restoration Technology	WEED BARRIER		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the proposed restoration system, the canal should receive a score of 5.	5	X 4	20	There is no obvious evidence of mangroves, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would not be present at the mouth of a canal with such poor water quality.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	The weed barrier system installation is not anticpated to require mitigation.
1C) Nearshore Water Concerns (scored from 0 to +5) Scoring is based on the potential for impacting nearshore waters with the installation of pilings.	Canals in which the pilings for the weed gate will not be installed within the excavated canal system, should receive a score of 0. Canals in which the pilings for the weed gate will be installed within the excavated canal system, should receive a score of 5.	0	X2	0	Based on Monroe County Property Appraiser and google earth the pilings will be placed outside the extent of the excavated canal system.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of the mouth of canal and shoreline configuration.	Canals that have mouth widths greater than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 0. Canals that have mouth widths greater than 120 but less than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 3. Canals that have mouth widths less than 120 less and/or shoreline configuration promotes natural flow conditions, should receive a score of 5.	3	X3	9	The mouth of the canal based on google earth is approximately 164 feet. The configuration of the mouth promotes natural flow with no pockets for seaweed accumulation.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of pilings, netting, and pumps, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 3	15	At the end of the canal system there is an empty lot that is cleared and would be a good area for staging of material and pump placement.
2C) Demolition Concerns (scored from 0 to + 5) Scoring is based upon whether the site has an existing weed gate that needs to be removed.	Canals that have an existing weed gate that needs to be removed, should receive score of 0. Canals that do not have an existing weed gate that needs to be removed, should receive score of 5.	0	X 2	0	Based on field visits and google earth the canal system has an existing weed gate system that will need to be removed in order to place a new weed barrier system.
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property, should receive score of 0. Canals that do have accessible electric hook up for the pump station on property, should receive score of 5.	0	X 2	0	There is currently no electrical drop, therefore electrical will have to be dropped for the proposed weed barrier. The approximate distance to the nearest electrical pole is 90 feet.
Overall Score				64	

Scoring Criteria for Potential Keys Canal Restoration Sites for WEED BARRIERS		Area Name	MM 31 Doctor's Arm subdivision Bayside		
		Canal Number	266 Big Pine Key		
		Potential Restoration Technology	WEED BARRIER		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0.	3	X 4	12	**Although the project site contains a few mangroves, there is no obvious evidence of seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present at the mouth of a canal with such poor water quality.**
	If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3.				
	If there is no observed sensitive resources such as seagrass in the footprint of the proposed restoration system, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	3	X4	12	**The weed barrier system installation will require the triming/removal of magroves.**
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Nearshore Water Concerns (scored from 0 to +5) Scoring is based on the potential for impacting nearshore waters with the installation of pilings.	Canals in which the pilings for the weed gate will not be installed within the excavated canal system, should receive a score of 0.	5	X2	10	**Based on Monroe County Property Appraiser and google earth the pilings will be placed within the extent of the excavated canal system.**
	Canals in which the pilings for the weed gate will be installed within the excavated canal system, should receive a score of 5.				
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of the mouth of canal and shoreline configuration.	Canals that have mouth widths greater than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 0.	5	X3	15	**The mouth of the canal based on google earth is approximately 52 feet. The configuration of the mouth promotes natural flow with no pockets for seaweed accumulation.**
	Canals that have mouth widths greater than 120 but less than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 3.				
	Canals that have mouth widths less than 120 less and/or shoreline configuration promotes natural flow conditions, should receive a score of 5.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of pilings, netting, and pumps, should receive score of 0.	5	X 3	15	**At the end of the canal system there is an empty lot that is cleared and would be a good area for staging of material and pump placement.**
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Demolition Concerns (scored from 0 to + 5) Scoring is based upon whether the site has an existing weed gate that needs to be removed.	Canals that have an existing weed gate that needs to be removed, should receive score of 0.	0	X 2	0	**Based on field visits and google earth the canal system has an existing weed gate system that will need to be removed in order to place a new weed barrier system.**
	Canals that do not have an existing weed gate that needs to be removed, should receive score of 5.				
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property, should receive score of 0.	5	X 2	10	**Based on field visits and google earth the canal system has an existing weed system with pump, therefore electrical is available for the proposed weed barrier.**
	Canals that do have accessible electric hook up for the pump station on property, should receive score of 5.				
Overall Score				74	

Scoring Criteria for Potential Keys Canal Restoration Sites for ORGANIC REMOVAL		Area Name	MM 31 Doctor's Arm subdivision Bayside		
		Canal Number	266 Big Pine Key		
		Potential Restoration Technology	ORGANIC REMOVAL		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.	5	X 4	20	There is no obvious evidence of mangrove, seagrass, or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present in a canal with such bad water quality.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	The restoration is not anticpated to require mitigation.
1C) Bathymetric and Sediment Characterization Data (scored from 0 to +5) Scoring is based on the potential for additional data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has no sedimentation data, should receive a score of 0. Canals that require less than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has sedimentation data, should receive a score of 5.	5	X2	10	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections. Sedimentation characterization analysis available indicating sediment meets clean fill disposal criteria.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 15 feet deep , should receive a score of 0. Canals that have navigational widths(boat lift to boat lift) greater than 25, less than 20 boat lifts, less than 15 feet deep , should receive a score of 5.	5	X 3	15	AMEC used google earth and bathymetric data to determine the approximate depth, width, and number of boat lifts.Depth = 10.93 feet, Width = 25 feet , and # of boat lifts = 5.If any of the parameters match the criteria then it recives that ranking score.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to set up dewatering system.	Canals that do not have an empty lot for dewatering system, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 4	20	At the end of the canal system there is an empty lot that is cleared and would be a good area for staging of material and pump placement.
2C) Quantity of Material (scored from 0 to + 5) Scoring is based upon the approximate volume of material to be removed from the canal system.	Canals that have greater than approximately 1600 cubic yards of muck, should receive score of 0. Canals that have greater than approximately 1050 but less than 1600 cubic yards of muck, should receive score of 3. Canals that have less than approximately 1050 cubic yards of muck, should receive score of 5.	3	X 3	9	AMEC used bathymetric data to determine the approximate volumetric muck removal to be 1,529 cubic yards.
Overall Score				94	

Scoring Criteria for Potential Keys Canal Restoration Sites for ORGANIC REMOVAL		Area Name	MM31 South of Ave J Bayside		
		Canal Number	290 Big Pine Key		
		Potential Restoration Technology	ORGANIC REMOVAL		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0.	5	X 4	20	**There is no obvious evidence of mangrove, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present in a canal with such bad water quality.**
	If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3.				
	If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	5	X4	20	**The restoration is not anticpated to require mitigation.**
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Bathymetric and Sediment Characterization Data (scored from 0 to +5) Scoring is based on the potential for additional data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has no sedimentation data, should	5	X2	10	**AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections. No sedimentation analysis available.**
	Canals that require less than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has sedimentation data, should receive a score of 5.				
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 15 feet deep , should receive a score of 0.	5	X 3	15	**AMEC used google earth and bathymetric data to determine the approximate depth, width, and number of boat lifts.Depth = 7.97 feet, Width = 40 feet , and # of boat lifts = 10.If any of the parameters match the criteria then it recives that ranking score.**
	Canals that have navigational widths(boat lift to boat lift) greater than 25, less than 20 boat lifts, less than 15 feet deep , should receive a score of 5.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to set up dewatering system.	Canals that do not have an empty lot for dewatering system, should receive score of 0.	3	X 4	12	**At the end of the canal system there is an empty lot that is cleared but has some mangroves that will have to be trimmed or removed for staging of material and pump placement.**
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Quantity of Material (scored from 0 to + 5) Scoring is based upon the approximate volume of material to be removed from the canal system.	Canals that have greater than approximately 1600 cubic yards of muck, should receive score of 0.	5	X 3	15	**AMEC used bathymetric data to determine the approximate volumetric muck removal to be 1,024 yd^3.**
	Canals that have greater than approximately 1050 but less than 1600 cubic yards of muck, should receive score of 3.				
	Canals that have less than approximately 1050 cubic yards of muck, should receive score of 5.				
Overall Score				92	

Scoring Criteria for Potential Keys Canal Restoration Sites for ORGANIC REMOVAL		Area Name	MM 31 Ross Haven subdivision Bayside		
		Canal Number	297 Big Pine Key		
		Potential Restoration Technology	ORGANIC REMOVAL		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.	5	X 4	20	**There is no obvious evidence of mangrove, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present in a canal with such bad water quality.**
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	**The restoration is not anticpated to require mitigation.**
1C) Bathymetric and Sediment Characterization Data (scored from 0 to +5) Scoring is based on the potential for additional data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has no sedimentation data, should receive a score of 0. Canals that require less than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has sedimentation data, should receive a score of 5.	5	X2	10	**AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine the approximate number of cross sections. No sedimentation analysis available.**
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 15 feet deep , should receive a score of 0. Canals that have navigational widths(boat lift to boat lift) greater than 25, less than 20 boat lifts, less than 15 feet deep , should receive a score of 5.	5	X 3	15	**AMEC used google earth and bathymetric data to determine the approximate depth, width, and number of boat lifts. Depth = 7.25 feet, Width = 27 feet , and # of boat lifts = 5. If any of the parameters match the criteria then it recives that ranking score.**
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to set up dewatering system.	Canals that do not have an empty lot for dewatering system, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 4	12	**At the end of the canal system there is an empty lot that is cleared and would be a good area for staging of material and pump placement. There is some misc pieces of trash/debris that will need to removed.**
2C) Quantity of Material (scored from 0 to + 5) Scoring is based upon the approximate volume of material to be removed from the canal system.	Canals that have greater than approximately 1600 cubic yards of muck, should receive score of 0. Canals that have greater than approximately 1050 but less than 1600 cubic yards of muck, should receive score of 3. Canals that have less than approximately 1050 cubic yards of muck, should receive score of 5.	5	X 3	15	**AMEC used bathymetric data to determine the approximate volumetric muck removal to be 933 yd^3**
Overall Score				92	

Scoring Criteria for Potential Keys Canal Restoration Sites for ORGANIC REMOVAL		Area Name	MM 31 Atlantic Estatates subdivision Bayside		
		Canal Number	287 Big Pine Key		
		Potential Restoration Technology	ORGANIC REMOVAL		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.	5	X 4	20	There is no obvious evidence of mangrove, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present in a canal with such bad water quality.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	The restoration is not anticpated to require mitigation.
1C) Bathymetric and Sediment Characterization Data (scored from 0 to +5) Scoring is based on the potential for additional data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has no sedimentation data, should receive a score of 0. Canals that require less than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has sedimentation data, should receive a score of 5.	0	X2	0	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections. No sedimentation analysis available.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 15 feet deep , should receive a score of 0. Canals that have navigational widths(boat lift to boat lift) greater than 25, less than 20 boat lifts, less than 15 feet deep , should receive a score of 5.	5	X 3	15	AMEC used google earth and bathymetric data to determine the approximate depth, width, and number of boat lifts.Depth = 13.98 feet, Width = 40 feet , and # of boat lifts = 10.If any of the parameters match the criteria then it recives that ranking score.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to set up dewatering system.	Canals that do not have an empty lot for dewatering system, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 4	12	At the end of the canal system there is an empty lot that is cleared but has some mangroves that will have to be trimmed or removed for staging of material and pump placement.
2C) Quantity of Material (scored from 0 to + 5) Scoring is based upon the approximate volume of material to be removed from the canal system.	Canals that have greater than approximately 1600 cubic yards of muck, should receive score of 0. Canals that have greater than approximately 1050 but less than 1600 cubic yards of muck, should receive score of 3. Canals that have less than approximately 1050 cubic yards of muck, should receive score of 5.	0	X 3	0	AMEC used bathymetric data to determine the approximate volumetric muck removal to be 1,931 yd^3.
Overall Score				67	

Scoring Criteria for Potential Keys Canal Restoration Sites for ORGANIC REMOVAL		Area Name	MM 31 Hollerich subdivision Bayside		
		Canal Number	288 Big Pine Key		
		Potential Restoration Technology	ORGANIC REMOVAL		
Items that Affect Permitting		Score	Weighting Factor	Total Score	Comments
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.	5	X 4	20	There is no obvious evidence of mangrove, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present in a canal with such bad water quality.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	The restoration is not anticpated to require mitigation.
1C) Bathymetric and Sediment Characterization Data (scored from 0 to +5) Scoring is based on the potential for additional data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has no sedimentation data, should receive a score of 0. Canals that require less than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has sedimentation data, should receive a score of 5.	0	X2	0	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections. No sedimentation analysis available.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 15 feet deep , should receive a score of 0. Canals that have navigational widths(boat lift to boat lift) greater than 25, less than 20 boat lifts, less than 15 feet deep , should receive a score of 5.	0	X 3	0	AMEC used google earth and bathymetric data to determine the approximate depth, width, and number of boat lifts.Depth = 18.58 feet, Width = 20 feet , and # of boat lifts = 12.If any of the parameters match the criteria then it recives that ranking score.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to set up dewatering system.	Canals that do not have an empty lot for dewatering system, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 4	12	At the back end of the canal system there is an empty lot that is overgrown with vegetation but with triming it would be a great area for staging of material.
2C) Quantity of Material (scored from 0 to + 5) Scoring is based upon the approximate volume of material to be removed from the canal system.	Canals that have greater than approximately 1600 cubic yards of muck, should receive score of 0. Canals that have greater than approximately 1050 but less than 1600 cubic yards of muck, should receive score of 3. Canals that have less than approximately 1050 cubic yards of muck, should receive score of 5.	0	X 3	0	AMEC used bathymetric data to determine the approximate volumetric muck removal to 1,851 yd^3.
Overall Score				52	

Scoring Criteria for Potential Keys Canal Restoration Sites for CULVERT INSTALLATION		Area Name	MM 10 Boca Chica Shores subdivision Oceanside		
		Canal Number	459 Geiger Key		
		Potential Restoration Technology	CULVERT		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprint, the canal should receive a score of 5.	3	X 3	9	Although the project site contains a few mangroves, the foot print of the restoration is not likely to impact seagrasses or corals.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X3	9	From Aerials the installation of the culvert will require mitigation along Boca Chica Road near both sides of the canals.
1C) Survey Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require private property topographic survey due to removal/replacement, should receive a score of 0. Canals that do not require private property topographic survey due to removal/replacement, should receive a score of 5.	5	X3	15	From site visits, the culvert installation will only require the replacement of the concrete seawall. Since concrete seawall is a typical replacement for every culvert installation it was not considered part of the ranking criteria
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0. Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5	5	X 1	5	Homes on this canal system are connected to a Central Waste Water Treatment System.
Items that Affect Ease of Implementation					
2A) Length of Culvert (scored from 0 to + 5) Scoring is based upon the length of culvert to connect the systems.	Canals that have a culvert connection greater than 200 feet, should receive a score of 0. Canals that have a culvert connection less than 200 feet, should receive a score of 5.	5	X 2	10	Based on google earth the culvert connection will be approximately 106 feet.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 2	6	AMEC used google earth to determine whether or not the canal system had a staging area and the vegetation density. There is an area located along Egret Lane that could be used as a staging area but vegetation would need to be cleared.
2C) Traffic Impact Concerns (scored from 0 to + 5) Scoring is based upon the severity of traffic impacts to the existing roadway.	Canals that have a FDOT AADT greater than 2000 and is the main road system into the subdivision, should receive score of 0. Canals that have a FDOT AADT less than 2000 and is not the main road system into the subdivision, should receive score of 5.	0	X 2	0	Based on FDOT 2012 traffic data, there is approximately 2200 AADT for Boca Chica Road. Also Boca Chica Road is the main road in and out of the subdivison.
2E) Existing Infrastructure Concerns (scored from 0 to + 5) Scoring is based upon whether or not the installation of the culvert would require removal/replacement of private property.	Canals that would require the removal/replacement of private property, should receive score of 0. Canals that do not require the removal/replacement of private property, should receive score of 5.	5	X 2	10	From site visits, the culvert installation will only require the replacement of the concrete seawall. Since concrete seawall is a typical replacement for every culvert installation it was not considered part of the ranking criteria
2F) Existing Utility Concerns (scored from 0 to + 5) Scoring is based upon whether or not the water, sewer, data, or electric utility lines will need to be removed/replaced.	Canals that require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 0. Canals that do not require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 5.	0	X 2	0	From field visits, the sewer and water system were identified, therefore the assumption was made that these would need to be removed/replaced during construction. The electrical line would not be an issue and the data line was not identified.
Overall Score				64	

Scoring Criteria for Potential Keys Canal Restoration Sites for CULVERT INSTALLATION		Area Name	MM 31 Tropical Bay Estates (3rd Addition) subdivision Bayside		
		Canal Number	277 Big Pine Key		
		Potential Restoration Technology	CULVERT		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprint, the canal should receive a score of 5.	3	X 3	9	The project site contains a few mangroves. There is no obvious evidence of seagrass or coral, and the anticipated footprint and potential impact on the nearshore bottom is anticpated to be minimal.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X3	9	The culvert installation will require mitigation for mangrove trimming/removal .
1C) Survey Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require private property topographic survey due to removal/replacement, should receive a score of 0. Canals that do not require private property topographic survey due to removal/replacement, should receive a score of 5.	5	X3	15	From site visits, the culvert installation will only require the replacement of the concrete seawall. Since concrete seawall is a typical replacement for every culvert installation it was not considered part of the ranking criteria
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0. Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5	0	X 1	0	Homes on this canal system are still on septic systems. Planned sewer connection by approximately 2015
Items that Affect Ease of Implementation					
2A) Length of Culvert (scored from 0 to + 5) Scoring is based upon the length of culvert to connect the systems.	Canals that have a culvert connection greater than 200 feet, should receive a score of 0. Canals that have a culvert connection less than 200 feet, should receive a score of 5.	0	X 2	0	Based on google earth the culvert connection will be approximately 106 feet.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 2	10	AMEC used google earth to determine whether or not the canal system had a staging area and the vegetation density. There is an area located along Sunrise Drive that could be used as a staging area.
2C) Traffic Impact Concerns (scored from 0 to + 5) Scoring is based upon the severity of traffic impacts to the existing roadway.	Canals that have a FDOT AADT greater than 2000 and is the main road system into the subdivision, should receive score of 0. Canals that have a FDOT AADT less than 2000 and is not the main road system into the subdivision, should receive score of 5.	5	X 2	10	Based on FDOT 2012 traffic data, there is approximately 1600 AADT for Watson Road. Also Watson road is not the main road in and out of the subdivison.
2D) Existing Infrastructure Concerns (scored from 0 to + 5) Scoring is based upon whether or not the installation of the culvert would require removal/replacement of private property.	Canals that would require the removal/replacement of structures on private property, should receive score of 0. Canals that do not require the removal/replacement of structures on private property, should receive score of 5.	5	X 2	10	From site visits, the culvert installation will only require the replacement of the concrete seawall. Since concrete seawall is a typical replacement for every culvert installation it was not considered part of the ranking criteria
2E) Existing Utility Concerns (scored from 0 to + 5) Scoring is based upon whether or not the water, sewer, data, or electric utility lines will need to be removed/replaced.	Canals that require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 0. Canals that do not require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 5.	0	X 2	0	From field visits, the sewer and water system were identified, therefore the assumption was made that these would need to be removed/replaced during construction. The electrical line would not be an issue and the data line was not identified.
Overall Score				63	

Scoring Criteria for Potential Keys Canal Restoration Sites for CULVERT INSTALLATION		Area Name	MM 10 Geiger Mobil Home subdivision		
		Canal Number	472 Geiger Key		
		Potential Restoration Technology	CULVERT		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprint, the canal should receive a score of 5.	5	X 3	15	There is no obvious evidence of sensitive resources within the footprint of this restoration.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X3	15	Mitigation is not anticipated for this restoration.
1C) Survey Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require private property topographic survey due to removal/replacement, should receive a score of 0. Canals that do not require private property topographic survey due to removal/replacement, should receive a score of 5.	0	X3	0	From site visits, the culvert installation will require the removal of a private concrete deck, therefore the contractor will be required to survey the structure and replace to match existing conditions.
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0. Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5	5	X 1	5	Homes on this canal system are connected to a Central Waste Water Treatment System.
Items that Affect Ease of Implementation					
2A) Length of Culvert (scored from 0 to + 5) Scoring is based upon the length of culvert to connect the systems.	Canals that have a culvert connection greater than 200 feet, should receive a score of 0. Canals that have a culvert connection less than 200 feet, should receive a score of 5.	5	X 2	10	Based on google earth the culvert connection will be approximately 106 feet.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 2	6	AMEC used google earth to determine whether or not the canal system had a staging area and the vegetation density. An area located along Venus Lane could be used as staging area but the vegetation woujld need to be cleared.
2C) Traffic Impact Concerns (scored from 0 to + 5) Scoring is based upon the severity of traffic impacts to the existing roadway.	Canals that have a FDOT AADT greater than 2000 and is the main road system into the subdivision, should receive score of 0. Canals that have a FDOT AADT less than 2000 and is not the main road system into the subdivision, should receive score of 5.	0	X 2	0	Based on FDOT 2012 traffic data, there is approximately 2200 AADT for Boca Chica Road. Also Boca Chica Road is the main road in and out of the subdivison.
2E) Existing Infrastructure Concerns (scored from 0 to + 5) Scoring is based upon whether or not the installation of the culvert would require removal/replacement of private property.	Canals that would require the removal/replacement of private property, should receive score of 0. Canals that do not require the removal/replacement of private property, should receive score of 5.	0	X 2	0	From site visits, the culvert installation will require the removal of a private concrete deck, therefore the contractor will be required to remove and replace to match existing conditions.
2F) Existing Utility Concerns (scored from 0 to + 5) Scoring is based upon whether or not the water, sewer, data, or electric utility lines will need to be removed/replaced.	Canals that require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 0. Canals that do not require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 5.	0	X 2	0	From field visits, the sewer and water system were identified, therefore the assumption was made that these would need to be removed/replaced during construction. The electrical line would not be an issue and the data line was not identified.
Overall Score				51	

Scoring Criteria for Potential Keys Canal Restoration Sites for PUMPING		Area Name	MM 31 Whispering Pines subdivision Bayside		
		Canal Number	286 Big Pine Key		
		Potential Restoration Technology	PUMPING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.	3	X 3	9	The project site contains a few mangroves near the canal mouth. There is no obvious evidence of seagrass or coral, and although a benthic survey has not yet been completed it was assumed that these sensitive resources would likely not be present at the mouth of a canal with such poor water quality.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X3	9	Mitigation may be required for mangrove trimming/removal.
1C) Bathymetric and Topographic Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0. Canals that require greater than 50 but less than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3. Canals that require less than 50 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.	5	X3	15	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0. Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5	0	X 1	0	Homes on this canal system are still on septic systems. Planned sewer connection by approximately 2015
Items that Affect Ease of Implementation					
2A) Length of Pumping System (scored from 0 to + 5) Scoring is based upon the length of pumping system.	Canals that have a pumping system greater than 2500 feet, should receive a score of 0. Canals that have a pumping system greater than 2500 feet, should receive a score of 0.	5	X 3	15	AMEC used bathymetric data and google earth to determine the approximate length of the canal system
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 2	10	AMEC used google earth to determine whether or not the canal system had a staging area and the vegetation density. A lot that could be used as a staging area is located at the end of Pine Lane.
2C) Depth of Pumping System (scored from 0 to + 5) Scoring is based upon the depth of canal.	Canals that have an average depth greater than 10 feet and a range in bottom elevations greater than 8 feet should receive a score of 0. Canals that have an average depth less than10 feet and a range in bottom elevation of less than 8 feet should receive a score of 5.	0	X 3	0	AMEC used bathymetric data to determine the average depth of 11.77' and range in depths of 14.94'.
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property and require a distance greater than 200 feet, should receive score of 0. Canals that do not have accessible electric hook up for the pump station on property and require a distance greater than 50 but less than 200 feet, should receive score of 3. Canals that do not have accessible electric hook up for the pump station on property and require a distance less than 50, should receive score of 5.	0	X 2	0	Based on field visits Amec determined whether the canal system had an electrical drop. The approximate distance to the nearest electrical pole is 240 feet.
Overall Score				58	

Scoring Criteria for Potential Keys Canal Restoration Sites for PUMPING		Area Name	MM 30 Eden Pines Colony (1st Addition) subdivision Bayside		
		Canal Number	278 Big Pine Key		
		Potential Restoration Technology	PUMPING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.	0	X 3	0	The proposed pump intake is located in a near shore area that contains mangroves and may contain seagrass.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	0	X3	0	Thee installation of the pumping system is likelly to require mitigation along Narcissus Avenue in the near shore area.
1C) Bathymetric and Topographic Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0. Canals that require greater than 50 but less than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3. Canals that require less than 50 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.	0	X3	0	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0. Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5	0	X 1	0	Homes on this canal system are still on septic systems. Planned sewer connection by approximately 2015
Items that Affect Ease of Implementation					
2A) Length of Pumping System (scored from 0 to + 5) Scoring is based upon the length of pumping system.	Canals that have a pumping system greater than 2500 feet, should receive a score of 0. Canals that have a pumping system greater than 2500 feet, should receive a score of 0.	0	X 3	0	AMEC used bathymetric data and google earth to determine the approximate length of the canal system
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 2	10	AMEC used google earth to determine whether or not the canal system had a staging area and the vegetation density. There is an area located along Narcissus Avenue that could be used as a staging area.
2C) Depth of Pumping System (scored from 0 to + 5) Scoring is based upon the depth of canal.	Canals that have an average depth greater than 10 feet and a range in bottom elevations greater than 8 feet should receive a score of 0. Canals that have an average depth less than10 feet and a range in bottom elevation of less than 8 feet should receive a score of 5.	5	X 3	15	AMEC used bathymetric data to determine the average depth of 7.87' and range in depths of 7.98'.
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property and require a distance greater than 200 feet, should receive score of 0. Canals that do not have accessible electric hook up for the pump station on property and require a distance greater than 50 but less than 200 feet, should receive score of 3. Canals that do not have accessible electric hook up for the pump station on property and require a distance less than 50, should receive score of 5.	5	X 2	10	Based on field visits Amec determined whether the canal system had an electrical drop. The approximate distance to the nearest electrical pole is 50 feet.
Overall Score				35	

Scoring Criteria for Potential Keys Canal Restoration Sites for PUMPING		Area Name	MM 103 Bermuda Shores subdivision, Bayside		
		Canal Number	47 Key Largo		
		Potential Restoration Technology	PUMPING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0.	0	X 3	0	The proposed pump intake is located in a near shore that contains mangroves and may contain seagrass.
	If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3.				
	If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	0	X3	0	The installation of the pumping system is likely to require mitigation along Shaw Drive in the nearshore wetland area.
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Bathymetric and Topographic Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0.	3	X3	9	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.
	Canals that require greater than 50 but less than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3.				
	Canals that require less than 50 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.				
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0.	5	X 1	5	Homes on this canal system are connected to a Central Waste Water Treatment System
	Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5				
Items that Affect Ease of Implementation					
2A) Length of Pumping System (scored from 0 to + 5) Scoring is based upon the length of pumping system.	Canals that have a pumping system greater than 2500 feet, should receive a score of 0.	0	X 3	0	AMEC used bathymetric data and google earth to determine the approximate lengths of the canal system
	Canals that have a pumping system greater than 2500 feet, should receive a score of 0.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0.	3	X 2	6	AMEC used google earth to determine whether or not the canal system had a staging area and the vegetation density. There is an area located along Shaw Drive that could be used as a staging area. The area is overgrown with vegeation and will need to be cleared for use.
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Depth of Pumping System (scored from 0 to + 5) Scoring is based upon the depth of canal.	Canals that have an average depth greater than 10 feet and a range in bottom elevations greater than 8 feet should receive a score of 0.	0	X 3	0	AMEC used bathymetric data to determine the average depth of 11.62' and range in depths of 14.37'.
	Canals that have an average depth less than10 feet and a range in bottom				
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property and require a distance greater than 200 feet, should receive score of 0.	3	X 2	6	Based on field visits Amec determined whether the canal system had an electrical drop. The approximate distance to the nearest electrical pole is 80 feet.
	Canals that do not have accessible electric hook up for the pump station on property and require a distance greater than 50 but less than 200 feet, should receive score of 3.				
	Canals that do not have accessible electric hook up for the pump station on property and require a distance less than 50, should receive score of 5.				
Overall Score				26	

Scoring Criteria for Potential Keys Canal Restoration Sites for BACKFILLING		Area Name	MM 106 Sexton Cove Estates subdivision Bayside		
		Canal Number	29 Key Largo		
		Potential Restoration Technology	BACKFILLING		
Items that Affect Permitting		Score	Weighting Factor	Total Score	Comments
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprin, the canal should receive a score of 5.	3	X 4	12	Although the project site contains a few mangroves, there is no obvious evidence of seagrass or coral, and although a benthic survey has not yet been completed due to the extreme depths, sensitive benthic resources are not anticpated.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X4	12	The restoration will require the triming/removal of magroves.
1C) Bathymetric Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0. Canals that require greater than 13 but less than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3. Canals that require less than 13 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.	3	X2	6	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, depth and whether aerators exist.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, or greater than 20 boat lifts, or greater than 35 feet deep and/or greater than 800 feet long or more than 2 aerators , should receive a score of 0. Canals that have navigational widths (boat lift to boat lift) greater than 25 but less than 35 feet, or greater than 15 but less than 20 boat lifts, or greater than 25 but less than 35 feet deep and/or greater than 650 but less than 800 feet long or less than 2 aerators, should receive a score of 3. Canals that have navigational widths(boat lift to boat lift) greater than 35 feet, less than 15 boat lifts, less than 25 feet deep and less than 650 feet long or no aerators, should receive a score of 5.	3	X 4	12	AMEC used google earth and bathymetric data to determine the approximate length, depth, width, ,number of boat lifts, and number of aerators. Length = 722 feet, Depth = 32.33 feet, Width = 30 feet , # of boat lifts = 12, and # of aerators = 1. If any of the parameters match the criteria then it recives that ranking score.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile backfill.	Canals that do not have an empty lot for stockpiling of backfill, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 4	12	Based on google earth there is an empty lot but it will need to be cleared.
2C) Hauling Distance (scored from 0 to + 5) Scoring is based upon the distance from Florida City, Florida to the canal system.	Canals that have a hauling distance greater than 50 miles, should receive score of 0. Canals that have a hauling distance greater than 30 but less than 50 miles, should receive score of 3. Canals that have a hauling distance less than 30 miles, should receive score of 5.	5	X 2	10	AMEC determined the hauling distance to Florida City from the canal system. The approximate distance is 22 miles.
Overall Score				64	

Scoring Criteria for Potential Keys Canal Restoration Sites for BACKFILLING		Area Name	MM 106 Sexton Cove Estates subdivision Bayside		
		Canal Number	27 Key Largo		
		Potential Restoration Technology	BACKFILLING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprin, the canal should receive a score of 5.	3	X 4	12	**Although the project site contains a few mangroves, there is no obvious evidence of seagrass or coral, and although a benthic survey has not yet been completed due to the extreme depths, sensitive benthic resources are not anticpated.**
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X4	12	**The restoration will require the triming/removal of magroves.**
1C) Bathymetric Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0. Canals that require greater than 13 but less than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3. Canals that require less than 13 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.	5	X2	10	**AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.**
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, depth and whether aerators exist.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, or greater than 20 boat lifts, or greater than 35 feet deep and/or greater than 800 feet long or more than 2 aerators , should receive a score of 0. Canals that have navigational widths (boat lift to boat lift) greater than 25 but less than 35 feet, or greater than 15 but less than 20 boat lifts, or greater than 25 but less than 35 feet deep and/or greater than 650 but less than 800 feet long or less than 2 aerators, should receive a score of 3. Canals that have navigational widths(boat lift to boat lift) greater than 35 feet, less than 15 boat lifts, less than 25 feet deep and less than 650 feet long or no aerators, should receive a score of 5.	0	X 4	0	**AMEC used google earth and bathymetric data to determine the approximate length, depth, width, ,number of boat lifts, and number of aerators. Length = 591 feet, Depth = 42.07 feet, Width = 35 feet , # of boat lifts = 12, # of aerators = 3.If any of the parameters match the criteria then it recives that ranking score.**
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile backfill.	Canals that do not have an empty lot for stockpiling of backfill, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 4	12	**Based on google earth there is an empty lot but it will need to be cleared.**
2C) Hauling Distance (scored from 0 to + 5) Scoring is based upon the distance from Florida City, Florida to the canal system.	Canals that have a hauling distance greater than 50 miles, should receive score of 0. Canals that have a hauling distance greater than 30 but less than 50 miles, should receive score of 3. Canals that have a hauling distance less than 30 miles, should receive score of 5.	5	X 2	10	**AMEC determined the hauling distance to Florida City from the canal system. The approximate distance is 22 miles.**
Overall Score				56	

Scoring Criteria for Potential Keys Canal Restoration Sites for BACKFILLING		Area Name	MM 105 Key Largo Mobile Home Site Plat 4 subdivision Oceanside		
		Canal Number	37 Key Largo		
		Potential Restoration Technology	BACKFILLING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprin, the canal should receive a score of 5.	3	X 4	12	Although the project site contains a few mangroves, there is no obvious evidence of seagrass or coral, and although a benthic survey has not yet been completed due to the extreme depths, sensitive benthic resources are not anticpated.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X4	12	The restoration will require the triming/removal of magroves.
1C) Bathymetric Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0. Canals that require greater than 13 but less than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3. Canals that requireless than 13 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.	0	X2	0	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, depth and whether aerators exist.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, or greater than 20 boat lifts, or greater than 35 feet deep and/or greater than 800 feet long or more than 2 aerators , should receive a score of 0. Canals that have navigational widths (boat lift to boat lift) greater than 25 but less than 35 feet, or greater than 15 but less than 20 boat lifts, or greater than 25 but less than 35 feet deep and/or greater than 650 but less than 800 feet long or less than 2 aerators, should receive a score of 3. Canals that have navigational widths(boat lift to boat lift) greater than 35 feet, less than 15 boat lifts, less than 25 feet deep and less than 650 feet long or no aerators, should receive a score of 5.	0	X 4	0	AMEC used google earth and bathymetric data to determine the approximate length, depth, width, number of boat lifts, and number of aerators. Length = 820 feet, Depth = 21.64 feet, Width = 23 feet , # of boat lifts = 20, and # of aerators = 0.If any of the parameters match the criteria then it recives that ranking score.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile backfill.	Canals that do not have an empty lot for stockpiling of backfill, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 4	20	Based on google earth there is a cleared empty lot.
2C) Hauling Distance (scored from 0 to + 5) Scoring is based upon the distance from Florida City, Florida to the canal system.	Canals that have a hauling distance greater than 50 miles, should receive score of 0. Canals that have a hauling distance greater than 30 but less than 50 miles, should receive score of 3. Canals that have a hauling distance less than 30 miles, should receive score of 5.	5	X 2	10	AMEC determined the hauling distance to Florida City from the canal system. The approximate distance is 23 miles.
Overall Score				54	

Scoring Criteria for Potential Keys Canal Restoration Sites for BACKFILLING		Area Name	MM 93 Hammer Point Park subdivision Bayside		
		Canal Number	92 Tavernier		
		Potential Restoration Technology	BACKFILLING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprin, the canal should receive a score of 5.	5	X 4	20	**There is no obvious evidence of mangrove, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present in a canal with such bad water quality.**
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	**The proposed restoration is not anticpated to require mitigation.**
1C) Bathymetric Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0. Canals that require greater than 13 but less than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3. Canals that require less than 13 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.	3	X2	6	**AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.**
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, depth and whether aerators exist.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, or greater than 20 boat lifts, or greater than 35 feet deep and/or greater than 800 feet long or more than 2 aerators , should receive a score of 0. Canals that have navigational widths (boat lift to boat lift) greater than 25 but less than 35 feet, or greater than 15 but less than 20 boat lifts, or greater than 25 but less than 35 feet deep and/or greater than 650 but less than 800 feet long or less than 2 aerators, should receive a score of 3. Canals that have navigational widths(boat lift to boat lift) greater than 35 feet, less than 15 boat lifts, less than 25 feet deep and less than 650 feet long or no aerators, should receive a score of 5.	0	X 4	0	**AMEC used google earth and bathymetric data to determine the approximate length, depth, width, ,number of boat lifts and number of aerators. Length = 656 feet, Depth = 27.08 feet, Width = 38 feet , # of boat lifts = 16, and # of aerators = 0.If any of the parameters match the criteria then it recives that ranking score.**
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile backfill.	Canals that do not have an empty lot for stockpiling of backfill, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	0	X 4	0	**Based on google earth there is not an empty lot near the canal.**
2C) Hauling Distance (scored from 0 to + 5) Scoring is based upon the distance from Florida City, Florida to the canal system.	Canals that have a hauling distance greater than 50 miles, should receive score of 0. Canals that have a hauling distance greater than 30 but less than 50 miles, should receive score of 3. Canals that have a hauling distance less than 30 miles, should receive score of 5.	3	X 2	6	**AMEC determined the hauling distance to Florida City from the canal system. The approximate distance is 35 miles.**
Overall Score				52	

APPENDIX C

DEMONSTRATION CANAL INFORMATIONAL SHEETS AND PRELIMINARY DESIGNS

WEED BARRIERS

Monroe County Selection of Demonstration Canals for WEED BARRIERS

Canal ID: 266 Big Pine Key

Location: MM 31 Doctor's Arm subdivision, Bayside

Summary of Water Quality Impacts: Primary – Weed wrack entry into canal; Secondary – organics accumulation on canal bottom

Restoration Technology: Weed barrier to prevent additional entry of weed wrack; Secondary - organic removal from canal bottom to eliminate on-going source of organic decomposition.

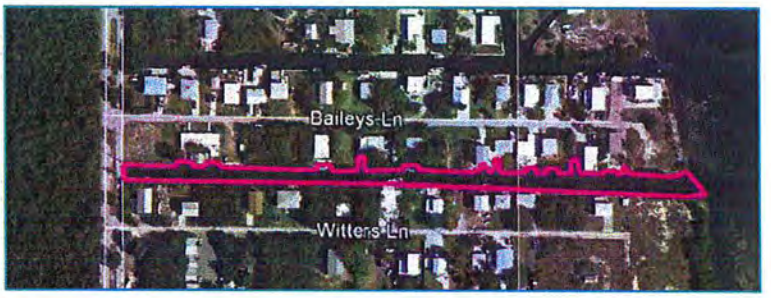
Site Conditions: The canal faces due east and discharges into Bogie Channel. A small area of submerged shoreline shows as privately owned on the aerials although the property appraiser's details of the property do not reflect private ownership. Further research is needed. Sediment characterization data is available indicating sediment can be disposed as clean fill.

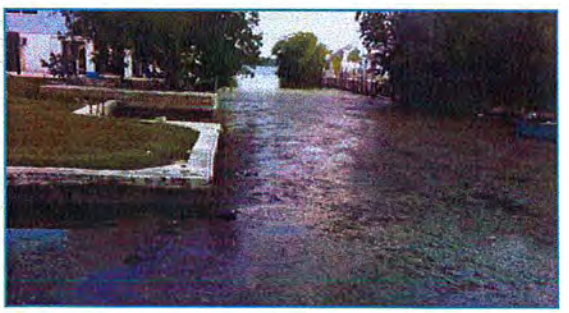
Existing Treatment: Air curtain/physical barriers not operating effectively

Homeowner Communication: Very interested homeowner group contacted Monroe County about the need for an upgrade to their weed barrier and removal of accumulated organics from the canal bottom. Sharon Ripley 305-797-7251

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.04 / 0.5% at 5 ft	Not Measured	Poor 115	74

Characteristics	
Size (acres)	1.1
**Average Depth (ft)	-7.18
**Min Depth (ft)	-10.93
Degree of Stagnation	-0.3
Number of Mouths	1
Organic Thickness (ft) Average	0.86
Parcels	37
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.43 miles





Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 266 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 14, Township 66 S, Range 29 E , (Latitude: 24°41'55.90" North; Longitude: - 81°20'53.46" West). The information sheet and the site location map **(Figure 6)** provide additional details.

Conceptual Design:

The purpose of the project is to reduce seaweed loading for canal 266 by installing a weed barrier system. The weed barrier system will entail a 5 horse power blower, 6 - 6 inch PVC piles, 50 linear feet of 3 inch PVC pipe, and 40 linear feet of plastic netting affixed to the piles. The following is the detailed schematic of the system:

- Two 10-foot stretches of physical weed barrier shall be constructed on either side of the channel at the entrance of the canal.
- Each of the 10' physical weed barrier sections will be comprised of (2) PVC piles that will be placed approximately 9' apart. Plastic netting will be affixed to the pilings in order to block the flow of weed wrack. The netting shall be oriented such that as mean sea level 2.5' of netting remains above the water and 2.5' of netting remains below the water.
- The area between the ends of the physical weed barrier shall contain a 20' wide air curtain. Coarse bubble diffusers will be spaced at an interval of 2 feet. Diffuser mounts will be used to affix the coarse bubble diffusers to the air curtain lateral. The air curtain lateral line will rest approximately 1 foot above the bottom surface to allow for maximum boating clearance.
- A 36 URAI blower in conjunction with a 5hp motor will provide air through 3" PVC pipe to the air curtain. Calculations for determining these blower specifications were based on an assumed diffuser depth of 9'. This estimate is subject to change based on detailed design data.

Before installing the proposed weed barrier system, the existing weed gate system will be removed using an excavator and barge. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

Construction Cost Estimate:

The approximate cost to construct the weed barrier system as aforementioned will be $26,000. This price does not include any cost associated with operation and maintenance and electric drop fees.

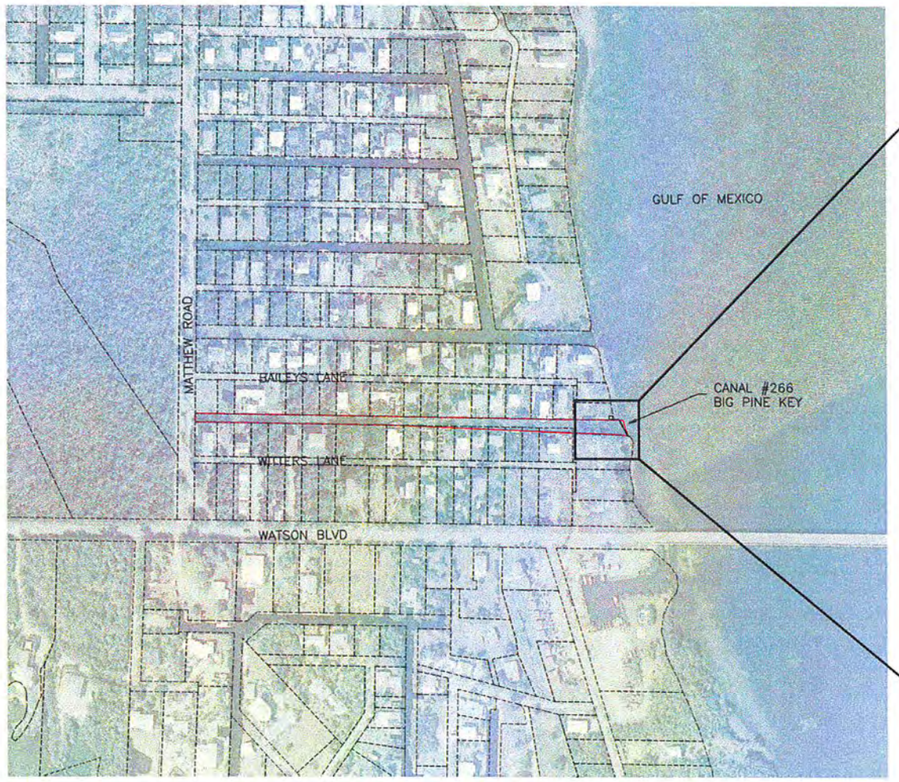
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot at the end of Baileys Lane that could be used as a construction staging area.

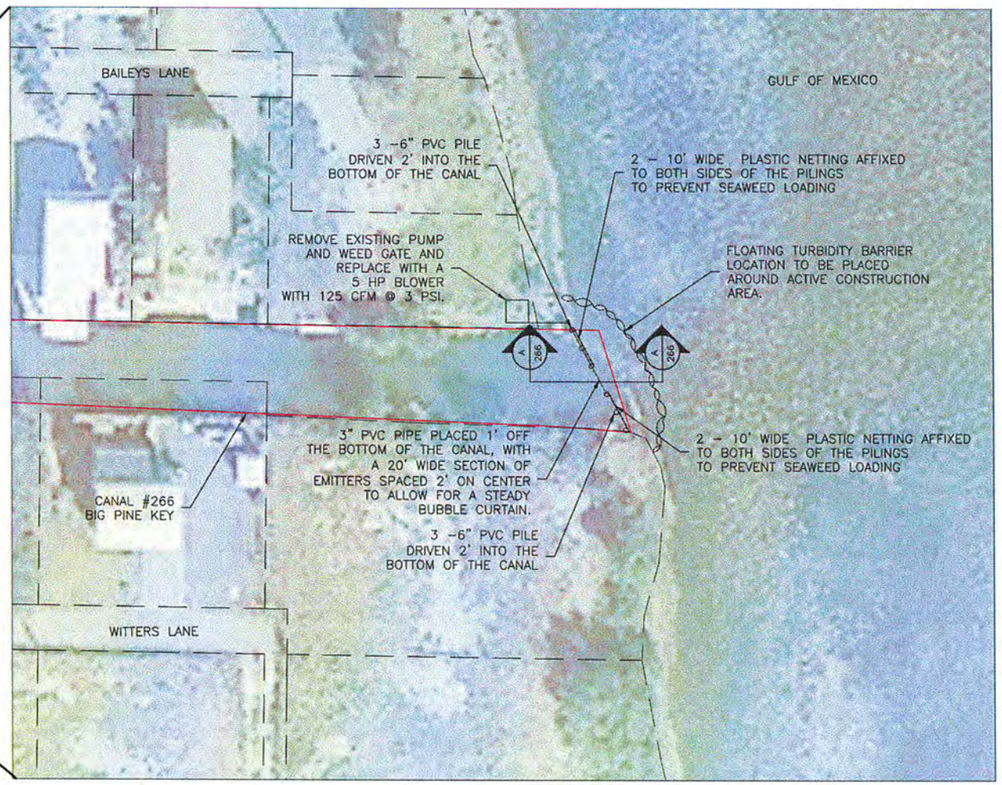
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



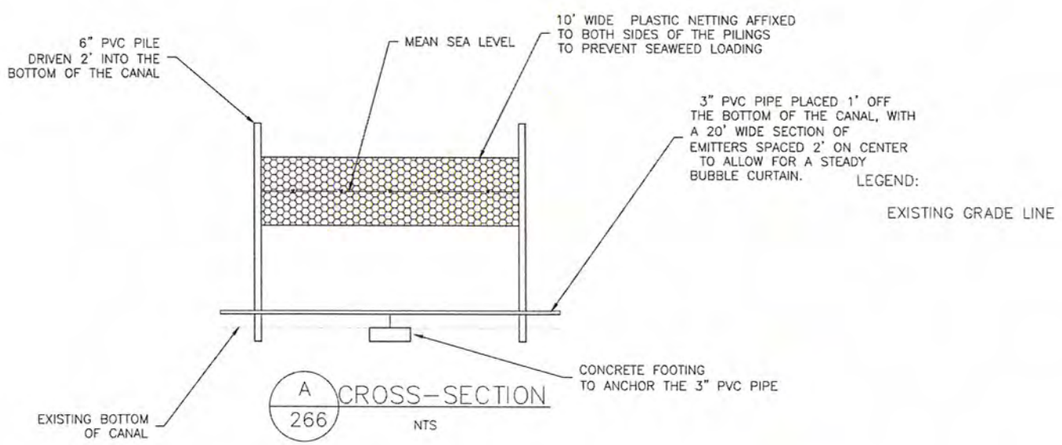
DETAIL SITE LAYOUT - WEED BARRIER

0 30' 60'

SCALE:1"=30'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #266 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A / 266 CROSS-SECTION

NTS

ROTRON® Regenerative Blowers

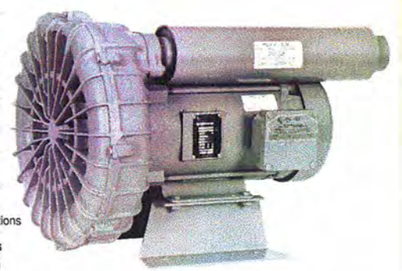
EN 6 & CP 6
Sealed Regenerative Blower w/Explosion-Proof Motor

FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 225 SCFM
- Maximum pressure: 104 IWG
- Maximum vacuum: 85 IWG
- Standard motor: 5.0 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package



BLOWER SPECIFICATION

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

WEED BARRIER CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 266	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for WEED BARRIERS

Canal ID: 288 Big Pine Key

Location: MM 31 Hollerich subdivision, Bayside

Summary of Water Quality Impacts: Primary – Weed wrack entry into canal; Secondary – organics accumulation on canal bottom; Tertiary – deep stagnant zone with an average depth of - 12.60 feet.

Restoration Technology: Primary – Weed barrier to prevent additional entry of weed wrack; Secondary - organic removal from canal bottom to eliminate on-going source of organic decomposition; Tertiary – backfilling (for the purpose of eliminating deep oxygen depleted impaired water quality zone)

Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Weedgate not operating effectively

Homeowner Communication: None to date. No HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.03 / 0.6% at 5 ft	0	Poor 112	74

Characteristics	
Size (acres)	1.36
Average Depth (ft)	-12.60
Min Depth (ft)	-18.58
Degree of Stagnation	-0.2
Number of Mouths	1
Organic Thickness (ft)	0.84
Parcels	37
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.23 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 288 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 24 Township 66 S, Range 29 E , (Latitude: 24°40'34.75" North; Longitude: - 81°20'37.33" West). The information sheet and the site location map (**Figure 11**) provide additional details.

Conceptual Design:

The purpose of the project is to reduce seaweed loading from the Gulf of Mexico for canal 288 by installing a weed barrier system. The weed barrier system will entail a 5 horse power blower, 4 - 6 inch PVC piles, 40 linear feet of 3 inch PVC pipe, and 20 linear feet of plastic netting affixed to the piles. The following is a more detailed description of the system:

- One 10-foot stretch of physical weed barrier shall be constructed on either side of the channel at the entrance to the canal.

- Each of the 10' physical weed barrier sections will be comprised of (2) PVC piles that will be placed approximately 9 feet apart. Plastic netting will be affixed to the pilings in order to block the seaweed from entering the canal. The netting shall be oriented such that at mean sea level 2.5 feet of netting remains above the water level and a minimum of 2.5 feet of netting is below the water level.

- The area between the physical weed barriers extending from the shorelines shall include a 20' wide air curtain. Coarse bubble diffusers in the air curtain will be spaced at an interval of 2 feet. Mounts will be used to affix the coarse bubble diffusers to the air curtain lateral. The air curtain lateral line will rest approximately 1 foot above the bottom surface to allow for maximum boating clearance and minimum resuspension of sediment.

- A 36 URAI blower, or similar, in conjunction with a 5hp motor will provide air through 3 inch PVC pipe to the air curtain. Calculations for determining these blower specifications were based on an assumed diffuser depth of 9'. This estimate is subject to change based on detailed design data.

Before installing the proposed weed barrier system, the existing weed barrier system will be removed using an excavator and barge. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

Construction Cost Estimate:

The approximate cost to construct the weed barrier system as aforementioned will be $23,000. This price does not include any cost associated with operation and maintenance and electric drop fees.

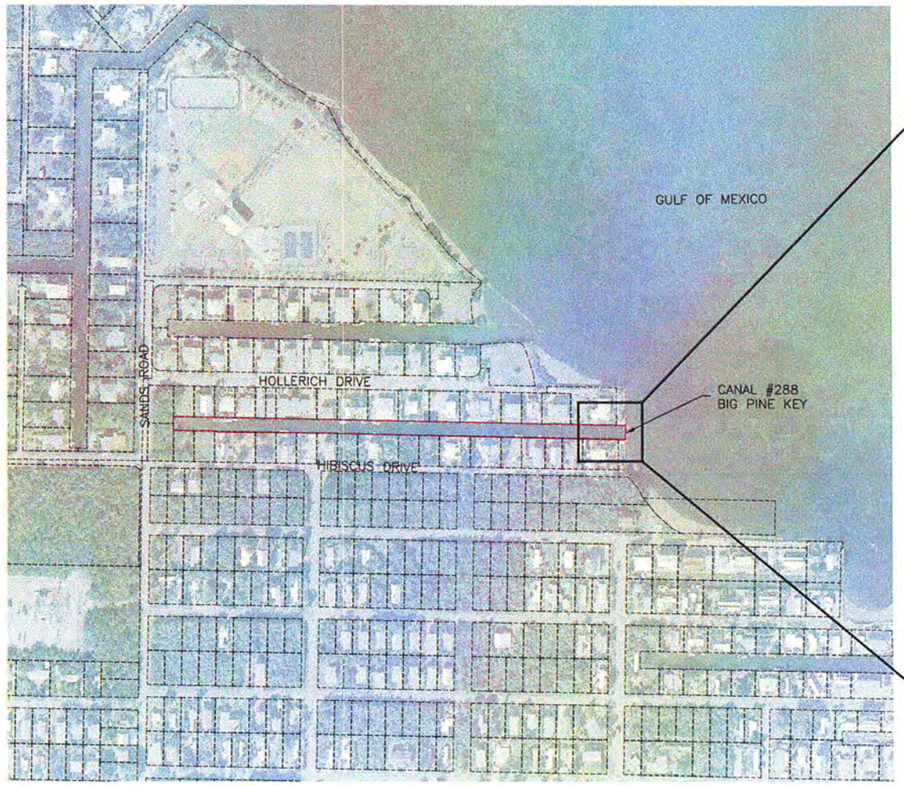
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot on the corner of Sands Road and Hollerich Drive that could be used as a construction staging area.

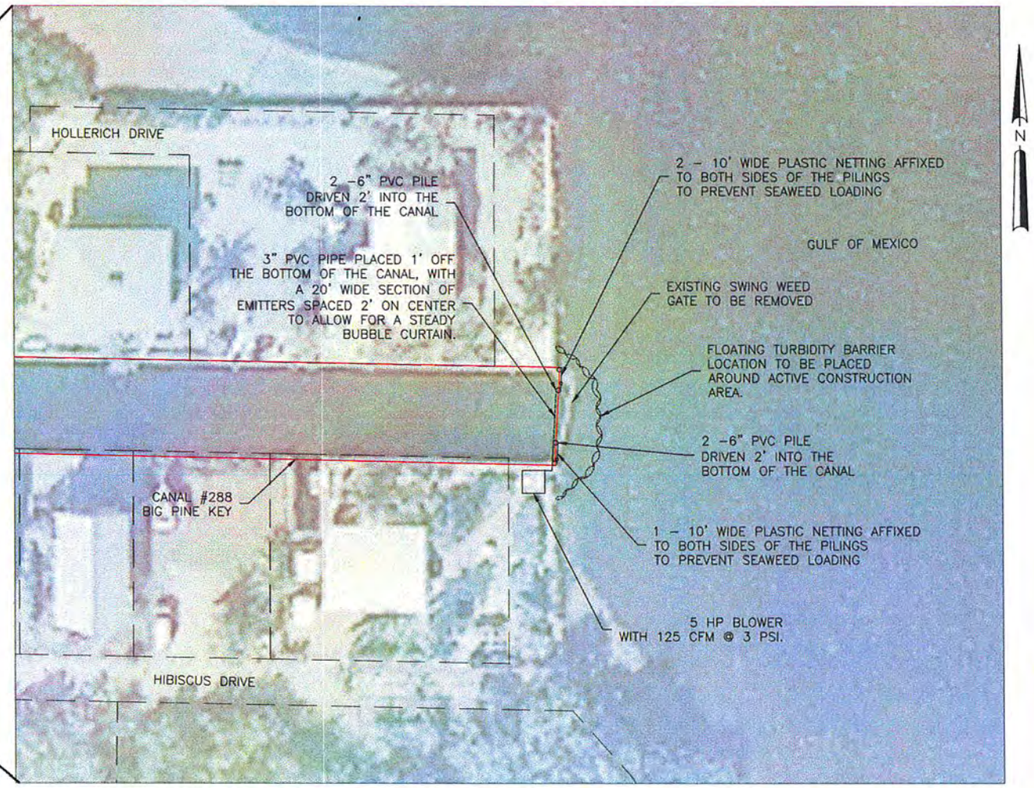
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



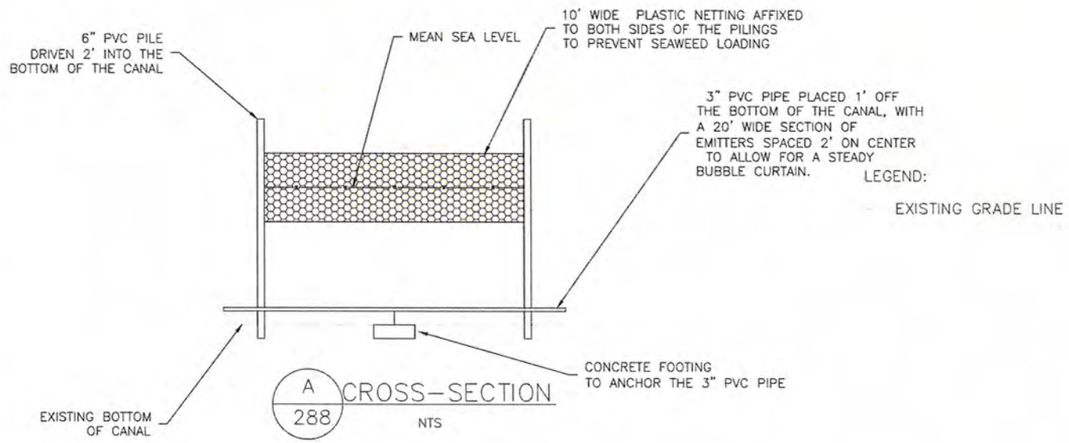
DETAIL SITE LAYOUT - WEED BARRIER

0 30' 60'

SCALE:1"=30'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #288 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A/288 CROSS-SECTION

NTS

ROTRON® Regenerative Blowers

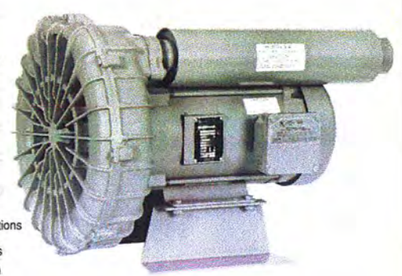
EN 6 & CP 6
Sealed Regenerative Blower w/Explosion-Proof Motor

FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 225 SCFM
- Maximum pressure: 104 IWG
- Maximum vacuum: 85 IWG
- Standard motor: 5.0 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package



BLOWER SPECIFICATION

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS

NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

WEED BARRIER CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 288	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for WEED BARRIERS

Canal ID: 297 Big Pine Key

Location: MM 31 Ross Haven subdivision, Bayside

Summary of Water Quality Impacts: Primary – Weed wrack entry into canal; Secondary – organics accumulation on canal bottom

Restoration Technology: Primary – Weed barrier to prevent additional entry of weed wrack; Secondary - organic removal from canal bottom to eliminate on-going source of organic decomposition

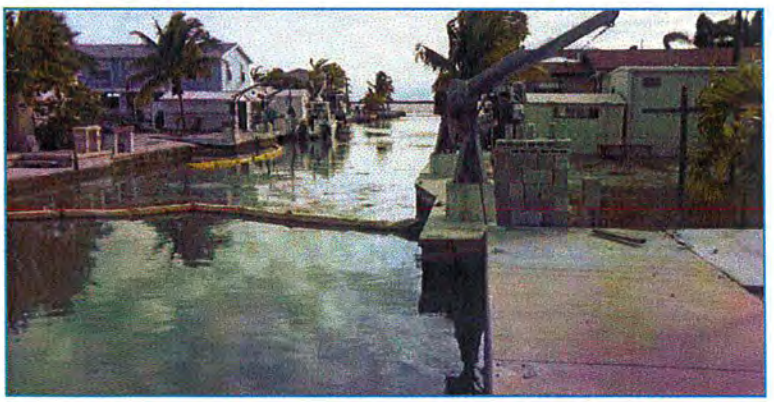
Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Weedgate that is not operating effectively

Homeonwer Communication: None to date. No HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.17 / 2.5% at 3 ft	9.63	Poor 115	64

Characteristics	
Size (acres)	0.46
Average Depth (ft)	-7.08
Min Depth (ft)	-7.25
Degree of Stagnation	-0.8
Number of Mouths	1
Organic Thickness (ft)	1.26
Parcels	15
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.59 miles



Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 297 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 24 Township 66 S, Range 29 E , (Latitude: 24°40'23.69" North; Longitude: - 81°20'24.70" West). The information sheet and the site location map (**Figure 13**) provide additional details.

Conceptual Design:

The purpose of the project is to reduce seaweed loading from the Gulf of Mexico for canal 297 by installing a weed barrier system. The weed barrier system will entail a 5 horse power blower, 17 - 6 inch PVC piles, 100 linear feet of 3 inch PVC pipe, and 140 linear feet of plastic netting affixed to the piles. The following is a more detailed description of the system:

- Seven 10-foot stretches of physical weed barrier shall be constructed on either side of the channel at the entrance to the canal.
- Each of the 10' physical weed barriers sections will be comprised of (2) PVC piles that will be placed approximately 9 feet apart. Plastic netting will be affixed to the pilings in order to block the seaweed from entering the canal. The netting shall be oriented such that at mean sea level 2.5 feet of netting remains above the water level and a minimum of 2.5 feet of netting is below the water level.
- The area between the physical weed barriers extending from the shorelines shall include a 20' wide air curtain. Coarse bubble diffusers in the air curtain will be spaced at an interval of 2 feet. Mounts will be used to affix the coarse bubble diffusers to the air curtain lateral. The air curtain lateral line will rest approximately 1 foot above the bottom surface to allow for maximum boating clearance and minimum resuspension of sediment.
- A 36 URAI blower, or similar, in conjunction with a 5hp motor will provide air through 3 inch PVC pipe to the air curtain. Calculations for determining these blower specifications were based on an assumed diffuser depth of 9'. This estimate is subject to change based on detailed design data.

Before installing the proposed weed barrier system, the existing weed gate system will be removed using an excavator and barge. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

Construction Cost Estimate:

The approximate cost to construct the weed barrier system as aforementioned will be $46,000. This price does not include any cost associated with operation and maintenance and electric drop fees.

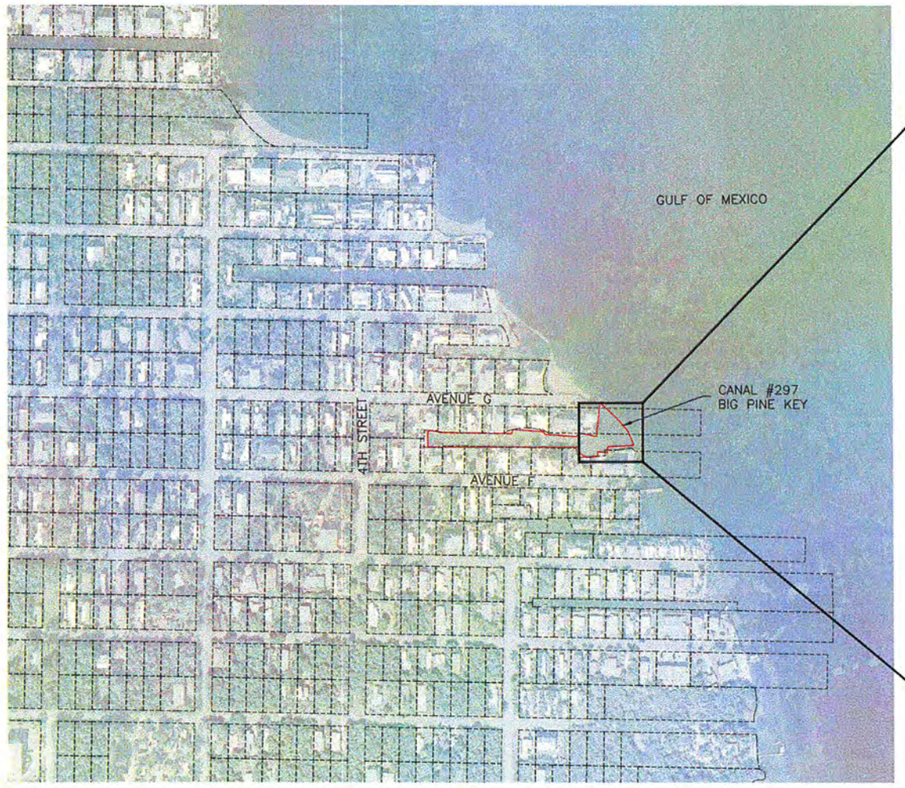
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot at the end of the canal between Avenue G and Avenue F that could be used as a construction staging area.

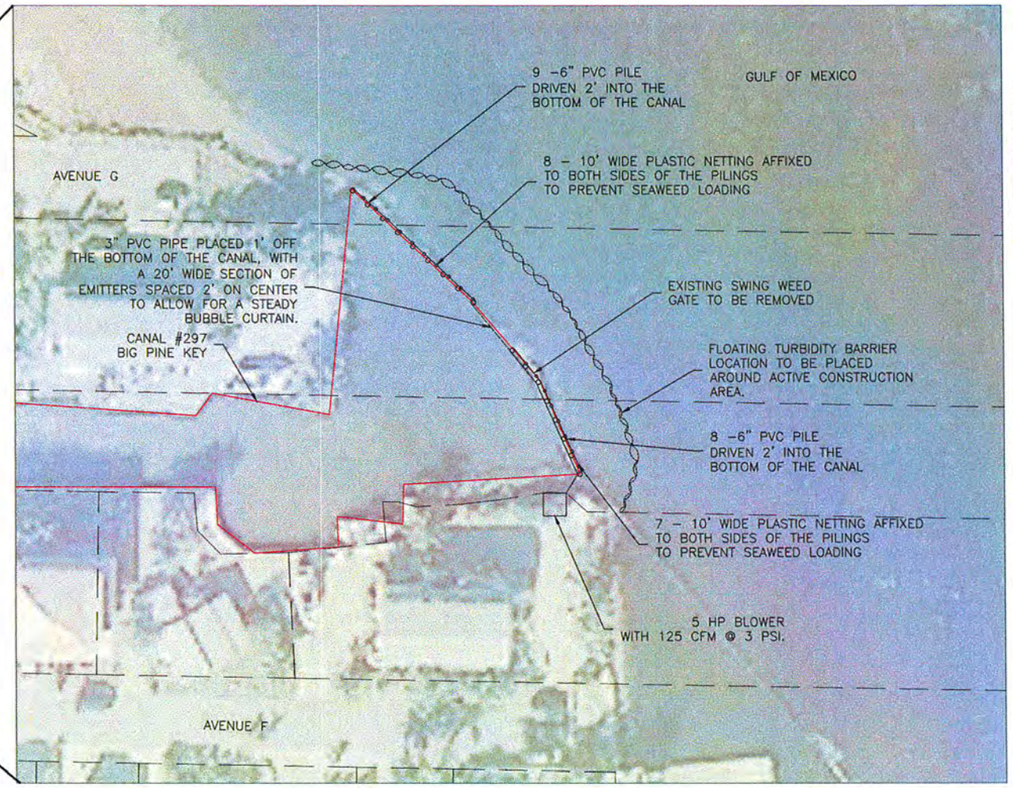
Conceptual Drawing: See Attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



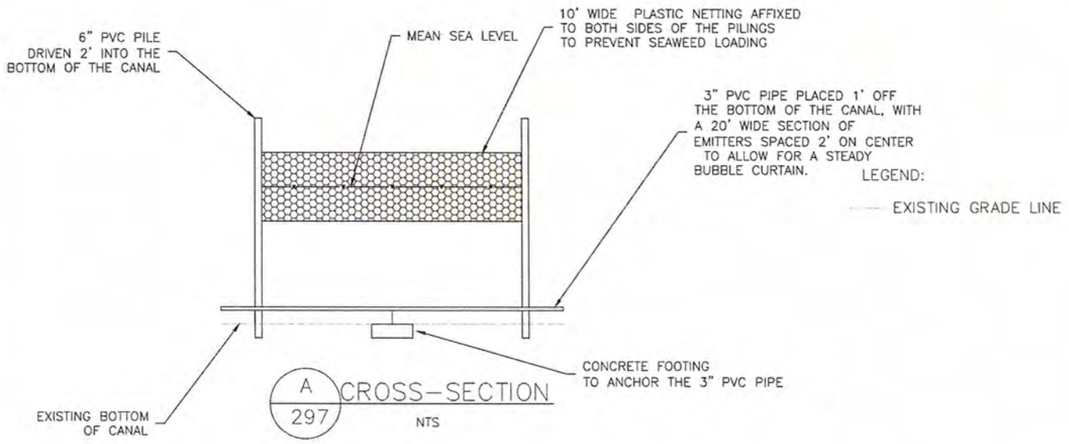
DETAIL SITE LAYOUT - WEED BARRIER

0 30' 60'

SCALE:1"=30'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #297 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A / 297 CROSS-SECTION

NTS

ROTRON® Regenerative Blowers

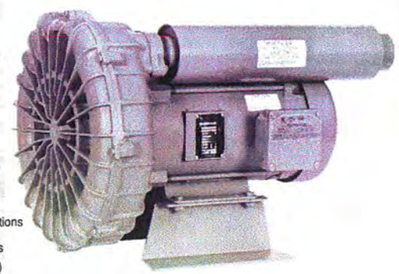
EN 6 & CP 6
Sealed Regenerative Blower w/Explosion-Proof Motor

FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 225 SCFM
- Maximum pressure: 104 IWG
- Maximum vacuum: 85 IWG
- Standard motor: 5.0 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package



BLOWER SPECIFICATION

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

WEED BARRIER CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 297	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for WEED BARRIERS

Canal ID: 287 Big Pine Key

Location: MM 31 Atlantic Estates subdivision, Bayside

Summary of Water Quality Impacts: Primary – Weed wrack entry into canal; Secondary – organics accumulation on canal bottom

Restoration Technology: Primary - Weed barrier to prevent additional entry of weed wrack; Secondary - organic removal from canal bottom to eliminate on-going source of organic decomposition

Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Weed gate

Homeowner Communication: AMEC spoke with Doug Scheele 305-797-4606 and Dennis Fowler 305 872-5656. Both seemed very interested in the project. No HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.98 / 15.8% at 5 ft	Not Measured	Poor 112	33

Characteristics	
Size (acres)	1.43
**Average Depth (ft)	-9.67
**Min Depth (ft)	-13.98
Degree of Stagnation	-0.3
Number of Mouths	1
Organic Thickness (ft) Average	0.83
Parcels	26
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Note Completed
FKNMS Monitoring Station	1.17 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Project ID: 287 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 24, Township 66 S, Range 29 E , (Latitude: 24°40'37.53" North; Longitude: - 81°20'40.62" West). The information sheet and site location map (**Figure 10**) provide additional details.

Conceptual Design:

The purpose of the project is to reduce seaweed loading from the Gulf of Mexico for canal 287 by installing a weed barrier system. The weed barrier system will entail a 5 horse power blower, 6 - 6 inch PVC piles, 50 linear feet of 3 inch PVC pipe, and 40 linear feet of plastic netting affixed to the piles. The following is a more detailed description of the system:

- Two 10-foot stretches of physical weed barrier shall be constructed on either side of the channel at the entrance to the canal.
- Each of the 10' physical weed barrier sections will be comprised of (2) PVC piles that will be placed approximately 9 feet apart. Plastic netting will be affixed to the pilings in order to block the seaweed from entering the canal. The netting shall be oriented such that at mean sea level 2.5 feet of netting remains above the water level and a minimum of 2.5 feet of netting is below the water level.
- The area between the physical weed barriers extending from the shorelines shall include a 20' wide air curtain. Coarse bubble diffusers in the air curtain will be spaced at an interval of 2 feet. Mounts will be used to affix the coarse bubble diffusers to the air curtain lateral. The air curtain lateral line will rest approximately 1 foot above the bottom surface to allow for maximum boating clearance and minimum resuspension of sediment.
- A 36 URAI blower, or similar, in conjunction with a 5hp motor will provide air through 3 inch PVC pipe to the air curtain. Calculations for determining these blower specifications were based on an assumed diffuser depth of 9'. This estimate is subject to change based on detailed design data.

Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The evaluation of the fortification/upgrade/replacement of the existing swing gate and barrier will be considered in the final design.

Construction Cost Estimate:

The approximate cost to construct the weed barrier system as aforementioned will be $25,000. This price does not include any cost associated with operation and maintenance and electric drop fees.

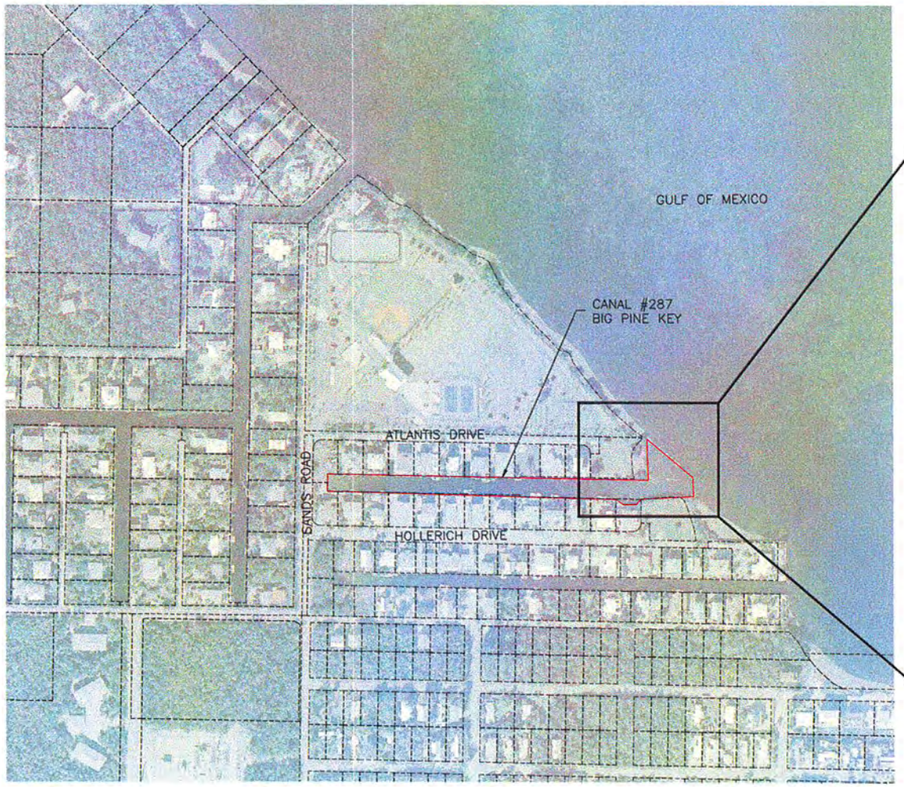
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot at the end of Hollerich Drive that could be used as a construction staging area.

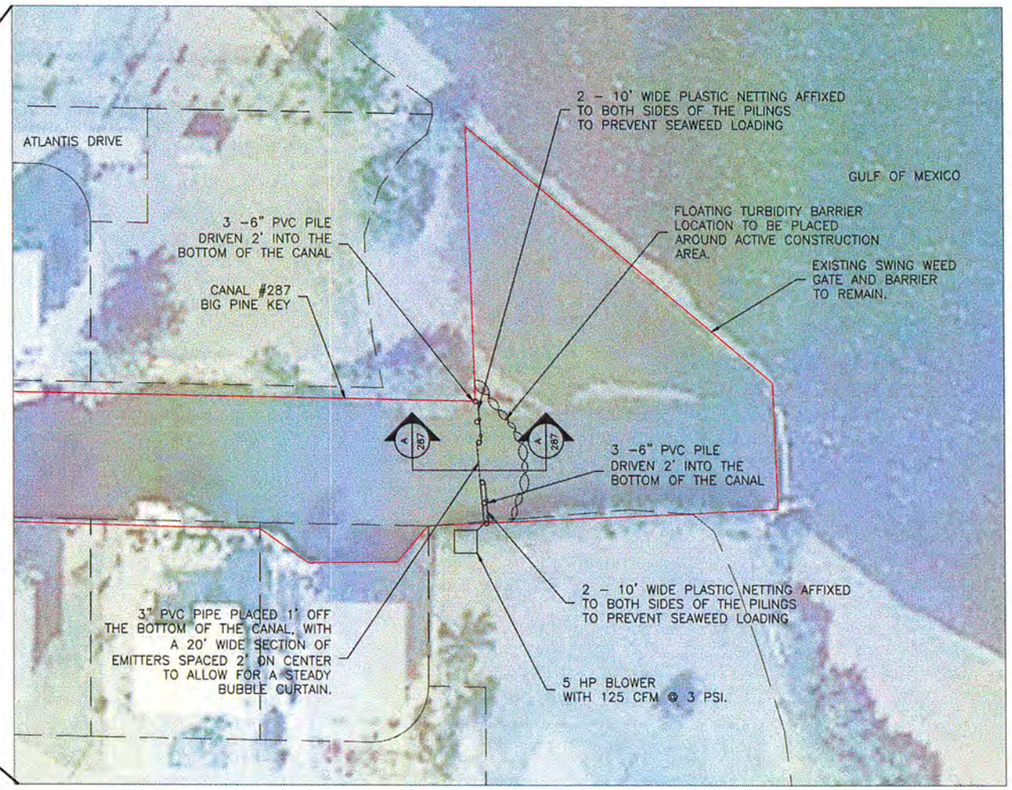
Conceptual Drawing: See Attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



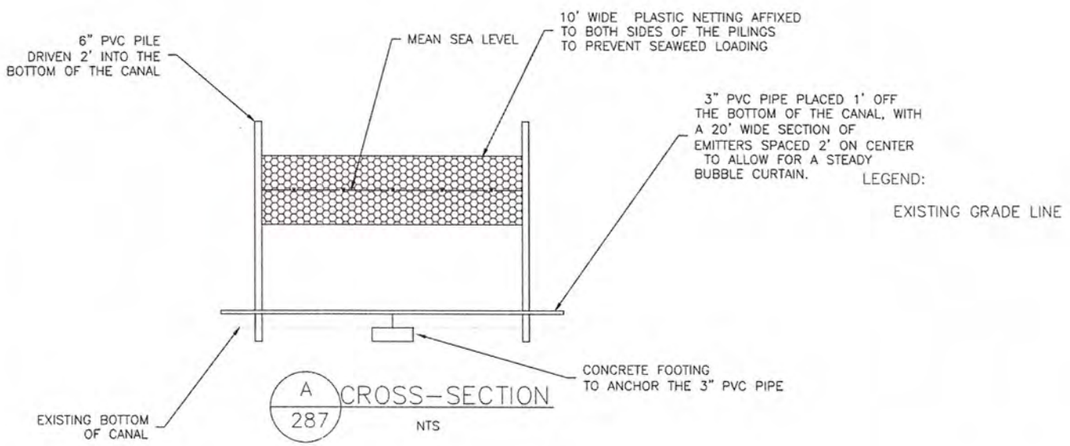
DETAIL SITE LAYOUT – WEED BARRIER

0 30' 60'

SCALE:1"=30'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #287 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A 287 CROSS–SECTION

NTS

ROTRON® Regenerative Blowers

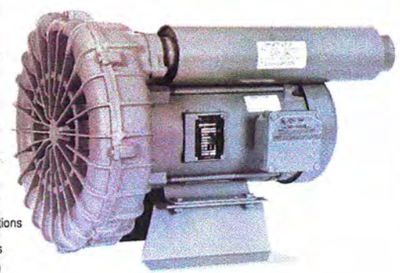
EN 6 & CP 6
Sealed Regenerative Blower w/Explosion-Proof Motor

FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 225 SCFM
- Maximum pressure: 104 IWG
- Maximum vacuum: 85 IWG
- Standard motor: 5.0 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package



BLOWER SPECIFICATION

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS

NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

WEED BARRIER CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 287	
SHEET OF SHEETS	

Monroe County
Selection of Demonstration Canals for
Water Quality Improvements
AMEC Project No. 6783-13-2507
November 8, 2013

ORGANIC REMOVAL

Monroe County Selection of Demonstration Canals for ORGANIC REMOVAL

Canal ID: 266 Big Pine Key

Location: MM 31 Doctor's Arm subdivision, Bayside

Summary of Water Quality Impacts: Primary – Organics accumulation on canal bottom; Secondary – Weed wrack entry into canal

Restoration Technology: Primary - organic removal from canal bottom to eliminate on-going source of organic decomposition; Secondary - Weed barrier to prevent additional entry of weed wrack.

Site Conditions: The canal faces due east and discharges into Bogie Channel. A small area of submerged shoreline shows as privately owned on the aerials although the property appraiser's details of the property do not reflect private ownership. Further research is needed. Sediment characterization data is available indicating sediment can be disposed as clean fill.

Existing Treatment: Air curtain/physical barriers not operating effectively

Homeowner Communication: Very interested homeowner group contacted Monroe County about the need for an upgrade to their weed barrier and removal of accumulated organics from the canal bottom. Sharon Ripley 305-797-7251

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.04 / 0.5% at 5 ft	Not Measured	Poor 115	94

Characteristics	
Size (acres)	1.1
**Average Depth (ft)	-7.18
**Min Depth (ft)	-10.93
Degree of Stagnation	-0.3
Number of Mouths	1
Organic Thickness (ft) Average	0.86
Parcels	37
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.43 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 266 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 14, Township 66 S, Range 29 E , (Latitude: 24°41'55.90" North; Longitude: - 81°20'53.46" West). The information sheet and site location map (**Figure 6**) provide additional details.

Conceptual Design:

The purpose of the project is to remove the organic material from the bottom of canal 266 to eliminate this organic and nutrient source and to increase dissolved oxygen in the water column. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Detailed physical testing
- Polymer and Geotextile Bag Testing

Therefore, for budgetary purposes, AMEC assumed all material would be required to be disposed of at Class I Landfill. Alternate options should be explored during the final design. To calculate the volume for removal, AMEC used the area of the canal and average depth of muck from the bathymetric center line profile of the canal to estimate the 1,529 cubic yards of organic muck to remove.

The project approach will entail using a barge mounted dredge and dewatering system to remove the muck from the canal. The dewatering system will be positioned near the canal shoreline to allow for ease of material loading from the barge system into the geotextile bags. The barge mounted dredge system will contain a pump and piping system which will transfer the material to the shoreline dewatering system. The pump will be connected to a suction hose which will be maneuvered by a certified driver. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity of organic muck to remove and the method of removal within the canal will be verified once detailed bathymetric and muck thickness cross section data, polymer and geotextile bag testing, and chemical and physical data collection are completed.

Construction Cost Estimate:

The approximate construction cost of $675,000, includes the following assumptions:

- Hauling and disposing the material at the Waste Management Medley Landfill
- Hydraulic Dredging
- Geotextile Bags and Roll off Container System without polymer

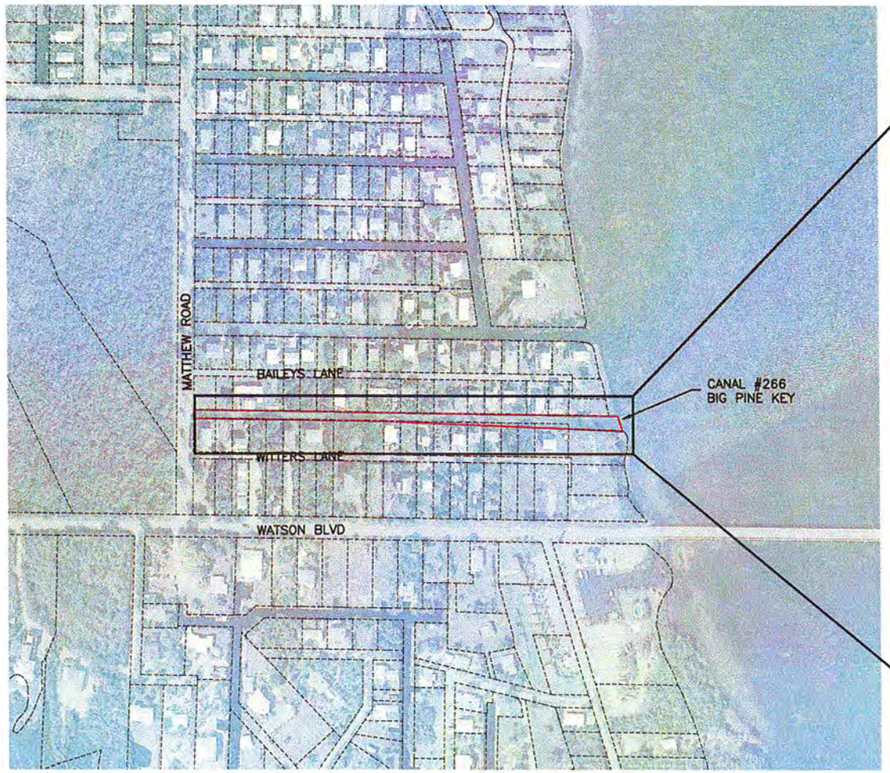
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot on the corner of Baileys Lance and Matthews Road that could be used as a construction staging area.

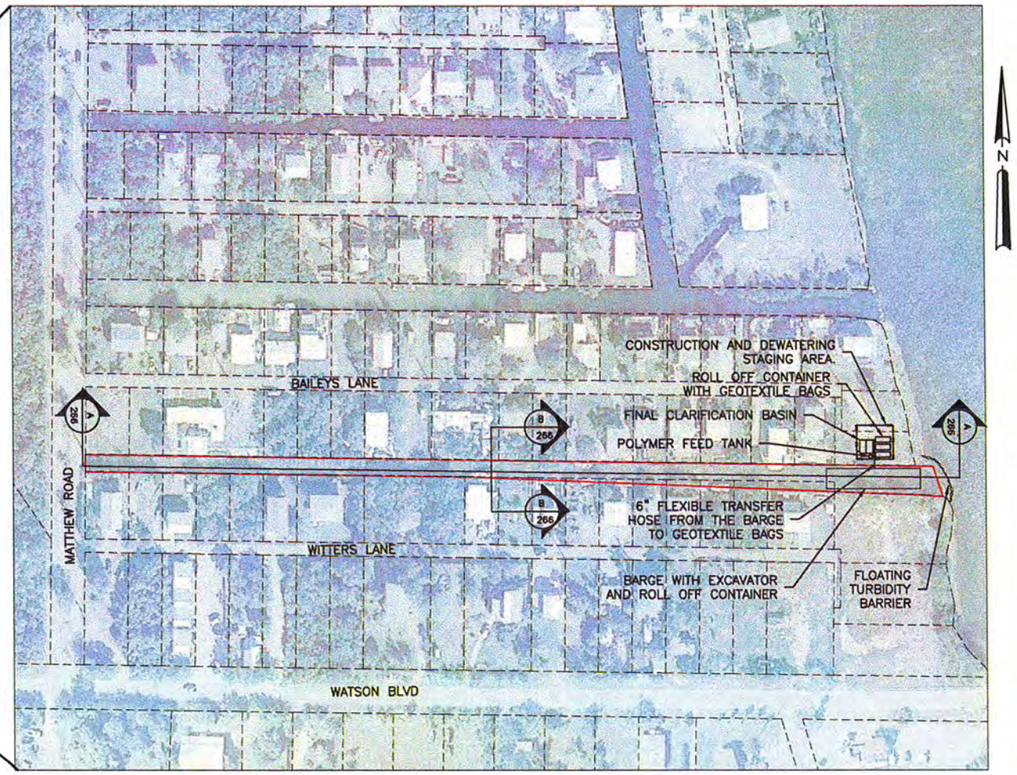
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



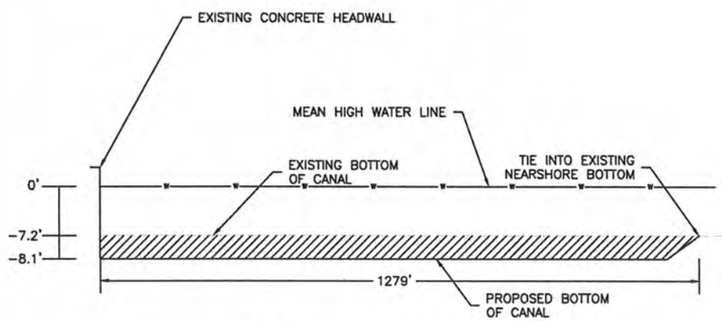
DETAIL SITE LAYOUT – ORGANIC REMOVAL

0 100' 200'

SCALE:1"=100'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #266 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

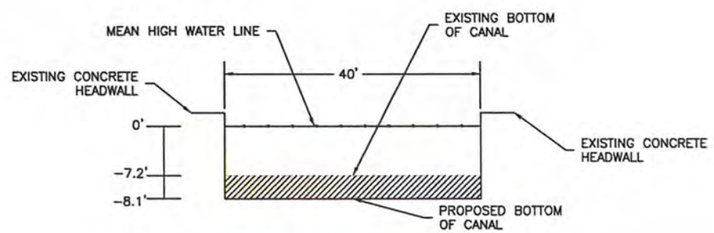


A 266 CROSS–SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- ORGANIC MUCK REMOVAL



B 266 CROSS–SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING ORGANIC REMOVAL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS –10.9 FEET AND THE MAXIMUM OBSERVED DEPTH IS –6.0 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

amec

ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332–3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783–13–2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

ORGANIC REMOVAL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 266	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for ORGANIC REMOVAL

Canal ID: 290 Big Pine Key

Location: MM 31 Not located within a subdivision, Bayside

Summary of Water Quality Impacts: Primary – Organics accumulation on canal bottom.

Restoration Technology: Primary – Organic removal from canal bottom to eliminate on-going source of organic decomposition

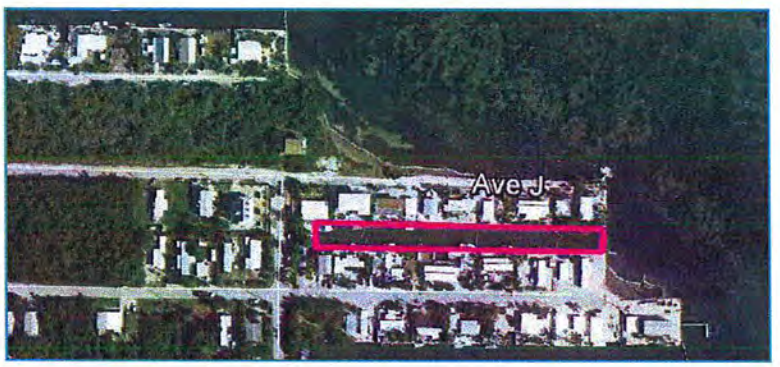
Site Conditions: The canal faces due east and discharges into Bogie Channel. The plat book reflects private ownership of lands below the high-water mark is asserted over 0.06 acres of submerged land in the adjacent canal.

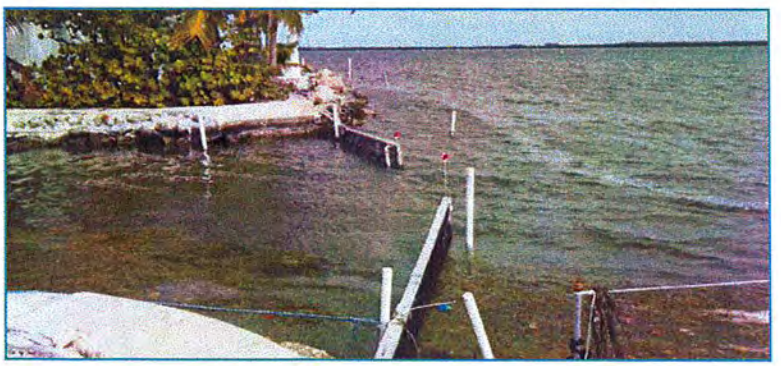
Existing Treatment: Weed barrier, air curtain and weed gates. An effective system operated by one of the homeowners.

Homeowner Communication: Stephen Konop 954-461-3797 sent an email to Monroe County stating this canal needs water quality improvements of muck removal.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.32 / 18.7% at 4 ft	2.68	Poor 106	92

Characteristics	
Size (acres)	0.62
Average Depth (ft)	-7.36
Min Depth (ft)	-7.97
Degree of Stagnation	-0.7
Number of Mouths	1
Organic Thickness (ft)	1.02
Parcels	13
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.36 miles





Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 290 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 25, Township 66 S , Range 29 E, (Latitude: 24°40'30.39" North; Longitude: - 81°20'30.58" West). The information sheet and site location map (**Figure 12**) provide additional details.

Conceptual Design:

The purpose of the project is to remove the organic material from the bottom of canal 290 to eliminate this organic and nutrient source and to increase dissolved oxygen in the water column. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Detailed chemical and physical testing
- Polymer and Geotextile Bag Testing

Therefore, for budgetary purposes, AMEC assumed all material would be required to be disposed of at Class I Landfill. Alternate options should be explored during the final design. To calculate the volume of removal, AMEC used the area of the canal and average depth of muck from the bathymetric center line profile of the canal to estimate the 1,024 cubic yards of organic muck to remove.

The project approach will entail using a barge mounted dredge and dewatering system to remove the muck from the canal. The dewatering system will be positioned near the canal shoreline to allow for ease of material loading from the barge system into the geotextile bags. The barge mounted dredge system will contain a pump and piping system which will transfer the material to the shoreline dewatering system. The pump will be connected to a suction hose which will be maneuvered by a certified driver. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity of organic muck to remove and the method of removal within the canal will be verified once detailed bathymetric and muck thickness cross section data, polymer and geotextile bag testing, and chemical and physical data collection are completed.

Construction Cost Estimate:

The approximate construction cost of $460,000, includes the following assumptions:

- Hauling and disposing the material at the Waste Management Medley Landfill
- Hydraulic Dredging
- Geotextile Bags and Roll off Container System without polymer

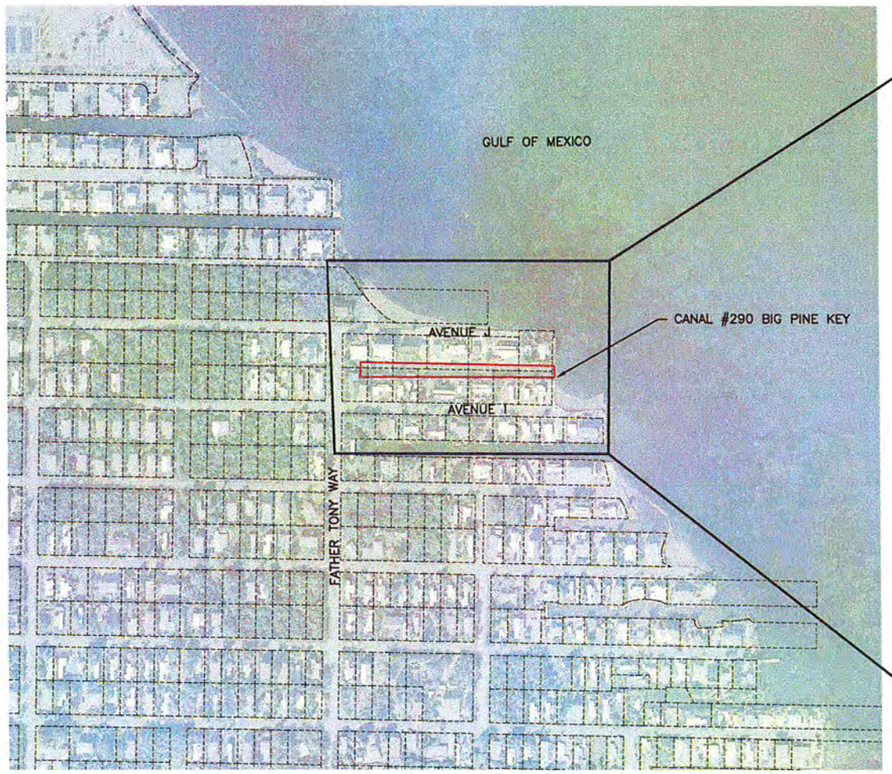
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot on the corner of Father Tony Way and Avenue I that could be used as a construction staging area with minor vegetation trimming.

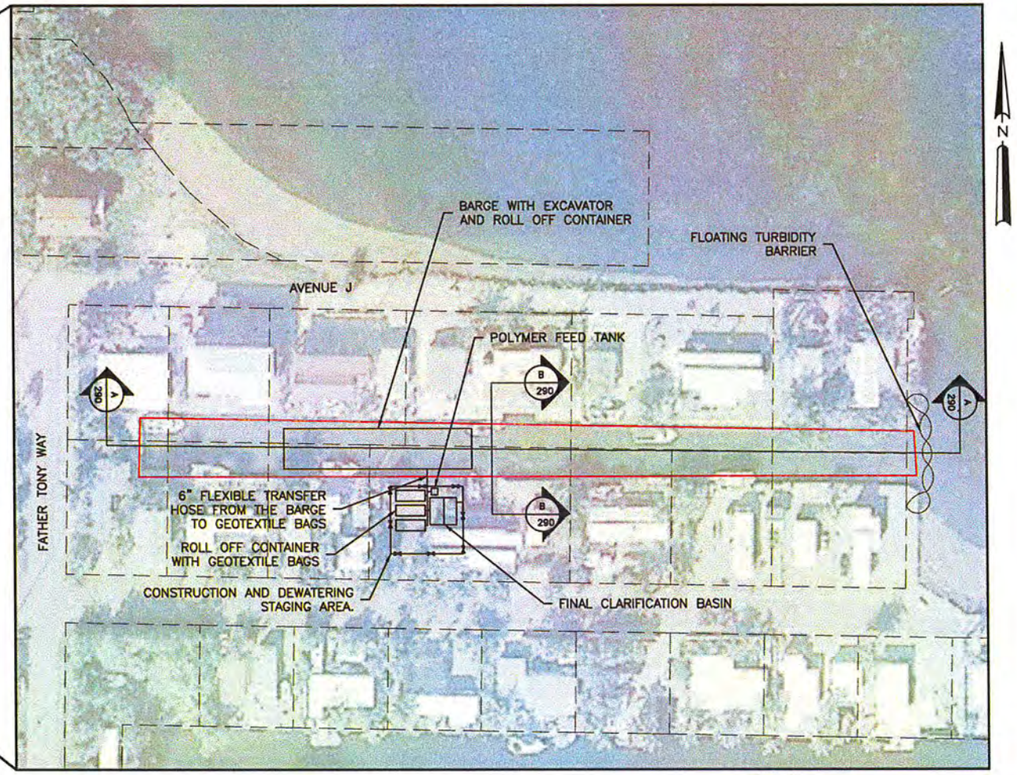
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



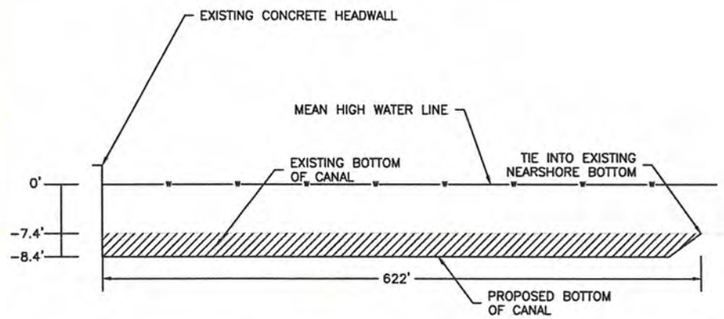
DETAIL SITE LAYOUT -ORGANIC REMOVAL

0 50' 100'

SCALE:1"=50'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #290 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

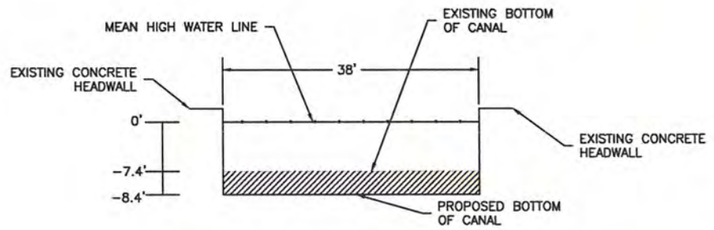


A/290 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- ORGANIC MUCK REMOVAL



B/290 CROSS-SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING ORGANIC REMOVAL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS -8.0 FEET AND THE MAXIMUM OBSERVED DEPTH IS -7.2 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

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ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

ORGANIC REMOVAL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 290	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for ORGANIC REMOVAL

Canal ID: 297 Big Pine Key

Location: MM 31 Ross Haven subdivision, Bayside

Summary of Water Quality Impacts: Primary – Organics accumulation on canal bottom; Secondary – Weed wrack entry into canal

Restoration Technology: Primary – Organic removal from canal bottom to eliminate on-going source of organic decomposition; Secondary - Weed barrier to prevent additional entry of weed wrack.

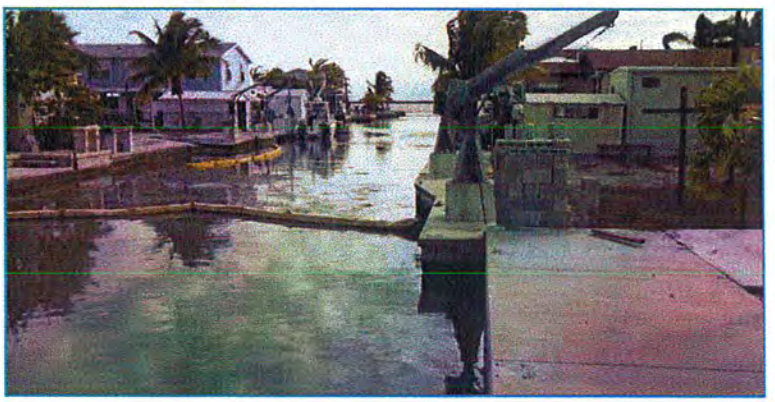
Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Weedgate that is not operating effectively

Homeonwer Communication: None to date. No HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.17 / 2.5% at 3 ft	9.63	Poor 115	92

Characteristics	
Size (acres)	0.46
Average Depth (ft)	-7.08
Min Depth (ft)	-7.25
Degree of Stagnation	-0.8
Number of Mouths	1
Organic Thickness (ft)	1.26
Parcels	15
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.59 miles



Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 297 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 24 Township 66 S, Range 29 E , (Latitude: 24°40'23.69" North; Longitude: - 81°20'24.70" West). The information sheet and site location map (**Figure 13)** provide additional details.

Conceptual Design:

The purpose of the project is to remove the organic material from the bottom of canal 297 to eliminate this organic and nutrient source and to increase dissolved oxygen in the water column. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Detailed chemical and physical testing
- Polymer and Geotextile Bag Testing

Therefore, for budgetary purposes, AMEC assumed all material would be required to be disposed of at Class I Landfill. Alternate options should be explored during final design. To calculate the volume of removal, AMEC used the area of the canal and average depth of muck from the bathymetric center line profile of the canal to estimate the 933 cubic yards of organic muck to remove.

The project approach will entail using a barge mounted dredge and dewatering system to remove the muck from the canal. The dewatering system will be positioned near the canal shoreline to allow for ease of material loading from the barge system into the geotextile bags. The barge mounted dredge system will contain a pump and piping system which will transfer the material to the shoreline dewatering system. The pump will be connected to a suction hose which will be maneuvered by a certified driver. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity of organic muck to remove and the method of removal within the canal will be verified once detailed bathymetric and muck thickness cross section data, polymer and geotextile bag testing, and chemical and physical data collection are completed.

Construction Cost Estimate:

The approximate construction cost of $420,000, includes the following assumptions:

- Hauling and disposing the material at the Waste Management Medley Landfill
- Hydraulic Dredging
- Geotextile Bags and Roll off Container System without polymer

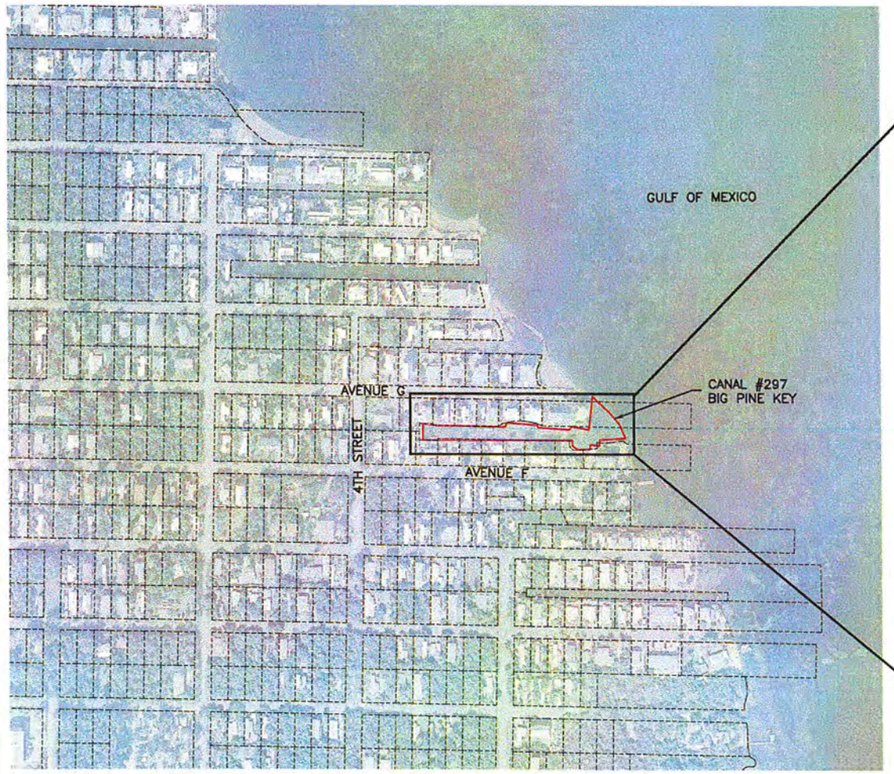
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot at the end of the canal between Avenue G and Avenue F that could be used as a construction staging area.

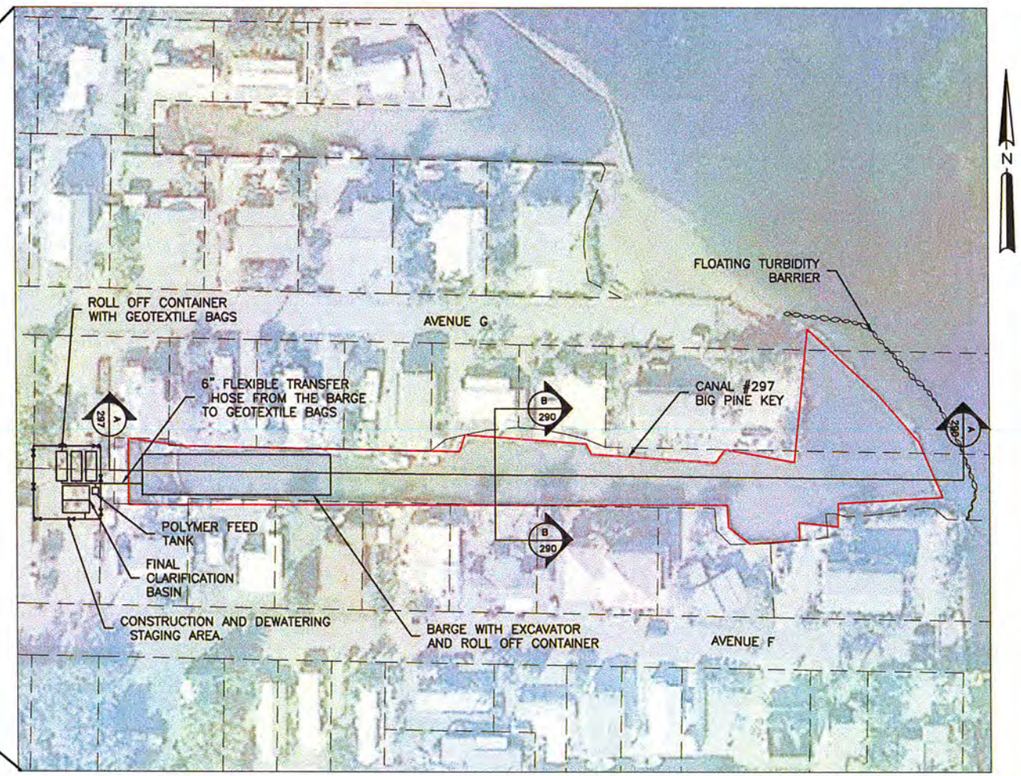
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



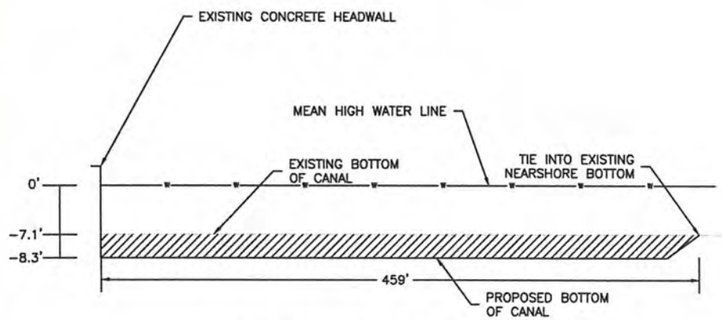
DETAIL SITE LAYOUT – ORGANIC REMOVAL

0 50' 100'

SCALE:1"=50'

LEGEND

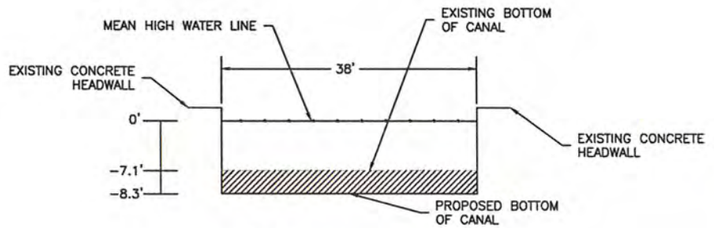
- FLOATING TURBIDITY BARRIER
- CANAL #297 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A / 297 CROSS–SECTION

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- ORGANIC MUCK REMOVAL



B / 297 CROSS–SECTION

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING ORGANIC REMOVAL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS –7.3 FEET AND THE MAXIMUM OBSERVED DEPTH IS –7.0 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332–3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783–13–2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

ORGANIC REMOVAL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 297	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for ORGANIC REMOVAL

Canal ID: 287 Big Pine Key

Location: MM 31 Atlantic Estates subdivision, Bayside

Summary of Water Quality Impacts: Primary – Organics accumulation on canal bottom; Secondary – Weed wrack entry into canal

Restoration Technology: Primary – Organic removal from canal bottom to eliminate on-going source of organic decomposition; Secondary - Weed barrier to prevent additional entry of weed wrack

Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Weed gate

Homeowner Communication: AMEC spoke with Doug Scheele 305-797-4606 and Dennis Fowler 305 872-5656. Both seemed very interested in the project. No HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.98 / 15.8% at 5 feet	Not Measured	Poor 112	67

Characteristics	
Size (acres)	1.43
**Average Depth (ft)	-9.67
**Min Depth (ft)	-13.98
Degree of Stagnation	-0.3
Number of Mouths	1
Organic Thickness (ft) Average	0.83
Parcels	26
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.17 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 287 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 24, Township 66 S, Range 29 E , (Latitude: 24°40'37.53" North; Longitude: - 81°20'40.62" West). The information sheet and site location map (**Figure 10**) provide additional details.

Conceptual Design:

The purpose of the project is to remove the organic material from the bottom of canal 287 to eliminate this organic and nutrient source and to increase dissolved oxygen in the water column. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Detailed chemical and physical testing
- Polymer and Geotextile Bag Testing

Therefore, for budgetary purposes, AMEC assumed all material would be required to be disposed of at Class I Landfill. Alternate options should be explored during the final design. To calculate the volume of removal, AMEC used the area of the canal and average depth of muck from the bathymetric center line profile of the canal to estimate the 1,931 cubic yards of organic muck to remove.

The project approach will entail using a barge mounted dredge and dewatering system to remove the muck from the canal. The dewatering system will be positioned near the canal shoreline to allow for ease of material loading from the barge system into the geotextile bags. The barge mounted dredge system will contain a pump and piping system which will transfer the material to the shoreline dewatering system. The pump will be connected to a suction hose which will be maneuvered by a certified driver. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity of organic muck to remove and the method of removal within the canal will be verified once detailed bathymetric and muck thickness cross section data, polymer and geotextile bag testing, and chemical and physical data collection are completed.

Construction Cost Estimate:

The approximate construction cost of $835,000, includes the following assumptions:

- Hauling the material to the Waste Management Medley Landfill
- Hydraulic Dredging
- Geotextile Bags and Roll off Container System without polymer

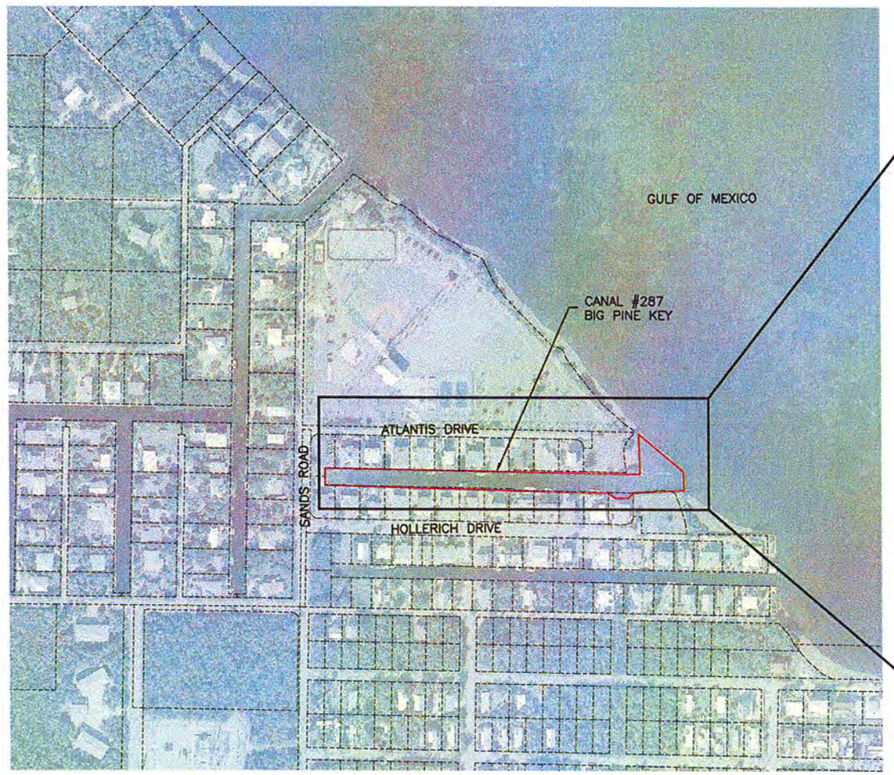
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot on the corner of Sands Road and Atlantis Drive that could be used as a construction staging area.

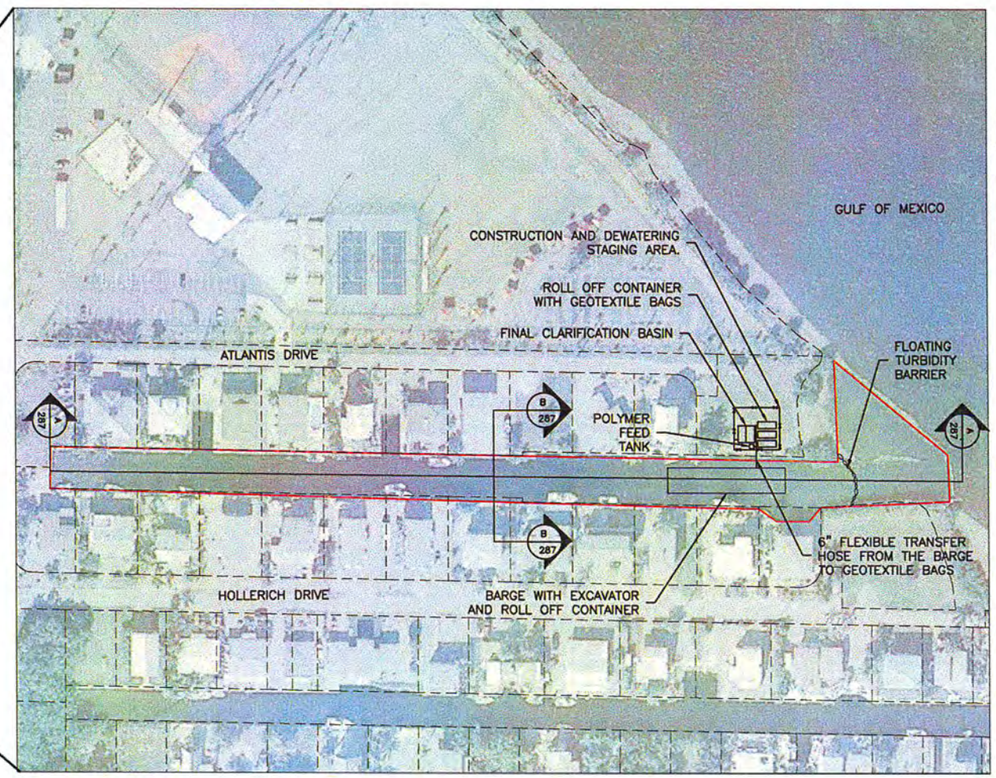
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



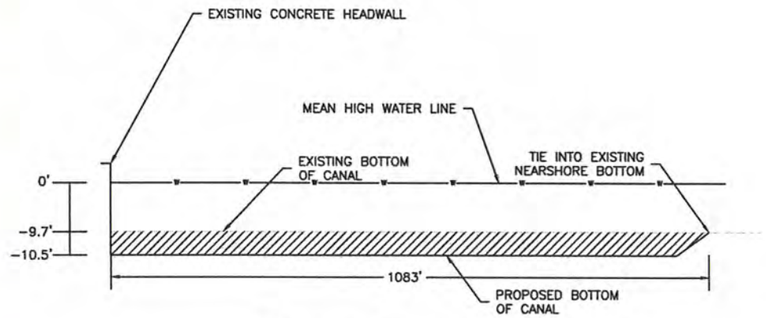
DETAIL SITE LAYOUT – ORGANIC REMOVAL

0 80' 160'

SCALE:1"=80'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #287 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

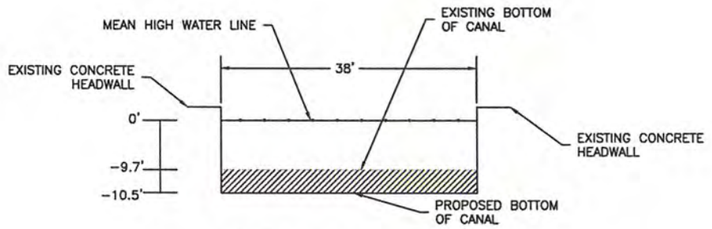


A/287 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- ORGANIC MUCK REMOVAL



B/287 CROSS-SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING ORGANIC REMOVAL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS –14.0 FEET AND THE MAXIMUM OBSERVED DEPTH IS –7.0 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

ORGANIC REMOVAL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 287	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for ORGANIC REMOVAL

Canal ID: 288 Big Pine Key

Location: MM 31 Hollerich subdivision, Bayside

Summary of Water Quality Impacts: Primary – Organics accumulation on canal bottom; Secondary – Weed wrack entry into canal; Tertiary – deep stagnant zone with an average depth of - 12.60 feet.

Restoration Technology: Primary – Organic removal from canal bottom to eliminate on-going source of organic decomposition; Secondary - Weed barrier to prevent additional entry of weed wrack; Tertiary – backfilling (for the purpose of eliminating deep oxygen depleted impaired water quality zone)

Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Weedgate not operating effectively

Homeowner Communication: None to date. No HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.03 / 0.6% at 5 ft	0	Poor 112	52

Characteristics	
Size (acres)	1.36
Average Depth (ft)	-12.60
Min Depth (ft)	-18.58
Degree of Stagnation	-0.2
Number of Mouths	1
Organic Thickness (ft)	0.84
Parcels	37
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.23 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); Waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 288 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 24, Township 66 S, Range 29 E , (Latitude: 24°40'34.75" North; Longitude: - 81°20'37.33" West). The information sheet and site location map (**Figure 11**) provide additional details.

Conceptual Design:

The purpose of the project is to remove the organic material from the bottom of canal 288 to eliminate this organic and nutrient source and to increase dissolved oxygen in the water column. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Detailed chemical and physical testing
- Polymer and Geotextile Bag Testing

Therefore, for budgetary purposes, AMEC assumed all material would be required to be disposed of at Class I Landfill. Alternate options should be explored during the final design. To calculate the volume of removal, AMEC used the area of the canal and average depth of muck from the bathymetric center line profile of the canal to estimate the 1,851 cubic yards of organic muck to remove.

The project approach will entail using a barge mounted dredge and dewatering system to remove the muck from the canal. The dewatering system will be positioned near the canal shoreline to allow for ease of material loading from the barge system into the geotextile bags. The barge mounted dredge system will contain a pump and piping system which will transfer the material to the shoreline dewatering system. The pump will be connected to a suction hose which will be maneuvered by a certified driver. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity of organic muck to remove and the method of removal within the canal will be verified once detailed bathymetric and muck thickness cross section data, polymer and geotextile bag testing, and chemical and physical data collection are completed.

Construction Cost Estimate:

The approximate construction cost of $802,000, includes the following assumptions:

- Hauling the material to the Waste Management Medley Landfill
- Hydraulic Dredging
- Geotextile Bags and Roll off Container System without polymer

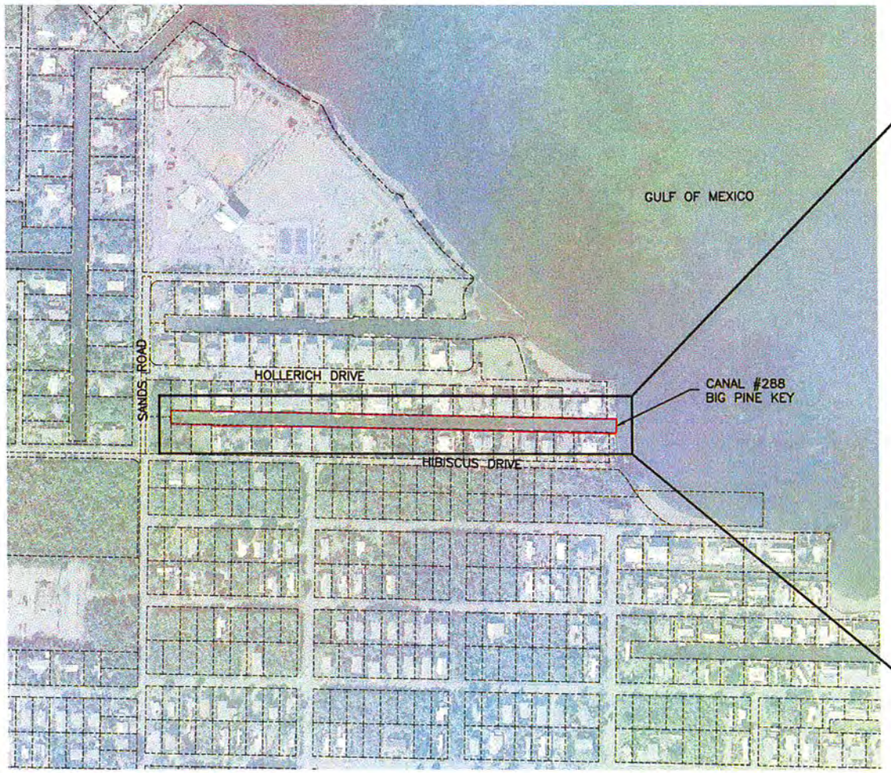
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot on the corner of Sands Road and Hollerich Drive that could be used as a construction staging area.

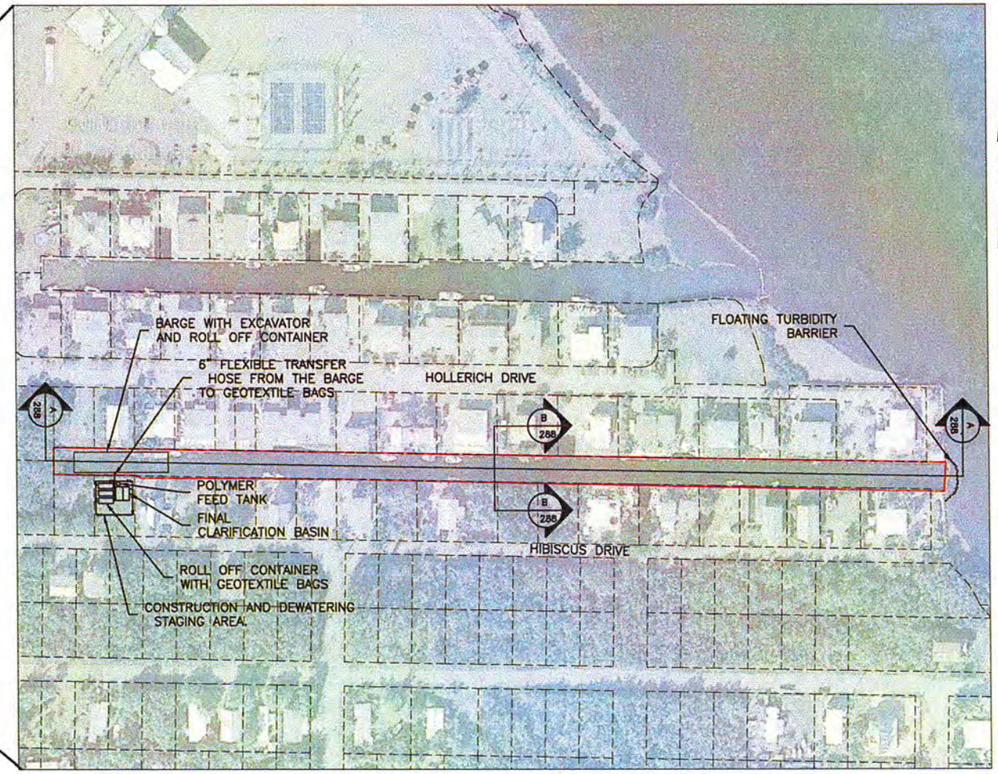
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



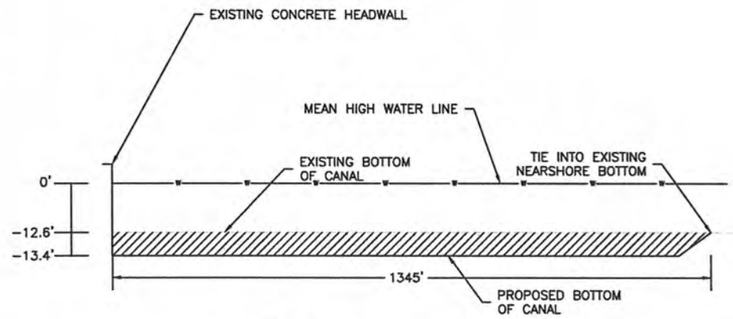
DETAIL SITE LAYOUT – ORGANIC REMOVAL

0 100' 200'

SCALE:1"=100'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #288 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

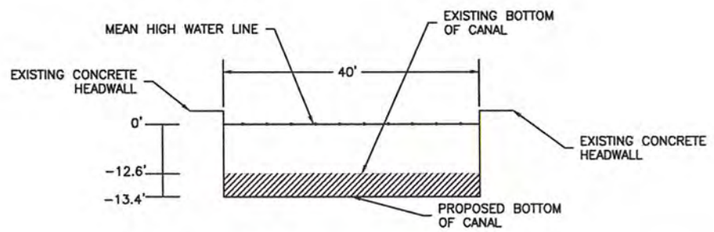


A 288 CROSS–SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- ORGANIC MUCK REMOVAL



B 288 CROSS–SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING ORGANIC REMOVAL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS –18.6 FEET AND THE MAXIMUM OBSERVED DEPTH IS –7.1 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

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TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783–13–2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

ORGANIC REMOVAL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 288	
SHEET OF SHEETS	

Monroe County
Selection of Demonstration Canals for
Water Quality Improvements
AMEC Project No. 6783-13-2507
November 8, 2013

CULVERTS

Monroe County Selection of Demonstration Canals for CULVERT INSTALLATION

Canal ID: 459 Geiger Key

Location: MM 10 Boca Chica Ocean Shores subdivision, Oceanside

Summary of Water Quality Impacts: Weed wrack entry into dead end canal

Restoration Technology: Culvert installation under Boca Chica Road with connection to Canal 460 Geiger Key to assist with flushing and prevent the entrapment of weed wrack at the end of the canal.

Site Conditions: The canal faces southeast and discharges into Similar Sound. The plat book indicates the property is owned by the federal government. The County indicated they cannot pre-empt federal use of the property and additional research is being conducted to determine the nature of the federal interest in the property.

Existing Treatment: None

Homeowner Communication: None to date

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.74 / 27.6% at 5 ft	Not Measured	Poor 86	64

Characteristics	
Size (acres)	0.25
Average Depth (ft)	-8.69
Min Depth (ft)	-9.71
Degree of Stagnation	-0.9
Number of Mouths	1
Organic Thickness (ft)	0.59
Parcels	7
WBID	6014C Not impaired
WWT	FKAA/Big Coppitt
FKNMS Monitoring Station	4.37 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 459 Geiger Key

Project Location:

The project area is located south of US1 in Monroe County, Geiger Key, Florida; Section 26, Township 67 S , Range 26 E , (Latitude: 24°35'04.80" North; Longitude: - 81° 39'00.15" West). The information sheet and site location map (**Figure 14**) provide additional details.

Conceptual Design:

The purpose of the project is to hydrologically connect canal 459 and 460 to increase the natural tidal flushing and reduce seaweed entrapment in the dead ends of the canal. At this stage in the project, the following design components have not been completed:

- Hydraulic models
- Geotechnical investigations
- Detailed topographic and bathymetric data

Therefore, for budgetary purposes AMEC has proposed installing an 8 feet high by 8 feet wide by 112 foot long precast concrete box culvert with a manatee grate under Boca Chica Road. The installation for the box culvert will entail using excavators to remove a 28 foot wide by 112 foot long section perpendicular to Boca Chica Road between Egret Lane and Jay Lane. Due to the removal of a portion of the main access road when installing the box culvert, maintenance of traffic plans will be created to ensure minimal impacts to local traffic. In the event the existing water and sewer lines need to be removed for the box culvert construction, a bypass system will be created during construction to ensure minimal outage to the local area. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

Construction Cost Estimate:

The approximate cost to construct the culvert connection as aforementioned will be $130,000.

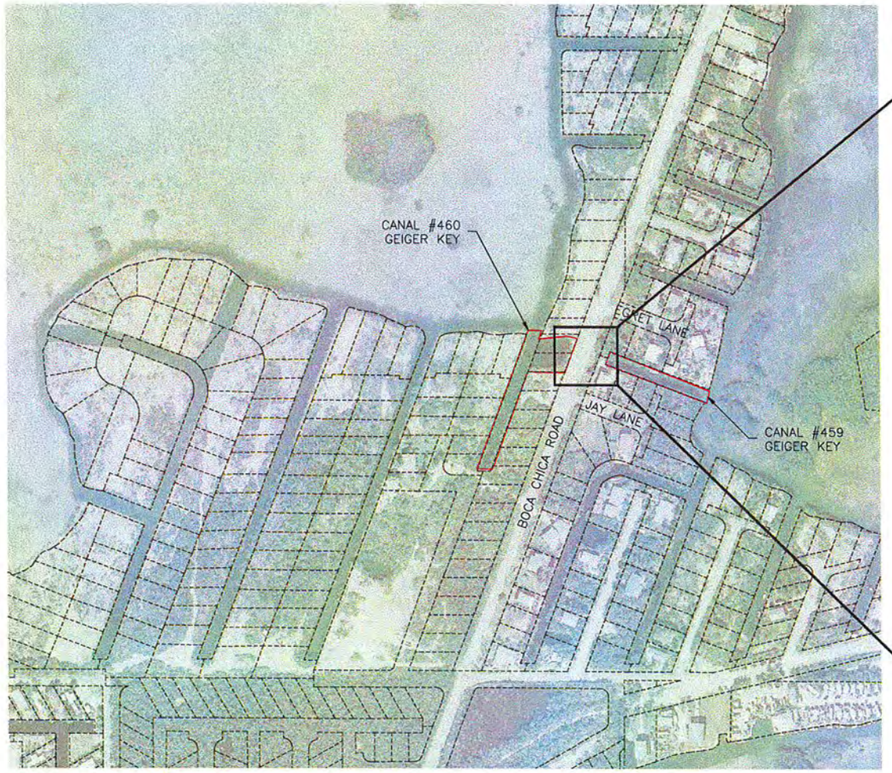
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Right of Way Permit
- Monroe County Building Permit

Access:

Based on field visits, an area located along Egret Lane could be used as a construction staging area with minor vegetation trimming.

Conceptual Drawing: See attached



OVERALL SITE LAYOUT

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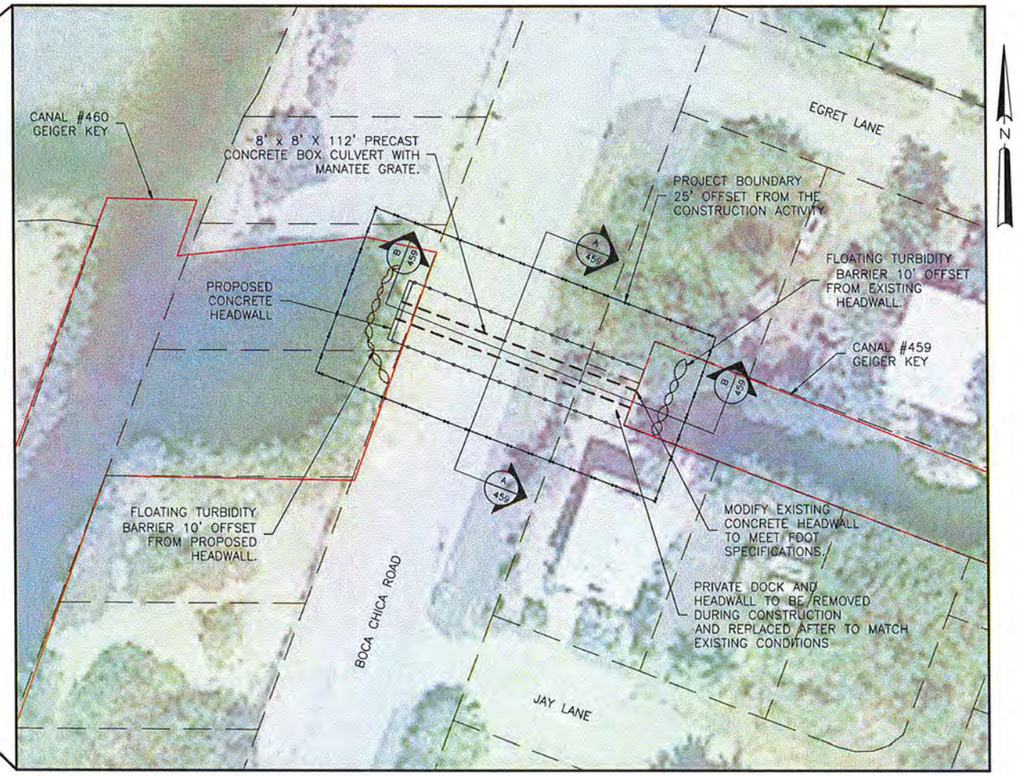
SCALE:1"=200'



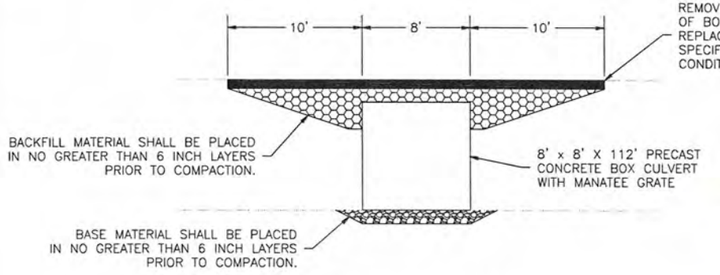
DETAIL SITE LAYOUT – CULVERT CONNECTION

0 30' 60'

SCALE:1"=30'

LEGEND

- BOX CULVERT
- EXCAVATION LIMITS
- FLOATING TURBIDITY BARRIER
- CANAL FOOTPRINTS
- MONROE COUNTY PARCELS, 2010



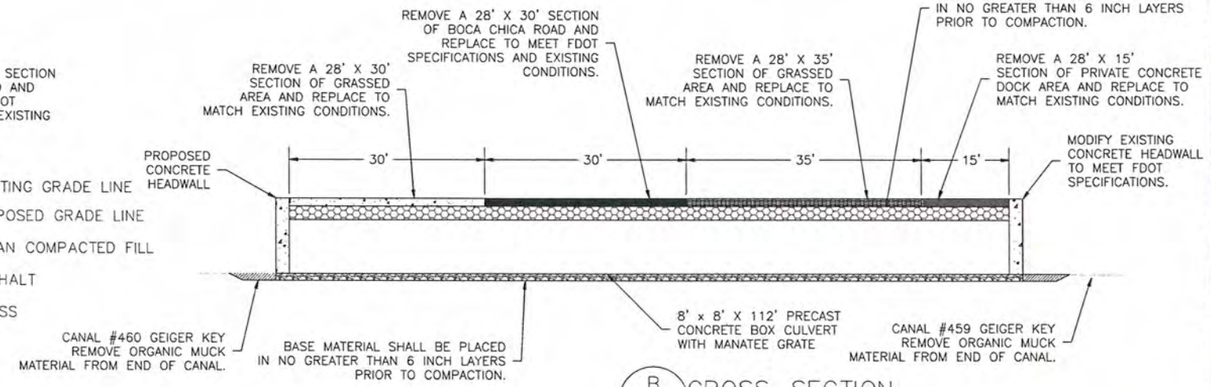
A 459 CROSS–SECTION

0 5' 10'

SCALE:1"=5'

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- CLEAN COMPACTED FILL
- ASPHALT
- GRASS



B 459 CROSS–SECTION

0 10' 20'

SCALE:1"=10'

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PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No:
6783–13–2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

CULVERT CONNECTION
CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 459	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for CULVERT INSTALLATION

Canal ID: 277 Big Pine Key

Location: MM 31 Tropical Bay (3rd Addition) subdivision, Bayside

Summary of Water Quality Impacts: This canal system has multiple water quality impacts; Primary – Lack of flushing due to long multi-fingered canal system; also weed wrack entry, accumulated organics and deep stagnant zones due to average depth of -10.3 and max depth of -21.04.

Restoration Technology: Primary - Culvert connection at north end of Sunset Drive to Bogie Channel to assist with flushing (also will assist with weed wrack not getting trapped at the dead end of the canal); Secondary - Organic removal from canal bottom to eliminate on-going source of organic decomposition; Tertiary – backfilling (For the purpose of eliminating deep oxygen depleted impaired water quality zone)

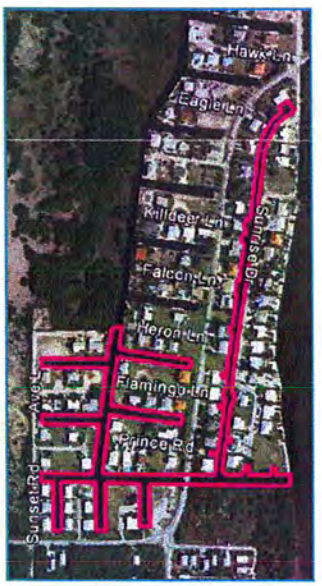
Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

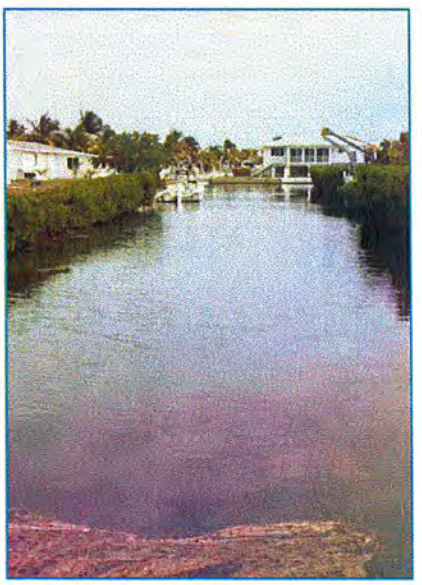
Existing Treatment: Culvert between 2 of the canal fingers; culvert appears undersized and possibly clogged.

Homeowner Communication: Numerous homeowners have submitted letters to Monroe County stating their request for demo canal cleanup funding. Some have suggested canal bottom organics removal.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.5 / 21% at 5 ft	0.89	Poor 111	63

Characteristics	
Size (acres)	5.44
Average Depth (ft)	-10.32
Min Depth (ft)	-21.04
Degree of Stagnation	1.2
Number of Mouths	1
Organic Thickness (ft)	1.15
Parcels	88
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.52 miles





Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 277 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 14, Township 66 S, Range 29 E , (Latitude: 24°41'43.52" North; Longitude: - 81° 21'22.92" West). The information sheet and site location map (**Figure 7**) provide additional details.

Conceptual Design:

The purpose of the project is to hydrologically connect canal 277 to open water in Doctor's Arm to increase natural tidal flushing and reduce seaweed entrapment in the dead ends of the canal. At this stage in the project, the following design components have not been completed:

- Hydraulic models
- Geotechnical investigations
- Detailed topographic and bathymetric data

Therefore, for budgetary purposes, AMEC is proposing installation of an 8 feet high by 8 feet wide by 185 foot long precast concrete box culvert with a manatee grate and plastic netting placed from the Doctor's Arm to canal 277. The installation will entail using excavators to remove a 28 foot wide by 185 foot long section through an empty lot and across Sunrise Drive. Due to the removal of a portion of the road, maintenance of traffic plans will be created to ensure minimal impacts to local traffic. In the event the existing water lines may be impacted due to construction, a bypass system will be created to maintain service to the local residents. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

Construction Cost Estimate:

The approximate cost to construct the culvert connection as aforementioned will be $195,000.

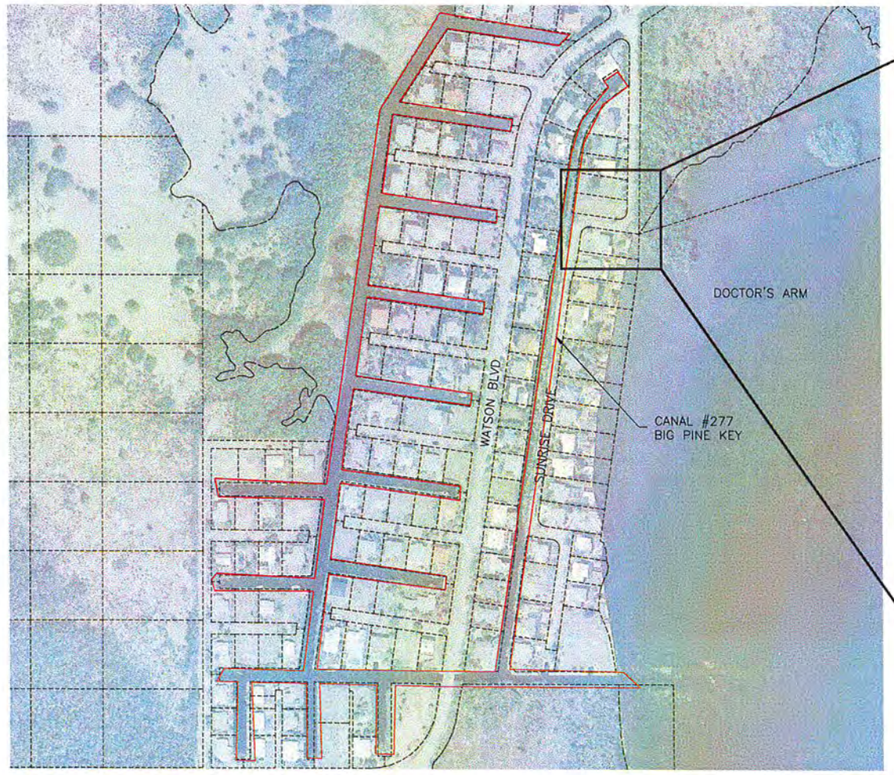
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Right of Way Permit
- Monroe County Building Permit

Access:

Based on field visits, an area located along within the empty lot adjacent to Sunrise Drive could be used as a construction staging area.

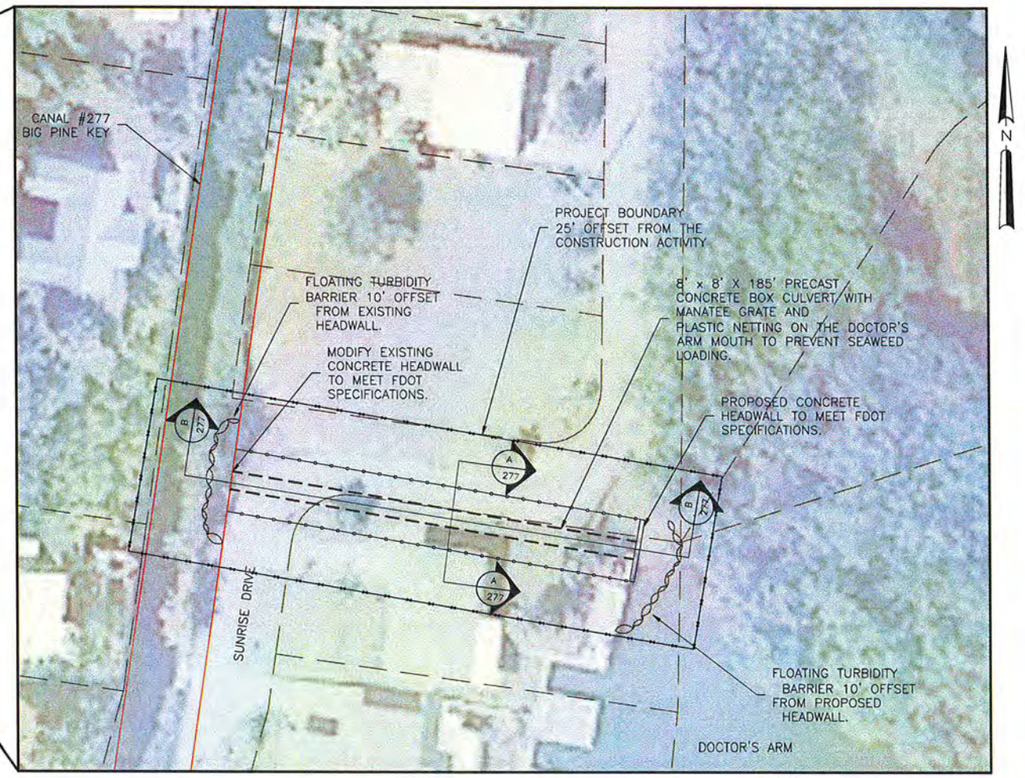
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



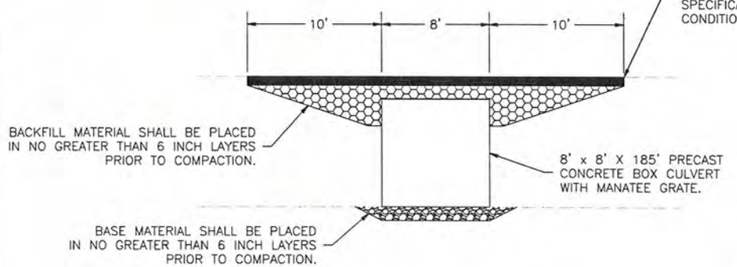
DETAIL SITE LAYOUT – CULVERT CONNECTION

0 30' 60'

SCALE:1"=30'

LEGEND

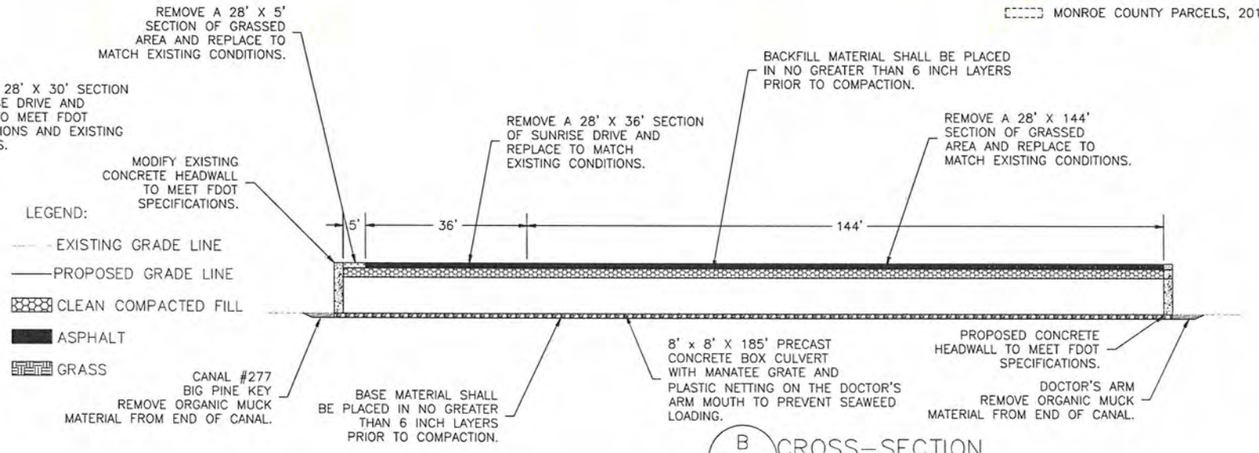
- BOX CULVERT
- EXCAVATION LIMITS
- FLOATING TURBIDITY BARRIER
- CANAL FOOTPRINTS
- MONROE COUNTY PARCELS, 2010



A 277 CROSS-SECTION

0 5' 10'

SCALE:1"=5'



B 277 CROSS-SECTION

0 15' 30'

SCALE:1"=15'

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NEWBERRY, FL 32669
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PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No:
6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

CULVERT CONNECTION CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 277	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for CULVERT INSTALLATION

Canal ID: 472 Geiger Key

Location: MM 10 Geiger Mobile Homes subdivision, Oceanside

Summary of Water Quality Impacts: This canal system has multiple water quality impacts including weed wrack entry, accumulated organics and deep stagnant zones due to average depth of -11.79 and max depth of -15.79.

Restoration Technology: Although there are multiple technologies that could improve the water quality of this canal (e. g. weed barrier, organic removal and backfilling), culvert installation was selected because of the potential connection under Boca Chica Road with connection to Canal # 470 Geiger Key to assist with flushing (which will also assist with weed wrack not getting trapped at the dead end of the canal).

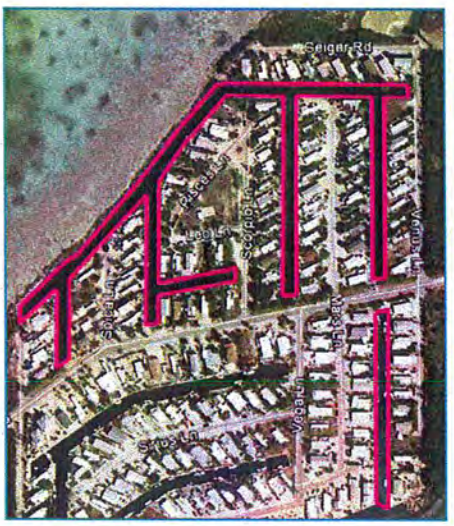
Site Conditions: The canal faces due south and discharges into Similar Sound. No information is available on submerged land ownership.

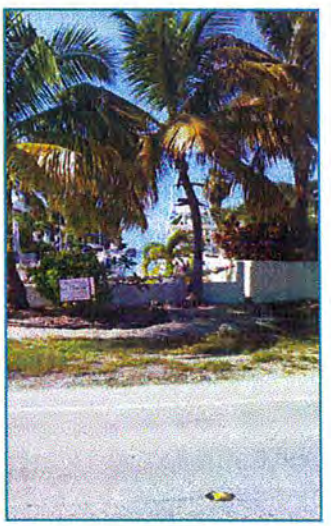
Existing Treatment: None

Homeowner Communication: AMEC spoke with Glen Owens (305) 293 0153 – past HOA president and owner of the property at the proposed culvert location. He is willing to help get the culvert installed. Had information about plans to install culvert when the subdivision was being constructed, but never got installed due to contractual differences between the developer and contractor. Current president is Don Riggs.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.28 / 20.7 % at 5 ft	0	Poor 100	51

Characteristics	
Size (acres)	0.59
Average Depth (ft)	-11.79
Min Depth (ft)	-15.27
Degree of Stagnation	-0.7
Number of Mouths	1
Organic Thickness (ft)	0.86
Parcels	21
WBID	6014C Not Impaired
WWT	FKAA/Big Coppitt
FKNMS Monitoring Station	2.64 miles





Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 472 Geiger Key

Project Location:

The project area is located south of US1 in Monroe County, Geiger Key, Florida; Section 27, Township 67 S, Range 26 E, (Latitude: 24°34'48.85" North; Longitude: - 81° 39'19.92" West). The information sheet and site location map (**Figure 15**) provide additional details.

Conceptual Design:

The purpose of the project is to hydrologically connect canal 472 and 470 to increase natural tidal flushing and reduce seaweed entrapment in the dead ends of the canal. At this stage in the project, the following design components have not been completed:

- Hydraulic models
- Geotechnical investigations
- Detailed topographic and bathymetric data

Therefore, for budgetary purposes AMEC has proposed installing an 8 feet high by 8 feet wide by 120 foot long precast concrete box culvert with a manatee grate under Boca Chica Road. The project also entails removing a 100' wide portion of the berm along the northern boundary of canal 470. The installation for the box culvert will entail using excavators to remove a 28 foot wide by 120 foot long section perpendicular to Boca Chica Road between Venus Lane and Mars Lane. The removal of the berm will entail using a barge and excavator system to create the cut to allow for increased flushing. Due to the removal of a portion of the main access road when installing the box culvert, maintenance of traffic plans will be created to ensure minimal impacts to local traffic. In the event the existing water and sewer lines need to be removed for the box culvert construction, a bypass system will be created during construction to ensure minimal outage to the local area. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

Construction Cost Estimate:

The approximate cost to construct the culvert connection as aforementioned will be $150,000.

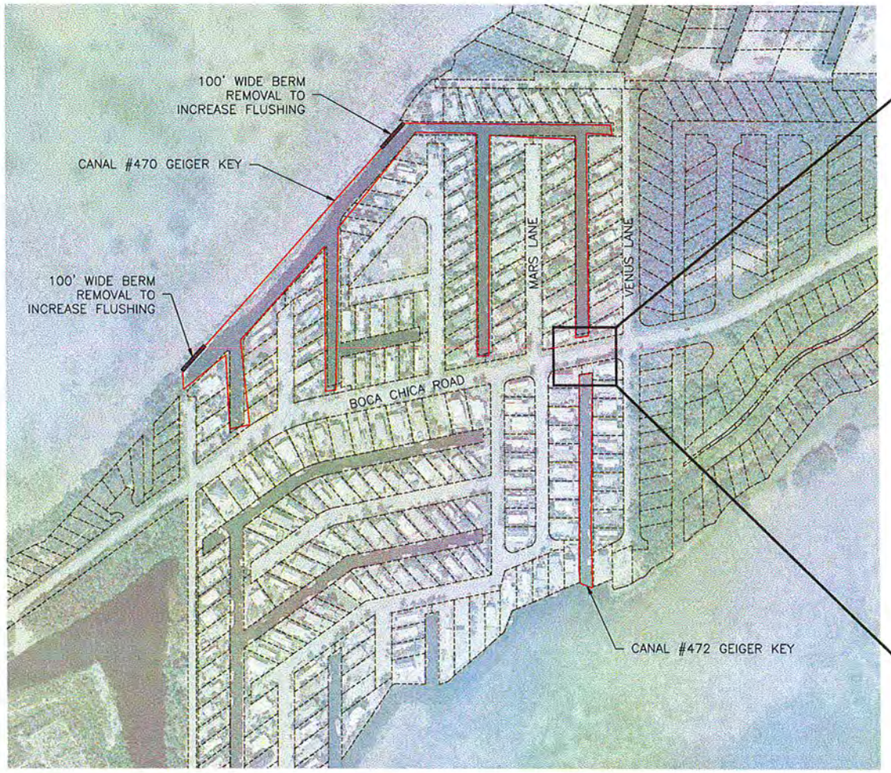
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Right of Way Permit
- Monroe County Building Permit

Access:

Based on field visits, an area located along Venus Lane could be used as a construction staging area with minor vegetation trimming.

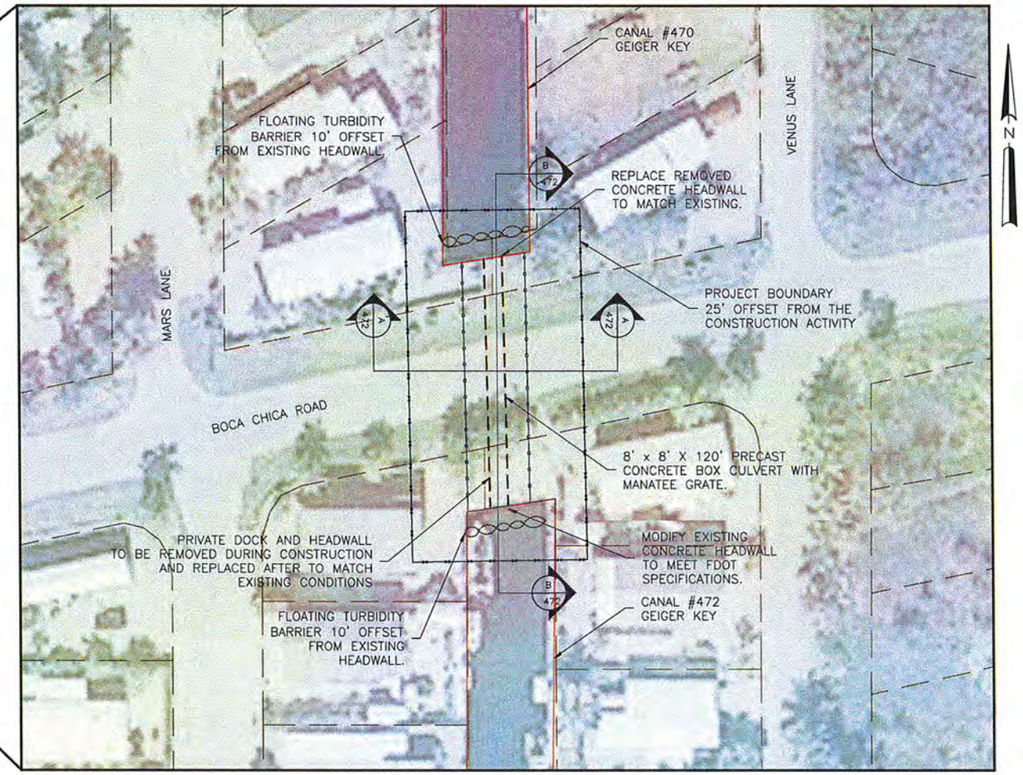
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



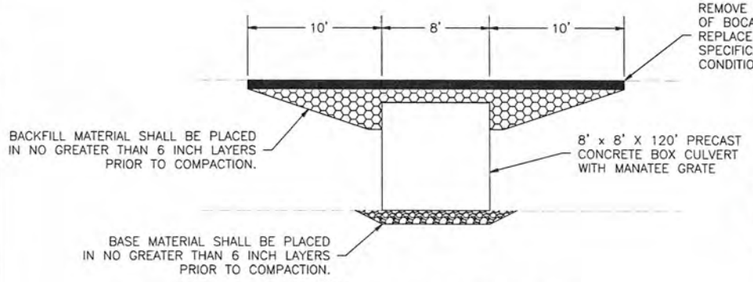
DETAIL SITE LAYOUT – CULVERT CONNECTION

0 30' 60'

SCALE:1"=30'

LEGEND

- BOX CULVERT
- EXCAVATION LIMITS
- FLOATING TURBIDITY BARRIER
- CANAL FOOTPRINTS
- MONROE COUNTY PARCELS, 2010



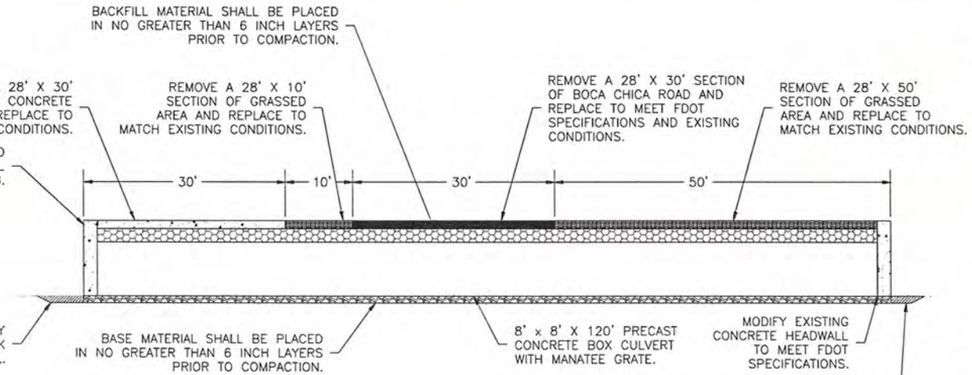
A 472 CROSS-SECTION

0 5' 10'

SCALE:1"=5'

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- CLEAN COMPACTED FILL
- ASPHALT
- GRASS



B 472 CROSS-SECTION

0 10' 20'

SCALE:1"=10'

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NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

CULVERT CONNECTION CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 472	
SHEET OF SHEETS	

PUMPING

Monroe County Selection of Demonstration Canals for PUMPING

Canal ID: 286 Big Pine Key

Location: MM 31 Whispering Pines subdivision, Bayside

Summary of Water Quality Impacts: There are multiple sources causing water quality impacts in this canal including: canal configuration that limits flushing, weed wrack entry, accumulated organics on the canal bottom; deep stagnant zones (with an average depth of -11.77 and minimum depth of -22.10); and a 24 inch corrugated pipe discharging stormwater into the canal.

Restoration Technology: Primary - Pumping (to prevent the buildup of oxygen depleted impaired water). Oxygenated water from near shore can be pumped into the end of the canal to enhance flushing. Additional restoration technologies that could assist with improving the water quality in this canal include: installation of a weed barrier, organic removal, backfilling and elimination of the stormwater pipe.

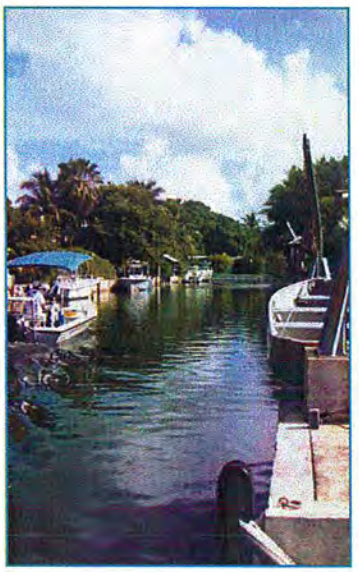
Site Conditions: The canal discharges to the northeast into Bogie Channel. Private ownership of lands below the high-water mark is not reflected in the plat books. The mouth of this canal discharges adjacent to Big Pine Key Park.

Existing Treatment: None

Homeowner Communication: Curtis Brown, President of the HA 305-872-8989 has attended numerous Canal Restoration Advisory Subcommittee meetings and sent emails indicating his interest in water quality improvements. Other residents have also sent emails stating their interest to be a part of the canal restoration demonstration project.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.69 / 27.0% at 5 ft	Not Measured	Poor 86	58

Characteristics	
Size (acres)	5.1
**Average Depth (ft)	-11.77
**Min Depth (ft)	-22.10
Degree of Stagnation	1.2
Number of Mouths	1
Organic Thickness (ft) Average	0.82
Parcels	71
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
KFNMS Monitoring Station	1.0 miles



Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 286 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 23 and 24, Township 66 S , Range 29 E , (Latitude: 24°40'46.97" North; Longitude: -81°20'50.98" West). The information sheet and site location map (**Figure 9**) provide additional details.

Conceptual Design:

The purpose of the project is to increase flushing by pumping from Bogie Channel to canal 286 resulting in increased dissolved oxygen and decreased stagnation. At this stage in the project, the following design components have not been completed:

- Hydraulic Modeling
- Detailed bathymetric data

Therefore, for budgetary purposes, AMEC used a 1.2 degree of stagnation for canal 286, which was calculated by first normalizing the values for area, length, number of convolutions, and area to length ratio, where normalization was calculated by subtracting the mean and dividing by the standard deviation for the respective attribute. Since the degree of stagnation was greater than one standard deviation above the mean it was considered to be significantly stagnant, and that increased circulation through a circulation pump system is proposed.

The pumping connection will be accomplished by installing 2 -6 horse power pumps and wet wells, 2 – 5 kilowatt solar arrays, approximately 3,100 linear feet of 12 inch PVC pipe, and approximately 2,800 linear feet of 6 inch PVC pipe. The installation will entail using a barge to install the approximately 5,900 linear feet of PVC pipe along the bottom center of the canal system with an anchor system. The intake of the pump will be placed at the mouth of the canal system and will have a screen to prevent impingement or entrainment of marine life. The discharge PVC pipes will be equipped with diffusers and other scour protection best management practices (BMP's). Due to the area outside the limits of the canal system designated as a Florida Outstanding Waters the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background during construction, until the area has been stabilized.

Other pumping system designs will be evaluated during the final design of the project.

Construction Cost Estimate:

The approximate cost to construct the pumping system as aforementioned will be $255,000.

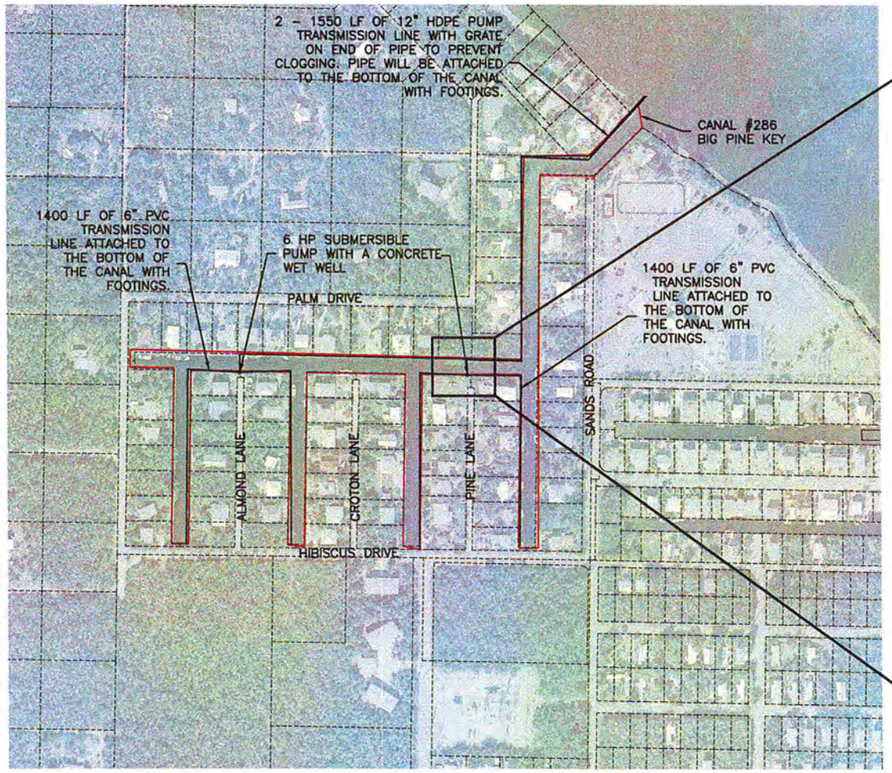
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot at the end of Pine Lane that could be used as a construction staging area.

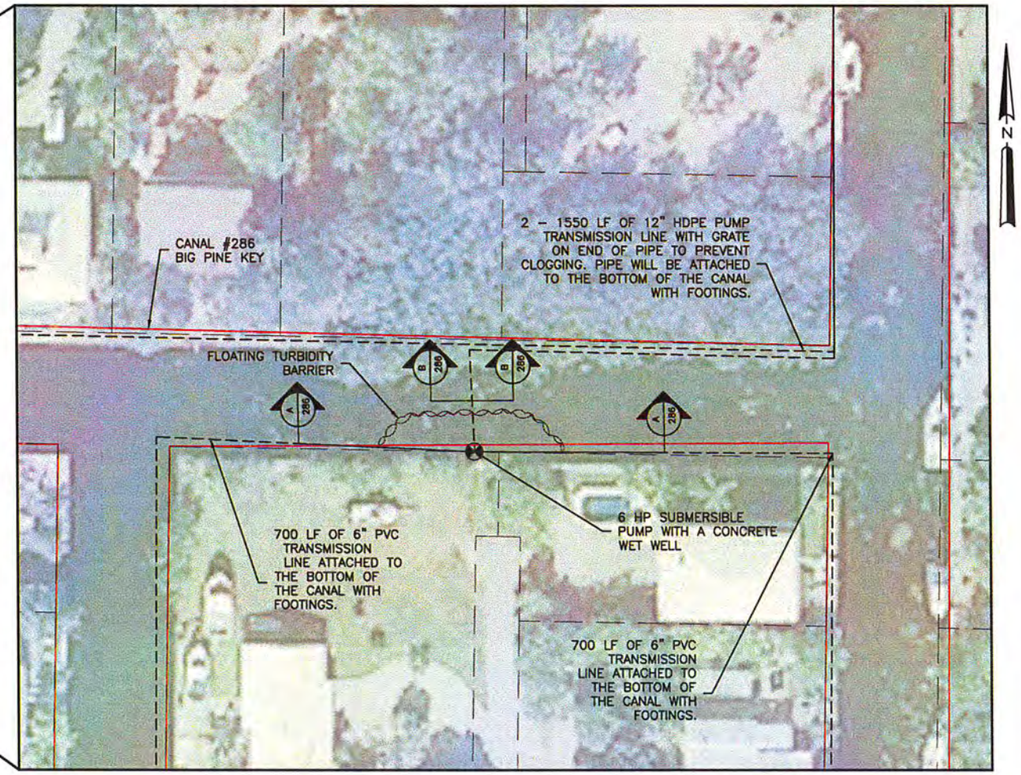
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



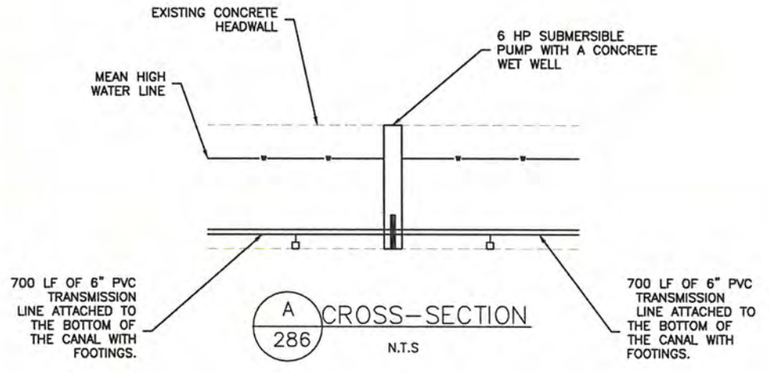
DETAIL SITE LAYOUT - PUMPING

0 30' 60'

SCALE:1"=30'

LEGEND

- PUMPING TRANSMISSION LINE
- CANAL 286 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

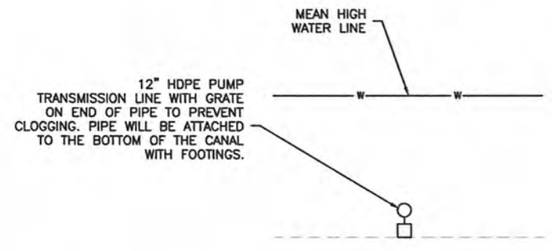


A/286 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE



B/286 CROSS-SECTION

N.T.S

amec

ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No:
6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

PUMPING CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 286	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for PUMPING

Canal ID: 278 Big Pine Key

Location: MM 30 Eden Pines Colony (1st Addition), Bayside

Summary of Water Quality Impacts: Primary – Extremely long canal with numerous convolutions (25) and high density of development (494 parcels) that has substandard flushing; Secondary - accumulated organics on canal bottom; Tertiary – some weed wrack entry in summer according to homeowner questionnaire.

Restoration Technology: Primary – Pumping (to prevent the buildup of oxygen depleted impaired water). Oxygenated water from the near shore area can be pumped into the ends of the canal fingers to enhance the flushing. Secondary – removal of organics from canal bottom to eliminate on-going source of organic decomposition.

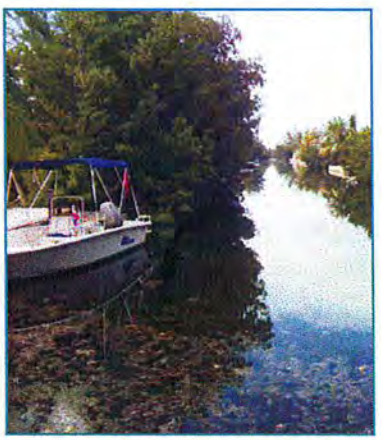
Site Conditions: The canal discharges to the west into Pine Channel. Private ownership of lands below the high-water mark is not reflected on the plat book; however, the aerials indicate a small area of submerged shoreline is privately claimed. Further investigation is needed.

Existing Treatment: None

Homeowner Communication: Questionnaires (7) from homeowners submitted indicating need for water quality improvements in this canal. Donna Lorenzo 305-872-2189 has attended numerous Canal Restoration Advisory Subcommittee meetings and stated her interest in being a part of the canal demonstration project.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.79 / 26.7 % at 9 ft	0.43	Poor 91	35

Characteristics	
Size (acres)	21.6
**Average Depth (ft)	-7.87
**Min Depth (ft)	-13.18
Degree of Stagnation	5.7
Number of Mouths	1
Organic Thickness (ft) Average	1.03
Parcels	494
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
KFNMS Monitoring Station	1.69 miles



Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 278 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 15, Township 66 S , Range 29 E , (Latitude: 24°41'36.86" North; Longitude: - 81°22'47.38" West). The information sheet and site location map (**Figure 8**) provide additional details.

Conceptual Design:

The purpose of the project is to increase flushing by pumping from Pine Channel to 278 resulting in increased dissolved oxygen and decreased stagnation. At this stage in the project, the following design components have not been completed:

- Hydraulic Modeling
- Detailed bathymetric data

Therefore, for budgetary purposes, AMEC used a 5.7 degree of stagnation for canal 278, which was calculated by first normalizing the values for area, length, number of convolutions, and area to length ratio, where normalization was calculated by subtracting the mean and dividing by the standard deviation for the respective attribute. Since the degree of stagnation was greater than one standard deviation above the mean it was considered to be significantly stagnant, and that increased circulation through a circulation pump system is proposed.

The pumping connection will be accomplished by installing a 2 -6 horse power pump and concrete wet well, approximately 200 linear feet of 24-inch HDPE pipe, approximately 1,965 linear feet of 12 inch PVC pipe and approximately 2,660 linear feet of 10 inch PVC pipe. The installation will entail using a barge to install the approximately 4,625 linear feet of PVC pipe along the bottom center of the canal system with an anchor system. The intake of the pump will be placed at the mouth of the canal system and will have a screen to prevent impingement or entrainment of marine life. The discharge PVC pipes will be equipped with diffusers and other scour protection BMP's. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background during construction, until the area has been stabilized..

Other pumping systems will be evaluated during the final design of the project.

Construction Cost Estimate:

The approximate cost to construct the pumping system as aforementioned will be $195,000.

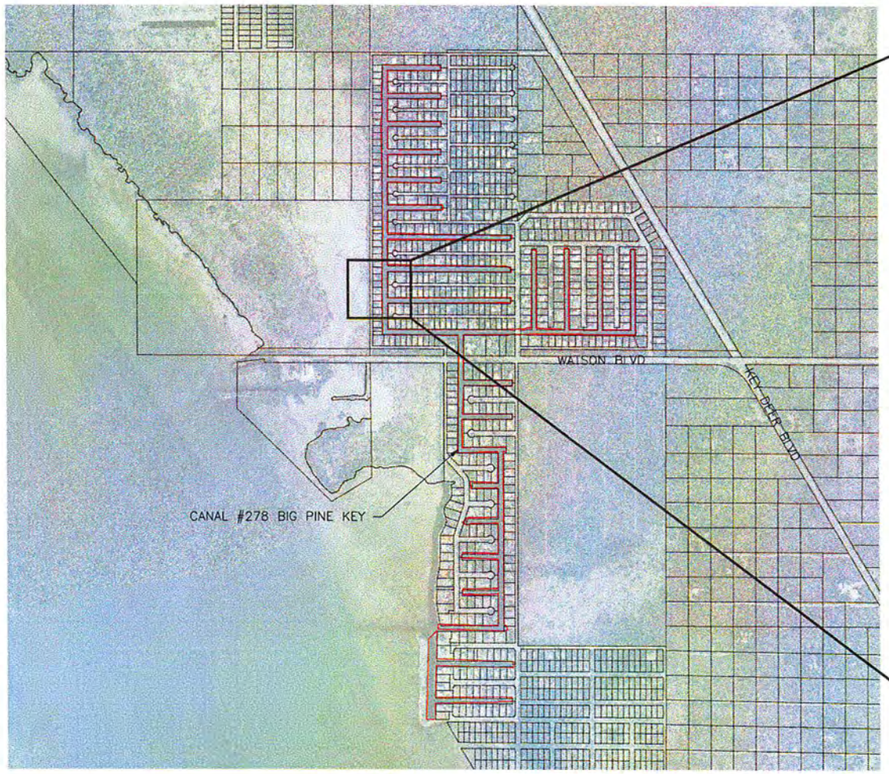
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot along Narcissus Avenue that could be used as a construction staging area.

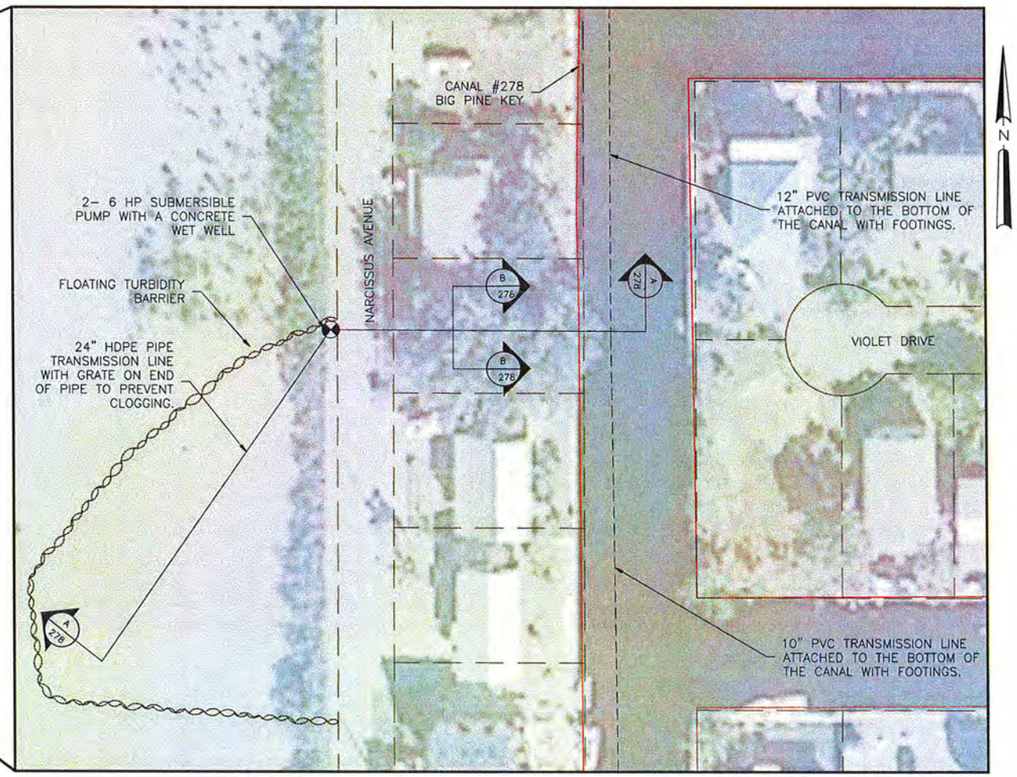
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 600' 1200'

SCALE:1"=600'



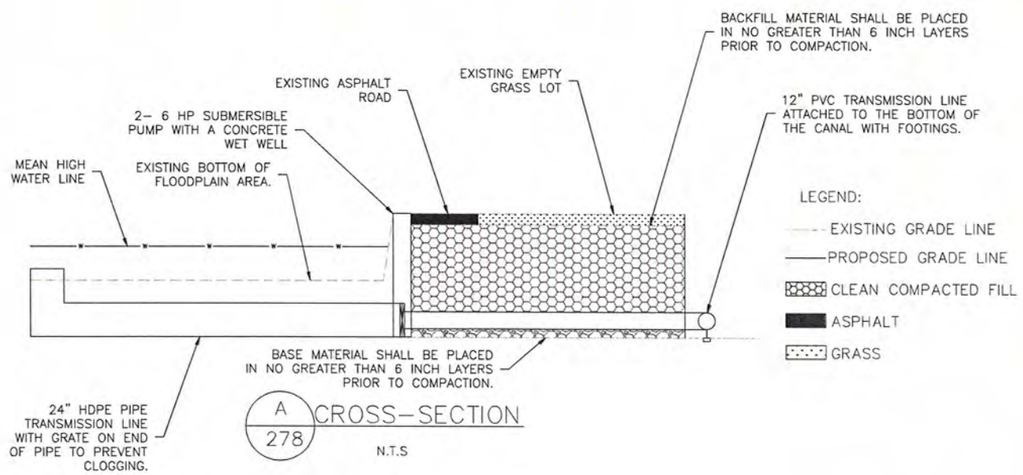
DETAIL SITE LAYOUT – PUMPING

0 30' 60'

SCALE:1"=30'

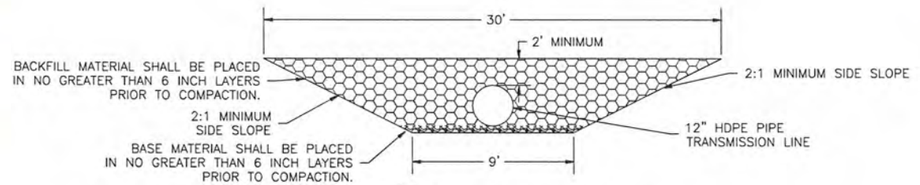
LEGEND

- PUMPING TRANSMISSION LINE
- CANAL 278 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A 278 CROSS–SECTION

N.T.S



B 278 CROSS–SECTION

N.T.S

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332–3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783–13–2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

PUMPING CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 278	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for PUMPING

Canal ID: 47 Key Largo

Location: MM 103 Bermuda Shores subdivision, Bayside

Summary of Water Quality Impacts: Primary – Long canal with numerous convolutions that does not flush well; Secondary – deep stagnant zone with an average depth of -11.62 and minimum depth of -20.65. The small finger along Bowie Lane is mostly restricted in discharge due to the land owner filling in the canal for all except a kayak depth discharge.

Restoration Technology: Primary - Pumping (to prevent the buildup of oxygen depleted impaired water). Oxygenated water from the near shore west of Shaw Drive can be pumped into the end of the canal to enhance the flushing.

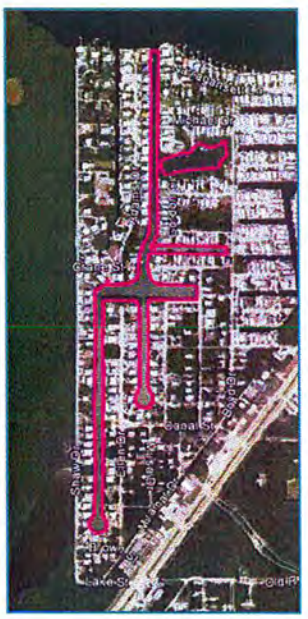
Site Conditions: This canal discharges north into Blackwater Sound. Private ownership of lands below the high-water mark is not asserted from the plat books; however, the aerials indicate a small area of submerged shoreline is privately claimed on part of the plugged canal. Further investigation is needed.

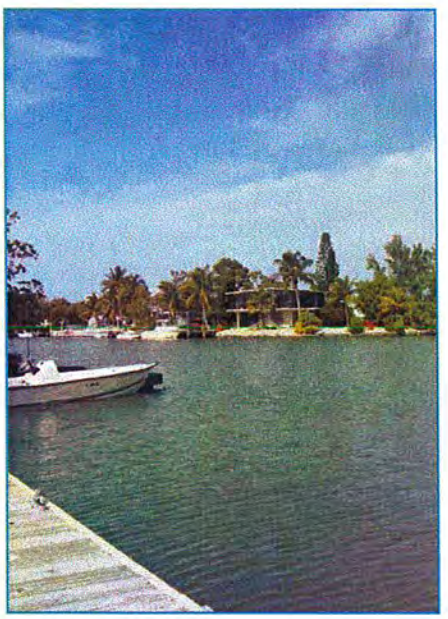
Existing Treatment: None presently. Canal used to have a culvert to Canal Key Largo 45 but it collapsed; aerators were installed in 1991 but are no longer operating.

Homeowner Communication: Several homeowners have contacted Monroe County to state the poor water quality conditions in this canal.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.3 / 4.4 % at 10 ft	9.93	Poor 79	26

Characteristics	
Size (acres)	13.4
**Average Depth (ft)	-11.62
**Min Depth (ft)	-20.65
Degree of Stagnation	3.3
Number of Mouths	1
Organic Thickness (ft) Average	0.74
Parcels	182
WBID	6006A Impaired
WWT	KLWTD
KFNMS Monitoring Station	None





Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 47 Key Largo

Project Location:

The project area is located north west of US1 in Monroe County, Key Largo, Florida; Section 15, Township 61 S , Range 39 E , (Latitude: 25°07'43.03" North; Longitude: - 80°24'49.11" West). The information sheet and site location map (**Figure 4**) provide additional details.

Conceptual Design:

The purpose of the project is to increase flushing by pumping from Backwaters Sound to canal 47 resulting in increased dissolved oxygen and decreased stagnation. At this stage in the project, the following design components have not been completed:

- Hydraulic Modeling
- Detailed bathymetric data

Therefore, for budgetary purposes, AMEC used a 3.3 degree of stagnation for canal 47, which was calculated by first normalizing the values for area, length, number of convolutions, and area to length ratio, where normalization was calculated by subtracting the mean and dividing by the standard deviation for the respective attribute. Since the degree of stagnation was greater than one standard deviation above the mean it was considered to be significantly stagnant, and that increased circulation through a circulation pump system is proposed.

The pumping connection will be accomplished by installing a 20 horse power pump and concrete wet well, approximately 450 linear feet of 24-inch HDPE pipe, and approximately 550 linear feet of 12 inch HDPE pipe. The installation will entail using a barge to install the 550 linear feet of PVC pipe along the bottom center of the canal system with an anchor system. The intake of the pump system will be placed in the floodplain area to the west of Shaw Drive and will have a screen to prevent impingement or entrainment of marine life. The discharge HDPE pipe will be equipped with diffusers and other scour protection BMP's. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background during construction, until the area has been stabilized.

Other pumping systems will be evaluated during the final design of the project.

Construction Cost Estimate:

The approximate cost to construct the pumping system as aforementioned will be $155,000.

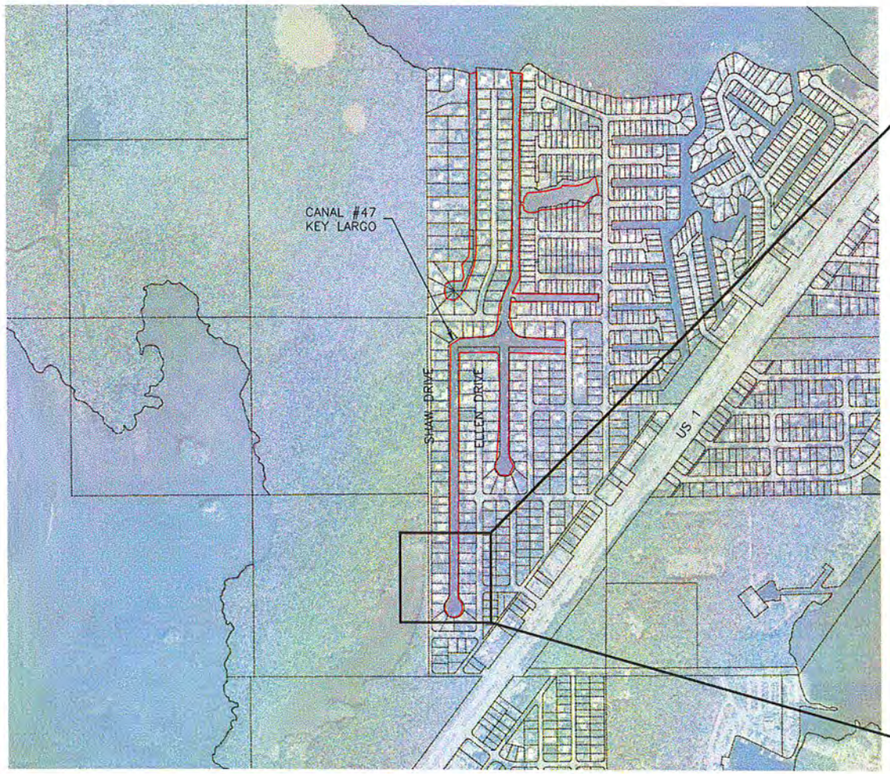
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot along Shaw Drive that could be used as a construction staging area, with minor tree and shrub trimming.

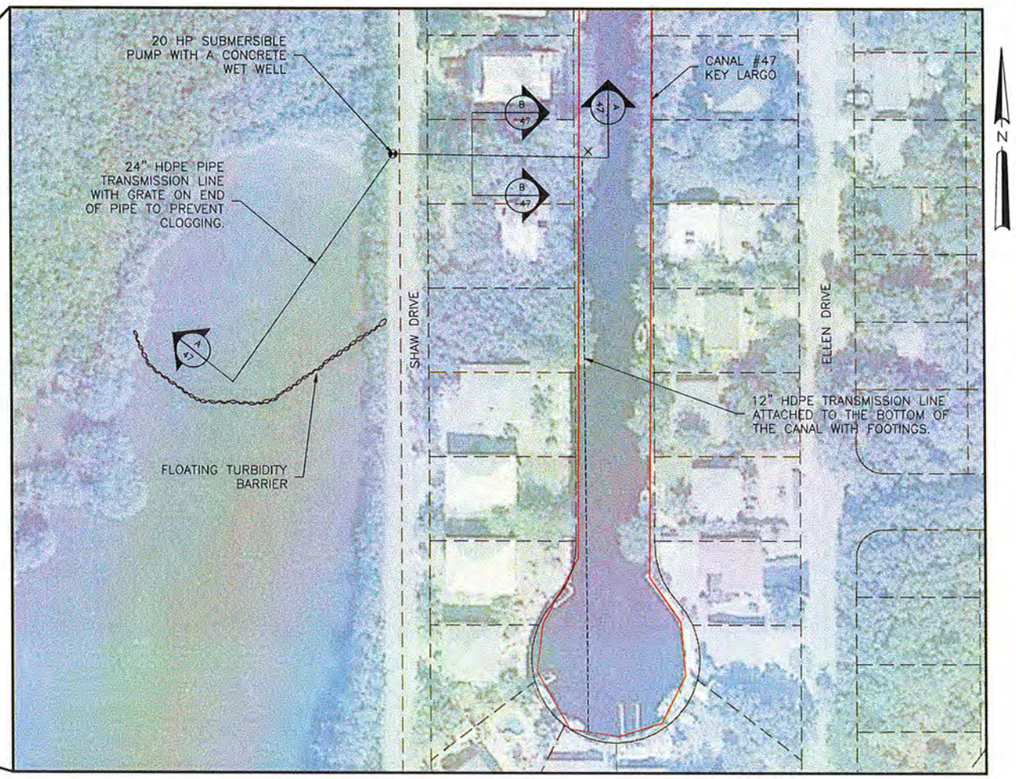
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 500' 1000'

SCALE:1"=500'



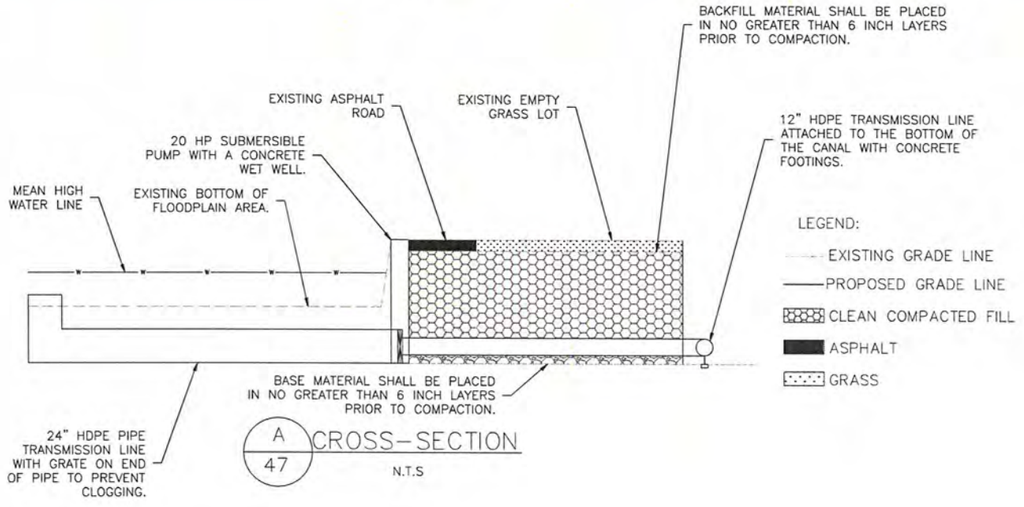
DETAIL SITE LAYOUT – PUMPING

0 60' 120'

SCALE:1"=60'

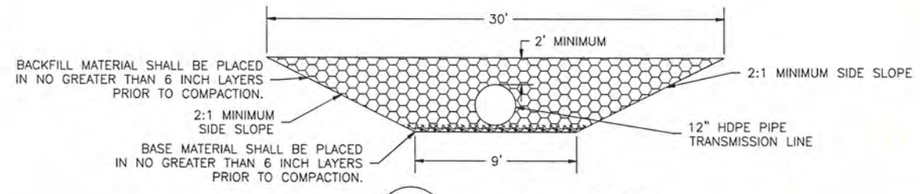
LEGEND

- PUMPING TRANSMISSION LINE
- CANAL 47 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A/47 CROSS–SECTION

N.T.S



B/47 CROSS–SECTION

N.T.S

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332–3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783–13–2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

PUMPING CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 47	
SHEET OF SHEETS	

Monroe County
Selection of Demonstration Canals for
Water Quality Improvements
AMEC Project No. 6783-13-2507
November 8, 2013

BACKFILLING

Monroe County Selection of Demonstration Canals for BACKFILLING

Canal ID: 29 Key Largo

Location: MM 106 Sexton Cove Estates subdivision, Bayside

Summary of Water Quality Impacts: Primary – Deep stagnant zone with an average depth of -19.44.

Restoration Technology: Backfilling (For the purpose of eliminating deep oxygen depleted impaired water quality zone).

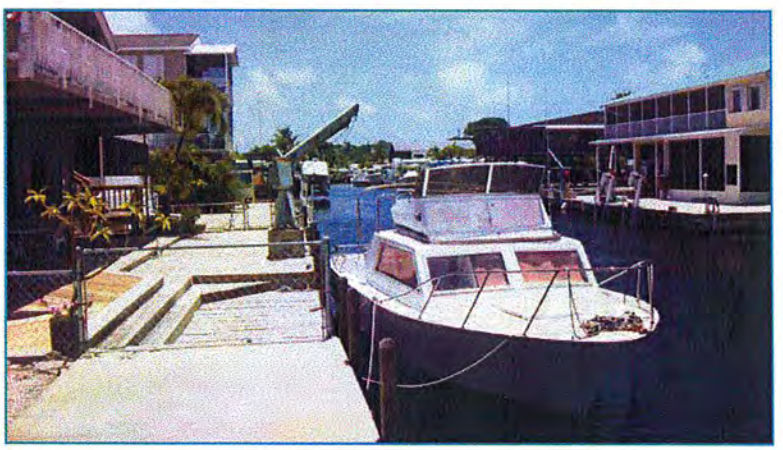
Site Conditions: The canal has an orientation pointing due west and discharges into Sexton Cove. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Aerator

Homeowner Communication: David Gilbert, president of the Sexton Cove Property Owners Association, 305-451-2020, emailed Monroe County stating interest in a demonstration project for backfilling in the Sexton Cove canals.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
3.05 / 43.5% at 3 ft	0	Poor 92	64

Characteristics	
Size (acres)	0.86
**Average Depth (ft)	-19.44
**Min Depth (ft)	-32.33
Degree of Stagnation	-0.6
Number of Mouths	1
Organic Thickness (ft) Average	1.41
Parcels	26
WBID	6006A Impaired
WWT	KLWTD
FKNMS Monitoring Station	None



Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 29 Key Largo

Project Location:

The project area is located west of US1 in Monroe County, Key Largo, Florida; Section 1, Township 61 S , Range 39 E, (Latitude: 25°09'50.32" North; Longitude: - 80°23'01.28" West). The information sheet and site location map (**Figure 2**) provide additional details.

Conceptual Design:

The purpose of the project is to backfill canal 29 to an average depth of 8 feet mean low water elevation to increase dissolved oxygen and reduce deep stagnation zones. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Method to prevent suspension of bottom sediments

Therefore, for budgetary purposes, AMEC used the surface area of the canal and average depth of the bathymetric center line profile of the canal to estimate the 21,000 tons to backfill the canal to the target elevation. It is assumed at this time that the source of the backfill will be a commercial quarry. The following is the backfill material specifications for the various layers:

- Top 1' of Material: Screening sand or A3 Sand Fill from Quarry.

- Subbase Material: Shall be clean, well-graded material free from debris, peat, roots, seeds of nuisance or exotic species, organic material, clods, and stones with a diameter greater than 3 inches (76 mm) in any direction. Backfill shall have an average organic content of not more than 5%. Backfill shall meet the following Unified Soil Classification System (ASTM D2487) designations: SW, SP, SP-SM, and SP-SC (These are coarse-grained soils with greater than 50% by dry weight retained on a No. 200 sieve; SP and SW have less than 5% finer than a No. 200 sieve; SP-SM and SP-SC have 5-12% finer than a No. 200 sieve).

- Base Material (thickness to be determined at each canal location): Backfill shall be clean, well-graded material, that is thoroughly mixed and free from debris, clods, seeds of nuisance or exotic species, and stones with a maximum 6-inch diameter in any direction. Backfill shall have an organic content of less than 5% by weight and shall meet the following Unified Soil Classification System (ASTM D2487) designations: SP, SP-SM, and SP-SC.

The project will entail using earthmoving and mechanical equipment to place the material on a barge from the canal shoreline while minimizing environmental impacts to existing mangrove fringe. An excavator will also be used to place the fill material into the canal system. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity to backfill the canal to the target elevation will be verified once detailed bathymetric cross section data is gathered.

Construction Cost Estimate:

The approximate cost to install fill in the canal as aforementioned will be approximately $1,800 per linear foot of canal (722 linear feet) or $1.3 million total for Canal 29.

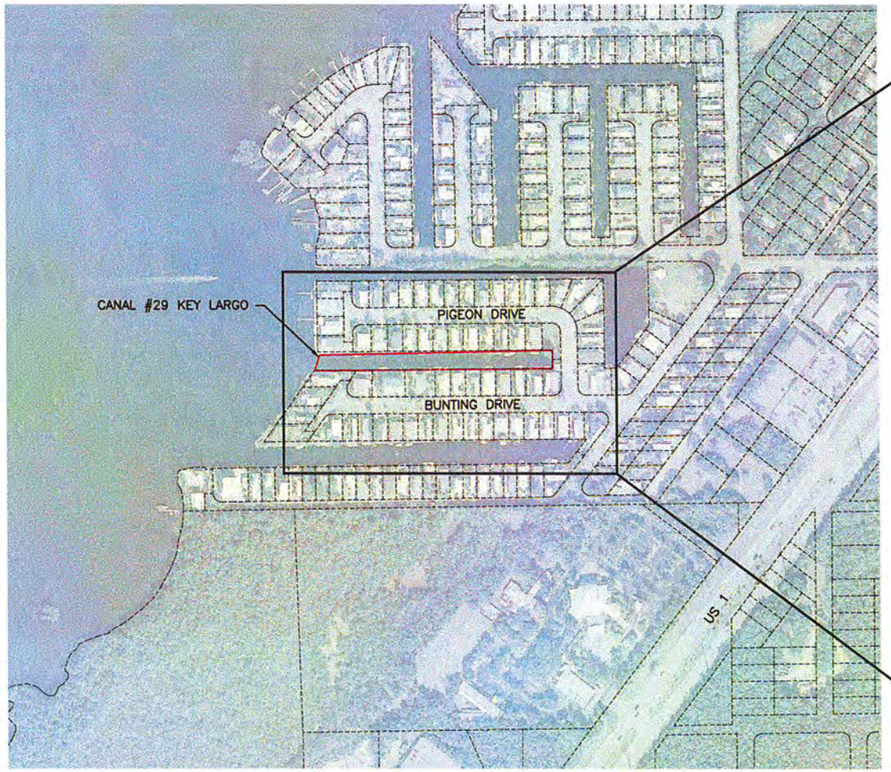
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit

Access:

Based on field visits, there is an empty lot at the end of the canal adjacent to Pigeon Drive that could be used as a construction staging area.

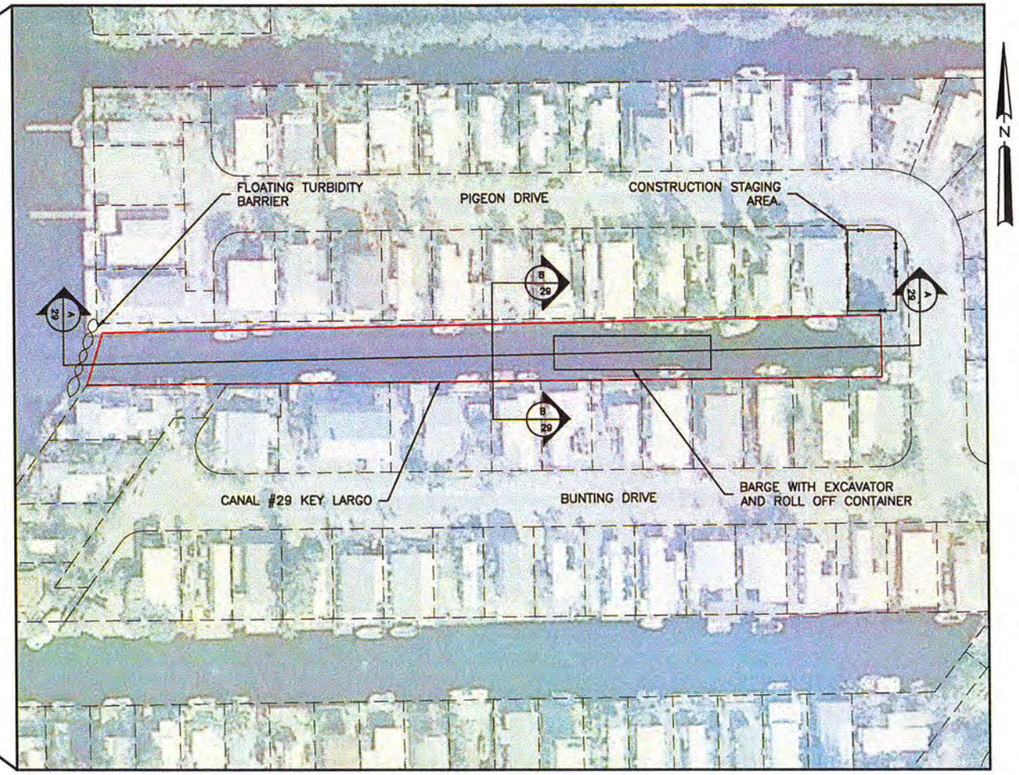
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



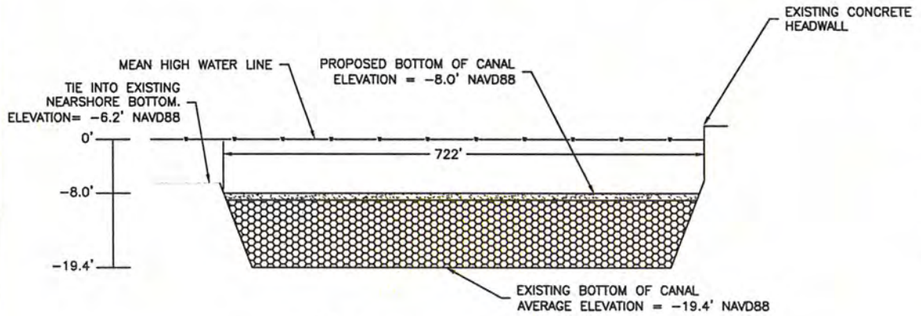
DETAIL SITE LAYOUT – BACKFILL

0 60' 120'

SCALE:1"=60'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #29 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

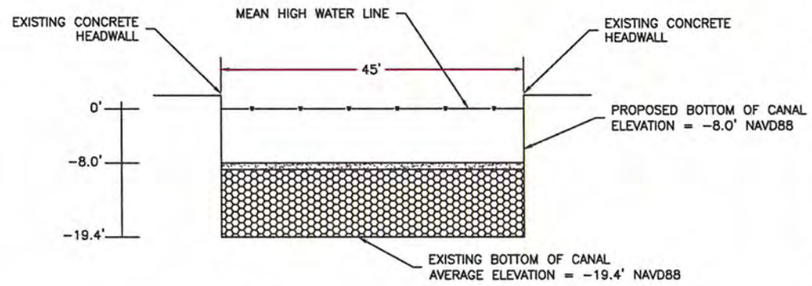


A/29 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- CLEAN COMPACTED FILL
- SCREENING SAND



B/29 CROSS-SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING BACKFILL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS -32.3 FEET AND THE MAXIMUM OBSERVED DEPTH IS -6.2 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

amec

ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

BACKFILL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 29	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for BACKFILLING

Canal ID: 27 Key Largo

Location: MM 106 Sexton Cove Estates subdivision, Bayside

Source of Water Quality Impacts: Primary – Deep stagnant zone with an average depth of - 29.77 feet.

Restoration Technology: Backfilling (For the purpose of eliminating deep oxygen depleted impaired water quality zone)

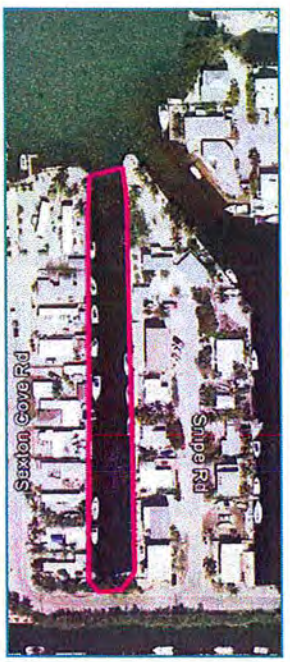
Site Conditions: The canal has an orientation pointing due north and discharges into Sexton Cove. Private ownership of the lands below the high-water mark is not reflected in the plat book.

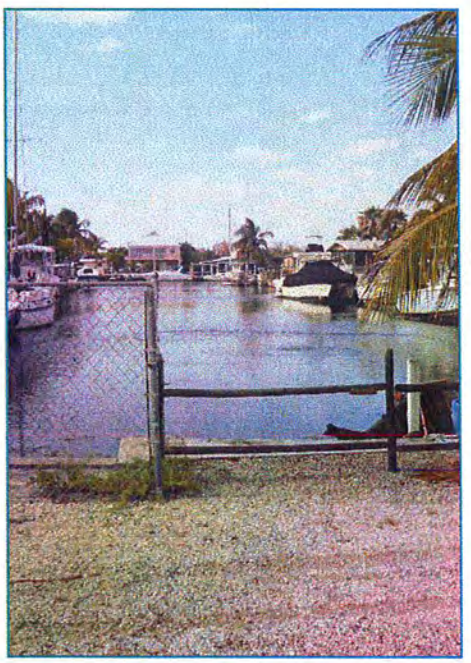
Existing Treatment: Aerators

Homeowner Communication: David Gilbert, president of the Sexton Cove Property Owners Association, 305-451-2020, emailed Monroe County stating interest in a demonstration project for backfilling in the Sexton Cove canals.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.98 / 31.1% at 8-10 ft	0	Poor 90	56

Characteristics	
Size (acres)	0.84
**Average Depth (ft)	-29.77
**Min Depth (ft)	-42.07
Degree of Stagnation	-0.7
Number of Mouths	1
Organic Thickness (ft) Average	3.50
Parcels	17
WBID	6006A Impaired
WWT	KLWTD
KFNMS Monitoring Station	None





Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 27 Key Largo

Project Location:

The project area is located west of US1 in Monroe County, Key Largo, Florida; Section 1, Township 61 S , Range 39 E, (Latitude: 25°09'54.40" North; Longitude: - 80°23'04.74" West). The information sheet and site location map (**Figure 1**) provide additional details.

Conceptual Design:

The purpose of the project is to backfill canal 27 to an average depth of 8 feet mean low water elevation to increase dissolved oxygen and reduce deep stagnation zones. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Method to prevent suspension of bottom sediments

Therefore, for budgetary purposes, AMEC used the surface area of the canal and average depth of the bathymetric center line profile of the canal to estimate the 38,000 tons to backfill the canal to the target elevation. It is assumed at this time that the source of the backfill will be a commercial quarry. The following is the backfill material specifications for the various layers:

- Top 1' of Material: Screening sand or A3 Sand Fill from Quarry.

- Subbase Material: Shall be clean, well-graded material free from debris, peat, roots, seeds of nuisance or exotic species, organic material, clods, and stones with a diameter greater than 3 inches (76 mm) in any direction. Backfill shall have an average organic content of not more than 5%. Backfill shall meet the following Unified Soil Classification System (ASTM D2487) designations: SW, SP, SP-SM, and SP-SC (These are coarse-grained soils with greater than 50% by dry weight retained on a No. 200 sieve; SP and SW have less than 5% finer than a No. 200 sieve; SP-SM and SP-SC have 5-12% finer than a No. 200 sieve).

- Base Material (thickness to be determined at each canal location): Backfill shall be clean, well-graded material that is thoroughly mixed and free from debris, clods, seeds of nuisance or exotic species, and stones with a maximum 6-inch diameter in any direction. Backfill shall have an organic content of less than 5% by weight and shall meet the following Unified Soil Classification System (ASTM D2487) designations: SP, SP-SM, and SP-SC.

The project will entail using earthmoving and mechanical equipment to place the material on a barge from the canal shoreline while minimizing environmental impacts to existing mangrove fringe. An excavator will also be used to place the fill material into the canal system. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity to backfill the canal to the target elevation will be verified once detailed bathymetric cross section data is gathered.

Construction Cost Estimate:

The approximate cost to install fill in the canal as aforementioned will be approximately $4,000 per linear foot of canal (590 linear feet) or $2.3 million total for Canal 27.

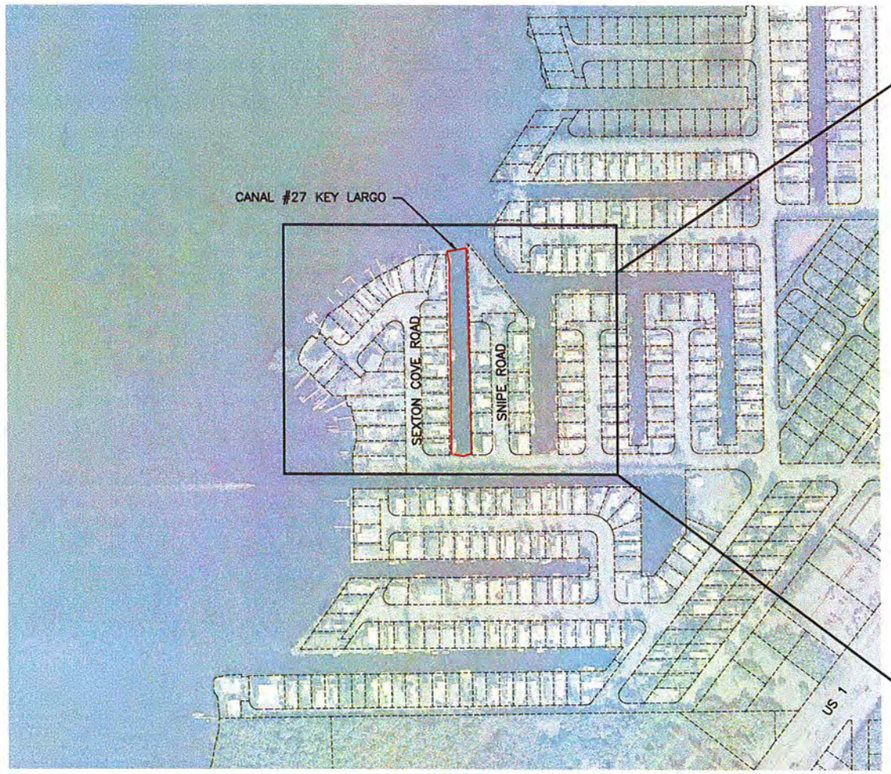
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit

Access:

Based on field visits, there is an empty lot at the end of Snipe Road that could be used as a construction staging area.

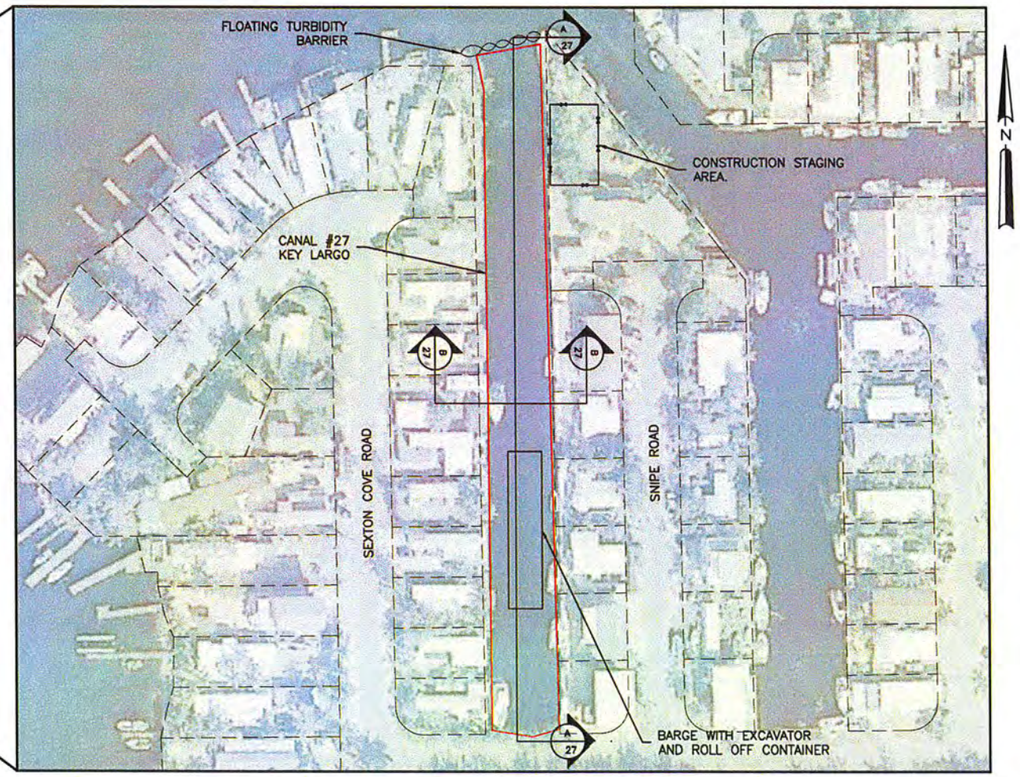
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



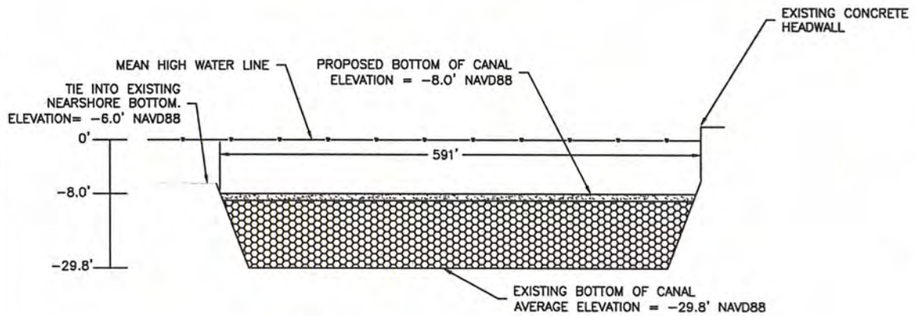
DETAIL SITE LAYOUT – BACKFILL

0 60' 120'

SCALE:1"=60'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #29 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

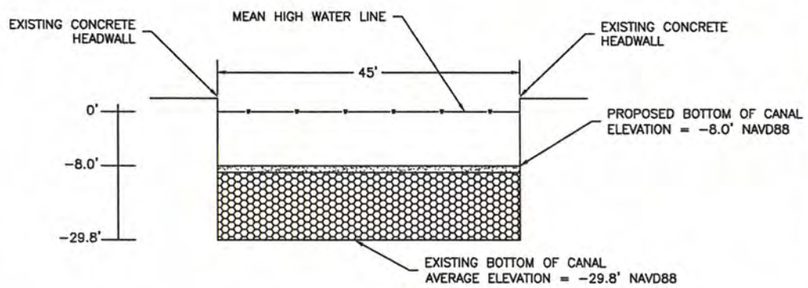


A 27 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- CLEAN COMPACTED FILL
- SCREENING SAND



B 27 CROSS-SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING BACKFILL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS -42.1 FEET AND THE MAXIMUM OBSERVED DEPTH IS -6.1 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

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NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

BACKFILL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 27	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for BACKFILLING

Canal ID: 37 Key Largo

Location: MM 105 Key Largo Mobile Home Site Plat 4 subdivision, Oceanside

Summary of Water Quality Impacts: Primary – Deep stagnant zone with an average depth of -17.05; Secondary – Substandard flushing.

Restoration Technology: Backfilling (For the purpose of eliminating deep oxygen depleted impaired water quality zone).

Site Conditions: The canal faces due east and discharges into a tributary of Largo Sound. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: None

Homeowner Communication: AMEC spoke with homeowners on Lance Lane to gain access to the private dock area. No communications concerning interest in water quality improvements.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
2.12 / 33.4% at 5 ft	Not Measured	Poor 84	54

Characteristics	
Size (acres)	0.98
**Average Depth (ft)	-17.05
**Min Depth (ft)	-21.64
Degree of Stagnation	-0.2
Number of Mouths	1
Organic Thickness (ft) Average	1.29
Parcels	26
WBID	6006A Impaired
WWT	KLWTD
FKNMS Monitoring Station	5.65 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 37 Key Largo

Project Location:

The project area is located west of US1 in Monroe County, Key Largo, Florida; Section 1, Township 61 S , Range 39 E, (Latitude: 25°09'50.32" North; Longitude: - 80°23'01.28" West). The information sheet and site location map (**Figure 3**) provide additional details.

Conceptual Design:

The purpose of the project is to backfill canal 37 to an average depth of 8 feet mean low water elevation to increase dissolved oxygen and reduce deep stagnation zones. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Method to prevent suspension of bottom sediments

Therefore, for budgetary purposes, AMEC used the surface area of the canal and average depth of the bathymetric center line profile of the canal to estimate the 22,000 tons to backfill the canal to the target elevation. It is assumed at this time that the source of the backfill will be a commercial quarry. The following is the backfill material specifications for the various layers:

- Top 1' of Material: Screening sand or A3 Sand Fill from Quarry.

- Subbase Material: Shall be clean, well-graded material free from debris, peat, roots, seeds of nuisance or exotic species, organic material, clods, and stones with a diameter greater than 3 inches (76 mm) in any direction. Backfill shall have an average organic content of not more than 5%. Backfill shall meet the following Unified Soil Classification System (ASTM D2487) designations: SW, SP, SP-SM, and SP-SC (These are coarse-grained soils with greater than 50% by dry weight retained on a No. 200 sieve; SP and SW have less than 5% finer than a No. 200 sieve; SP-SM and SP-SC have 5-12% finer than a No. 200 sieve).

- Base Material (thickness to be determined at each canal location): Backfill shall be clean, well-graded material that is thoroughly mixed and free from debris, clods, seeds of nuisance or exotic species, and stones with a maximum 6-inch diameter in any direction. Backfill shall have an organic content of less than 5% by weight and shall meet the following Unified Soil Classification System (ASTM D2487) designations: SP, SP-SM, and SP-SC.

The project will entail using earthmoving and mechanical equipment to place the material on a barge from the canal shoreline while minimizing environmental impacts to existing mangrove fringe. An excavator will also be used to place the fill material into the canal system. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity to backfill the canal to the target elevation will be verified once detailed bathymetric cross section data is gathered.

Construction Cost Estimate:

The approximate cost to install fill in the canal as aforementioned will be approximately $1,500 per linear foot of canal (820 linear feet) or $1.2 million total for Canal 37.

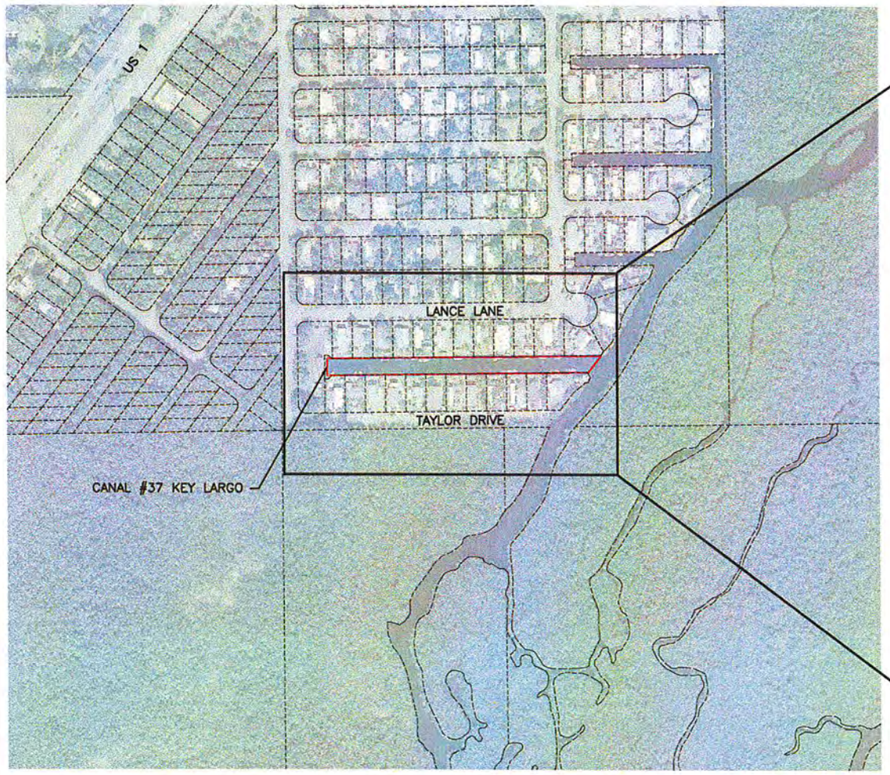
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit

Access:

Based on field visits, there is an empty lot adjacent to Taylor Drive that could be used as a construction staging area.

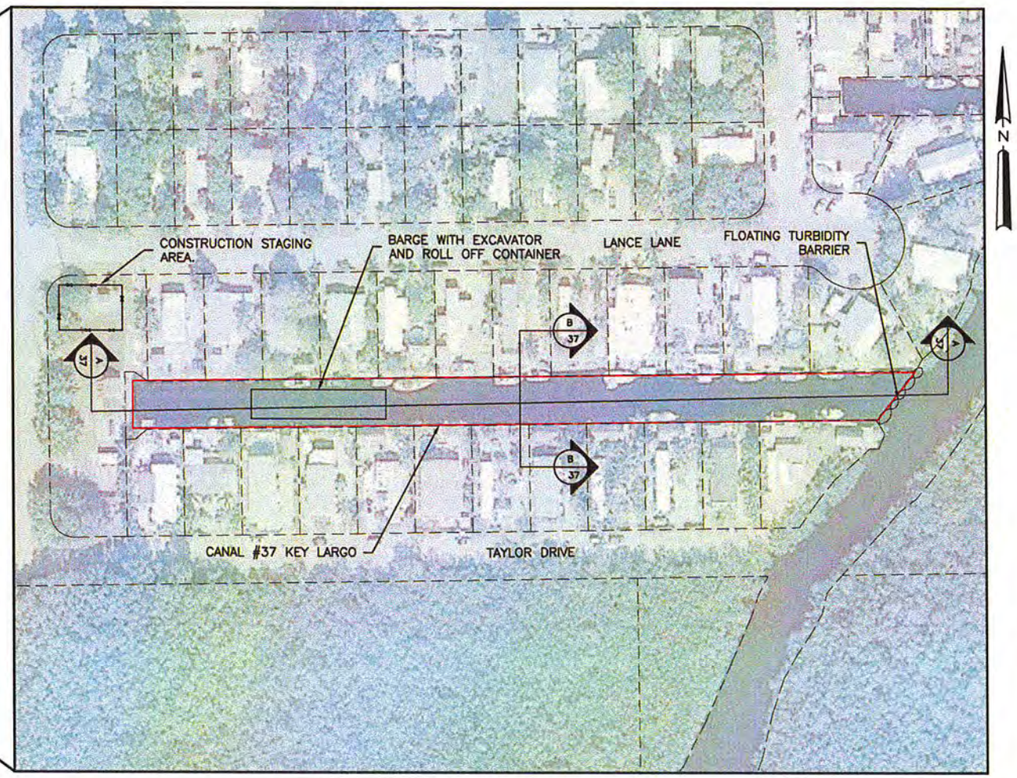
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



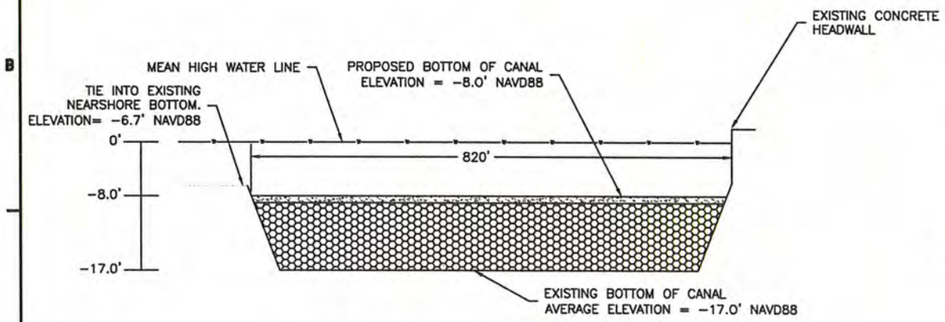
DETAIL SITE LAYOUT – BACKFILL

0 70' 140'

SCALE:1"=70'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #37 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

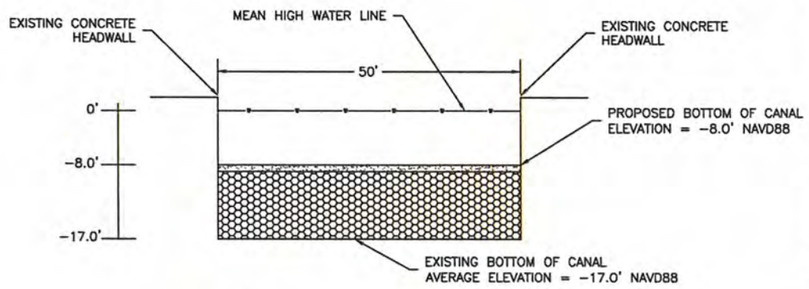


A/37 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- CLEAN COMPACTED FILL
- SCREENING SAND



B/37 CROSS-SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING BACKFILL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS -21.6 FEET AND THE MAXIMUM OBSERVED DEPTH IS -6.7 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

amec

ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

BACKFILL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 37	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for BACKFILLING

Canal ID: 92 Tavernier

Location: MM 93 Hammer Point Park subdivision, Bayside

Summary of Water Quality Impacts: Primary – Deep stagnant zone with an average depth of - 23.65 feet.

Restoration Technology: Backfilling (For the purpose of eliminating deep oxygen depleted impaired water quality zone).

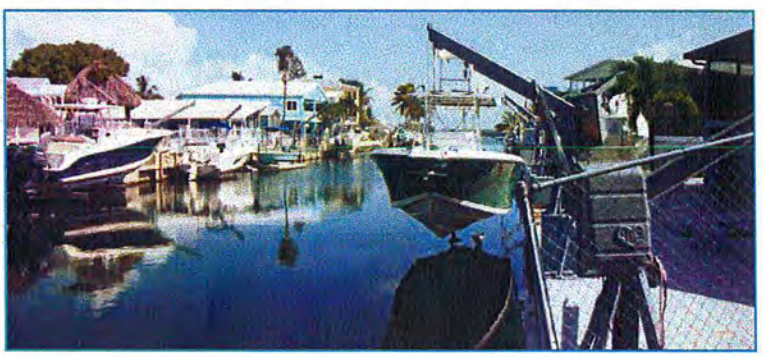
Site Conditions: The canal faces due north and discharges into Florida Bay. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: None

Homeowner Communication: AMEC spoke with the homeowner on the corner of Guilford Ct and Wellington Drive. They indicated they thought the water quality was fine. There is a HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.06 / 0.9% at 10 ft	Not Measured	Poor 78	52

Characteristics	
Size (acres)	0.93
**Average Depth (ft)	-23.65
**Min Depth (ft)	-27.08
Degree of Stagnation	-0.6
Number of Mouths	1
Organic Thickness (ft) Average	0.76
Parcels	21
WBID	6006A Impaired
WWT	KLWTD
FKNMS Monitoring Station	None



Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 92 Tavernier

Project Location:

The project area is located north west of US1 in Monroe County, Tavernier, Florida; Section 22, Township 62 S, Range 38 E , (Latitude: 25°01'35.27" North; Longitude: - 80°30'33.39" West). The information sheet and site location map (**Figure 5**) provide additional details.

Conceptual Design:

The purpose of the project is to backfill canal 92 to an average depth of 8 feet mean low water elevation to increase dissolved oxygen and reduce deep stagnation zones. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Method to prevent suspension of bottom sediments

Therefore, for budgetary purposes, AMEC used the surface area of the canal and average depth of the bathymetric center line profile of the canal to estimate the 30,000 tons to backfill the canal to the target elevation. It is assumed at this time that the source of the backfill will be a commercial quarry. The following is the backfill material specifications for the various layers:

- Top 1' of Material: Screening sand or A3 Sand Fill from Quarry.

- Subbase Material: Shall be clean, well-graded material free from debris, peat, roots, seeds of nuisance or exotic species, organic material, clods, and stones with a diameter greater than 3 inches (76 mm) in any direction. Backfill shall have an average organic content of not more than 5%. Backfill shall meet the following Unified Soil Classification System (ASTM D2487) designations: SW, SP, SP-SM, and SP-SC (These are coarse-grained soils with greater than 50% by dry weight retained on a No. 200 sieve; SP and SW have less than 5% finer than a No. 200 sieve; SP-SM and SP-SC have 5-12% finer than a No. 200 sieve)

- Base Material (thickness to be determined at each canal location): Backfill shall be clean, well-graded material that is thoroughly mixed and free from debris, clods, seeds of nuisance or exotic species, and stones with a maximum 6-inch diameter in any direction. Backfill shall have an organic content of less than 5% by weight and shall meet the following Unified Soil Classification System (ASTM D2487) designations: SP, SP-SM, and SP-SC.

The project will entail using earthmoving and mechanical equipment to place the material on a barge from the canal shoreline while minimizing environmental impacts to existing mangrove fringe. An excavator will also be used to place the fill material into the canal system. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity to backfill the canal to the target elevation will be verified once detailed bathymetric cross section data is gathered.

Construction Cost Estimate:

The approximate cost to install fill in the canal as aforementioned will be approximately $2,800 per linear foot of canal (656 linear feet) or $1.8 million total for Canal 92.

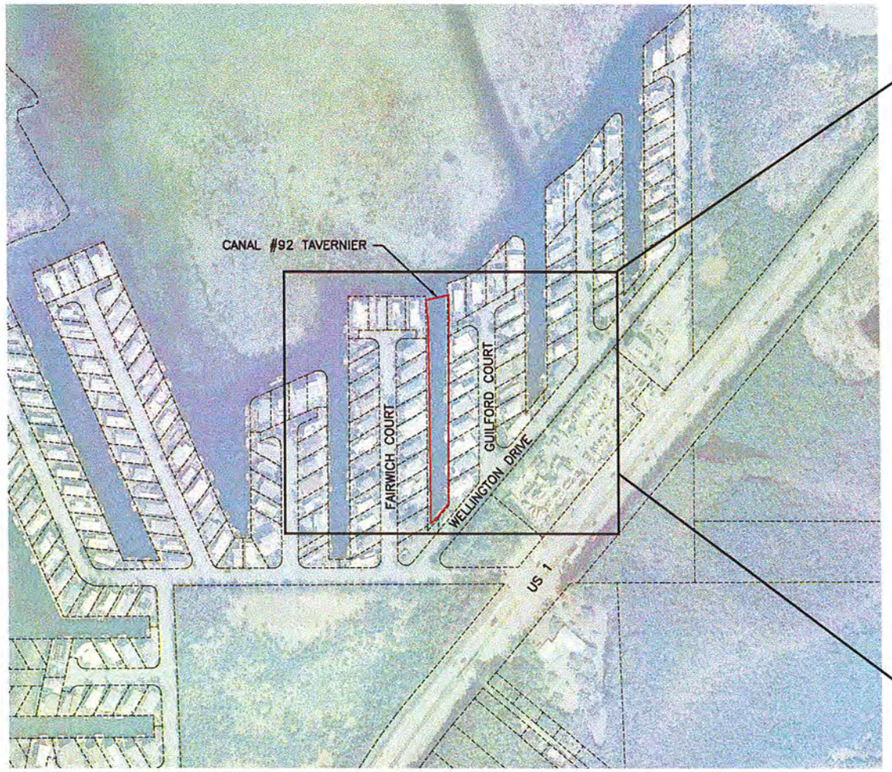
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit

Access:

Based on field visits, there is an empty lot adjacent to Sunrise Drive that could be used as a construction staging area.

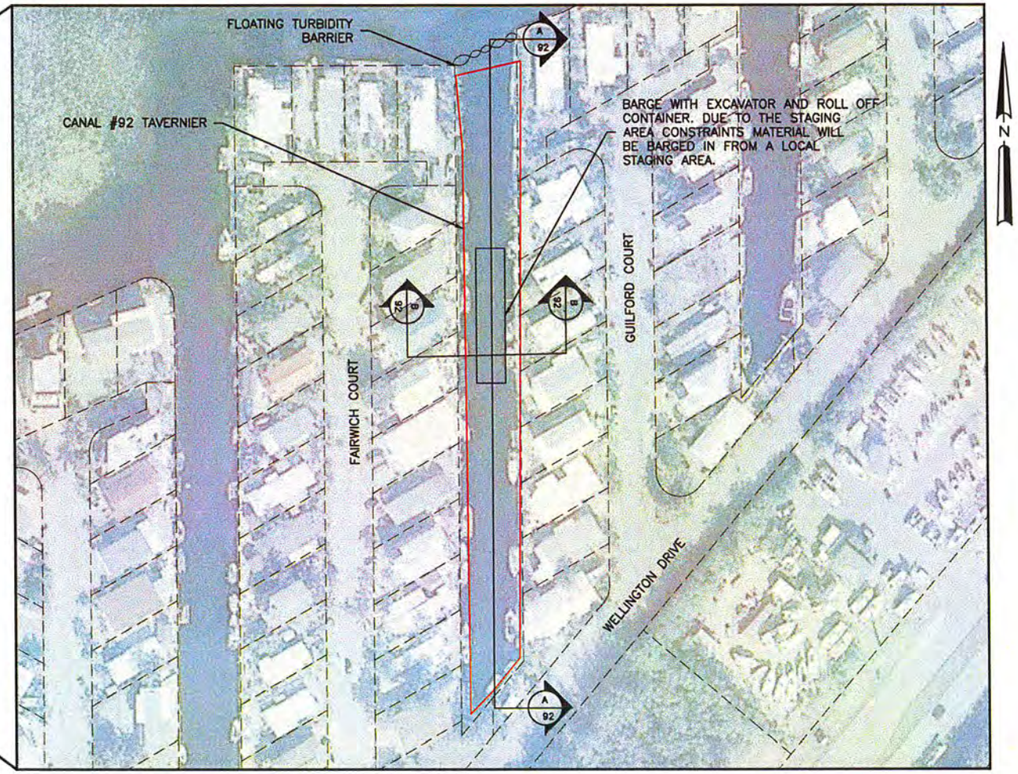
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



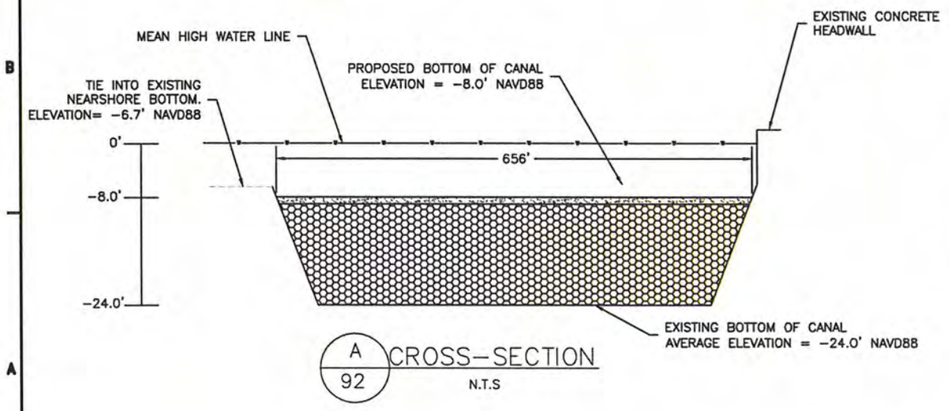
DETAIL SITE LAYOUT – BACKFILL

0 70' 140'

SCALE:1"=70'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #92 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

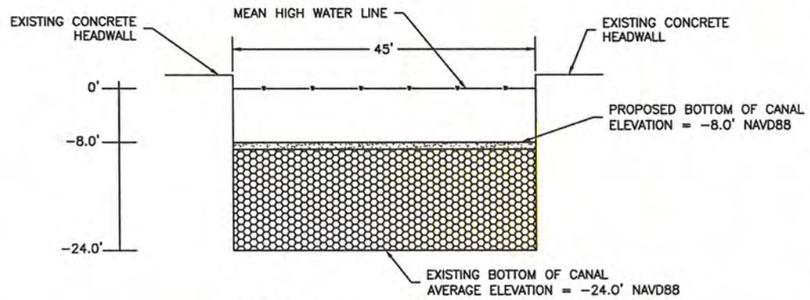


A 92 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- CLEAN COMPACTED FILL
- SCREENING SAND



B 92 CROSS-SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING BACKFILL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS -27.1 FEET AND THE MAXIMUM OBSERVED DEPTH IS -17.6 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.

2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

amec

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404 SW 140TH TERRACE
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TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

BACKFILL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 92	
SHEET OF SHEETS	

TABLE OF CONTENTS

1.0 INTRODUCTION

Monroe County plans on implementing canal restoration techniques that are designed to improve the water quality of the Florida Keys canals and thus near shore waters affected by canal outflow. The Monroe County Board of County Commissioners (BOCC) has set aside $5,000,000 for completion of a 5 technology demonstration project for residential canal restorations. The canal restoration demonstration testing is the initiation of a County wide program to improve canal water quality. Implementing canal restorations that address dissolved oxygen will also provide reasonable assurance to the Florida Department of Environmental Protection (DEP) that these impairments are being corrected and that water body specific Total Maximum Daily Loads (TMDLs) will not be required.

The first task in the implementation of the demonstration projects is the selection of the most suitable canals for inclusion in the program. AMEC Environment & Infrastructure (AMEC) was awarded a task order by Monroe County in May 2013 to develop an objective process to select the demonstration canals.

1.1 OBJECTIVE(S)

The first step to implement demonstration projects of various restoration techniques is the selection of the residential canals for each of the identified technologies. Once the specific canals are selected, detailed scopes of services for the final design/permitting and construction of the canal restoration demonstrations can be completed.

The objective of the canal restoration demonstrations is to verify the applicability, feasibility, effectiveness, and costs in real time on Keys canals. The demonstration canal restoration results will assist in modifying, if required, the restoration designs, and will provide costs that can be utilized for future restoration planning. The demonstration testing will allow for future 'shovel ready' proposals to be prepared to obtain grant funding, particularly from Restore Action 2012 sources, where 'shovel ready' is a high priority for funding approval.

1.2 OVERVIEW OF SCOPE

A screening and ranking process was developed by AMEC to select the canal restoration demonstration projects to be funded by Monroe County. Monroe County stated that AMEC shall use a selection and ranking process approved by the County and the Water Quality Protection Program (WQPP) Canal Restoration Advisory Subcommittee. Monroe County has also indicated that only canals located within Unincorporated Monroe County shall be considered at this time as the source of the restoration funds is Unincorporated Monroe County Infrastructure tax funds.

This report presents the list of top ranked canals by restoration technology that were selected to be included in the demonstration program, as well as the screening and ranking process utilized to select the demonstration canals.

2.0 METHODOLOGY

AMEC was tasked with working closely with Monroe County to select at least 5 canal restoration technology demonstration sites that will be constructed using County funds that will be used to obtain realistic permitting, scheduling, and cost information for future restoration planning and grant application purposes. The technologies under current consideration which have already been permitted and tested and presented in the Canal Management Master Plan[1] (CMMP) and include:

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

Other technologies have been proposed by interested parties, and may be considered at a later time as directed by Monroe County.

There are currently 332 canals in AMEC's canal inventory which are located in Unincorporated Monroe County. In order to select 5 demonstration sites from the list of 332, AMEC developed a screening and ranking process utilizing criteria that had been identified as important by the WQPP Canal Restoration Advisory Subcommittee.

The selection process consisted of 3 Phases. In **Phase 1**, AMEC utilized the CMMP water quality rankings to select the most impaired canals and the GIS Canal Inventory database to group the canals by applicable technology. This process allowed the selection of a reduced number of the highest priority canals for each technology (a minimum of 3 canals per technology) that was then submitted for detailed **Phase 2** engineering evaluation.

[1] AMEC Environment & Infrastructure 2013. Monroe County Canal Management Master Plan

Phase 2 included site visits to obtain necessary information to complete a ranking sheet to score the canals. At the conclusion of **Phase 2**, AMEC provided at least 3 top recommended canals for each of the above 5 identified technologies (total of 15 canals) to Monroe County for their review.

Phase 3 consisted of the WQPP Canal Restoration Advisory Subcommittee final selection of the top 5 sites to be included as canal restoration demonstrations. The list of the top 5 recommended canals was then presented to the Monroe County BOCC for final funding approval.

A technical memorandum detailing the selection process methodology is included in **Appendix A**. This methodology was presented to the WQPP Canal Restoration Advisory Subcommittee and approved at the July 26, 2013 meeting. Each of the criteria included in the three phases are discussed below.

Phase 1 of the Selection and Ranking Criteria for the Demonstration Projects:

The canal characteristics selected for the Phase 1 grouping process were:

- Water quality
- CMMP Ranking, and
- Applicable technology.

Criterion #1: Water Quality

A methodology to define the water quality of the residential canals in the Keys, ranging from Good, to Fair, to Poor, was developed as part of the CMMP process based upon field assessments. The methodology is included in attachment #1 of the Selection Process Methodology included as **Appendix A**. Only canals with Poor Water Quality were considered in the demonstration canal selection.

Criterion #2: Canal Management Master Plan Ranking

The poor water quality canals were ranked by their CMMP ranking number. This ranking process included all identified priority issues for the canal restorations. The CMMP ranking

process was approved the Canal Restoration Advisory Subcommittee as part of the CMMP oversight process. The CMMP details the CMMP ranking process and contains the ranking forms.

Criterion #3: Applicable Technology

The goal of the demonstration projects is to implement different technologies. In order to ensure that there were at least 3 canals in each technology group in the final list, the canals were sorted by applicable technology prior to any further ranking. The GIS Canal Inventory database and CMMP contain information on the most applicable technologies for each canal and the basis for the selection. All the Poor Water Quality canals ranked by their CMMP ranking numbers were retained and sorted by the most applicable technology for restoration of each canal.

Special Condition Elimination Final Selection

The last step in the **Phase 1** process was reviewing the canal information to determine if there was a special condition that would eliminate the canal from consideration, such as being plugged, which involves permitting beyond the scope of the demonstration projects.

Final Selection

At the completion of **Phase 1** the canals with Poor Water Quality and the highest CMMP rankings were selected for each technology (a minimum of 3 canals for each technology) and subjected to a **Phase 2** detailed field engineering evaluation and ranking.

Phase 2 of the Selection and Ranking Criteria for the Demonstration Projects:

Phase 2 consisted of a detailed field engineering evaluation and ranking that consisted of the following:

- Performance of a site visit at each of the canals selected at the conclusion of Phase 1 to evaluate permitting requirements, access, utility impacts, and other factors that would affect the ease of implementation and cost of the canal restoration.
- Completion of a selection criteria ranking form.

The ranking form is included as Attachment #1 in the Selection Process Methodology included in **Appendix A.** An overview of the ranking criteria and scoring points are presented below.

Ranking Criterion #1: Ease of Permitting (50 points)

Scoring was based upon an identification of site conditions that were likely to have the least permit issues. Sites anticipated to have the least complex permitting requirements received the highest score.

Ranking Criterion #2 Ease of Implementation (50 points)

Scoring was based upon the ease in implementing the proposed restoration. Sites anticipated to have the least complex permitting requirements received the highest score.

Phase 3 of the Selection and Ranking Criteria for the Demonstration Projects:

Phase 3 consisted of the final selection of the top 5 (minimum) sites to be included in the canal restoration demonstration program. The WQPP Canal Restoration Advisory Subcommittee approved the selection. The list of the top recommended canals was then presented to the Monroe County BOCC for final funding approval.

Additional information that was utilized by the WQPP Canal Advisory Subcommittee and the BOCC in the selection of the canals to be included in the demonstration program includes:

- Number of homeowners and public that will benefit from the restoration
- Homeowner support of the project.

3.0 RESULTS

3.1 TOP 15 RANKED CANALS

Table 1 presents the top 15 ranked canals sorted by applicable technology selected for evaluation in the canal demonstration project program developed by implementing Phase 1 of the methodology described in Section 2. **Figures 1-15** show the site locations of each of the 15 canals. Please note that some canals were included under more than one applicable technology. These 15 canals were then subjected to the Phase 2 ranking process detailed in Section 2.

3.2 RANKING OF CANALS FOR SELECTION AS DEMONSTRATION PROJECT

Tables 2-6 show the results of the Phase 2 ranking methodology by technology. The canal ranking forms are included in **Appendix B**. Pertinent information on each canal is included in **Appendix C**. The WQPP Canal Restoration Advisory Subcommittee approved the selection of the entire ranking process at the September 27, 2013 meeting and the following canals for inclusion in the Monroe County demonstration program:

- #1 Weed Barriers: #266 Doctor's Arm Big Pine Key
- #1 Organic Removal: #266 Doctor's Arm Big Pine Key
- #2 Organic Removal: #290 between Avenues I and J Big Pine Key
- #1 Culvert: #459 Boca Chica Ocean Shores Geiger Key
- #1 Pumping: #286 Whispering Pines Big Pine Key
- #1 Backfilling: #29 Sexton Cove Estates Key Largo.

The tables provide the rationale for the selections.

3.3 FINAL BOCC SELECTION OF THE CANALS TO BE INCLUDED IN THE DEMONSTRATION PROGRAM

The list of September 27, 2013 WQPP Canal Restoration Advisory Subcommittee approved canals recommended to be included in the Demonstration Program were presented to the BOCC at the October 16, 2013 meeting for approval. The BOCC approved the list and in additional approved the funding of the #2 ranked canal for a culvert, #277 Tropical Bay Big Pine Key.

At the October 18, 2013 Canal Restoration Advisory Subcommittee meeting, it was additionally approved to include the #2 ranked canal for a weed barrier, #288 Hollerich Big Pine Key, in order to include a canal in the demonstration project with only this technology. The request for BOCC to approve this additional canal for inclusion in the canal demonstration program is scheduled for November 20, 2013.

Table 7 shows the canals selected for the demonstration program in yellow highlight.

4.0 PRELIMINARY RESTORATION DESIGNS AND CONSTRUCTION COST ESTIMATES

Information on each of the top 15 canals ranked for the demonstration program is included in **Appendix C**. This includes the following:

- Informational Sheets
- Conceptual Designs with conceptual layout
- System components
- Construction Cost Estimates
- Permits Needed
- Access

TABLES

TABLE 1

TOP 15 CANALS EVALUATED FOR CANAL DEMONSTRATION PROJECTS

WEED BARRIER	ORGANIC REMOVAL	CULVERT INSTALLATION	PUMPING	BACKFILLING
#266 Big Pine **Doctor's Arm Subdivision** between Witters and Bailey Lanes	**#266 Big Pine** **Doctor's Arm Subdivision** between Witters and Bailey Lanes	**#459 Geiger** **Boca Chica Ocean Shores Subdivision** between Boca Chica Road and Jay Lane	**#286 Big Pine** **Whispering Pines Subdivision** between Sands Road and Hibiscus Drive	**#29 Key Largo** **Sexton Cove Estates Subdivision** between Bunting and Pigeon Drives
#288 Big Pine **Hollerich Subdivision** between Hollerich and Hibiscus Drives	**#290 Big Pine** between Avenue I and Avenue J	**#277 Big Pine** **Tropical Bay Subdivision** between Watson and Sunset Roads	**#278 Big Pine** **Eden Pines Colony Subdivision** Pine Ave	**#27 Key Largo** **Sexton Cove Estates Subdivision** Sexton Cove Road
#297 Big Pine **Ross Haven Subdivision** between Avenues F and G	**#297 Big Pine** **Ross Haven Subdivision** between Avenues F and G	**#472 Geiger** **Geiger Mobile Homes Subdivision** between Caribbean Drive and Venus Lane	**#47 Key Largo** **Bermuda Shores Subdivision** between Shaw Drive and Bowie Lane	**#37 Key Largo** **Key Largo Mobile Homes Subdivision** Taylor Drive
#287 Big Pine **Atlantic Estates Subdivision** between Hollerich and Atlantis Drives	**#287 Big Pine** **Atlantic Estates Subdivision** between Hollerich and Atlantis Drives			**#92 Tavernier** **Hammer Point Park Subdivision** between Fairwich and Guilford Courts
	#288 Big Pine **Hollerich Subdivision** between Hollerich and Hibiscus Drives			

TABLE 2: Demonstration Canal Selection for Weed Barriers

	Canal_Name	Subdivsion Name/Location	Noted Weed Wrack Problem	WQ_SUMMARY	CMMP Ranking No (Max Score 140)	PARCELS	Public Use	Demonstration Ranking Score	Comments
1	**266 BIG PINE KEY**	Doctor's Arm/ MM 31 Bayside between Witters & Bailey Lns	X	Poor	115	37		**74**	**Selected over #288 due to homeowner communications indicating interest in the project**
2	**288 BIG PINE KEY**	Hollerich/ MM 31 Between Hollerich and Hibiscus Drs	X	Poor	112	37		74	Being presented to BOCC for approval for funding so that the demonstration projects have a stand alone weed barrier project
3	297 BIG PINE KEY	Ross Haven/ MM 31 Between Aves F & G	X	Poor	115	15		64	
4	287 BIG PINE KEY	Atlantic Estates/ MM 31 Between Hollerich and Atlantis Drs	X	Poor	112	26	X	33	

REFERENCE: The inventory is a listing of the residential canals indentified in the 2013 GIS Database prepared by AMEC Environment Infrastructure, Inc.

TABLE 3: Demonstration Canal Selection for Organic Removal

	Canal_Name	Subdivsion Name/Location	Greater than 0.75' sediment thickness and has a seaweed loading issue	AVERAGE ORGANIC THICKNESS (ft)	WQ_SUMMARY	CMMP Ranking No (Max Score 140)	PARCELS	Public Use	Demonstration Ranking Score	Comments
1	**266 BIG PINE KEY**	Doctor's Arm/ MM 31 Bayside between Witters & Bailey Lns	X	0.86	Poor	115	37		94	**#1 Ranked site, organic removal proposed to be done concurrently with installation of a weed barrier in this canal.**
2	**290 BIG PINE KEY**	MM 31 South of Ave J	X	1.02	Poor	106	13		92	**Also selected for organic removal so that five different technologies would be tested in 5 different canals. This canal already has an operational weed barrier system.**
3	297 BIG PINE KEY	Ross Haven/ MM 31 Between Aves F & G	X	1.26	Poor	115	15		92	
4	287 BIG PINE KEY	Atlantic Estates/ MM 31 Between Hollerich and Atlantis Drs	X	0.83	Poor	112	26	X	67	
5	288 BIG PINE KEY	Hollerich/ MM 31 Between Hollerich and Hibiscus Drs	X	0.84	Poor	112	37		52	

REFERENCE: The inventory is a listing of the residential canals indentified in the 2013 GIS Database prepared by AMEC Environment Infrastructure, Inc.

TABLE 4: Demonstration Canal Selection for Culverts

	Canal_Name	Subdivsion Name/Location	Culvert Location Observed on Aerials	WQ_SUMMARY	CMMP Ranking No (Max Score 140)	PARCELS	Public Use	Demonstratiion Ranking Score	Comments
1	**459 GEIGER KEY**	Boca Chica Ocean Shores/ MM 10 Boca Chica Rd and Jay Ln	X	Poor	86	7		**64**	**#1 top ranked canal for a culvert; although federal land ownership may require this canal to be removed from consideration**
2	277 BIG PINE KEY	Tropical Bay/ MM 31 Watson Blvd and Sunset Rd	X	Poor	111	88		63	**Also selected by the BOCC due to homeowner request and only 1 point difference**
3	472 GEIGER KEY	Geiger Mobile Homes/ MM 10 Caribbean Drive and Venus Lane	X	Poor	100	21		51	

REFERENCE: The inventory is a listing of the residential canals indentified in the 2013 GIS Database prepared by AMEC Environment Infrastructure, Inc.

TABLE 5: Demonstration Canal Selection for Pumping

	Canal_Name	Subdivsion Name/Location	Pumping (Degree of Stagnation greater than 1)	Degree of Stagnation	WQ_SUMMARY	CMMP Ranking No (Max Score 140)	PARCELS	Public Use	Demonstration Ranking Score	Comments
1	**286 BIG PINE KEY**	Whispering Pines/ MM 31 Between Sands and Hibiscus	X	1.2	Poor	86	71	X	**58**	**#1 Ranked site; howerver homeowner association president at meeting indicated objection to pump installation.**
2	278 BIG PINE KEY	Eden Pines Colony/ MM 30 Pine Ave	X	5.7	Poor	91	494		35	**#1 Alternate site. Homeowners very interested.**
3	47 KEY LARGO	Bermuda Shores/ MM 103 Between Shaw Drive and Bowie Ln	X	3.3	Poor	79	182		26	

REFERENCE: The inventory is a listing of the residential canals indentified in the 2013 GIS Database prepared by AMEC Environment Infrastructure, Inc.

TABLE 6: Demonstration Canal Selection for Backfilling

	Canal_Name	Subdivsion Name/Location	Backfilling(greater than -15' average elevation)	MIN_EL	AVE EL	WQ_SUMMARY	CMMP Ranking No (Max Score 140)	PARCELS	Demonstration Ranking Score	Comments
1	**29 KEY LARGO**	Sexton Cove Estates/ MM 106 Between Bunting & Pigeon Drs	X	-32.33	-19.44	Poor	92	26	**64**	**#1 Ranked site**
2	27 KEY LARGO	Sexton Cove Estates/ MM 106 Sexton Cove Rd	X	-42.07	-29.77	Poor	90	17	56	
3	37 KEY LARGO	Key Largo Mobile Home/ MM 105 Taylor Drive	X	-21.64	-17.05	Poor	84	26	54	
4	92 TAVERNIER	Hammer Point Park/ MM 93 Between Fairwich & Guilford Cts	X	-27.08	-23.66	Poor	78	21	52	

REFERENCE: The inventory is a listing of the residential canals indentified in the 2013 GIS Database prepared by AMEC Environment Infrastructure, Inc.

TABLE 7

TOP 15 CANALS EVALUATED FOR CANAL DEMONSTRATION PROJECTS WITH THE IDENTIFIED CANALS SELECTED FOR INCLUSION IN THE DEMONSTRATION PROJECT PROGRAM SHOWN IN YELLOW HIGHLIGHT

WEED BARRIER	ORGANIC REMOVAL	CULVERT INSTALLATION	PUMPING	BACKFILLING
#266 Big Pine **Doctor's Arm Subdivision** between Witters and Bailey Lanes	**#266 Big Pine** **Doctor's Arm Subdivision** between Witters and Bailey Lanes	**#459 Geiger** **Boca Chica Ocean Shores Subdivision** between Boca Chica Road and Jay Lane	**#286 Big Pine** **Whispering Pines Subdivision** between Sands Road and Hibiscus Drive	**#29 Key Largo** **Sexton Cove Estates Subdivision** between Bunting and Pigeon Drives
#288 Big Pine **Hollerich Subdivision** between Hollerich and Hibiscus Drives	**#290 Big Pine** between Avenue I and Avenue J	**#277 Big Pine** **Tropical Bay Subdivision** between Watson and Sunset Roads	**#278 Big Pine** **Eden Pines Colony Subdivision** Pine Ave	**#27 Key Largo** **Sexton Cove Estates Subdivision** Sexton Cove Road
#297 Big Pine **Ross Haven Subdivision** between Avenues F and G	**#297 Big Pine** **Ross Haven Subdivision** between Avenues F and G	**#472 Geiger** **Geiger Mobile Homes Subdivision** between Caribbean Drive and Venus Lane	**#47 Key Largo** **Bermuda Shores Subdivision** between Shaw Drive and Bowie Lane	**#37 Key Largo** **Key Largo Mobile Homes Subdivision** Taylor Drive
#287 Big Pine **Atlantic Estates Subdivision** between Hollerich and Atlantis Drives	**#287 Big Pine** **Atlantic Estates Subdivision** between Hollerich and Atlantis Drives			**#92 Tavernier** **Hammer Point Park Subdivision** between Fairwich and Guilford Courts
	#288 Big Pine **Hollerich Subdivision** between Hollerich and Hibiscus Drives			

FIGURES

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
27 KEY LARGO (MM-106)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 1
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

Monroe County Canal Demonstration Project

29 KEY LARGO (MM-106)

Drawn	Date
JAM	08/20/2013
Checked	Date
WCB	08/20/2013

amec

Project# 6783-13-2507

Figure 2

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
37 KEY LARGO (MM-105)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 3
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
47 KEY LARGO (MM-103)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 4
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project

92 TAVERNIER (MM-93)

Drawn	Date
JAM	08/20/2013
Checked	Date
WCB	08/20/2013

amec

Project# 6783-13-2507

Figure 5

Source: Google Earth Pro
2013 (aerial), AMEC 2013

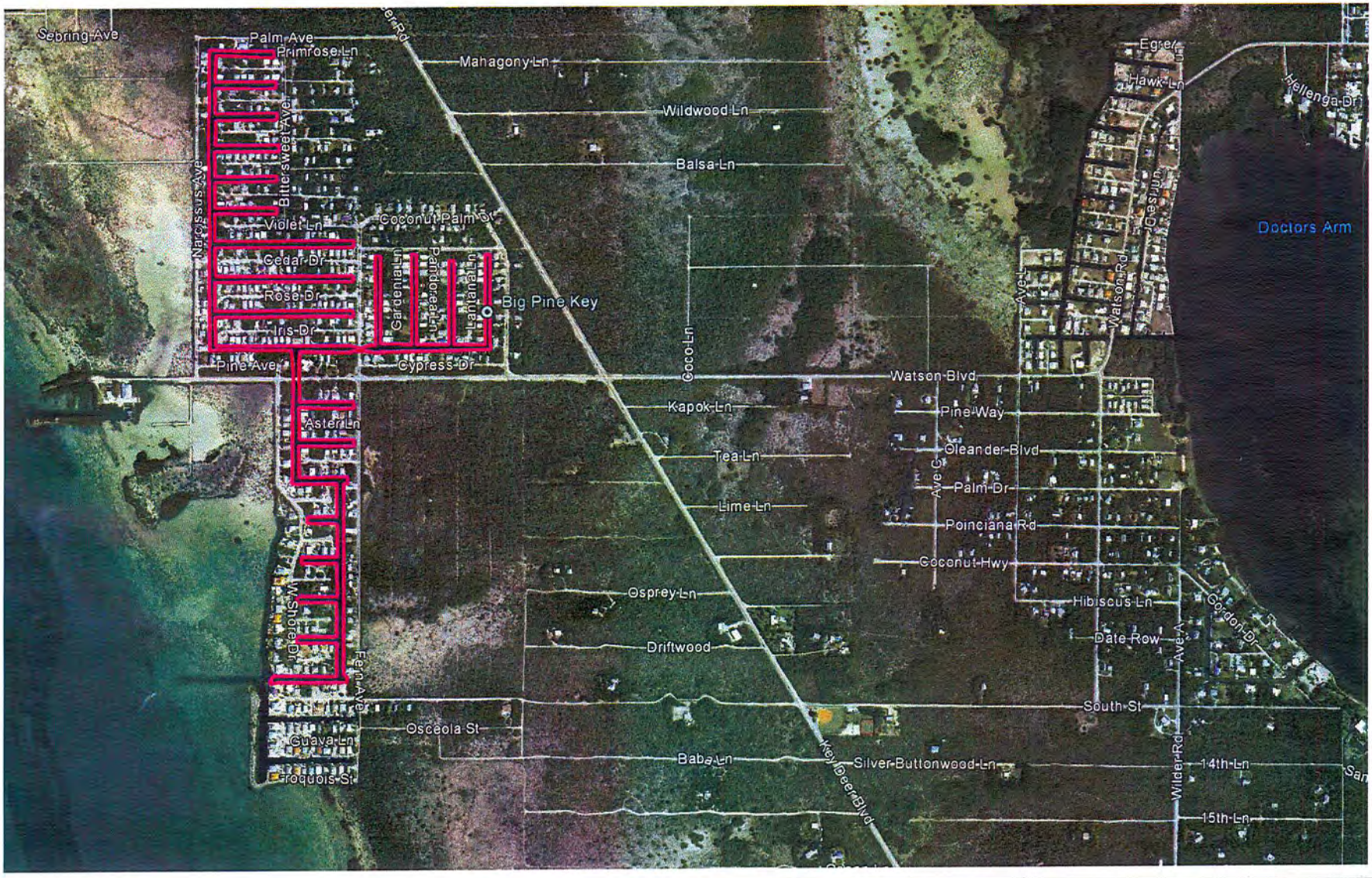
N

Monroe County Canal Demonstration Project				
266 BIG PINE KEY (MM-31)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 6
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
277 BIG PINE KEY (MM-30)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 7
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			



Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project

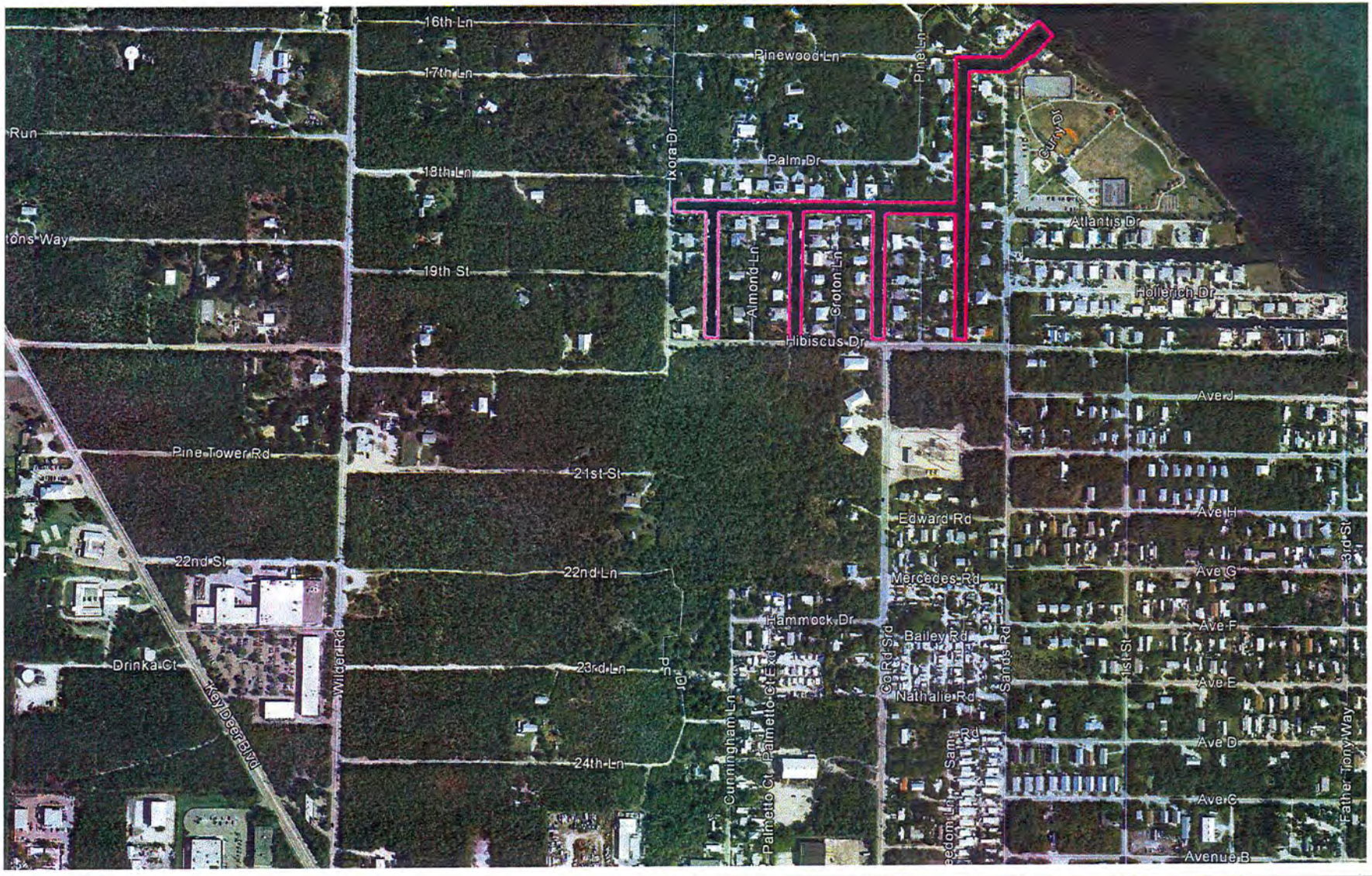
278 BIG PINE KEY (MM-30)

Drawn	Date
JAM	08/20/2013
Checked	Date
WCB	08/20/2013

amec

Project# 6783-13-2507

Figure 8



Source: Google Earth Pro
2013 (aerial), AMEC 2013

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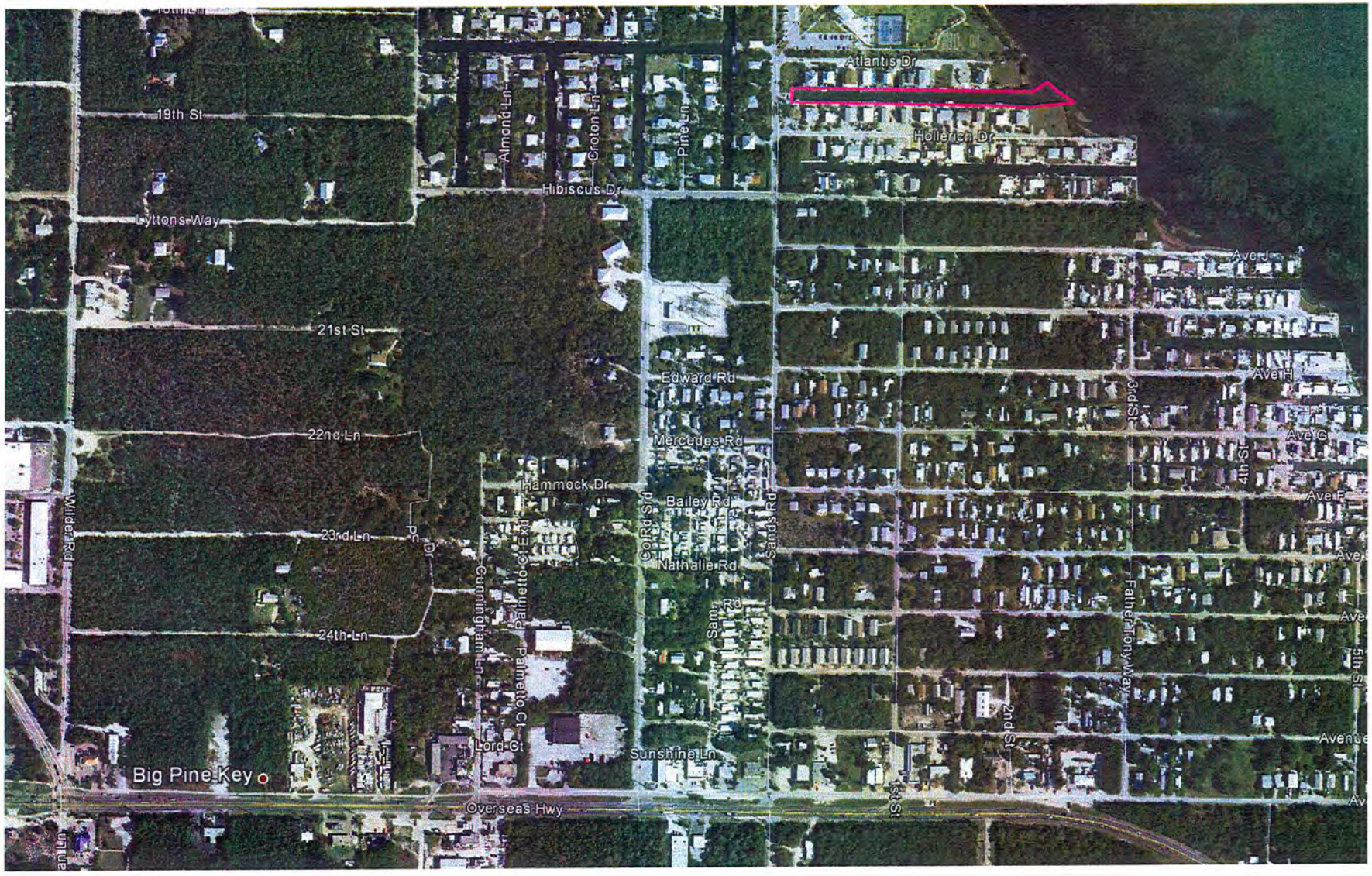
Monroe County Canal Demonstration Project				
286 BIG PINE KEY (MM-31)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 9
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			



Source: Google Earth Pro
2013 (aerial), AMEC 2013

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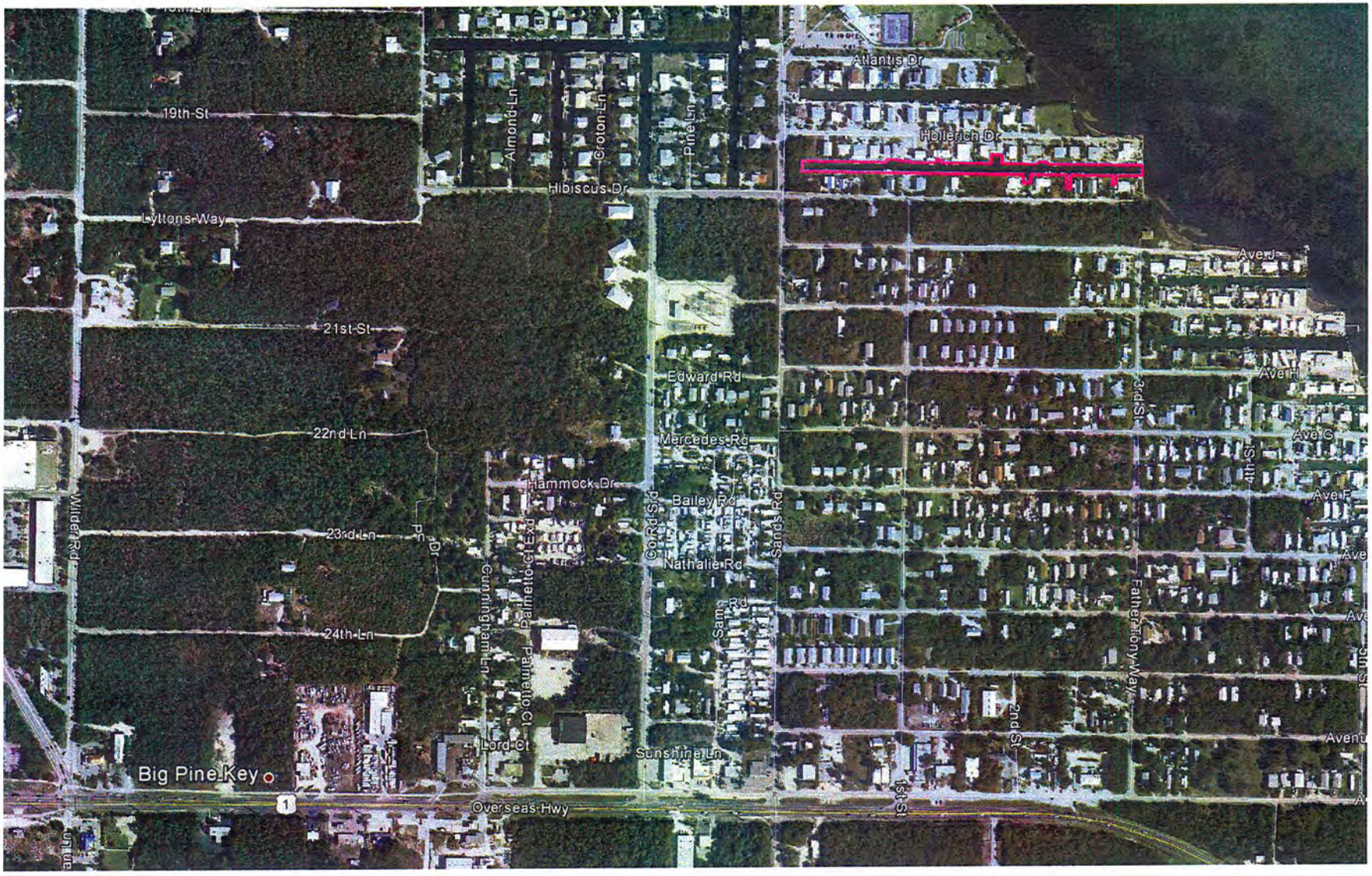
Monroe County Canal Demonstration Project				
287 BIG PINE KEY (MM-31)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 10
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			



Source: Google Earth Pro
2013 (aerial), AMEC 2013

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Monroe County Canal Demonstration Project				
288 BIG PINE KEY (MM-31)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 11
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
290 BIG PINE KEY (MM-31)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 12
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
297 BIG PINE KEY (MM-31)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 13
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
459/460 GEIGER KEY (MM-11)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 14
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

Source: Google Earth Pro
2013 (aerial), AMEC 2013

N

Monroe County Canal Demonstration Project				
470/472 GEIGER KEY (MM-10)				
Drawn	Date	amec	Project# 6783-13-2507	Figure 15
JAM	08/20/2013			
Checked	Date			
WCB	08/20/2013			

APPENDIX A

DEMONSTRATION CANAL SELECTION PROCESS

Revised August 15, 2013

TECHNICAL MEMORANDUM

Prepared For: Water Quality Protection Program Steering Committee

Prepared By: AMEC Environment & Infrastructure

Subject: **Criteria for Screening and Ranking Canals for Selection in Monroe County Canal Restoration Demonstration Projects**

Project: Monroe County Selection of Canal Demonstration Projects

This technical memorandum presents the screening and ranking process that AMEC proposes to utilize to select the canal restoration demonstration projects to be funded by Monroe County. Monroe County has stated that AMEC shall use a selection and ranking process approved by the County and the Water Quality Protection Program (WQPP) Canal Restoration Advisory Subcommittee. Monroe County has also indicated that only canals located within Unincorporated Monroe County shall be considered at this time as the source of the restoration funds is Unincorporated Monroe County Infrastructure tax funds.

Overall Approach

AMEC is tasked with working closely with Monroe County to select at least 5 canal restoration technology demonstration sites that will be constructed using County funds that will be used to obtain realistic permitting, scheduling, and cost information for future restoration planning and grant application purposes. The technologies under current consideration which have already been permitted and tested include:

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

Other technologies have been proposed by interested parties, and may be considered at a later time as directed by Monroe County.

There are currently 332 canals in AMEC's canal inventory which are located in Unincorporated Monroe County. In order to select 5 demonstration sites from the list of 332, AMEC has developed a screening and ranking process utilizing criteria that has been identified as important by the WQPP Canal Restoration Advisory Subcommittee.

The proposed selection process consists of 3 Phases. In **Phase 1**, AMEC will utilize the GIS Canal Inventory database to group the canals by selected characteristics as well as applicable technology. This process will allow the selection of a reduced number of the most suitable canals for each technology (estimated to be 4 canals per technology) that will then be submitted for detailed **Phase 2** engineering evaluation. **Phase 2** will include site visits to obtain necessary information to complete a ranking sheet to score the canals. At the conclusion of **Phase 2**, AMEC will provide 3 recommended canals for each of the above 5 identified technologies (total of 15 canals) to Monroe County for their review. **Phase 3** consists

of the WQPP Canal Restoration Advisory Subcommittee final selection of the top 5 sites to fund for canal restoration demonstrations. The list of the top 5 recommended canals will be presented to the Monroe County BOCC for final funding approval. Details of each of the criteria to be included in Phase 1 and Phase 2 are discussed below.

Phase 1 of the Proposed Selection and Ranking Criteria for the Demonstration Projects:

The canal characteristics selected for the Phase 1 grouping process are:

- Water quality
- Canal Management Master Plan Ranking, and
- Applicable technology.

Criterion #1: Water Quality

A methodology to define the water quality of the residential canals in the Keys, ranging from Good, to Fair, to Poor, was developed as part of the Canal Management Master Plan (CMMP) process based upon field assessments. The methodology is included in **Attachment 1. It is proposed that only canals with Poor Water Quality will be considered as a demonstration canal.**

Criterion #2: Canal Management Master Plan Ranking

The poor water quality canals will be ranked by their CMMP ranking number. This ranking process includes all identified priority issues for the canal restoration. The ranking process was approved the Canal Restoration Advisory Subcommittee as part of the CMMP process.

Criterion #3: Applicable Technology

The goal of the demonstration projects is to implement different technologies. In order to ensure that there are at least 3 canals for each technology in the final list to be provided to Monroe County for review, the canals will be grouped by applicable technology prior to any further ranking. The GIS Canal Inventory database contains information on the most applicable technologies for each canal and this will be the basis for the initial selection. All the Poor Water Quality canals ranked by their CMMP ranking numbers will be retained just sorted by the most applicable technology for restoration of each canal.

Special Condition Elimination Final Selection

The last step in the **Phase 1** process is reviewing the canal information to determine if there is a special condition that would eliminate the canal from consideration, such as being plugged, which involves permitting beyond the scope of the demonstration projects.

Final Selection

At the completion of **Phase 1** the canals with Poor Water Quality and the highest CMMP rankings will be selected for each technology (estimated to be the top ranked 4 canals for each technology) and subjected to a **Phase 2** detailed field engineering evaluation and ranking.

Phase 2 of the Proposed Selection and Ranking Criteria for the Demonstration Projects:

Phase 2 consists of a detailed field engineering evaluation and ranking that will consist of the following:

- Performance of a site visit at each of the canals selected at the conclusion of Phase 1 (estimated to be 20 canals) to evaluate permitting requirements, access, utility impacts, and other factors that will affect the ease of implementation and cost of the canal restoration.
- Completion of a selection criteria ranking form.

The proposed ranking criteria and proposed scoring points are presented below.

Ranking Criterion #1: Ease of Permitting (50 points)

Scoring is based upon an identification of site conditions that are likely to have the least permit issues. Factors that will be considered include:

- Will a dewatering permit need to be obtained?
- Will a ROW permit need to be obtained?
- Will canal specific sediment samples be required?
- Will additional surveys need to be acquired?
- Will mitigation credits need to be obtained?
- Will canal specific water quality sampling be required?
- Will Sovereign Submerged Lands need to be obtained?
- Will Archeological survey/permitting be required?
- Will hydrologic modeling be required?
- Will geotechnical investigation/report need to obtained?

The lowest score will be for sites anticipated to have the most complex permitting requirements.

Ranking Criterion #2 Ease of Implementation (50 points)

Scoring is based upon the ease in implementing the proposed restoration. Factors that will be considered include:

- Sewer, water, data lines, or overhead electric lines in the way of restoration construction
- Identification of a required Construction Staging Area
- Maintenance of Traffic
- Clearing and Grubbing
- Infrastructure Removal/Replacement

The lowest score will be for sites indicating significant difficulties in implementation and the highest score for sites indicating relative ease of implementation.

Phase 3 of the Proposed Selection and Ranking Criteria for the Demonstration Projects:

Phase 3 consists of the final selection of a minimum of the top 5 sites to fund for canal restoration demonstrations. The WQPP Canal Restoration Advisory Subcommittee will select the top 5 sites to fund for canal restoration demonstrations. The list of the top 5 recommended canals will be presented to the Monroe County BOCC for final funding approval.

Additional information that may be utilized by the WQPP Canal Advisory Subcommittee in the selection of the top 5 canals includes:

- Number of homeowners and public that will benefit from the restoration
- Homeowner support of the project
- Homeowner commitment to the operation and maintenance of the restoration
- Homeowner commitment to contribute funding to the installation of the restoration

ATTACHMENT 1

FIELD METHODOLOGY FOR SUMMARIZING WATER QUALITY

Field Methodology for Summarizing Water Quality

The Monroe County Canal Master Plan Phase II summarized the water quality within the assessed canals as the following: ***Good***, ***Fair***, and ***Poor***. Qualified field personnel utilized the following instruments and visual observations to preliminarily determine the aforementioned water quality summary for the assessed canals:

- The primary method for determining water quality within the assessed canals was the measurement of dissolved oxygen (DO). DO was measured at various intervals throughout the canal's water column with the use of a calibrated YSI 556. DO measurements were recorded in both mg/L and % saturation. The Florida Department of Environmental Protection (FDEP) states that a Class III surface water body that displays DO levels less than 4.0 mg/L should be classified as impaired.

- As part of the field assessment process, professional scientists recorded visual observations detailing the prevalence of biological indicators which can be used as an indication of water quality. The following biological indicators were used as a secondary tool for more precisely determining the canals water quality:

    a. The presence of blue-green algae (covered substrate or floating mats) as well as, brown macro-algae were used as modifier to indicate sub-standard water quality.
    b. Green macro-algae, which is an indicator of good water quality and is a positive habitat feature, was used as modifier to upgrade the water quality determination in the field.
    c. Additional modifiers of good water quality included the presence of sponges, seagrasses, and reef fish which are particularly sensitive to water quality.

- The third tool used to assist in the summarizing of water quality within the canal was "water clarity." Water clarity was determined through turbidity monitoring and visual observations through the use of high quality polarized sunglasses. Due to "water clarity's" potentially subjective nature, it was only utilized in instances where biological indicators were not observable.

Water Quality Summary Determination

- If a canal displayed DO readings above 4.0 mg/L and displayed no negative biological characteristics, the canal was field classified as having **Good** water quality.
- If a canal displayed DO readings above 4.0 mg/L but displayed negative biological characteristics, the canal was field classified as having **Fair** water quality.
- If a canal displayed DO readings between 3.0 and 4.0 mg/L but displayed positive biological characteristics, the canal was field classified as having **Fair** water quality.
- If a canal displayed DO readings between 3.0 and 4.0 and displayed negative biological characteristics, the canal was field classified as having **Poor** water quality.
- If a canal displayed DO readings less than 3.0 mg/L, the canal was field classified as having **Poor** water quality.

If all measured intervals of the profile were above the standard of 4.0 mg/L except the lowest measured depth, the canal was field classified as having **Fair** water quality.

ATTACHMENT 2

SELECTION CRITERIA RANKING FORM FOR DEMONSTRATION CANALS

Scoring Criteria for Potential Keys Canal Restoration Sites for WEED BARRIERS		Area Name			
(For a criterion that cannot be scored due to a lack of relevant information, a value of zero will be assigned)		Canal Number			
		Potential Restoration Technology	WEED BARRIER		
Items that Affect Permitting		Score	Weighting Factor	Total Score	Comments
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If there are no observed sensitive resources such as seagrass in the footprint of the proposed restoration system, the canal should receive a score of 5.	5	X 4	20	
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	
1C) Nearshore Water Concerns (scored from 0 to +5) Scoring is based on the potential for impacting nearshore waters with the installation of pilings.	Canals in which the pilings for the weed gate will not be installed within the excavated canal system, should receive a score of 0. Canals in which the pilings for the weed gate will be installed within the excavagted canal system, should receive a score of 5.	5	X2	10	
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of the mouth of canal and shoreline configuration.	Canals that have mouth widths greater than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 0. Canals that have mouth widths greater than 120 but less than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 3. Canals that have mouth widths less than 120 less and/or shoreline configuration promotes natural flow conditions, should receive a score of 5.	5	X3	15	
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of pilings, netting, and pumps, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 3	15	
2C) Demolition Concerns (scored from 0 to + 5) Scoring is based upon whether the site has an existing weed gate that needs to be removed.	Canals that have an existing weed gate that needs to be removed, should receive score of 0. Canals that do not have an existing weed gate that needs to be removed, should receive score of 5.	5	X 2	10	
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property, should receive score of 0. Canals that do have accessible electric hook up for the pump station on property, should receive score of 5.	5	X 2	10	
Overall Score				100	

Scoring Criteria for Potential Keys Canal Restoration Sites for ORGANIC REMOVAL		Area Name			
(For a criterion that cannot be scored due to a lack of relevant information, a value of zero will be assigned)		Canal Number			
		Potential Restoration Technology	ORGANIC REMOVAL		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 0.	5	X 4	20	
	If there are no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	5	X4	20	
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Bathymetric and Sediment Characterization Data (scored from 0 to +5) Scoring is based on the potential for additional data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has no sedimentation data, should receive a score of 0.	5	X2	10	
	Canals that require less than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has sedimentation data, should receive a score of 5.				
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 15 feet deep , should receive a score of 0.	5	X 3	15	
	Canals that have navigational widths(boat lift to boat lift) greater than 25, less than 20 boat lifts, less than 15 feet deep , should receive a score of 5.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to set up dewatering system.	Canals that do not have an empty lot for dewatering system, should receive score of 0.	5	X 4	20	
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Quantity of Material (scored from 0 to + 5) Scoring is based upon the approximate volume of material to be removed from the canal system.	Canals that have greater than approximately 1600 cubic yards of muck, should receive score of 0.	5	X 3	15	
	Canals that have greater than approximately 1050 but less than 1600 cubic yards of muck, should receive score of 3.				
	Canals that have less than approximately 1050 cubic yards of muck, should receive score of 5.				
Overall Score				100	

Scoring Criteria for Potential Keys Canal Restoration Sites for CULVERT INSTALLATION		Area Name			
		Canal Number			
(For a criterion that cannot be scored due to a lack of relevant information, a value of zero will be assigned)		Potential Restoration Technology	CULVERT		
Items that Affect Permitting		Score	Weighting Factor	Total Score	Comments
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as seagrass in the project footprint, the canal should receive a score of 0.	5	X 3	15	
	If there are no observed sensitive resources such as seagrass in the project footprint, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	5	X3	15	
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Survey Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require private property topographic survey due to removal/replacement, should receive a score of 0.	5	X3	15	
	Canals that do not require private property topographic survey due to removal/replacement, should receive a score of 5.				
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0.	5	X 1	5	
	Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5				
Items that Affect Ease of Implementation					
2A) Length of Culvert (scored from 0 to + 5) Scoring is based upon the length of culvert to connect the systems.	Canals that have a culvert connection greater than 200 feet, should receive a score of 0.	5	X 2	10	
	Canals that have a culvert connection less than 200 feet, should receive a score of 5.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0.	5	X 2	10	
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Traffic Impact Concerns (scored from 0 to + 5) Scoring is based upon the severity of traffic impacts to the existing roadway.	Canals that have a FDOT AADT greater than 2000 and is the main road system into the subdivision, should receive score of 0.	5	X 2	10	
	Canals that have a FDOT AADT less than 2000 and is not the main road system into the subdivision, should receive score of 5.				
2D) Existing Infrastructure Concerns (scored from 0 to + 5) Scoring is based upon whether or not the installation of the culvert would require removal/replacement of private property.	Canals that would require the removal/replacement of structures on private property, should receive score of 0.	5	X 2	10	
	Canals that do not require the removal/replacement of structures on private property, should receive score of 5.				
2E) Existing Utility Concerns (scored from 0 to + 5) Scoring is based upon whether or not the water, sewer, data, or electric utility lines will need to be removed/replaced.	Canals that require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 0.	5	X 2	10	
	Canals that do not require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 5.				
Overall Score				100	

Scoring Criteria for Potential Keys Canal Restoration Sites for PUMPING		Area Name			
(For a criterion that cannot be scored due to a lack of relevant information, a value of zero will be assigned)		Canal Number			
		Potential Restoration Technology	PUMPING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 0.	5	X 3	15	
	If there are no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	5	X3	15	
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Bathymetric and Topographic Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0.	5	X3	15	
	Canals that require greater than 50 but less than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3.				
	Canals that require less than 50 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.				
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0.	5	X 1	5	
	Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5				
Items that Affect Ease of Implementation					
2A) Length of Pumping System (scored from 0 to + 5) Scoring is based upon the length of pumping system.	Canals that have a pumping system greater than 2500 feet, should receive a score of 0.	5	X 3	15	
	Canals that have a pumping system less than 2500 feet, should receive a score of 5.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0.	5	X 2	10	
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Depth of Pumping System (scored from 0 to + 5) Scoring is based upon the depth of canal.	Canals that have an average depth greater than 10 feet and a range in bottom elevations greater than 8 feet should receive a score of 0.	5	X 3	15	
	Canals that have an average depth less than10 feet and a range in bottom elevation of less than 8 feet should receive a score of 5.				
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether he site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property, should receive score of 0.	5	X 2	10	
	Canals that do have accessible electric hook up for the pump station on property, should receive score of 5.				
Overall Score				100	

Scoring Criteria for Potential Keys Canal Restoration Sites for BACKFILLING		Area Name			
(For a criterion that cannot be scored due to a lack of relevant information, a value of zero will be assigned)		Canal Number			
		Potential Restoration Technology	BACKFILLING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as seagrass in the project footprint, the canal should receive a score of 0.	5	X 4	20	
	If there are no observed sensitive resources such as seagrass in the project footprin, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	5	X4	20	
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Bathymetric Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0.	5	X2	10	
	Canals that require greater than 13 but less than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3.				
	Canals that require less than 13 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.				
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 35 feet deep and/or greater than 800 feet long, should receive a score of 0.	5	X 4	20	
	Canals that have navigational widths(boat lift to boat lift) greater than 25 but less than 35 feet, greater than 15 but less than 20 boat lifts, greater than 25 but less than 35 feet deep and greater than 650 but less than 800 feet long, should receive a score of 3.				
	Canals that have navigational widths(boat lift to boat lift) greater than 35 feet, less than 15 boat lifts, less than 25 feet deep and less than 650 feet long, should receive a score of 5.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile backfill.	Canals that do not have an empty lot for stockpiling of backfill, should receive score of 0.	5	X 4	20	
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Hauling Distance (scored from 0 to + 5) Scoring is based upon the distance from Florida City, Florida to the canal system.	Canals that have a hauling distance greater than 50 miles, should receive score of 0.	5	X 2	10	
	Canals that have a hauling distance greater than 30 but less than 50 miles, should receive score of 3.				
	Canals that have a hauling distance less than 30 miles, should receive score of 5.				
Overall Score				100	

APPENDIX B

DEMONSTRATION CANAL RANKING FORMS

Scoring Criteria for Potential Keys Canal Restoration Sites for WEED BARRIERS		Area Name	MM 31 Atlantic Estatates subdivision Bayside		
		Canal Number	287 Big Pine Key		
		Potential Restoration Technology	WEED BARRIER		
Items that Affect Permitting		Score	Weighting Factor	Total Score	Comments
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the proposed restoration system, the canal should receive a score of 5.	3	X 4	12	Although the project site contains a few mangroves, there is no obvious evidence of seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present at the mouth of a canal with such poor water quality.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X4	12	The weed barrier system installation will require the triming/removal of magroves.
1C) Nearshore Water Concerns (scored from 0 to +5) Scoring is based on the potential for impacting nearshore waters with the installation of pilings.	Canals in which the pilings for the weed gate will not be installed within the excavated canal system, should receive a score of 0. Canals in which the pilings for the weed gate will be installed within the excavated canal system, should receive a score of 5.	0	X2	0	Based on Monroe County Property Appraiser and google earth the pilings will be placed outside the extent of the excavated canal system.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of the mouth of canal and shoreline configuration.	Canals that have mouth widths greater than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 0. Canals that have mouth widths greater than 120 but less than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 3. Canals that have mouth widths less than 120 less and/or shoreline configuration promotes natural flow conditions, should receive a score of 5.	0	X3	0	The mouth of the canal based on google earth is approximately 231 feet. The configuration of the mouth does not promote natural flow and has pockets for seaweed accumulation.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of pilings, netting, and pumps, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 3	9	At the end of the canal system there is an empty lot that is cleared but has some mangroves that will have to be trimmed or removed for staging of material and pump placement.
2C) Demolition Concerns (scored from 0 to + 5) Scoring is based upon whether the site has an existing weed gate that needs to be removed.	Canals that have an existing weed gate that needs to be removed, should receive score of 0. Canals that do not have an existing weed gate that needs to be removed, should receive score of 5.	0	X 2	0	Based on field visits and google earth the canal system has an existing weed gate system that will need to be removed in order to place a new weed barrier system.
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property, should receive score of 0. Canals that do have accessible electric hook up for the pump station on property, should receive score of 5.	0	X 2	0	There is currently no electrical drop, therefore electrical will have to be dropped for the proposed weed barrier. The approximate distance to the nearest electrical pole is 140 feet.
Overall Score				33	

Scoring Criteria for Potential Keys Canal Restoration Sites for WEED BARRIERS		Area Name	MM 31 Hollerich subdivision Bayside		
		Canal Number	288 Big Pine Key		
		Potential Restoration Technology	WEED BARRIER		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the proposed restoration system, the canal should receive a score of 5.	5	X 4	20	**There is no obvious evidence of mangroves, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would not be present at the mouth of a canal with such poor water quality.**
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	**The weed barrier system installation is not anticpated to require mitigation.**
1C) Nearshore Water Concerns (scored from 0 to +5) Scoring is based on the potential for impacting nearshore waters with the installation of pilings.	Canals in which the pilings for the weed gate will not be installed within the excavated canal system, should receive a score of 0. Canals in which the pilings for the weed gate will be installed within the excavated canal system, should receive a score of 5.	5	X2	10	**Based on Monroe County Property Appraiser and google earth the pilings will be placed within the extent of the excavated canal system.**
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of the mouth of canal and shoreline configuration.	Canals that have mouth widths greater than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 0. Canals that have mouth widths greater than 120 but less than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 3. Canals that have mouth widths less than 120 less and/or shoreline configuration promotes natural flow conditions, should receive a score of 5.	5	X3	15	**The mouth of the canal based on google earth is approximately 40 feet. The configuration of the mouth promotes natural flow with no pockets for seaweed accumulation.**
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of pilings, netting, and pumps, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 3	9	**At the back end of the canal system there is an empty lot that is overgrown with vegetation but with triming it would be a good area for staging of material.**
2C) Demolition Concerns (scored from 0 to + 5) Scoring is based upon whether the site has an existing weed gate that needs to be removed.	Canals that have an existing weed gate that needs to be removed, should receive score of 0. Canals that do not have an existing weed gate that needs to be removed, should receive score of 5.	0	X 2	0	**Based on field visits and google earth the canal system has an existing weed gate system that will need to be removed in order to place a new weed barrier system.**
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property, should receive score of 0. Canals that do have accessible electric hook up for the pump station on property, should receive score of 5.	0	X 2	0	**There is currently no electrical drop, therefore electrical will have to be dropped for the proposed weed barrier. The approximate distance to the nearest electrical pole is 110 feet.**
Overall Score				74	

Scoring Criteria for Potential Keys Canal Restoration Sites for WEED BARRIERS		Area Name	MM 31 Ross Haven subdivision Bayside		
		Canal Number	297 Big Pine Key		
		Potential Restoration Technology	WEED BARRIER		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the proposed restoration system, the canal should receive a score of 5.	5	X 4	20	There is no obvious evidence of mangroves, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would not be present at the mouth of a canal with such poor water quality.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	The weed barrier system installation is not anticpated to require mitigation.
1C) Nearshore Water Concerns (scored from 0 to +5) Scoring is based on the potential for impacting nearshore waters with the installation of pilings.	Canals in which the pilings for the weed gate will not be installed within the excavated canal system, should receive a score of 0. Canals in which the pilings for the weed gate will be installed within the excavated canal system, should receive a score of 5.	0	X2	0	Based on Monroe County Property Appraiser and google earth the pilings will be placed outside the extent of the excavated canal system.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of the mouth of canal and shoreline configuration.	Canals that have mouth widths greater than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 0. Canals that have mouth widths greater than 120 but less than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 3. Canals that have mouth widths less than 120 less and/or shoreline configuration promotes natural flow conditions, should receive a score of 5.	3	X3	9	The mouth of the canal based on google earth is approximately 164 feet. The configuration of the mouth promotes natural flow with no pockets for seaweed accumulation.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of pilings, netting, and pumps, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 3	15	At the end of the canal system there is an empty lot that is cleared and would be a good area for staging of material and pump placement.
2C) Demolition Concerns (scored from 0 to + 5) Scoring is based upon whether the site has an existing weed gate that needs to be removed.	Canals that have an existing weed gate that needs to be removed, should receive score of 0. Canals that do not have an existing weed gate that needs to be removed, should receive score of 5.	0	X 2	0	Based on field visits and google earth the canal system has an existing weed gate system that will need to be removed in order to place a new weed barrier system.
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property, should receive score of 0. Canals that do have accessible electric hook up for the pump station on property, should receive score of 5.	0	X 2	0	There is currently no electrical drop, therefore electrical will have to be dropped for the proposed weed barrier. The approximate distance to the nearest electrical pole is 90 feet.
Overall Score				64	

Scoring Criteria for Potential Keys Canal Restoration Sites for WEED BARRIERS		Area Name	MM 31 Doctor's Arm subdivision Bayside		
		Canal Number	266 Big Pine Key		
		Potential Restoration Technology	WEED BARRIER		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0.	3	X 4	12	**Although the project site contains a few mangroves, there is no obvious evidence of seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present at the mouth of a canal with such poor water quality.**
	If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3.				
	If there is no observed sensitive resources such as seagrass in the footprint of the proposed restoration system, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	3	X4	12	**The weed barrier system installation will require the triming/removal of magroves.**
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Nearshore Water Concerns (scored from 0 to +5) Scoring is based on the potential for impacting nearshore waters with the installation of pilings.	Canals in which the pilings for the weed gate will not be installed within the excavated canal system, should receive a score of 0.	5	X2	10	**Based on Monroe County Property Appraiser and google earth the pilings will be placed within the extent of the excavated canal system.**
	Canals in which the pilings for the weed gate will be installed within the excavated canal system, should receive a score of 5.				
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of the mouth of canal and shoreline configuration.	Canals that have mouth widths greater than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 0.	5	X3	15	**The mouth of the canal based on google earth is approximately 52 feet. The configuration of the mouth promotes natural flow with no pockets for seaweed accumulation.**
	Canals that have mouth widths greater than 120 but less than 200 feet and/or shoreline configuration that does not promote natural flow conditions, should receive a score of 3.				
	Canals that have mouth widths less than 120 less and/or shoreline configuration promotes natural flow conditions, should receive a score of 5.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of pilings, netting, and pumps, should receive score of 0.	5	X 3	15	**At the end of the canal system there is an empty lot that is cleared and would be a good area for staging of material and pump placement.**
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Demolition Concerns (scored from 0 to + 5) Scoring is based upon whether the site has an existing weed gate that needs to be removed.	Canals that have an existing weed gate that needs to be removed, should receive score of 0.	0	X 2	0	**Based on field visits and google earth the canal system has an existing weed gate system that will need to be removed in order to place a new weed barrier system.**
	Canals that do not have an existing weed gate that needs to be removed, should receive score of 5.				
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property, should receive score of 0.	5	X 2	10	**Based on field visits and google earth the canal system has an existing weed system with pump, therefore electrical is available for the proposed weed barrier.**
	Canals that do have accessible electric hook up for the pump station on property, should receive score of 5.				
Overall Score				74	

Scoring Criteria for Potential Keys Canal Restoration Sites for ORGANIC REMOVAL		Area Name	MM 31 Doctor's Arm subdivision Bayside		
		Canal Number	266 Big Pine Key		
		Potential Restoration Technology	ORGANIC REMOVAL		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.	5	X 4	20	There is no obvious evidence of mangrove, seagrass, or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present in a canal with such bad water quality.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	The restoration is not anticpated to require mitigation.
1C) Bathymetric and Sediment Characterization Data (scored from 0 to +5) Scoring is based on the potential for additional data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has no sedimentation data, should receive a score of 0. Canals that require less than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has sedimentation data, should receive a score of 5.	5	X2	10	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections. Sedimentation characterization analysis available indicating sediment meets clean fill disposal criteria.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 15 feet deep , should receive a score of 0. Canals that have navigational widths(boat lift to boat lift) greater than 25, less than 20 boat lifts, less than 15 feet deep , should receive a score of 5.	5	X 3	15	AMEC used google earth and bathymetric data to determine the approximate depth, width, and number of boat lifts.Depth = 10.93 feet, Width = 25 feet , and # of boat lifts = 5.If any of the parameters match the criteria then it recives that ranking score.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to set up dewatering system.	Canals that do not have an empty lot for dewatering system, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 4	20	At the end of the canal system there is an empty lot that is cleared and would be a good area for staging of material and pump placement.
2C) Quantity of Material (scored from 0 to + 5) Scoring is based upon the approximate volume of material to be removed from the canal system.	Canals that have greater than approximately 1600 cubic yards of muck, should receive score of 0. Canals that have greater than approximately 1050 but less than 1600 cubic yards of muck, should receive score of 3. Canals that have less than approximately 1050 cubic yards of muck, should receive score of 5.	3	X 3	9	AMEC used bathymetric data to determine the approximate volumetric muck removal to be 1,529 cubic yards.
Overall Score				94	

Scoring Criteria for Potential Keys Canal Restoration Sites for ORGANIC REMOVAL		Area Name	MM31 South of Ave J Bayside		
		Canal Number	290 Big Pine Key		
		Potential Restoration Technology	ORGANIC REMOVAL		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0.	5	X 4	20	**There is no obvious evidence of mangrove, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present in a canal with such bad water quality.**
	If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3.				
	If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	5	X4	20	**The restoration is not anticpated to require mitigation.**
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Bathymetric and Sediment Characterization Data (scored from 0 to +5) Scoring is based on the potential for additional data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has no sedimentation data, should	5	X2	10	**AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections. No sedimentation analysis available.**
	Canals that require less than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has sedimentation data, should receive a score of 5.				
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 15 feet deep , should receive a score of 0.	5	X 3	15	**AMEC used google earth and bathymetric data to determine the approximate depth, width, and number of boat lifts.Depth = 7.97 feet, Width = 40 feet , and # of boat lifts = 10.If any of the parameters match the criteria then it recives that ranking score.**
	Canals that have navigational widths(boat lift to boat lift) greater than 25, less than 20 boat lifts, less than 15 feet deep , should receive a score of 5.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to set up dewatering system.	Canals that do not have an empty lot for dewatering system, should receive score of 0.	3	X 4	12	**At the end of the canal system there is an empty lot that is cleared but has some mangroves that will have to be trimmed or removed for staging of material and pump placement.**
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Quantity of Material (scored from 0 to + 5) Scoring is based upon the approximate volume of material to be removed from the canal system.	Canals that have greater than approximately 1600 cubic yards of muck, should receive score of 0.	5	X 3	15	**AMEC used bathymetric data to determine the approximate volumetric muck removal to be 1,024 yd^3.**
	Canals that have greater than approximately 1050 but less than 1600 cubic yards of muck, should receive score of 3.				
	Canals that have less than approximately 1050 cubic yards of muck, should receive score of 5.				
Overall Score				92	

Scoring Criteria for Potential Keys Canal Restoration Sites for ORGANIC REMOVAL		Area Name	MM 31 Ross Haven subdivision Bayside		
		Canal Number	297 Big Pine Key		
		Potential Restoration Technology	ORGANIC REMOVAL		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.	5	X 4	20	**There is no obvious evidence of mangrove, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present in a canal with such bad water quality.**
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	**The restoration is not anticpated to require mitigation.**
1C) Bathymetric and Sediment Characterization Data (scored from 0 to +5) Scoring is based on the potential for additional data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has no sedimentation data, should receive a score of 0. Canals that require less than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has sedimentation data, should receive a score of 5.	5	X2	10	**AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine the approximate number of cross sections. No sedimentation analysis available.**
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 15 feet deep , should receive a score of 0. Canals that have navigational widths(boat lift to boat lift) greater than 25, less than 20 boat lifts, less than 15 feet deep , should receive a score of 5.	5	X 3	15	**AMEC used google earth and bathymetric data to determine the approximate depth, width, and number of boat lifts. Depth = 7.25 feet, Width = 27 feet , and # of boat lifts = 5. If any of the parameters match the criteria then it recives that ranking score.**
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to set up dewatering system.	Canals that do not have an empty lot for dewatering system, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 4	12	**At the end of the canal system there is an empty lot that is cleared and would be a good area for staging of material and pump placement. There is some misc pieces of trash/debris that will need to removed.**
2C) Quantity of Material (scored from 0 to + 5) Scoring is based upon the approximate volume of material to be removed from the canal system.	Canals that have greater than approximately 1600 cubic yards of muck, should receive score of 0. Canals that have greater than approximately 1050 but less than 1600 cubic yards of muck, should receive score of 3. Canals that have less than approximately 1050 cubic yards of muck, should receive score of 5.	5	X 3	15	**AMEC used bathymetric data to determine the approximate volumetric muck removal to be 933 yd^3**
Overall Score				92	

Scoring Criteria for Potential Keys Canal Restoration Sites for ORGANIC REMOVAL		Area Name	MM 31 Atlantic Estatates subdivision Bayside		
		Canal Number	287 Big Pine Key		
		Potential Restoration Technology	ORGANIC REMOVAL		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.	5	X 4	20	There is no obvious evidence of mangrove, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present in a canal with such bad water quality.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	The restoration is not anticpated to require mitigation.
1C) Bathymetric and Sediment Characterization Data (scored from 0 to +5) Scoring is based on the potential for additional data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has no sedimentation data, should receive a score of 0. Canals that require less than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has sedimentation data, should receive a score of 5.	0	X2	0	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections. No sedimentation analysis available.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 15 feet deep , should receive a score of 0. Canals that have navigational widths(boat lift to boat lift) greater than 25, less than 20 boat lifts, less than 15 feet deep , should receive a score of 5.	5	X 3	15	AMEC used google earth and bathymetric data to determine the approximate depth, width, and number of boat lifts.Depth = 13.98 feet, Width = 40 feet , and # of boat lifts = 10.If any of the parameters match the criteria then it recives that ranking score.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to set up dewatering system.	Canals that do not have an empty lot for dewatering system, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 4	12	At the end of the canal system there is an empty lot that is cleared but has some mangroves that will have to be trimmed or removed for staging of material and pump placement.
2C) Quantity of Material (scored from 0 to + 5) Scoring is based upon the approximate volume of material to be removed from the canal system.	Canals that have greater than approximately 1600 cubic yards of muck, should receive score of 0. Canals that have greater than approximately 1050 but less than 1600 cubic yards of muck, should receive score of 3. Canals that have less than approximately 1050 cubic yards of muck, should receive score of 5.	0	X 3	0	AMEC used bathymetric data to determine the approximate volumetric muck removal to be 1,931 yd^3.
Overall Score				67	

Scoring Criteria for Potential Keys Canal Restoration Sites for ORGANIC REMOVAL		Area Name	MM 31 Hollerich subdivision Bayside		
		Canal Number	288 Big Pine Key		
		Potential Restoration Technology	ORGANIC REMOVAL		
Items that Affect Permitting		Score	Weighting Factor	Total Score	Comments
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.	5	X 4	20	There is no obvious evidence of mangrove, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present in a canal with such bad water quality.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	The restoration is not anticpated to require mitigation.
1C) Bathymetric and Sediment Characterization Data (scored from 0 to +5) Scoring is based on the potential for additional data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has no sedimentation data, should receive a score of 0. Canals that require less than 15 bathymetric survey cross sections spaced every 50 feet through the system and/or has sedimentation data, should receive a score of 5.	0	X2	0	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections. No sedimentation analysis available.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, and depth.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, greater than 20 boat lifts, greater than 15 feet deep , should receive a score of 0. Canals that have navigational widths(boat lift to boat lift) greater than 25, less than 20 boat lifts, less than 15 feet deep , should receive a score of 5.	0	X 3	0	AMEC used google earth and bathymetric data to determine the approximate depth, width, and number of boat lifts.Depth = 18.58 feet, Width = 20 feet , and # of boat lifts = 12.If any of the parameters match the criteria then it recives that ranking score.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to set up dewatering system.	Canals that do not have an empty lot for dewatering system, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 4	12	At the back end of the canal system there is an empty lot that is overgrown with vegetation but with triming it would be a great area for staging of material.
2C) Quantity of Material (scored from 0 to + 5) Scoring is based upon the approximate volume of material to be removed from the canal system.	Canals that have greater than approximately 1600 cubic yards of muck, should receive score of 0. Canals that have greater than approximately 1050 but less than 1600 cubic yards of muck, should receive score of 3. Canals that have less than approximately 1050 cubic yards of muck, should receive score of 5.	0	X 3	0	AMEC used bathymetric data to determine the approximate volumetric muck removal to 1,851 yd^3.
Overall Score				52	

Scoring Criteria for Potential Keys Canal Restoration Sites for CULVERT INSTALLATION		Area Name	MM 10 Boca Chica Shores subdivision Oceanside		
		Canal Number	459 Geiger Key		
		Potential Restoration Technology	CULVERT		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprint, the canal should receive a score of 5.	3	X 3	9	Although the project site contains a few mangroves, the foot print of the restoration is not likely to impact seagrasses or corals.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X3	9	From Aerials the installation of the culvert will require mitigation along Boca Chica Road near both sides of the canals.
1C) Survey Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require private property topographic survey due to removal/replacement, should receive a score of 0. Canals that do not require private property topographic survey due to removal/replacement, should receive a score of 5.	5	X3	15	From site visits, the culvert installation will only require the replacement of the concrete seawall. Since concrete seawall is a typical replacement for every culvert installation it was not considered part of the ranking criteria
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0. Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5	5	X 1	5	Homes on this canal system are connected to a Central Waste Water Treatment System.
Items that Affect Ease of Implementation					
2A) Length of Culvert (scored from 0 to + 5) Scoring is based upon the length of culvert to connect the systems.	Canals that have a culvert connection greater than 200 feet, should receive a score of 0. Canals that have a culvert connection less than 200 feet, should receive a score of 5.	5	X 2	10	Based on google earth the culvert connection will be approximately 106 feet.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 2	6	AMEC used google earth to determine whether or not the canal system had a staging area and the vegetation density. There is an area located along Egret Lane that could be used as a staging area but vegetation would need to be cleared.
2C) Traffic Impact Concerns (scored from 0 to + 5) Scoring is based upon the severity of traffic impacts to the existing roadway.	Canals that have a FDOT AADT greater than 2000 and is the main road system into the subdivision, should receive score of 0. Canals that have a FDOT AADT less than 2000 and is not the main road system into the subdivision, should receive score of 5.	0	X 2	0	Based on FDOT 2012 traffic data, there is approximately 2200 AADT for Boca Chica Road. Also Boca Chica Road is the main road in and out of the subdivison.
2E) Existing Infrastructure Concerns (scored from 0 to + 5) Scoring is based upon whether or not the installation of the culvert would require removal/replacement of private property.	Canals that would require the removal/replacement of private property, should receive score of 0. Canals that do not require the removal/replacement of private property, should receive score of 5.	5	X 2	10	From site visits, the culvert installation will only require the replacement of the concrete seawall. Since concrete seawall is a typical replacement for every culvert installation it was not considered part of the ranking criteria
2F) Existing Utility Concerns (scored from 0 to + 5) Scoring is based upon whether or not the water, sewer, data, or electric utility lines will need to be removed/replaced.	Canals that require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 0. Canals that do not require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 5.	0	X 2	0	From field visits, the sewer and water system were identified, therefore the assumption was made that these would need to be removed/replaced during construction. The electrical line would not be an issue and the data line was not identified.
Overall Score				64	

Scoring Criteria for Potential Keys Canal Restoration Sites for CULVERT INSTALLATION		Area Name	MM 31 Tropical Bay Estates (3rd Addition) subdivision Bayside		
		Canal Number	277 Big Pine Key		
		Potential Restoration Technology	CULVERT		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprint, the canal should receive a score of 5.	3	X 3	9	The project site contains a few mangroves. There is no obvious evidence of seagrass or coral, and the anticipated footprint and potential impact on the nearshore bottom is anticpated to be minimal.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X3	9	The culvert installation will require mitigation for mangrove trimming/removal .
1C) Survey Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require private property topographic survey due to removal/replacement, should receive a score of 0. Canals that do not require private property topographic survey due to removal/replacement, should receive a score of 5.	5	X3	15	From site visits, the culvert installation will only require the replacement of the concrete seawall. Since concrete seawall is a typical replacement for every culvert installation it was not considered part of the ranking criteria
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0. Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5	0	X 1	0	Homes on this canal system are still on septic systems. Planned sewer connection by approximately 2015
Items that Affect Ease of Implementation					
2A) Length of Culvert (scored from 0 to + 5) Scoring is based upon the length of culvert to connect the systems.	Canals that have a culvert connection greater than 200 feet, should receive a score of 0. Canals that have a culvert connection less than 200 feet, should receive a score of 5.	0	X 2	0	Based on google earth the culvert connection will be approximately 106 feet.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 2	10	AMEC used google earth to determine whether or not the canal system had a staging area and the vegetation density. There is an area located along Sunrise Drive that could be used as a staging area.
2C) Traffic Impact Concerns (scored from 0 to + 5) Scoring is based upon the severity of traffic impacts to the existing roadway.	Canals that have a FDOT AADT greater than 2000 and is the main road system into the subdivision, should receive score of 0. Canals that have a FDOT AADT less than 2000 and is not the main road system into the subdivision, should receive score of 5.	5	X 2	10	Based on FDOT 2012 traffic data, there is approximately 1600 AADT for Watson Road. Also Watson road is not the main road in and out of the subdivison.
2D) Existing Infrastructure Concerns (scored from 0 to + 5) Scoring is based upon whether or not the installation of the culvert would require removal/replacement of private property.	Canals that would require the removal/replacement of structures on private property, should receive score of 0. Canals that do not require the removal/replacement of structures on private property, should receive score of 5.	5	X 2	10	From site visits, the culvert installation will only require the replacement of the concrete seawall. Since concrete seawall is a typical replacement for every culvert installation it was not considered part of the ranking criteria
2E) Existing Utility Concerns (scored from 0 to + 5) Scoring is based upon whether or not the water, sewer, data, or electric utility lines will need to be removed/replaced.	Canals that require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 0. Canals that do not require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 5.	0	X 2	0	From field visits, the sewer and water system were identified, therefore the assumption was made that these would need to be removed/replaced during construction. The electrical line would not be an issue and the data line was not identified.
Overall Score				63	

Scoring Criteria for Potential Keys Canal Restoration Sites for CULVERT INSTALLATION		Area Name	MM 10 Geiger Mobil Home subdivision		
		Canal Number	472 Geiger Key		
		Potential Restoration Technology	CULVERT		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprint, the canal should receive a score of 5.	5	X 3	15	There is no obvious evidence of sensitive resources within the footprint of this restoration.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X3	15	Mitigation is not anticipated for this restoration.
1C) Survey Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require private property topographic survey due to removal/replacement, should receive a score of 0. Canals that do not require private property topographic survey due to removal/replacement, should receive a score of 5.	0	X3	0	From site visits, the culvert installation will require the removal of a private concrete deck, therefore the contractor will be required to survey the structure and replace to match existing conditions.
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0. Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5	5	X 1	5	Homes on this canal system are connected to a Central Waste Water Treatment System.
Items that Affect Ease of Implementation					
2A) Length of Culvert (scored from 0 to + 5) Scoring is based upon the length of culvert to connect the systems.	Canals that have a culvert connection greater than 200 feet, should receive a score of 0. Canals that have a culvert connection less than 200 feet, should receive a score of 5.	5	X 2	10	Based on google earth the culvert connection will be approximately 106 feet.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 2	6	AMEC used google earth to determine whether or not the canal system had a staging area and the vegetation density. An area located along Venus Lane could be used as staging area but the vegetation woujld need to be cleared.
2C) Traffic Impact Concerns (scored from 0 to + 5) Scoring is based upon the severity of traffic impacts to the existing roadway.	Canals that have a FDOT AADT greater than 2000 and is the main road system into the subdivision, should receive score of 0. Canals that have a FDOT AADT less than 2000 and is not the main road system into the subdivision, should receive score of 5.	0	X 2	0	Based on FDOT 2012 traffic data, there is approximately 2200 AADT for Boca Chica Road. Also Boca Chica Road is the main road in and out of the subdivison.
2E) Existing Infrastructure Concerns (scored from 0 to + 5) Scoring is based upon whether or not the installation of the culvert would require removal/replacement of private property.	Canals that would require the removal/replacement of private property, should receive score of 0. Canals that do not require the removal/replacement of private property, should receive score of 5.	0	X 2	0	From site visits, the culvert installation will require the removal of a private concrete deck, therefore the contractor will be required to remove and replace to match existing conditions.
2F) Existing Utility Concerns (scored from 0 to + 5) Scoring is based upon whether or not the water, sewer, data, or electric utility lines will need to be removed/replaced.	Canals that require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 0. Canals that do not require the removal/replacement of the sewer, water, data, or electric utility lines should receive score of 5.	0	X 2	0	From field visits, the sewer and water system were identified, therefore the assumption was made that these would need to be removed/replaced during construction. The electrical line would not be an issue and the data line was not identified.
Overall Score				51	

Scoring Criteria for Potential Keys Canal Restoration Sites for PUMPING		Area Name	MM 31 Whispering Pines subdivision Bayside		
		Canal Number	286 Big Pine Key		
		Potential Restoration Technology	PUMPING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.	3	X 3	9	The project site contains a few mangroves near the canal mouth. There is no obvious evidence of seagrass or coral, and although a benthic survey has not yet been completed it was assumed that these sensitive resources would likely not be present at the mouth of a canal with such poor water quality.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X3	9	Mitigation may be required for mangrove trimming/removal.
1C) Bathymetric and Topographic Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0. Canals that require greater than 50 but less than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3. Canals that require less than 50 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.	5	X3	15	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0. Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5	0	X 1	0	Homes on this canal system are still on septic systems. Planned sewer connection by approximately 2015
Items that Affect Ease of Implementation					
2A) Length of Pumping System (scored from 0 to + 5) Scoring is based upon the length of pumping system.	Canals that have a pumping system greater than 2500 feet, should receive a score of 0. Canals that have a pumping system greater than 2500 feet, should receive a score of 0.	5	X 3	15	AMEC used bathymetric data and google earth to determine the approximate length of the canal system
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 2	10	AMEC used google earth to determine whether or not the canal system had a staging area and the vegetation density. A lot that could be used as a staging area is located at the end of Pine Lane.
2C) Depth of Pumping System (scored from 0 to + 5) Scoring is based upon the depth of canal.	Canals that have an average depth greater than 10 feet and a range in bottom elevations greater than 8 feet should receive a score of 0. Canals that have an average depth less than10 feet and a range in bottom elevation of less than 8 feet should receive a score of 5.	0	X 3	0	AMEC used bathymetric data to determine the average depth of 11.77' and range in depths of 14.94'.
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property and require a distance greater than 200 feet, should receive score of 0. Canals that do not have accessible electric hook up for the pump station on property and require a distance greater than 50 but less than 200 feet, should receive score of 3. Canals that do not have accessible electric hook up for the pump station on property and require a distance less than 50, should receive score of 5.	0	X 2	0	Based on field visits Amec determined whether the canal system had an electrical drop. The approximate distance to the nearest electrical pole is 240 feet.
Overall Score				58	

Scoring Criteria for Potential Keys Canal Restoration Sites for PUMPING		Area Name	MM 30 Eden Pines Colony (1st Addition) subdivision Bayside		
		Canal Number	278 Big Pine Key		
		Potential Restoration Technology	PUMPING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.	0	X 3	0	The proposed pump intake is located in a near shore area that contains mangroves and may contain seagrass.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	0	X3	0	Thee installation of the pumping system is likelly to require mitigation along Narcissus Avenue in the near shore area.
1C) Bathymetric and Topographic Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0. Canals that require greater than 50 but less than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3. Canals that require less than 50 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.	0	X3	0	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0. Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5	0	X 1	0	Homes on this canal system are still on septic systems. Planned sewer connection by approximately 2015
Items that Affect Ease of Implementation					
2A) Length of Pumping System (scored from 0 to + 5) Scoring is based upon the length of pumping system.	Canals that have a pumping system greater than 2500 feet, should receive a score of 0. Canals that have a pumping system greater than 2500 feet, should receive a score of 0.	0	X 3	0	AMEC used bathymetric data and google earth to determine the approximate length of the canal system
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 2	10	AMEC used google earth to determine whether or not the canal system had a staging area and the vegetation density. There is an area located along Narcissus Avenue that could be used as a staging area.
2C) Depth of Pumping System (scored from 0 to + 5) Scoring is based upon the depth of canal.	Canals that have an average depth greater than 10 feet and a range in bottom elevations greater than 8 feet should receive a score of 0. Canals that have an average depth less than10 feet and a range in bottom elevation of less than 8 feet should receive a score of 5.	5	X 3	15	AMEC used bathymetric data to determine the average depth of 7.87' and range in depths of 7.98'.
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property and require a distance greater than 200 feet, should receive score of 0. Canals that do not have accessible electric hook up for the pump station on property and require a distance greater than 50 but less than 200 feet, should receive score of 3. Canals that do not have accessible electric hook up for the pump station on property and require a distance less than 50, should receive score of 5.	5	X 2	10	Based on field visits Amec determined whether the canal system had an electrical drop. The approximate distance to the nearest electrical pole is 50 feet.
Overall Score				35	

Scoring Criteria for Potential Keys Canal Restoration Sites for PUMPING		Area Name	MM 103 Bermuda Shores subdivision, Bayside		
		Canal Number	47 Key Largo		
		Potential Restoration Technology	PUMPING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0.	0	X 3	0	The proposed pump intake is located in a near shore that contains mangroves and may contain seagrass.
	If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3.				
	If there is no observed sensitive resources such as seagrass in the footprint of the project, the canal should receive a score of 5.				
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0.	0	X3	0	The installation of the pumping system is likely to require mitigation along Shaw Drive in the nearshore wetland area.
	Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3.				
	Canals that do not require any mitigation, should receive a score of 5.				
1C) Bathymetric and Topographic Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0.	3	X3	9	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.
	Canals that require greater than 50 but less than 90 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3.				
	Canals that require less than 50 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.				
1D) Near Shore Potential Water Quality Impacts (scored from 0 to + 5) Scoring is based upon whether or not the homes along the canal are on sewer or septic system.	Homes along canals that are still on a septic system, should receive score of 0.	5	X 1	5	Homes on this canal system are connected to a Central Waste Water Treatment System
	Homes along canals that are connected to a Central Waste Water Treatment System, should receive score of 5				
Items that Affect Ease of Implementation					
2A) Length of Pumping System (scored from 0 to + 5) Scoring is based upon the length of pumping system.	Canals that have a pumping system greater than 2500 feet, should receive a score of 0.	0	X 3	0	AMEC used bathymetric data and google earth to determine the approximate lengths of the canal system
	Canals that have a pumping system greater than 2500 feet, should receive a score of 0.				
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile material and equipment.	Canals that do not have an empty lot for stockpiling of material, should receive score of 0.	3	X 2	6	AMEC used google earth to determine whether or not the canal system had a staging area and the vegetation density. There is an area located along Shaw Drive that could be used as a staging area. The area is overgrown with vegeation and will need to be cleared for use.
	Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3.				
	Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.				
2C) Depth of Pumping System (scored from 0 to + 5) Scoring is based upon the depth of canal.	Canals that have an average depth greater than 10 feet and a range in bottom elevations greater than 8 feet should receive a score of 0.	0	X 3	0	AMEC used bathymetric data to determine the average depth of 11.62' and range in depths of 14.37'.
	Canals that have an average depth less than10 feet and a range in bottom				
2D) Site Accessibility (scored from 0 to + 5) Scoring is based upon whether the site has accessible electric hook up for pump station.	Canals that do not have accessible electric hook up for the pump station on property and require a distance greater than 200 feet, should receive score of 0.	3	X 2	6	Based on field visits Amec determined whether the canal system had an electrical drop. The approximate distance to the nearest electrical pole is 80 feet.
	Canals that do not have accessible electric hook up for the pump station on property and require a distance greater than 50 but less than 200 feet, should receive score of 3.				
	Canals that do not have accessible electric hook up for the pump station on property and require a distance less than 50, should receive score of 5.				
Overall Score				26	

Scoring Criteria for Potential Keys Canal Restoration Sites for BACKFILLING		Area Name	MM 106 Sexton Cove Estates subdivision Bayside		
		Canal Number	29 Key Largo		
		Potential Restoration Technology	BACKFILLING		
Items that Affect Permitting		Score	Weighting Factor	Total Score	Comments
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprin, the canal should receive a score of 5.	3	X 4	12	Although the project site contains a few mangroves, there is no obvious evidence of seagrass or coral, and although a benthic survey has not yet been completed due to the extreme depths, sensitive benthic resources are not anticpated.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X4	12	The restoration will require the triming/removal of magroves.
1C) Bathymetric Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0. Canals that require greater than 13 but less than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3. Canals that require less than 13 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.	3	X2	6	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, depth and whether aerators exist.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, or greater than 20 boat lifts, or greater than 35 feet deep and/or greater than 800 feet long or more than 2 aerators , should receive a score of 0. Canals that have navigational widths (boat lift to boat lift) greater than 25 but less than 35 feet, or greater than 15 but less than 20 boat lifts, or greater than 25 but less than 35 feet deep and/or greater than 650 but less than 800 feet long or less than 2 aerators, should receive a score of 3. Canals that have navigational widths(boat lift to boat lift) greater than 35 feet, less than 15 boat lifts, less than 25 feet deep and less than 650 feet long or no aerators, should receive a score of 5.	3	X 4	12	AMEC used google earth and bathymetric data to determine the approximate length, depth, width, ,number of boat lifts, and number of aerators. Length = 722 feet, Depth = 32.33 feet, Width = 30 feet , # of boat lifts = 12, and # of aerators = 1. If any of the parameters match the criteria then it recives that ranking score.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile backfill.	Canals that do not have an empty lot for stockpiling of backfill, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 4	12	Based on google earth there is an empty lot but it will need to be cleared.
2C) Hauling Distance (scored from 0 to + 5) Scoring is based upon the distance from Florida City, Florida to the canal system.	Canals that have a hauling distance greater than 50 miles, should receive score of 0. Canals that have a hauling distance greater than 30 but less than 50 miles, should receive score of 3. Canals that have a hauling distance less than 30 miles, should receive score of 5.	5	X 2	10	AMEC determined the hauling distance to Florida City from the canal system. The approximate distance is 22 miles.
Overall Score				64	

Scoring Criteria for Potential Keys Canal Restoration Sites for BACKFILLING		Area Name	MM 106 Sexton Cove Estates subdivision Bayside		
		Canal Number	27 Key Largo		
		Potential Restoration Technology	BACKFILLING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprin, the canal should receive a score of 5.	3	X 4	12	**Although the project site contains a few mangroves, there is no obvious evidence of seagrass or coral, and although a benthic survey has not yet been completed due to the extreme depths, sensitive benthic resources are not anticpated.**
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X4	12	**The restoration will require the triming/removal of magroves.**
1C) Bathymetric Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0. Canals that require greater than 13 but less than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3. Canals that require less than 13 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.	5	X2	10	**AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.**
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, depth and whether aerators exist.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, or greater than 20 boat lifts, or greater than 35 feet deep and/or greater than 800 feet long or more than 2 aerators , should receive a score of 0. Canals that have navigational widths (boat lift to boat lift) greater than 25 but less than 35 feet, or greater than 15 but less than 20 boat lifts, or greater than 25 but less than 35 feet deep and/or greater than 650 but less than 800 feet long or less than 2 aerators, should receive a score of 3. Canals that have navigational widths(boat lift to boat lift) greater than 35 feet, less than 15 boat lifts, less than 25 feet deep and less than 650 feet long or no aerators, should receive a score of 5.	0	X 4	0	**AMEC used google earth and bathymetric data to determine the approximate length, depth, width, ,number of boat lifts, and number of aerators. Length = 591 feet, Depth = 42.07 feet, Width = 35 feet , # of boat lifts = 12, # of aerators = 3.If any of the parameters match the criteria then it recives that ranking score.**
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile backfill.	Canals that do not have an empty lot for stockpiling of backfill, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	3	X 4	12	**Based on google earth there is an empty lot but it will need to be cleared.**
2C) Hauling Distance (scored from 0 to + 5) Scoring is based upon the distance from Florida City, Florida to the canal system.	Canals that have a hauling distance greater than 50 miles, should receive score of 0. Canals that have a hauling distance greater than 30 but less than 50 miles, should receive score of 3. Canals that have a hauling distance less than 30 miles, should receive score of 5.	5	X 2	10	**AMEC determined the hauling distance to Florida City from the canal system. The approximate distance is 22 miles.**
Overall Score				56	

Scoring Criteria for Potential Keys Canal Restoration Sites for BACKFILLING		Area Name	MM 105 Key Largo Mobile Home Site Plat 4 subdivision Oceanside		
		Canal Number	37 Key Largo		
		Potential Restoration Technology	BACKFILLING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprin, the canal should receive a score of 5.	3	X 4	12	Although the project site contains a few mangroves, there is no obvious evidence of seagrass or coral, and although a benthic survey has not yet been completed due to the extreme depths, sensitive benthic resources are not anticpated.
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	3	X4	12	The restoration will require the triming/removal of magroves.
1C) Bathymetric Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0. Canals that require greater than 13 but less than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3. Canals that requireless than 13 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.	0	X2	0	AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, depth and whether aerators exist.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, or greater than 20 boat lifts, or greater than 35 feet deep and/or greater than 800 feet long or more than 2 aerators , should receive a score of 0. Canals that have navigational widths (boat lift to boat lift) greater than 25 but less than 35 feet, or greater than 15 but less than 20 boat lifts, or greater than 25 but less than 35 feet deep and/or greater than 650 but less than 800 feet long or less than 2 aerators, should receive a score of 3. Canals that have navigational widths(boat lift to boat lift) greater than 35 feet, less than 15 boat lifts, less than 25 feet deep and less than 650 feet long or no aerators, should receive a score of 5.	0	X 4	0	AMEC used google earth and bathymetric data to determine the approximate length, depth, width, number of boat lifts, and number of aerators. Length = 820 feet, Depth = 21.64 feet, Width = 23 feet , # of boat lifts = 20, and # of aerators = 0.If any of the parameters match the criteria then it recives that ranking score.
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile backfill.	Canals that do not have an empty lot for stockpiling of backfill, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	5	X 4	20	Based on google earth there is a cleared empty lot.
2C) Hauling Distance (scored from 0 to + 5) Scoring is based upon the distance from Florida City, Florida to the canal system.	Canals that have a hauling distance greater than 50 miles, should receive score of 0. Canals that have a hauling distance greater than 30 but less than 50 miles, should receive score of 3. Canals that have a hauling distance less than 30 miles, should receive score of 5.	5	X 2	10	AMEC determined the hauling distance to Florida City from the canal system. The approximate distance is 23 miles.
Overall Score				54	

Scoring Criteria for Potential Keys Canal Restoration Sites for BACKFILLING		Area Name	MM 93 Hammer Point Park subdivision Bayside		
		Canal Number	92 Tavernier		
		Potential Restoration Technology	BACKFILLING		
Items that Affect Permitting		**Score**	**Weighting Factor**	**Total Score**	**Comments**
1A) Sensitive Resources (scored from 0 to + 5) Scoring is based upon the presence of sensitive resources.	If there are observed sensitive resources such as mangroves or seagrass in the footprint of the proposed restoration system, the canal should receive a score of 0. If mangroves are located within the footprint of the proposed restoration system and there is no indication of seagrasses or corals the canal should receive a score of 3. If there is no observed sensitive resources such as seagrass in the project footprin, the canal should receive a score of 5.	5	X 4	20	**There is no obvious evidence of mangrove, seagrass or coral, and although a benthic survey has not yet been completed it is assumed that these sensitive resources would likely not be present in a canal with such bad water quality.**
1B) Mitigation Concerns (scored from 0 to +5) Scoring is based on the potential removal of sensitive resources.	Canals that require a combination of mangrove, seagrass and/or hard bottom coral mitigation, should receive a score of 0. Canals that only require one of the following mangrove, seagrass, or hard bottom coral mitigation, should receive a score of 3. Canals that do not require any mitigation, should receive a score of 5.	5	X4	20	**The proposed restoration is not anticpated to require mitigation.**
1C) Bathymetric Data (scored from 0 to +5) Scoring is based on the potential for additional survey data.	Canals that require greater than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 0. Canals that require greater than 13 but less than 15 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 3. Canals that require less than 13 bathymetric survey cross sections spaced every 50 feet through the system, should receive a score of 5.	3	X2	6	**AMEC used bathymetric data to determine the length of the canal and then divided by 50 feet to determine and approximate number of cross sections.**
Items that Affect Ease of Implementation					
2A) Canal Configuration Concerns (scored from 0 to + 5) Scoring is based upon the width of canal, number of boat lifts, size of boats, depth and whether aerators exist.	Canals that have navigational widths(boat lift to boat lift) less than 25 feet, or greater than 20 boat lifts, or greater than 35 feet deep and/or greater than 800 feet long or more than 2 aerators , should receive a score of 0. Canals that have navigational widths (boat lift to boat lift) greater than 25 but less than 35 feet, or greater than 15 but less than 20 boat lifts, or greater than 25 but less than 35 feet deep and/or greater than 650 but less than 800 feet long or less than 2 aerators, should receive a score of 3. Canals that have navigational widths(boat lift to boat lift) greater than 35 feet, less than 15 boat lifts, less than 25 feet deep and less than 650 feet long or no aerators, should receive a score of 5.	0	X 4	0	**AMEC used google earth and bathymetric data to determine the approximate length, depth, width, ,number of boat lifts and number of aerators. Length = 656 feet, Depth = 27.08 feet, Width = 38 feet , # of boat lifts = 16, and # of aerators = 0.If any of the parameters match the criteria then it recives that ranking score.**
2B) Construction Staging Area (scored from 0 to + 5) Scoring is based upon the location of vacant lots and the accessibility to the canal to stockpile backfill.	Canals that do not have an empty lot for stockpiling of backfill, should receive score of 0. Canals that do have an empty lot, but the empty lot doesn't have access to the canal and/or is overrun with trash or vegetation, should receive score of 3. Canals that do have an empty lot and the lot has access to the canal and is clear of trash or vegetation, should receive score of 5.	0	X 4	0	**Based on google earth there is not an empty lot near the canal.**
2C) Hauling Distance (scored from 0 to + 5) Scoring is based upon the distance from Florida City, Florida to the canal system.	Canals that have a hauling distance greater than 50 miles, should receive score of 0. Canals that have a hauling distance greater than 30 but less than 50 miles, should receive score of 3. Canals that have a hauling distance less than 30 miles, should receive score of 5.	3	X 2	6	**AMEC determined the hauling distance to Florida City from the canal system. The approximate distance is 35 miles.**
Overall Score				52	

APPENDIX C

DEMONSTRATION CANAL INFORMATIONAL SHEETS AND PRELIMINARY DESIGNS

WEED BARRIERS

Monroe County Selection of Demonstration Canals for WEED BARRIERS

Canal ID: 266 Big Pine Key

Location: MM 31 Doctor's Arm subdivision, Bayside

Summary of Water Quality Impacts: Primary – Weed wrack entry into canal; Secondary – organics accumulation on canal bottom

Restoration Technology: Weed barrier to prevent additional entry of weed wrack; Secondary - organic removal from canal bottom to eliminate on-going source of organic decomposition.

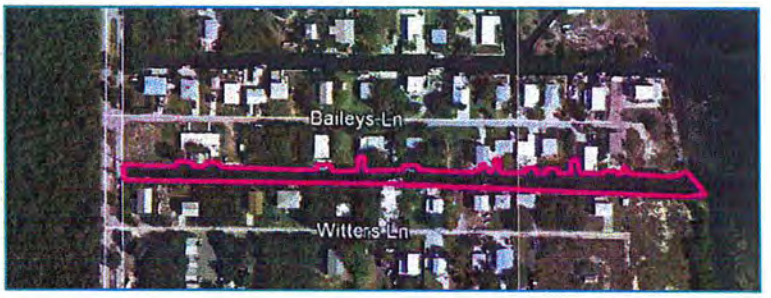
Site Conditions: The canal faces due east and discharges into Bogie Channel. A small area of submerged shoreline shows as privately owned on the aerials although the property appraiser's details of the property do not reflect private ownership. Further research is needed. Sediment characterization data is available indicating sediment can be disposed as clean fill.

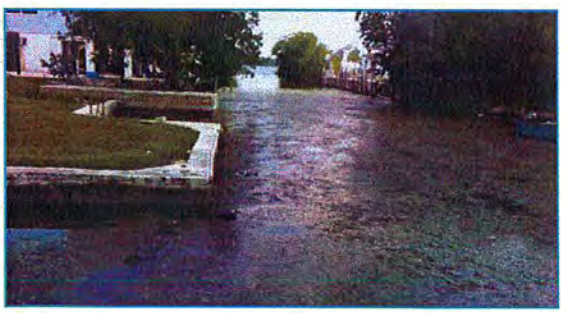
Existing Treatment: Air curtain/physical barriers not operating effectively

Homeowner Communication: Very interested homeowner group contacted Monroe County about the need for an upgrade to their weed barrier and removal of accumulated organics from the canal bottom. Sharon Ripley 305-797-7251

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.04 / 0.5% at 5 ft	Not Measured	Poor 115	74

Characteristics	
Size (acres)	1.1
**Average Depth (ft)	-7.18
**Min Depth (ft)	-10.93
Degree of Stagnation	-0.3
Number of Mouths	1
Organic Thickness (ft) Average	0.86
Parcels	37
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.43 miles





Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 266 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 14, Township 66 S, Range 29 E , (Latitude: 24°41'55.90" North; Longitude: - 81°20'53.46" West). The information sheet and the site location map **(Figure 6)** provide additional details.

Conceptual Design:

The purpose of the project is to reduce seaweed loading for canal 266 by installing a weed barrier system. The weed barrier system will entail a 5 horse power blower, 6 - 6 inch PVC piles, 50 linear feet of 3 inch PVC pipe, and 40 linear feet of plastic netting affixed to the piles. The following is the detailed schematic of the system:

- Two 10-foot stretches of physical weed barrier shall be constructed on either side of the channel at the entrance of the canal.
- Each of the 10' physical weed barrier sections will be comprised of (2) PVC piles that will be placed approximately 9' apart. Plastic netting will be affixed to the pilings in order to block the flow of weed wrack. The netting shall be oriented such that as mean sea level 2.5' of netting remains above the water and 2.5' of netting remains below the water.
- The area between the ends of the physical weed barrier shall contain a 20' wide air curtain. Coarse bubble diffusers will be spaced at an interval of 2 feet. Diffuser mounts will be used to affix the coarse bubble diffusers to the air curtain lateral. The air curtain lateral line will rest approximately 1 foot above the bottom surface to allow for maximum boating clearance.
- A 36 URAI blower in conjunction with a 5hp motor will provide air through 3" PVC pipe to the air curtain. Calculations for determining these blower specifications were based on an assumed diffuser depth of 9'. This estimate is subject to change based on detailed design data.

Before installing the proposed weed barrier system, the existing weed gate system will be removed using an excavator and barge. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

Construction Cost Estimate:

The approximate cost to construct the weed barrier system as aforementioned will be $26,000. This price does not include any cost associated with operation and maintenance and electric drop fees.

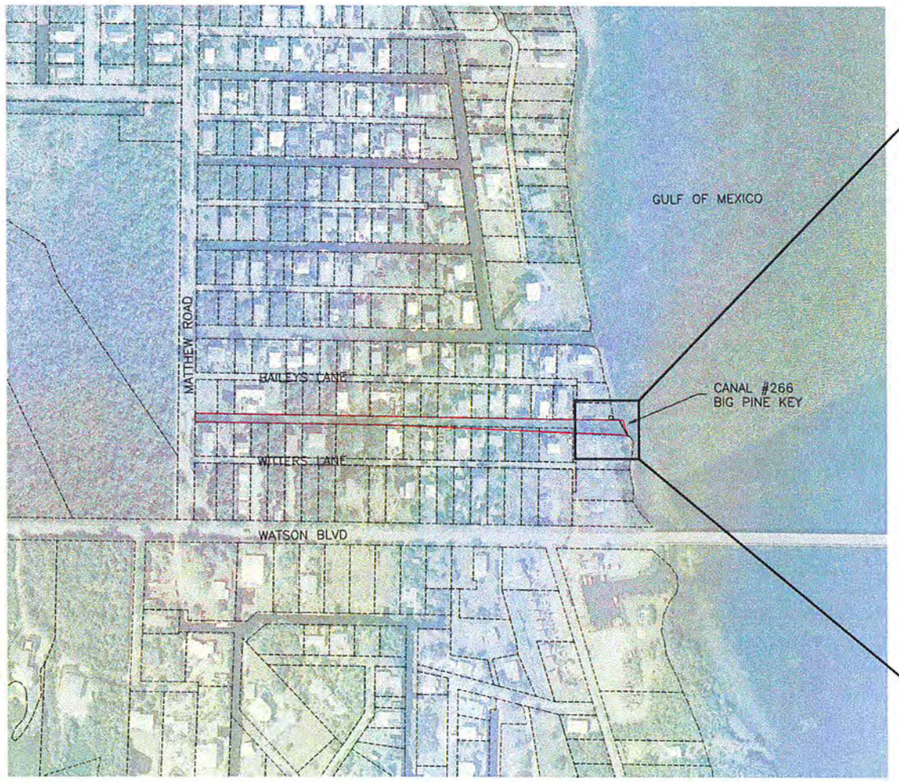
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot at the end of Baileys Lane that could be used as a construction staging area.

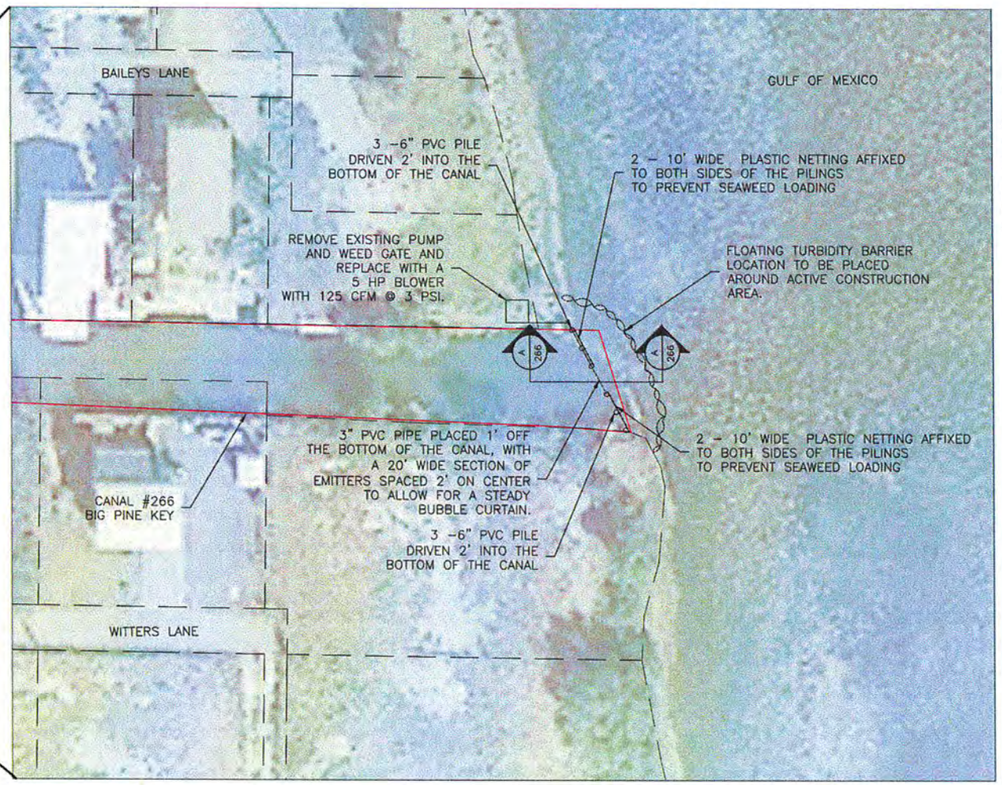
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



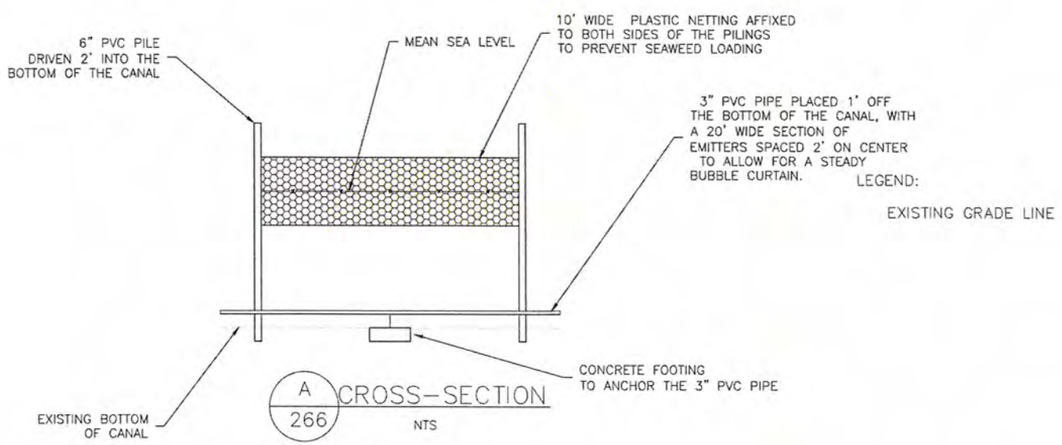
DETAIL SITE LAYOUT - WEED BARRIER

0 30' 60'

SCALE:1"=30'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #266 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A / 266 CROSS-SECTION

NTS

ROTRON® Regenerative Blowers

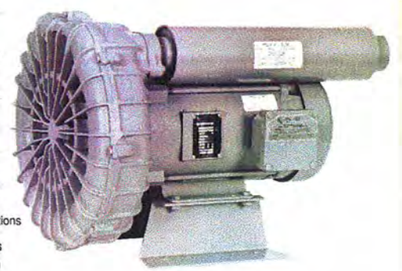
EN 6 & CP 6
Sealed Regenerative Blower w/Explosion-Proof Motor

FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 225 SCFM
- Maximum pressure: 104 IWG
- Maximum vacuum: 85 IWG
- Standard motor: 5.0 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package



BLOWER SPECIFICATION

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

WEED BARRIER CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 266	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for WEED BARRIERS

Canal ID: 288 Big Pine Key

Location: MM 31 Hollerich subdivision, Bayside

Summary of Water Quality Impacts: Primary – Weed wrack entry into canal; Secondary – organics accumulation on canal bottom; Tertiary – deep stagnant zone with an average depth of - 12.60 feet.

Restoration Technology: Primary – Weed barrier to prevent additional entry of weed wrack; Secondary - organic removal from canal bottom to eliminate on-going source of organic decomposition; Tertiary – backfilling (for the purpose of eliminating deep oxygen depleted impaired water quality zone)

Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Weedgate not operating effectively

Homeowner Communication: None to date. No HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.03 / 0.6% at 5 ft	0	Poor 112	74

Characteristics	
Size (acres)	1.36
Average Depth (ft)	-12.60
Min Depth (ft)	-18.58
Degree of Stagnation	-0.2
Number of Mouths	1
Organic Thickness (ft)	0.84
Parcels	37
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.23 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 288 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 24 Township 66 S, Range 29 E , (Latitude: 24°40'34.75" North; Longitude: - 81°20'37.33" West). The information sheet and the site location map (**Figure 11**) provide additional details.

Conceptual Design:

The purpose of the project is to reduce seaweed loading from the Gulf of Mexico for canal 288 by installing a weed barrier system. The weed barrier system will entail a 5 horse power blower, 4 - 6 inch PVC piles, 40 linear feet of 3 inch PVC pipe, and 20 linear feet of plastic netting affixed to the piles. The following is a more detailed description of the system:

- One 10-foot stretch of physical weed barrier shall be constructed on either side of the channel at the entrance to the canal.

- Each of the 10' physical weed barrier sections will be comprised of (2) PVC piles that will be placed approximately 9 feet apart. Plastic netting will be affixed to the pilings in order to block the seaweed from entering the canal. The netting shall be oriented such that at mean sea level 2.5 feet of netting remains above the water level and a minimum of 2.5 feet of netting is below the water level.

- The area between the physical weed barriers extending from the shorelines shall include a 20' wide air curtain. Coarse bubble diffusers in the air curtain will be spaced at an interval of 2 feet. Mounts will be used to affix the coarse bubble diffusers to the air curtain lateral. The air curtain lateral line will rest approximately 1 foot above the bottom surface to allow for maximum boating clearance and minimum resuspension of sediment.

- A 36 URAI blower, or similar, in conjunction with a 5hp motor will provide air through 3 inch PVC pipe to the air curtain. Calculations for determining these blower specifications were based on an assumed diffuser depth of 9'. This estimate is subject to change based on detailed design data.

Before installing the proposed weed barrier system, the existing weed barrier system will be removed using an excavator and barge. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

Construction Cost Estimate:

The approximate cost to construct the weed barrier system as aforementioned will be $23,000. This price does not include any cost associated with operation and maintenance and electric drop fees.

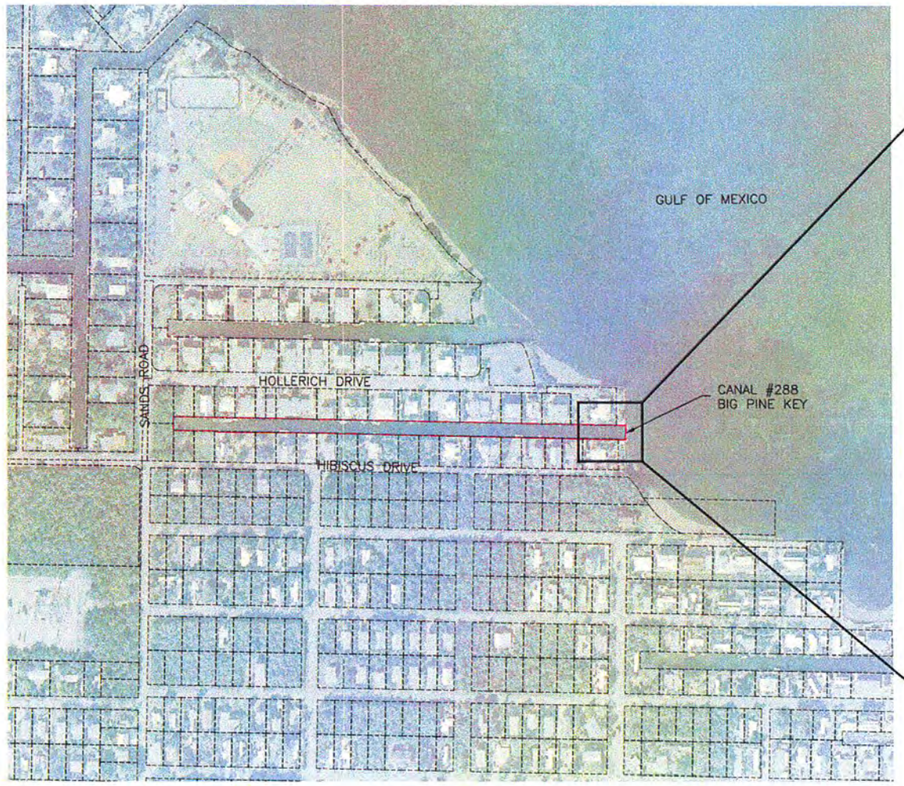
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot on the corner of Sands Road and Hollerich Drive that could be used as a construction staging area.

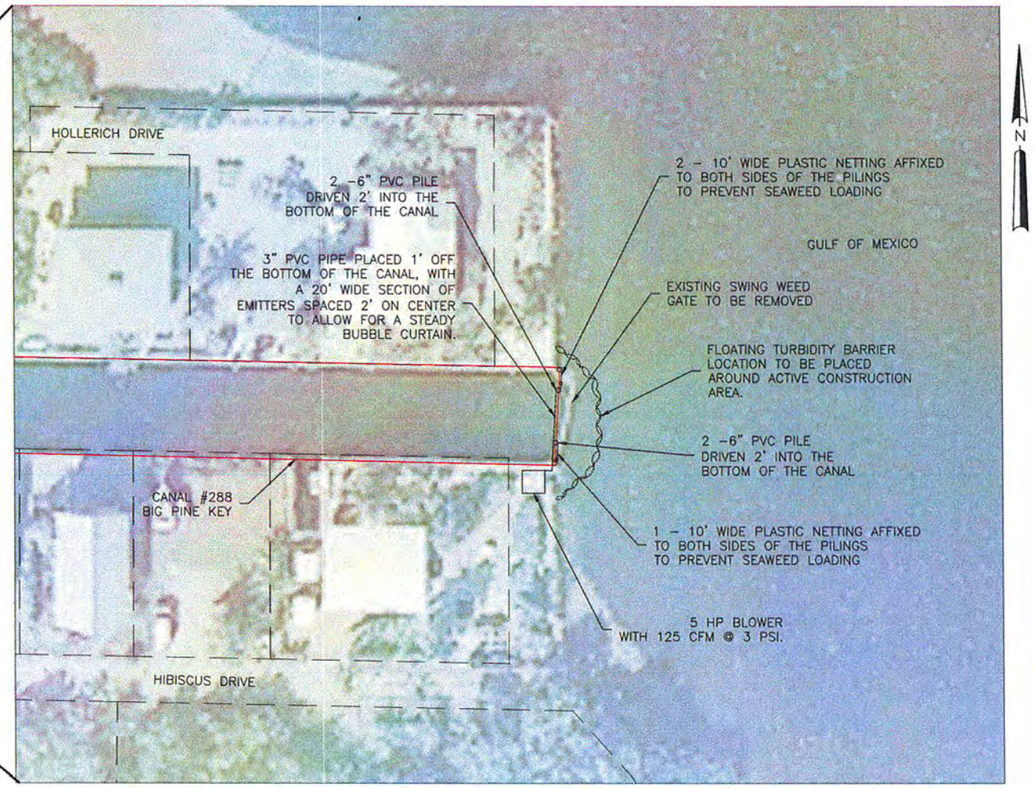
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



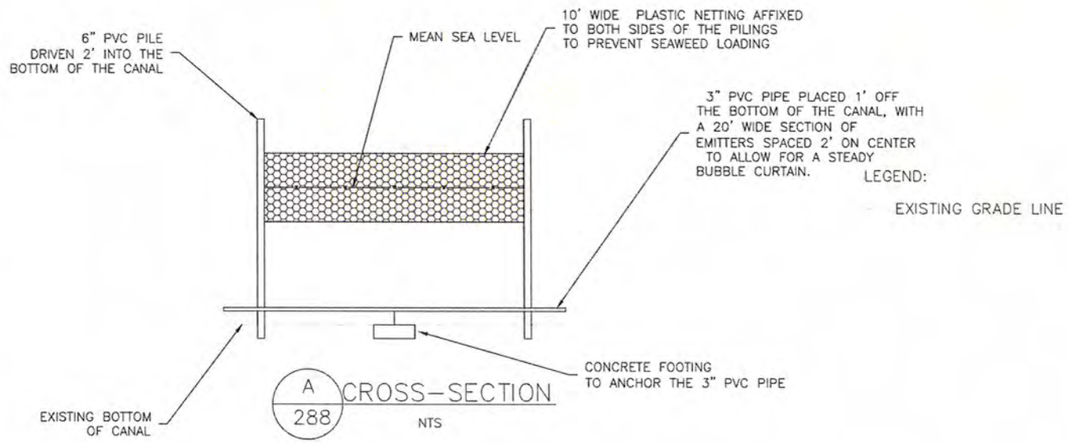
DETAIL SITE LAYOUT - WEED BARRIER

0 30' 60'

SCALE:1"=30'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #288 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A/288 CROSS-SECTION

NTS

ROTRON® Regenerative Blowers

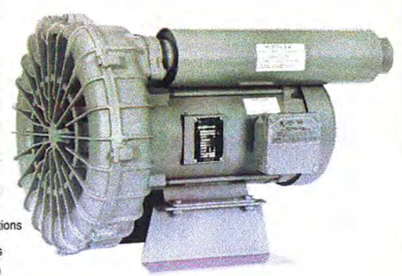
EN 6 & CP 6
Sealed Regenerative Blower w/Explosion-Proof Motor

FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 225 SCFM
- Maximum pressure: 104 IWG
- Maximum vacuum: 85 IWG
- Standard motor: 5.0 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package



BLOWER SPECIFICATION

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS

NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

WEED BARRIER CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 288	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for WEED BARRIERS

Canal ID: 297 Big Pine Key

Location: MM 31 Ross Haven subdivision, Bayside

Summary of Water Quality Impacts: Primary – Weed wrack entry into canal; Secondary – organics accumulation on canal bottom

Restoration Technology: Primary – Weed barrier to prevent additional entry of weed wrack; Secondary - organic removal from canal bottom to eliminate on-going source of organic decomposition

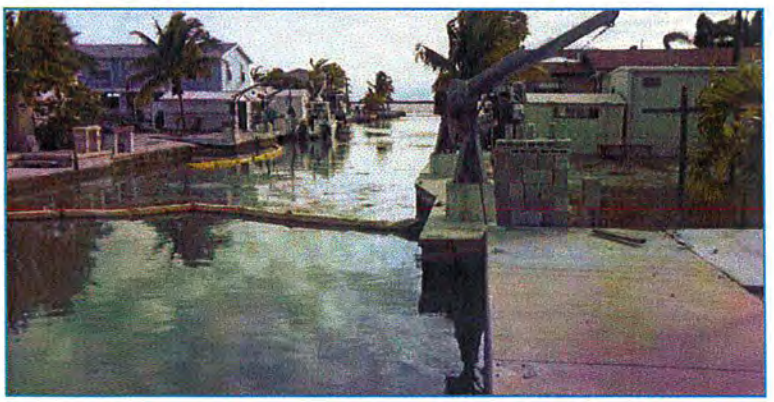
Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Weedgate that is not operating effectively

Homeonwer Communication: None to date. No HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.17 / 2.5% at 3 ft	9.63	Poor 115	64

Characteristics	
Size (acres)	0.46
Average Depth (ft)	-7.08
Min Depth (ft)	-7.25
Degree of Stagnation	-0.8
Number of Mouths	1
Organic Thickness (ft)	1.26
Parcels	15
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.59 miles



Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 297 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 24 Township 66 S, Range 29 E , (Latitude: 24°40'23.69" North; Longitude: - 81°20'24.70" West). The information sheet and the site location map (**Figure 13**) provide additional details.

Conceptual Design:

The purpose of the project is to reduce seaweed loading from the Gulf of Mexico for canal 297 by installing a weed barrier system. The weed barrier system will entail a 5 horse power blower, 17 - 6 inch PVC piles, 100 linear feet of 3 inch PVC pipe, and 140 linear feet of plastic netting affixed to the piles. The following is a more detailed description of the system:

- Seven 10-foot stretches of physical weed barrier shall be constructed on either side of the channel at the entrance to the canal.
- Each of the 10' physical weed barriers sections will be comprised of (2) PVC piles that will be placed approximately 9 feet apart. Plastic netting will be affixed to the pilings in order to block the seaweed from entering the canal. The netting shall be oriented such that at mean sea level 2.5 feet of netting remains above the water level and a minimum of 2.5 feet of netting is below the water level.
- The area between the physical weed barriers extending from the shorelines shall include a 20' wide air curtain. Coarse bubble diffusers in the air curtain will be spaced at an interval of 2 feet. Mounts will be used to affix the coarse bubble diffusers to the air curtain lateral. The air curtain lateral line will rest approximately 1 foot above the bottom surface to allow for maximum boating clearance and minimum resuspension of sediment.
- A 36 URAI blower, or similar, in conjunction with a 5hp motor will provide air through 3 inch PVC pipe to the air curtain. Calculations for determining these blower specifications were based on an assumed diffuser depth of 9'. This estimate is subject to change based on detailed design data.

Before installing the proposed weed barrier system, the existing weed gate system will be removed using an excavator and barge. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

Construction Cost Estimate:

The approximate cost to construct the weed barrier system as aforementioned will be $46,000. This price does not include any cost associated with operation and maintenance and electric drop fees.

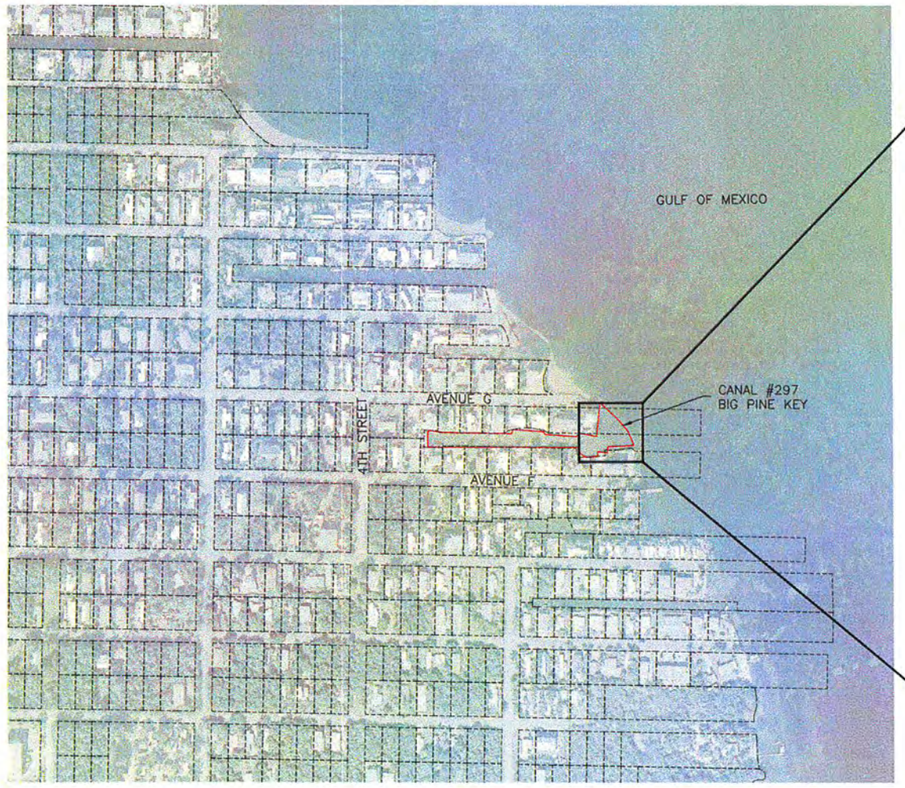
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot at the end of the canal between Avenue G and Avenue F that could be used as a construction staging area.

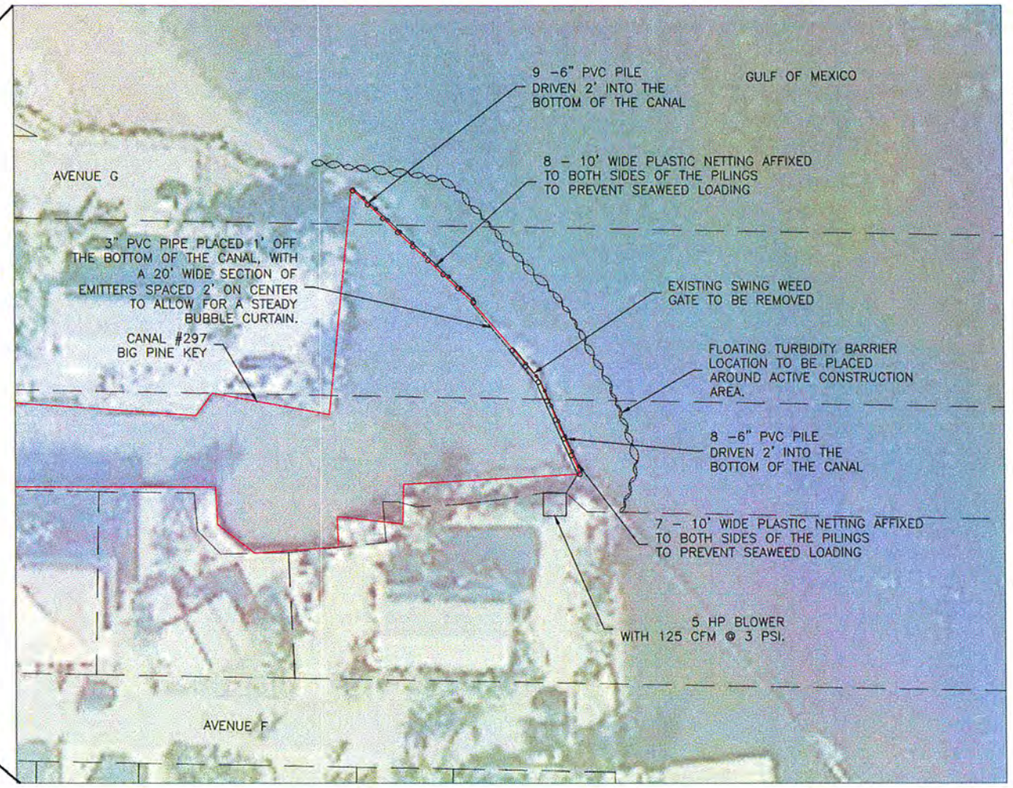
Conceptual Drawing: See Attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



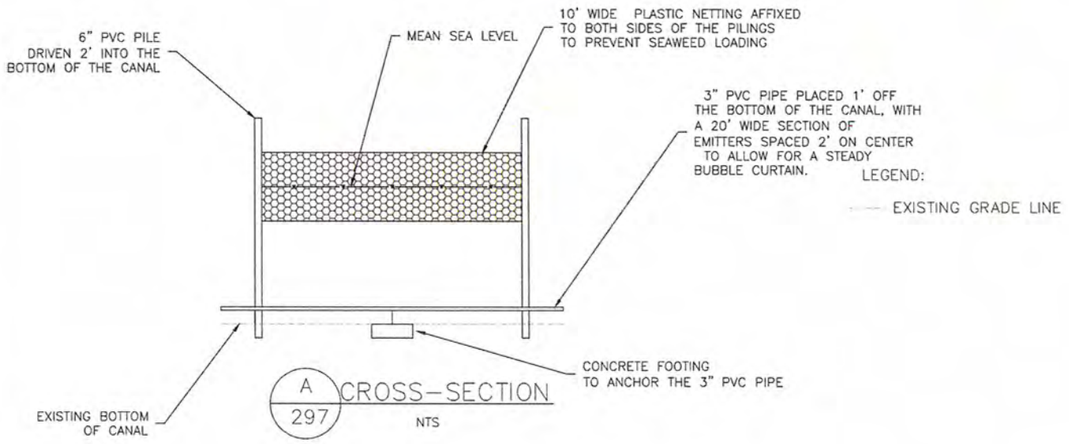
DETAIL SITE LAYOUT - WEED BARRIER

0 30' 60'

SCALE:1"=30'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #297 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A / 297 CROSS-SECTION

NTS

ROTRON® Regenerative Blowers

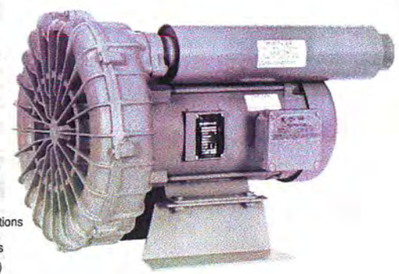
EN 6 & CP 6
Sealed Regenerative Blower w/Explosion-Proof Motor

FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 225 SCFM
- Maximum pressure: 104 IWG
- Maximum vacuum: 85 IWG
- Standard motor: 5.0 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package



BLOWER SPECIFICATION

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

WEED BARRIER CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 297	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for WEED BARRIERS

Canal ID: 287 Big Pine Key

Location: MM 31 Atlantic Estates subdivision, Bayside

Summary of Water Quality Impacts: Primary – Weed wrack entry into canal; Secondary – organics accumulation on canal bottom

Restoration Technology: Primary - Weed barrier to prevent additional entry of weed wrack; Secondary - organic removal from canal bottom to eliminate on-going source of organic decomposition

Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Weed gate

Homeowner Communication: AMEC spoke with Doug Scheele 305-797-4606 and Dennis Fowler 305 872-5656. Both seemed very interested in the project. No HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.98 / 15.8% at 5 ft	Not Measured	Poor 112	33

Characteristics	
Size (acres)	1.43
**Average Depth (ft)	-9.67
**Min Depth (ft)	-13.98
Degree of Stagnation	-0.3
Number of Mouths	1
Organic Thickness (ft) Average	0.83
Parcels	26
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Note Completed
FKNMS Monitoring Station	1.17 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Project ID: 287 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 24, Township 66 S, Range 29 E , (Latitude: 24°40'37.53" North; Longitude: - 81°20'40.62" West). The information sheet and site location map (**Figure 10**) provide additional details.

Conceptual Design:

The purpose of the project is to reduce seaweed loading from the Gulf of Mexico for canal 287 by installing a weed barrier system. The weed barrier system will entail a 5 horse power blower, 6 - 6 inch PVC piles, 50 linear feet of 3 inch PVC pipe, and 40 linear feet of plastic netting affixed to the piles. The following is a more detailed description of the system:

- Two 10-foot stretches of physical weed barrier shall be constructed on either side of the channel at the entrance to the canal.
- Each of the 10' physical weed barrier sections will be comprised of (2) PVC piles that will be placed approximately 9 feet apart. Plastic netting will be affixed to the pilings in order to block the seaweed from entering the canal. The netting shall be oriented such that at mean sea level 2.5 feet of netting remains above the water level and a minimum of 2.5 feet of netting is below the water level.
- The area between the physical weed barriers extending from the shorelines shall include a 20' wide air curtain. Coarse bubble diffusers in the air curtain will be spaced at an interval of 2 feet. Mounts will be used to affix the coarse bubble diffusers to the air curtain lateral. The air curtain lateral line will rest approximately 1 foot above the bottom surface to allow for maximum boating clearance and minimum resuspension of sediment.
- A 36 URAI blower, or similar, in conjunction with a 5hp motor will provide air through 3 inch PVC pipe to the air curtain. Calculations for determining these blower specifications were based on an assumed diffuser depth of 9'. This estimate is subject to change based on detailed design data.

Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The evaluation of the fortification/upgrade/replacement of the existing swing gate and barrier will be considered in the final design.

Construction Cost Estimate:

The approximate cost to construct the weed barrier system as aforementioned will be $25,000. This price does not include any cost associated with operation and maintenance and electric drop fees.

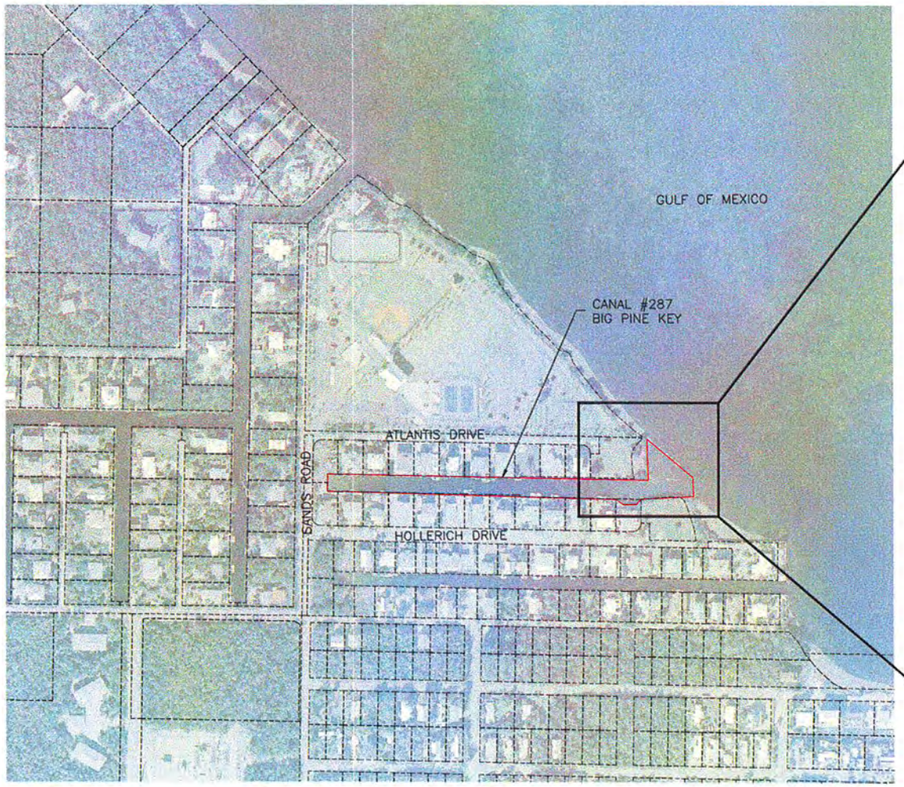
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot at the end of Hollerich Drive that could be used as a construction staging area.

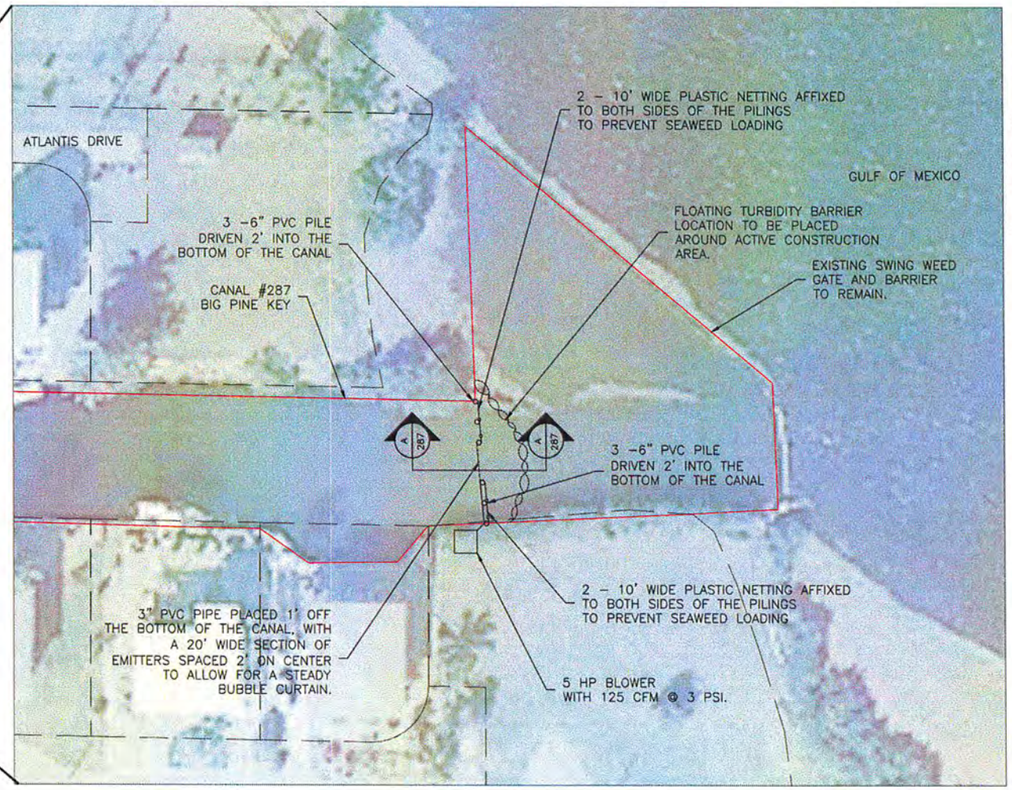
Conceptual Drawing: See Attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



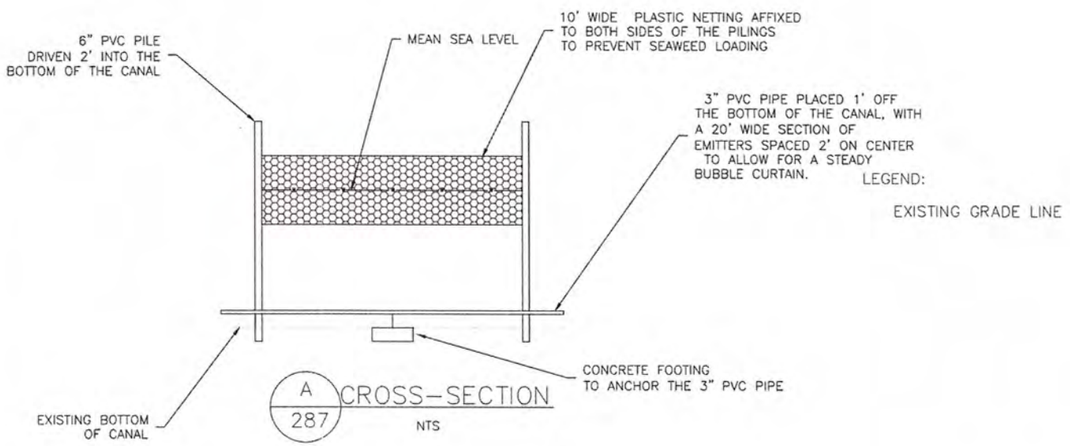
DETAIL SITE LAYOUT – WEED BARRIER

0 30' 60'

SCALE:1"=30'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #287 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A 287 CROSS–SECTION

NTS

ROTRON® Regenerative Blowers

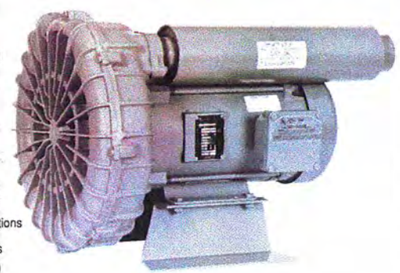
EN 6 & CP 6
Sealed Regenerative Blower w/Explosion-Proof Motor

FEATURES
- Manufactured in the USA – ISO 9001 compliant
- Maximum flow: 225 SCFM
- Maximum pressure: 104 IWG
- Maximum vacuum: 85 IWG
- Standard motor: 5.0 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package



BLOWER SPECIFICATION

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS

NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

WEED BARRIER CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 287	
SHEET OF SHEETS	

Monroe County
Selection of Demonstration Canals for
Water Quality Improvements
AMEC Project No. 6783-13-2507
November 8, 2013

ORGANIC REMOVAL

Monroe County Selection of Demonstration Canals for ORGANIC REMOVAL

Canal ID: 266 Big Pine Key

Location: MM 31 Doctor's Arm subdivision, Bayside

Summary of Water Quality Impacts: Primary – Organics accumulation on canal bottom; Secondary – Weed wrack entry into canal

Restoration Technology: Primary - organic removal from canal bottom to eliminate on-going source of organic decomposition; Secondary - Weed barrier to prevent additional entry of weed wrack.

Site Conditions: The canal faces due east and discharges into Bogie Channel. A small area of submerged shoreline shows as privately owned on the aerials although the property appraiser's details of the property do not reflect private ownership. Further research is needed. Sediment characterization data is available indicating sediment can be disposed as clean fill.

Existing Treatment: Air curtain/physical barriers not operating effectively

Homeowner Communication: Very interested homeowner group contacted Monroe County about the need for an upgrade to their weed barrier and removal of accumulated organics from the canal bottom. Sharon Ripley 305-797-7251

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.04 / 0.5% at 5 ft	Not Measured	Poor 115	94

Characteristics	
Size (acres)	1.1
**Average Depth (ft)	-7.18
**Min Depth (ft)	-10.93
Degree of Stagnation	-0.3
Number of Mouths	1
Organic Thickness (ft) Average	0.86
Parcels	37
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.43 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 266 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 14, Township 66 S, Range 29 E , (Latitude: 24°41'55.90" North; Longitude: - 81°20'53.46" West). The information sheet and site location map (**Figure 6**) provide additional details.

Conceptual Design:

The purpose of the project is to remove the organic material from the bottom of canal 266 to eliminate this organic and nutrient source and to increase dissolved oxygen in the water column. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Detailed physical testing
- Polymer and Geotextile Bag Testing

Therefore, for budgetary purposes, AMEC assumed all material would be required to be disposed of at Class I Landfill. Alternate options should be explored during the final design. To calculate the volume for removal, AMEC used the area of the canal and average depth of muck from the bathymetric center line profile of the canal to estimate the 1,529 cubic yards of organic muck to remove.

The project approach will entail using a barge mounted dredge and dewatering system to remove the muck from the canal. The dewatering system will be positioned near the canal shoreline to allow for ease of material loading from the barge system into the geotextile bags. The barge mounted dredge system will contain a pump and piping system which will transfer the material to the shoreline dewatering system. The pump will be connected to a suction hose which will be maneuvered by a certified driver. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity of organic muck to remove and the method of removal within the canal will be verified once detailed bathymetric and muck thickness cross section data, polymer and geotextile bag testing, and chemical and physical data collection are completed.

Construction Cost Estimate:

The approximate construction cost of $675,000, includes the following assumptions:

- Hauling and disposing the material at the Waste Management Medley Landfill
- Hydraulic Dredging
- Geotextile Bags and Roll off Container System without polymer

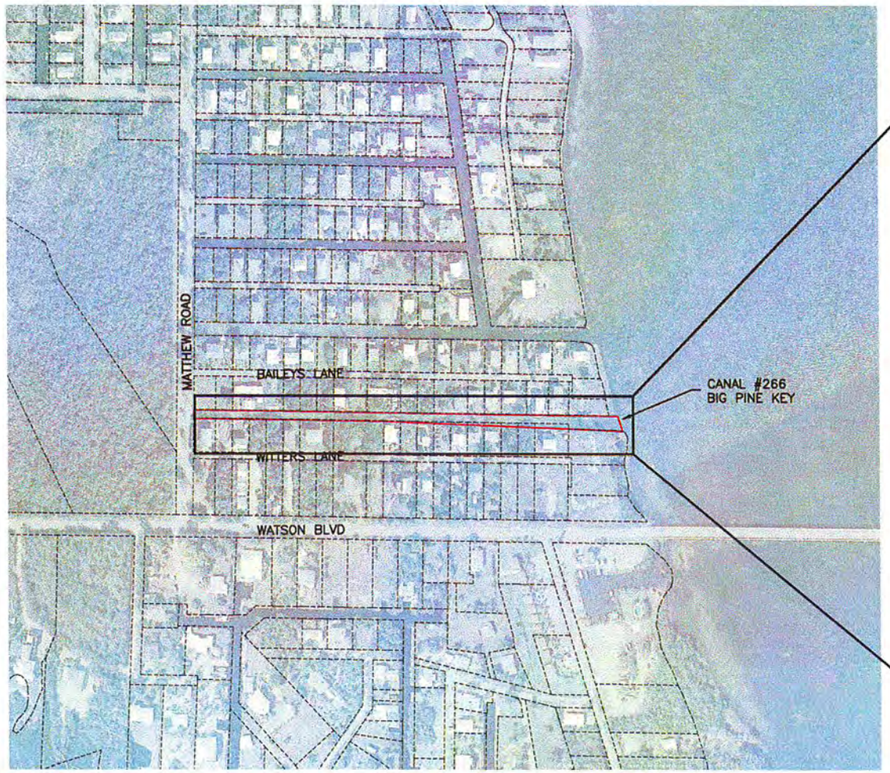
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot on the corner of Baileys Lance and Matthews Road that could be used as a construction staging area.

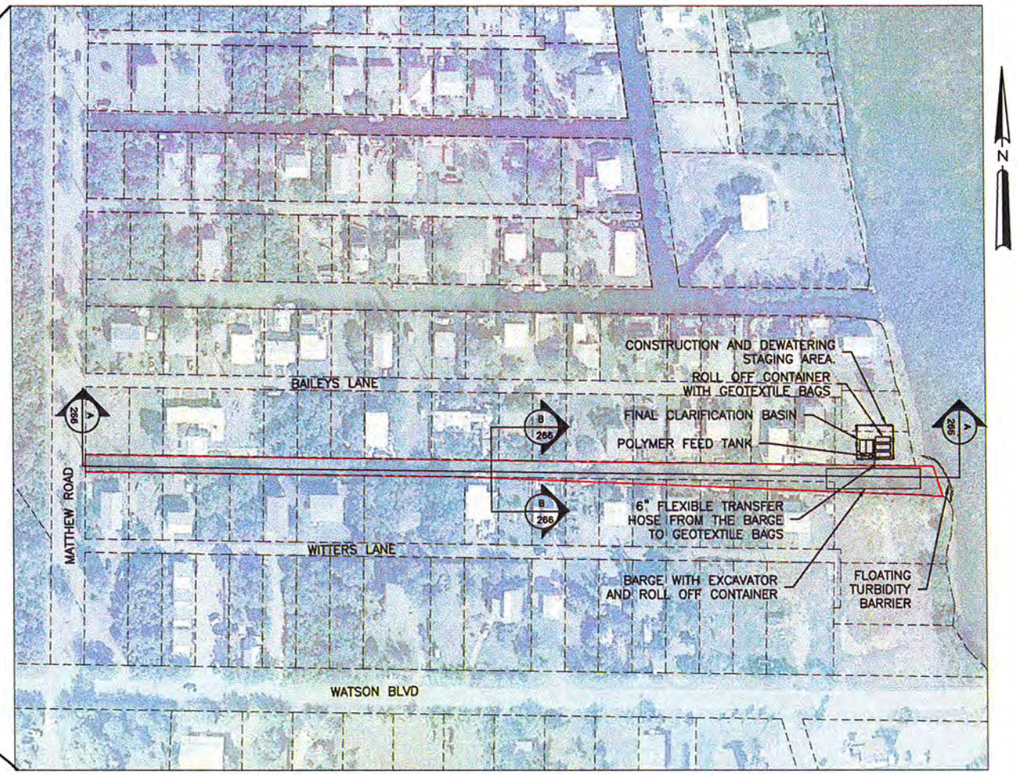
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



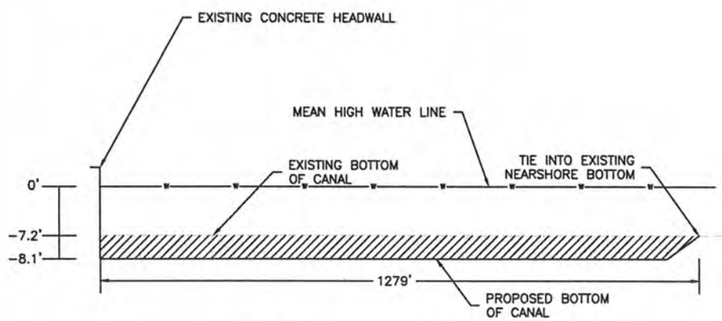
DETAIL SITE LAYOUT – ORGANIC REMOVAL

0 100' 200'

SCALE:1"=100'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #266 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

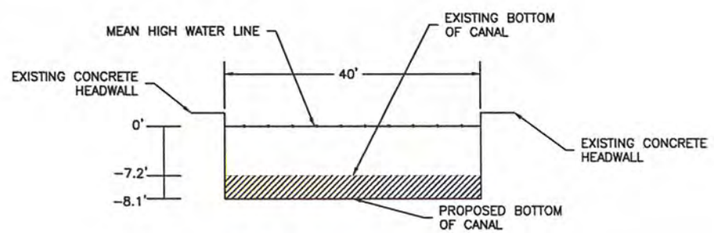


A 266 CROSS–SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- ORGANIC MUCK REMOVAL



B 266 CROSS–SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING ORGANIC REMOVAL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS –10.9 FEET AND THE MAXIMUM OBSERVED DEPTH IS –6.0 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

amec

ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332–3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783–13–2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

ORGANIC REMOVAL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 266	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for ORGANIC REMOVAL

Canal ID: 290 Big Pine Key

Location: MM 31 Not located within a subdivision, Bayside

Summary of Water Quality Impacts: Primary – Organics accumulation on canal bottom.

Restoration Technology: Primary – Organic removal from canal bottom to eliminate on-going source of organic decomposition

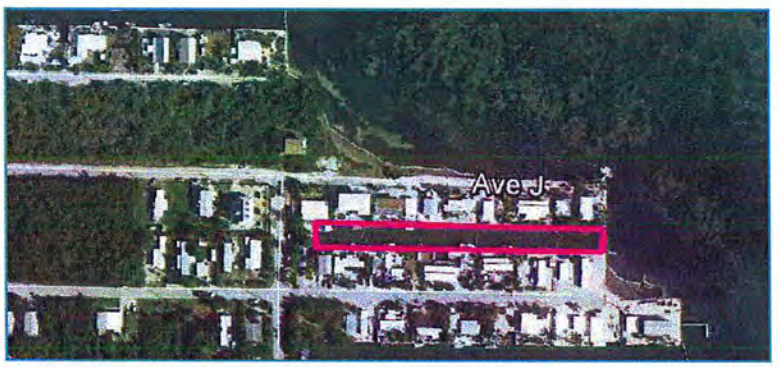
Site Conditions: The canal faces due east and discharges into Bogie Channel. The plat book reflects private ownership of lands below the high-water mark is asserted over 0.06 acres of submerged land in the adjacent canal.

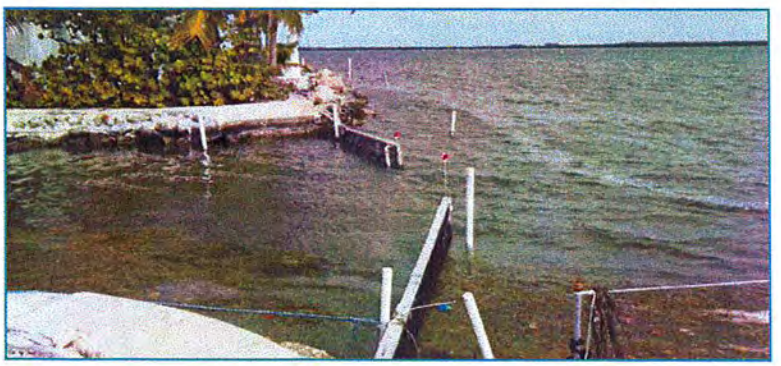
Existing Treatment: Weed barrier, air curtain and weed gates. An effective system operated by one of the homeowners.

Homeowner Communication: Stephen Konop 954-461-3797 sent an email to Monroe County stating this canal needs water quality improvements of muck removal.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.32 / 18.7% at 4 ft	2.68	Poor 106	92

Characteristics	
Size (acres)	0.62
Average Depth (ft)	-7.36
Min Depth (ft)	-7.97
Degree of Stagnation	-0.7
Number of Mouths	1
Organic Thickness (ft)	1.02
Parcels	13
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.36 miles





Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 290 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 25, Township 66 S , Range 29 E, (Latitude: 24°40'30.39" North; Longitude: - 81°20'30.58" West). The information sheet and site location map (**Figure 12**) provide additional details.

Conceptual Design:

The purpose of the project is to remove the organic material from the bottom of canal 290 to eliminate this organic and nutrient source and to increase dissolved oxygen in the water column. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Detailed chemical and physical testing
- Polymer and Geotextile Bag Testing

Therefore, for budgetary purposes, AMEC assumed all material would be required to be disposed of at Class I Landfill. Alternate options should be explored during the final design. To calculate the volume of removal, AMEC used the area of the canal and average depth of muck from the bathymetric center line profile of the canal to estimate the 1,024 cubic yards of organic muck to remove.

The project approach will entail using a barge mounted dredge and dewatering system to remove the muck from the canal. The dewatering system will be positioned near the canal shoreline to allow for ease of material loading from the barge system into the geotextile bags. The barge mounted dredge system will contain a pump and piping system which will transfer the material to the shoreline dewatering system. The pump will be connected to a suction hose which will be maneuvered by a certified driver. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity of organic muck to remove and the method of removal within the canal will be verified once detailed bathymetric and muck thickness cross section data, polymer and geotextile bag testing, and chemical and physical data collection are completed.

Construction Cost Estimate:

The approximate construction cost of $460,000, includes the following assumptions:

- Hauling and disposing the material at the Waste Management Medley Landfill
- Hydraulic Dredging
- Geotextile Bags and Roll off Container System without polymer

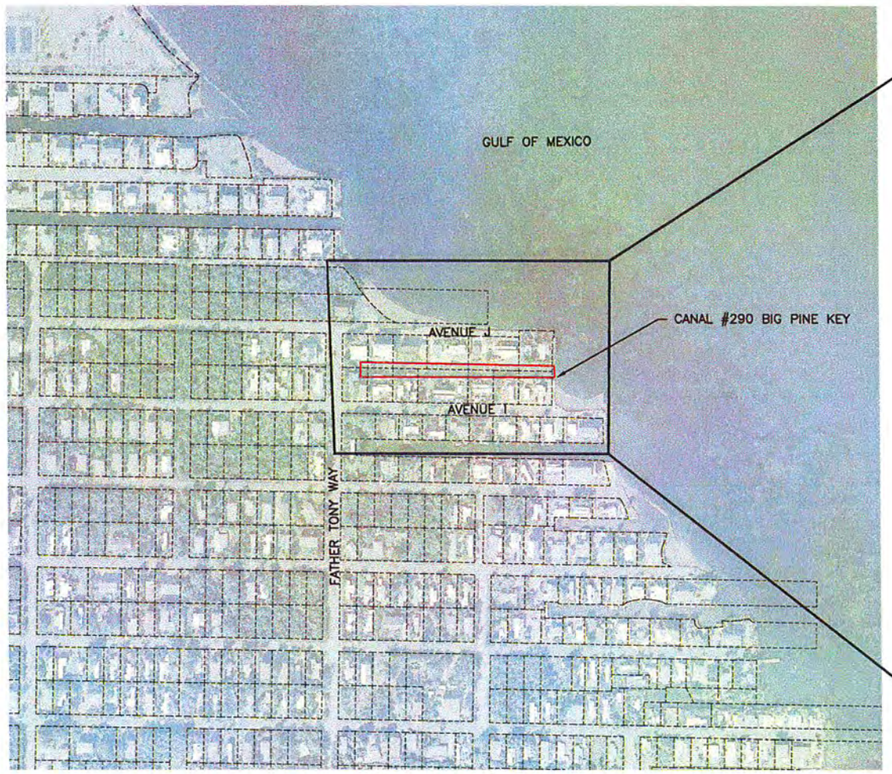
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot on the corner of Father Tony Way and Avenue I that could be used as a construction staging area with minor vegetation trimming.

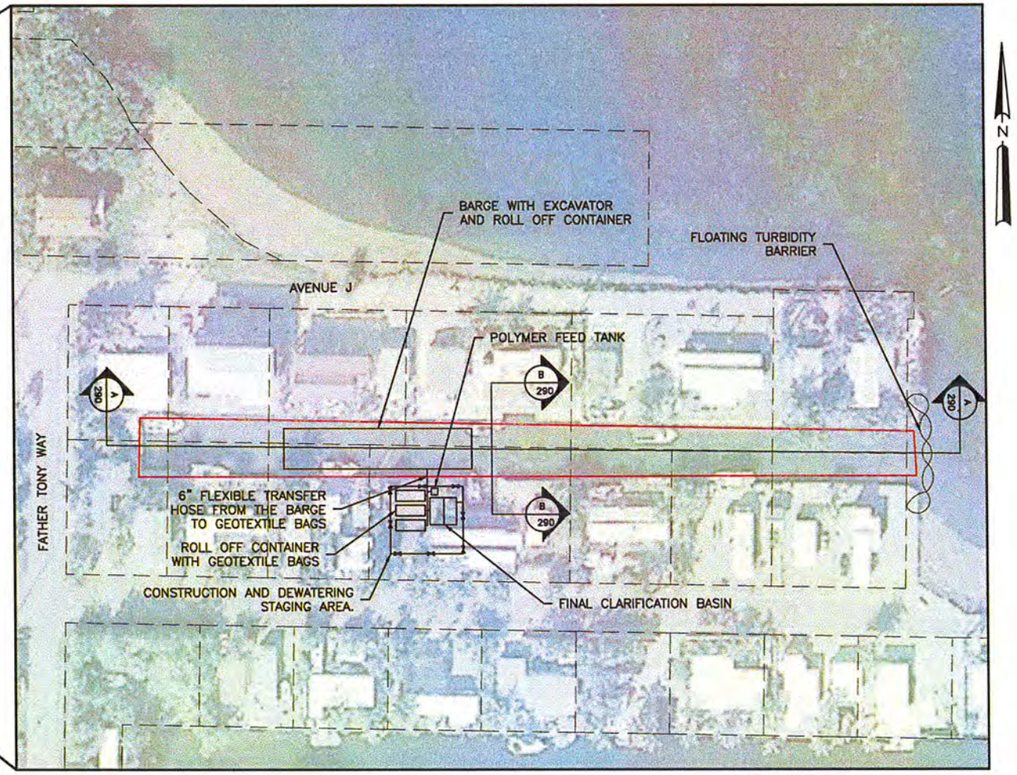
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



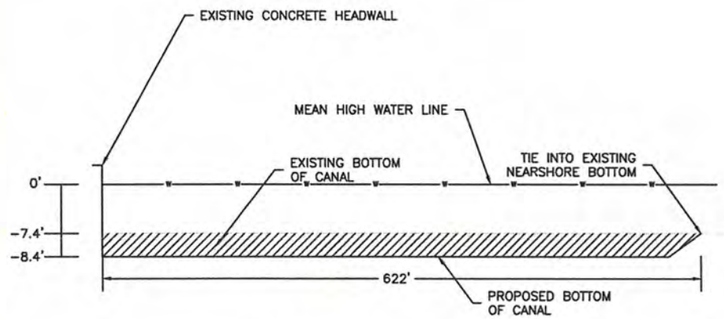
DETAIL SITE LAYOUT -ORGANIC REMOVAL

0 50' 100'

SCALE:1"=50'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #290 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

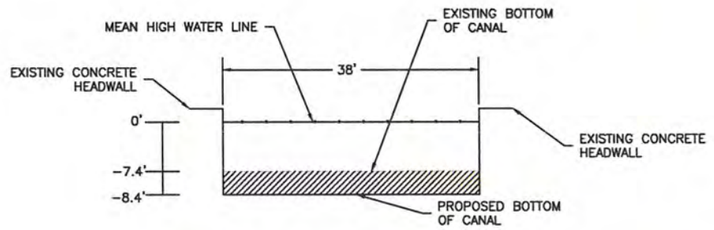


A/290 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- ORGANIC MUCK REMOVAL



B/290 CROSS-SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING ORGANIC REMOVAL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS -8.0 FEET AND THE MAXIMUM OBSERVED DEPTH IS -7.2 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

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404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

ORGANIC REMOVAL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 290	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for ORGANIC REMOVAL

Canal ID: 297 Big Pine Key

Location: MM 31 Ross Haven subdivision, Bayside

Summary of Water Quality Impacts: Primary – Organics accumulation on canal bottom; Secondary – Weed wrack entry into canal

Restoration Technology: Primary – Organic removal from canal bottom to eliminate on-going source of organic decomposition; Secondary - Weed barrier to prevent additional entry of weed wrack.

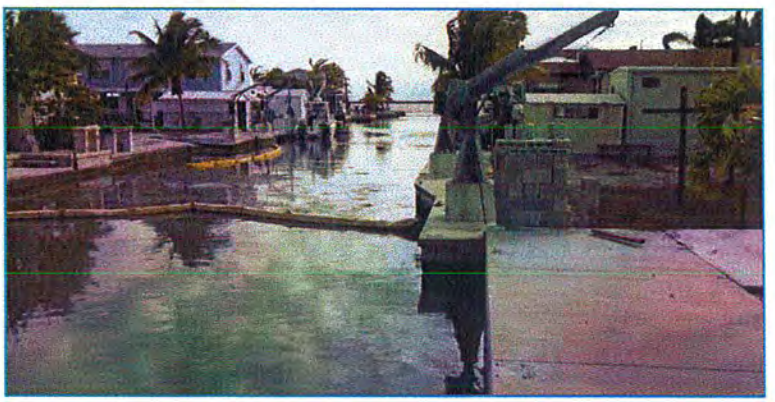
Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Weedgate that is not operating effectively

Homeonwer Communication: None to date. No HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.17 / 2.5% at 3 ft	9.63	Poor 115	92

Characteristics	
Size (acres)	0.46
Average Depth (ft)	-7.08
Min Depth (ft)	-7.25
Degree of Stagnation	-0.8
Number of Mouths	1
Organic Thickness (ft)	1.26
Parcels	15
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.59 miles



Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 297 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 24 Township 66 S, Range 29 E , (Latitude: 24°40'23.69" North; Longitude: - 81°20'24.70" West). The information sheet and site location map (**Figure 13)** provide additional details.

Conceptual Design:

The purpose of the project is to remove the organic material from the bottom of canal 297 to eliminate this organic and nutrient source and to increase dissolved oxygen in the water column. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Detailed chemical and physical testing
- Polymer and Geotextile Bag Testing

Therefore, for budgetary purposes, AMEC assumed all material would be required to be disposed of at Class I Landfill. Alternate options should be explored during final design. To calculate the volume of removal, AMEC used the area of the canal and average depth of muck from the bathymetric center line profile of the canal to estimate the 933 cubic yards of organic muck to remove.

The project approach will entail using a barge mounted dredge and dewatering system to remove the muck from the canal. The dewatering system will be positioned near the canal shoreline to allow for ease of material loading from the barge system into the geotextile bags. The barge mounted dredge system will contain a pump and piping system which will transfer the material to the shoreline dewatering system. The pump will be connected to a suction hose which will be maneuvered by a certified driver. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity of organic muck to remove and the method of removal within the canal will be verified once detailed bathymetric and muck thickness cross section data, polymer and geotextile bag testing, and chemical and physical data collection are completed.

Construction Cost Estimate:

The approximate construction cost of $420,000, includes the following assumptions:

- Hauling and disposing the material at the Waste Management Medley Landfill
- Hydraulic Dredging
- Geotextile Bags and Roll off Container System without polymer

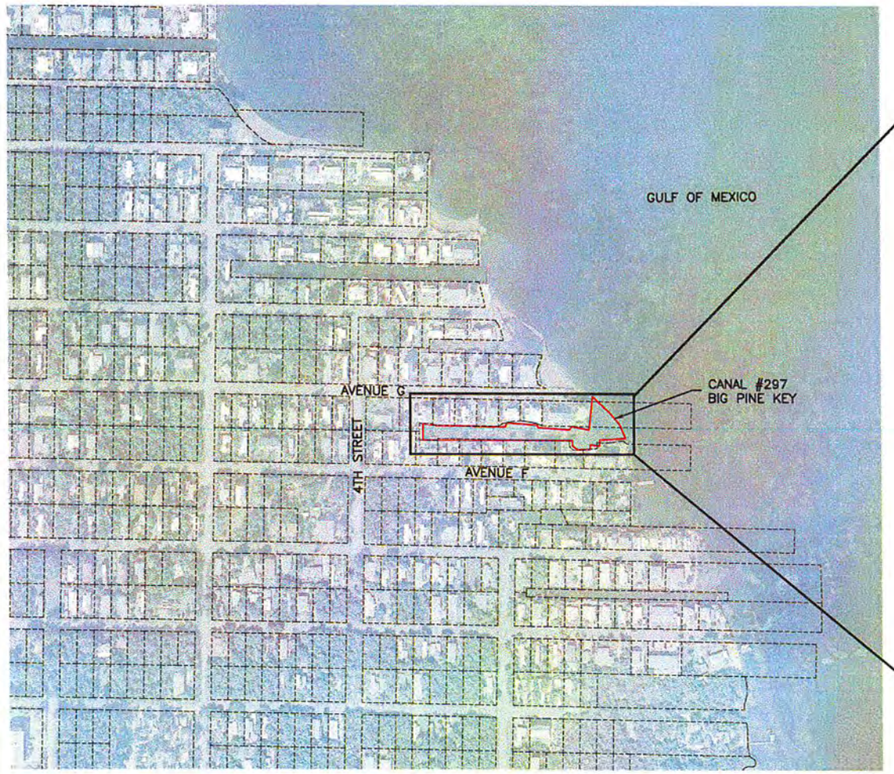
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot at the end of the canal between Avenue G and Avenue F that could be used as a construction staging area.

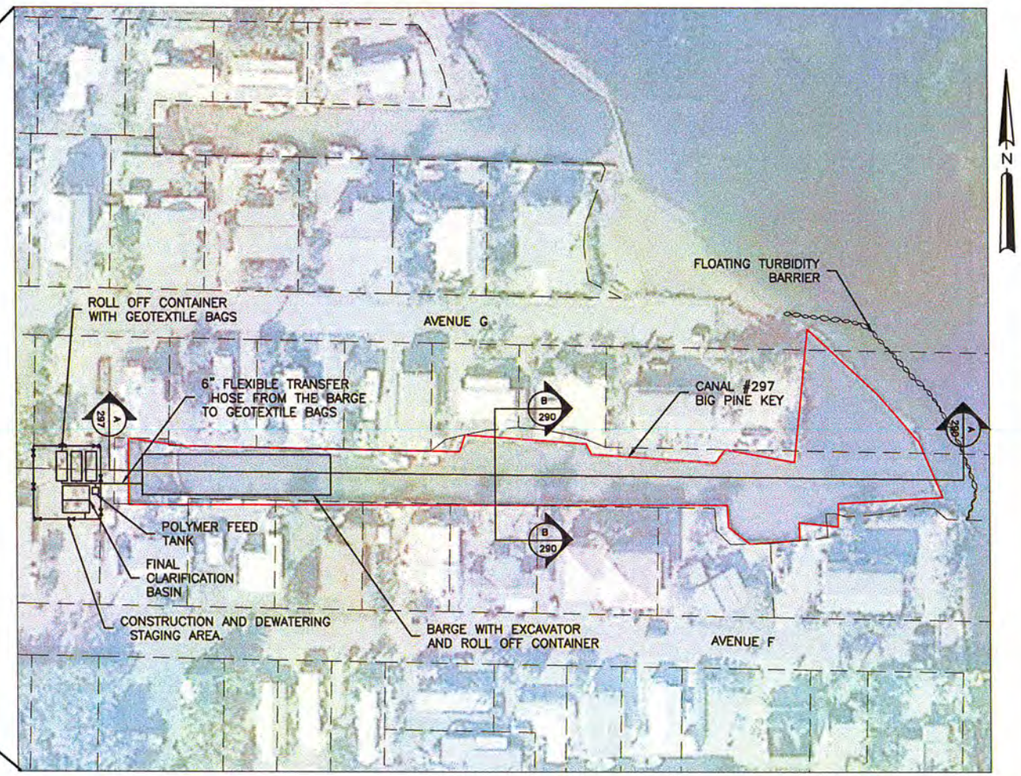
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



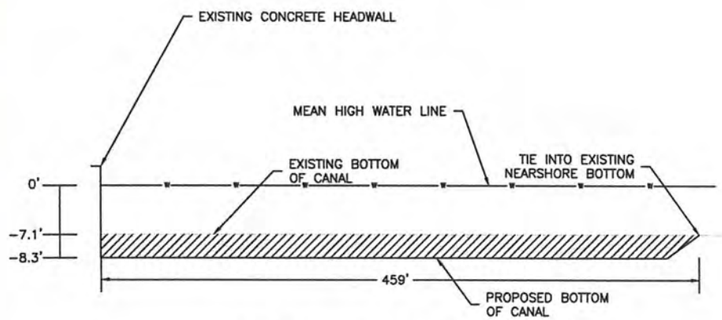
DETAIL SITE LAYOUT – ORGANIC REMOVAL

0 50' 100'

SCALE:1"=50'

LEGEND

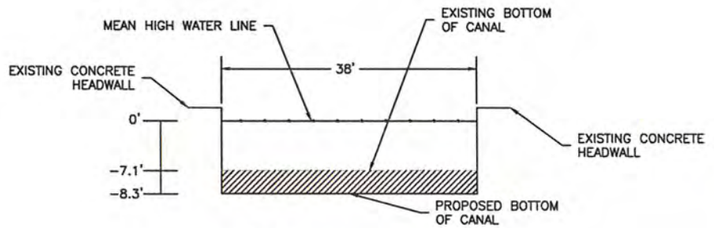
- FLOATING TURBIDITY BARRIER
- CANAL #297 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A / 297 CROSS–SECTION

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- ORGANIC MUCK REMOVAL



B / 297 CROSS–SECTION

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING ORGANIC REMOVAL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS –7.3 FEET AND THE MAXIMUM OBSERVED DEPTH IS –7.0 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

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ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332–3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783–13–2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

ORGANIC REMOVAL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 297	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for ORGANIC REMOVAL

Canal ID: 287 Big Pine Key

Location: MM 31 Atlantic Estates subdivision, Bayside

Summary of Water Quality Impacts: Primary – Organics accumulation on canal bottom; Secondary – Weed wrack entry into canal

Restoration Technology: Primary – Organic removal from canal bottom to eliminate on-going source of organic decomposition; Secondary - Weed barrier to prevent additional entry of weed wrack

Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Weed gate

Homeowner Communication: AMEC spoke with Doug Scheele 305-797-4606 and Dennis Fowler 305 872-5656. Both seemed very interested in the project. No HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.98 / 15.8% at 5 feet	Not Measured	Poor 112	67

Characteristics	
Size (acres)	1.43
**Average Depth (ft)	-9.67
**Min Depth (ft)	-13.98
Degree of Stagnation	-0.3
Number of Mouths	1
Organic Thickness (ft) Average	0.83
Parcels	26
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.17 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 287 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 24, Township 66 S, Range 29 E , (Latitude: 24°40'37.53" North; Longitude: - 81°20'40.62" West). The information sheet and site location map (**Figure 10**) provide additional details.

Conceptual Design:

The purpose of the project is to remove the organic material from the bottom of canal 287 to eliminate this organic and nutrient source and to increase dissolved oxygen in the water column. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Detailed chemical and physical testing
- Polymer and Geotextile Bag Testing

Therefore, for budgetary purposes, AMEC assumed all material would be required to be disposed of at Class I Landfill. Alternate options should be explored during the final design. To calculate the volume of removal, AMEC used the area of the canal and average depth of muck from the bathymetric center line profile of the canal to estimate the 1,931 cubic yards of organic muck to remove.

The project approach will entail using a barge mounted dredge and dewatering system to remove the muck from the canal. The dewatering system will be positioned near the canal shoreline to allow for ease of material loading from the barge system into the geotextile bags. The barge mounted dredge system will contain a pump and piping system which will transfer the material to the shoreline dewatering system. The pump will be connected to a suction hose which will be maneuvered by a certified driver. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity of organic muck to remove and the method of removal within the canal will be verified once detailed bathymetric and muck thickness cross section data, polymer and geotextile bag testing, and chemical and physical data collection are completed.

Construction Cost Estimate:

The approximate construction cost of $835,000, includes the following assumptions:

- Hauling the material to the Waste Management Medley Landfill
- Hydraulic Dredging
- Geotextile Bags and Roll off Container System without polymer

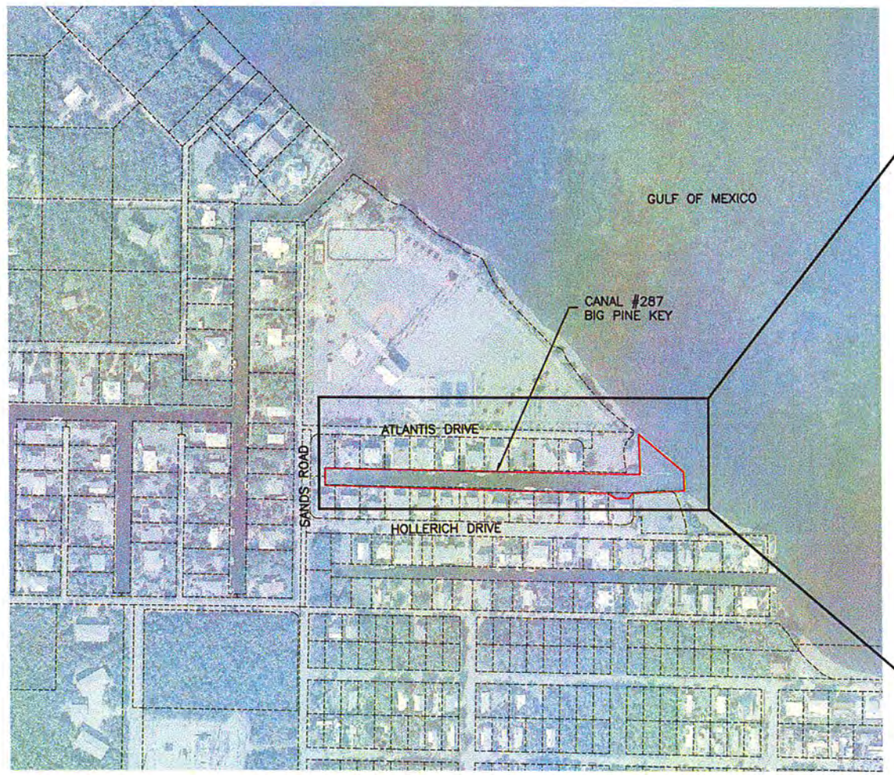
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot on the corner of Sands Road and Atlantis Drive that could be used as a construction staging area.

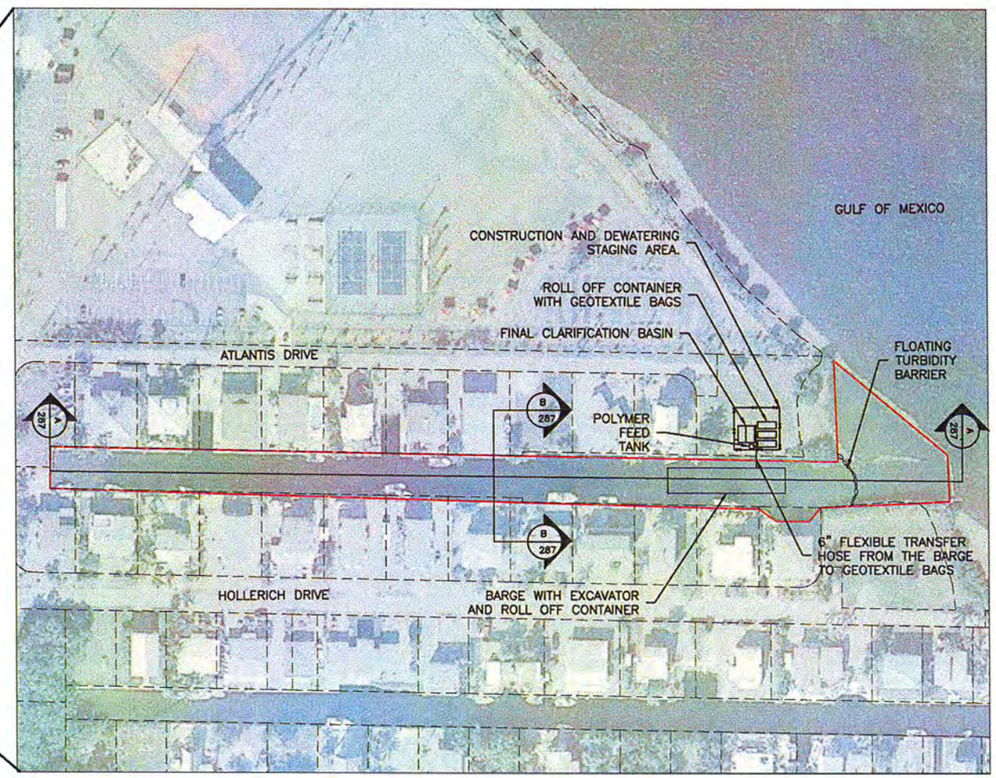
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



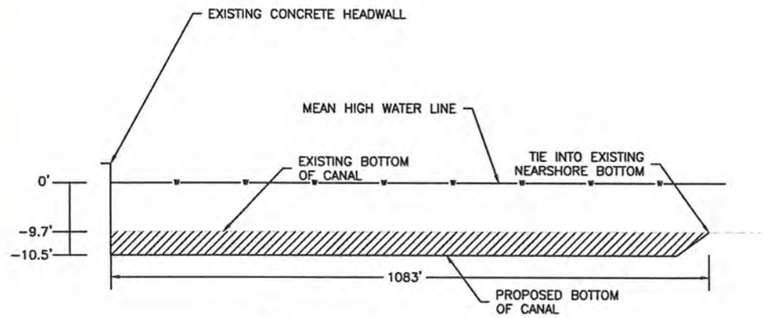
DETAIL SITE LAYOUT – ORGANIC REMOVAL

0 80' 160'

SCALE:1"=80'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #287 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

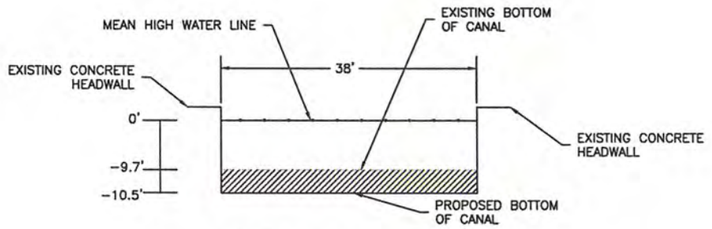


A/287 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- ORGANIC MUCK REMOVAL



B/287 CROSS-SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING ORGANIC REMOVAL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS –14.0 FEET AND THE MAXIMUM OBSERVED DEPTH IS –7.0 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

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ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

ORGANIC REMOVAL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 287	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for ORGANIC REMOVAL

Canal ID: 288 Big Pine Key

Location: MM 31 Hollerich subdivision, Bayside

Summary of Water Quality Impacts: Primary – Organics accumulation on canal bottom; Secondary – Weed wrack entry into canal; Tertiary – deep stagnant zone with an average depth of - 12.60 feet.

Restoration Technology: Primary – Organic removal from canal bottom to eliminate on-going source of organic decomposition; Secondary - Weed barrier to prevent additional entry of weed wrack; Tertiary – backfilling (for the purpose of eliminating deep oxygen depleted impaired water quality zone)

Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Weedgate not operating effectively

Homeowner Communication: None to date. No HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.03 / 0.6% at 5 ft	0	Poor 112	52

Characteristics	
Size (acres)	1.36
Average Depth (ft)	-12.60
Min Depth (ft)	-18.58
Degree of Stagnation	-0.2
Number of Mouths	1
Organic Thickness (ft)	0.84
Parcels	37
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.23 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); Waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 288 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 24, Township 66 S, Range 29 E , (Latitude: 24°40'34.75" North; Longitude: - 81°20'37.33" West). The information sheet and site location map (**Figure 11**) provide additional details.

Conceptual Design:

The purpose of the project is to remove the organic material from the bottom of canal 288 to eliminate this organic and nutrient source and to increase dissolved oxygen in the water column. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Detailed chemical and physical testing
- Polymer and Geotextile Bag Testing

Therefore, for budgetary purposes, AMEC assumed all material would be required to be disposed of at Class I Landfill. Alternate options should be explored during the final design. To calculate the volume of removal, AMEC used the area of the canal and average depth of muck from the bathymetric center line profile of the canal to estimate the 1,851 cubic yards of organic muck to remove.

The project approach will entail using a barge mounted dredge and dewatering system to remove the muck from the canal. The dewatering system will be positioned near the canal shoreline to allow for ease of material loading from the barge system into the geotextile bags. The barge mounted dredge system will contain a pump and piping system which will transfer the material to the shoreline dewatering system. The pump will be connected to a suction hose which will be maneuvered by a certified driver. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity of organic muck to remove and the method of removal within the canal will be verified once detailed bathymetric and muck thickness cross section data, polymer and geotextile bag testing, and chemical and physical data collection are completed.

Construction Cost Estimate:

The approximate construction cost of $802,000, includes the following assumptions:

- Hauling the material to the Waste Management Medley Landfill
- Hydraulic Dredging
- Geotextile Bags and Roll off Container System without polymer

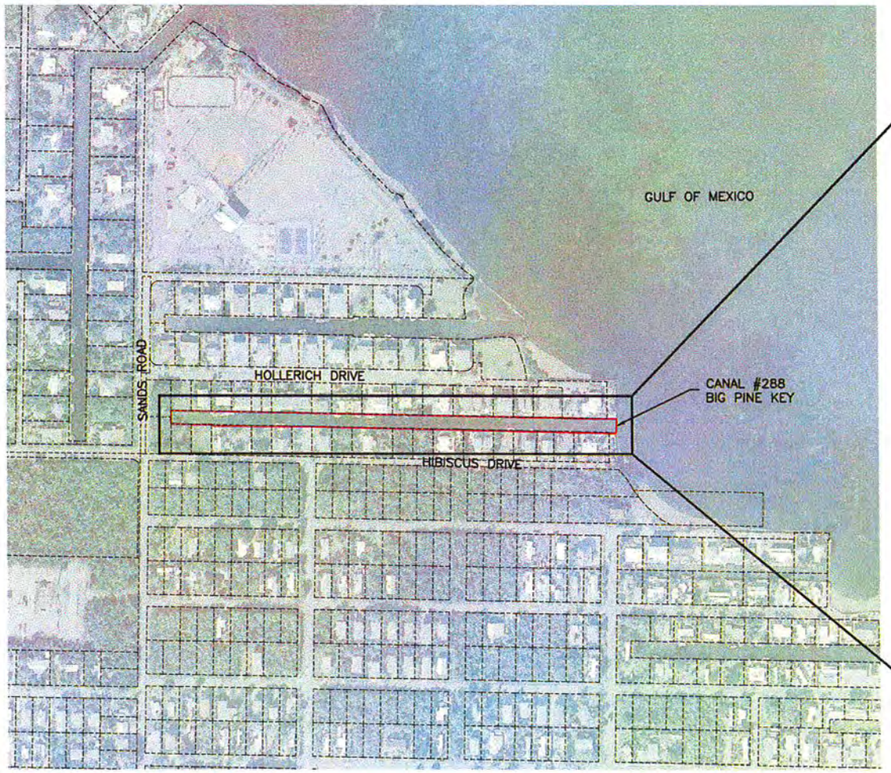
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot on the corner of Sands Road and Hollerich Drive that could be used as a construction staging area.

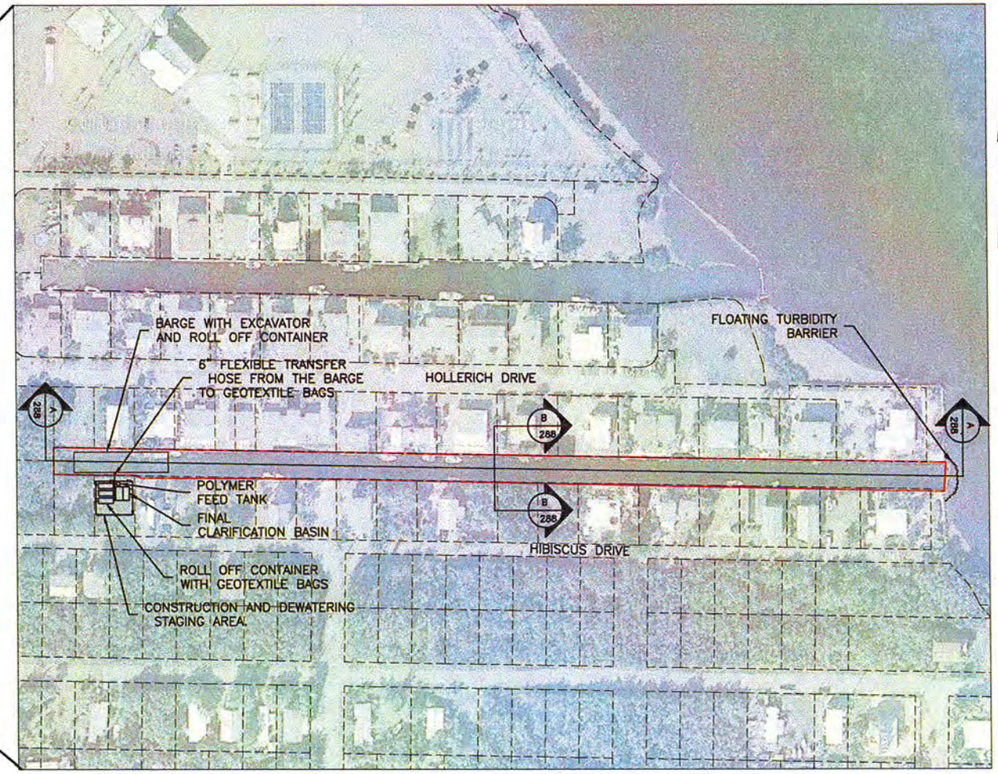
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



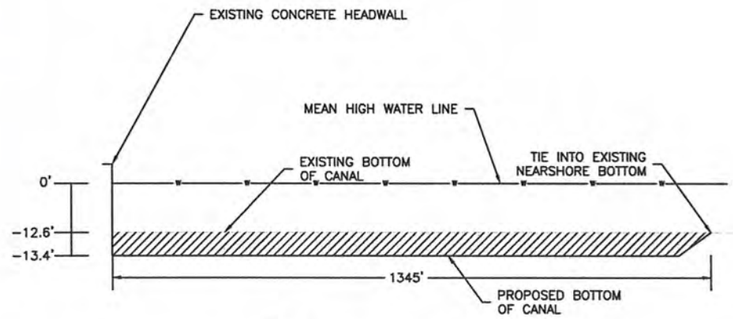
DETAIL SITE LAYOUT – ORGANIC REMOVAL

0 100' 200'

SCALE:1"=100'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #288 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

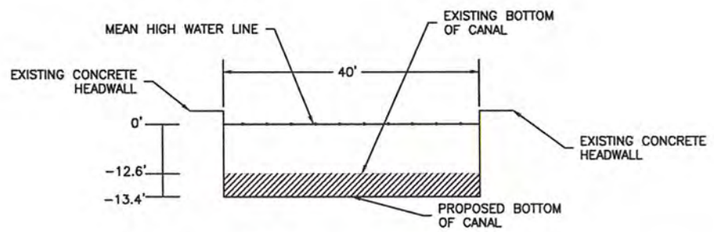


A 288 CROSS–SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- ORGANIC MUCK REMOVAL



B 288 CROSS–SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING ORGANIC REMOVAL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS –18.6 FEET AND THE MAXIMUM OBSERVED DEPTH IS –7.1 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

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404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783–13–2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

ORGANIC REMOVAL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 288	
SHEET OF SHEETS	

Monroe County
Selection of Demonstration Canals for
Water Quality Improvements
AMEC Project No. 6783-13-2507
November 8, 2013

CULVERTS

Monroe County Selection of Demonstration Canals for CULVERT INSTALLATION

Canal ID: 459 Geiger Key

Location: MM 10 Boca Chica Ocean Shores subdivision, Oceanside

Summary of Water Quality Impacts: Weed wrack entry into dead end canal

Restoration Technology: Culvert installation under Boca Chica Road with connection to Canal 460 Geiger Key to assist with flushing and prevent the entrapment of weed wrack at the end of the canal.

Site Conditions: The canal faces southeast and discharges into Similar Sound. The plat book indicates the property is owned by the federal government. The County indicated they cannot pre-empt federal use of the property and additional research is being conducted to determine the nature of the federal interest in the property.

Existing Treatment: None

Homeowner Communication: None to date

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.74 / 27.6% at 5 ft	Not Measured	Poor 86	64

Characteristics	
Size (acres)	0.25
Average Depth (ft)	-8.69
Min Depth (ft)	-9.71
Degree of Stagnation	-0.9
Number of Mouths	1
Organic Thickness (ft)	0.59
Parcels	7
WBID	6014C Not impaired
WWT	FKAA/Big Coppitt
FKNMS Monitoring Station	4.37 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 459 Geiger Key

Project Location:

The project area is located south of US1 in Monroe County, Geiger Key, Florida; Section 26, Township 67 S , Range 26 E , (Latitude: 24°35'04.80" North; Longitude: - 81° 39'00.15" West). The information sheet and site location map (**Figure 14**) provide additional details.

Conceptual Design:

The purpose of the project is to hydrologically connect canal 459 and 460 to increase the natural tidal flushing and reduce seaweed entrapment in the dead ends of the canal. At this stage in the project, the following design components have not been completed:

- Hydraulic models
- Geotechnical investigations
- Detailed topographic and bathymetric data

Therefore, for budgetary purposes AMEC has proposed installing an 8 feet high by 8 feet wide by 112 foot long precast concrete box culvert with a manatee grate under Boca Chica Road. The installation for the box culvert will entail using excavators to remove a 28 foot wide by 112 foot long section perpendicular to Boca Chica Road between Egret Lane and Jay Lane. Due to the removal of a portion of the main access road when installing the box culvert, maintenance of traffic plans will be created to ensure minimal impacts to local traffic. In the event the existing water and sewer lines need to be removed for the box culvert construction, a bypass system will be created during construction to ensure minimal outage to the local area. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

Construction Cost Estimate:

The approximate cost to construct the culvert connection as aforementioned will be $130,000.

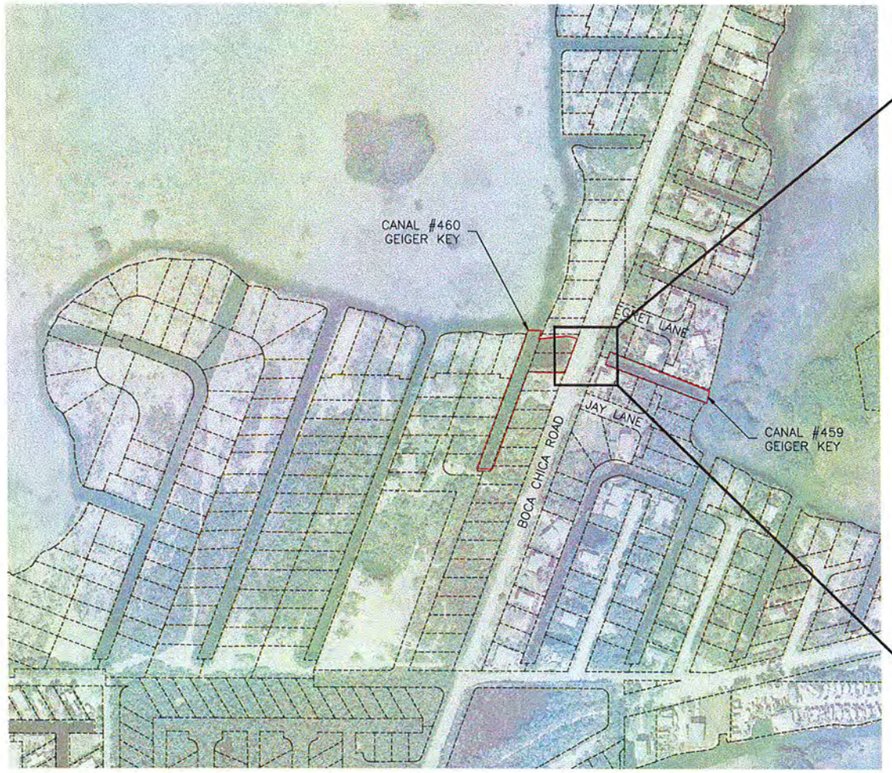
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Right of Way Permit
- Monroe County Building Permit

Access:

Based on field visits, an area located along Egret Lane could be used as a construction staging area with minor vegetation trimming.

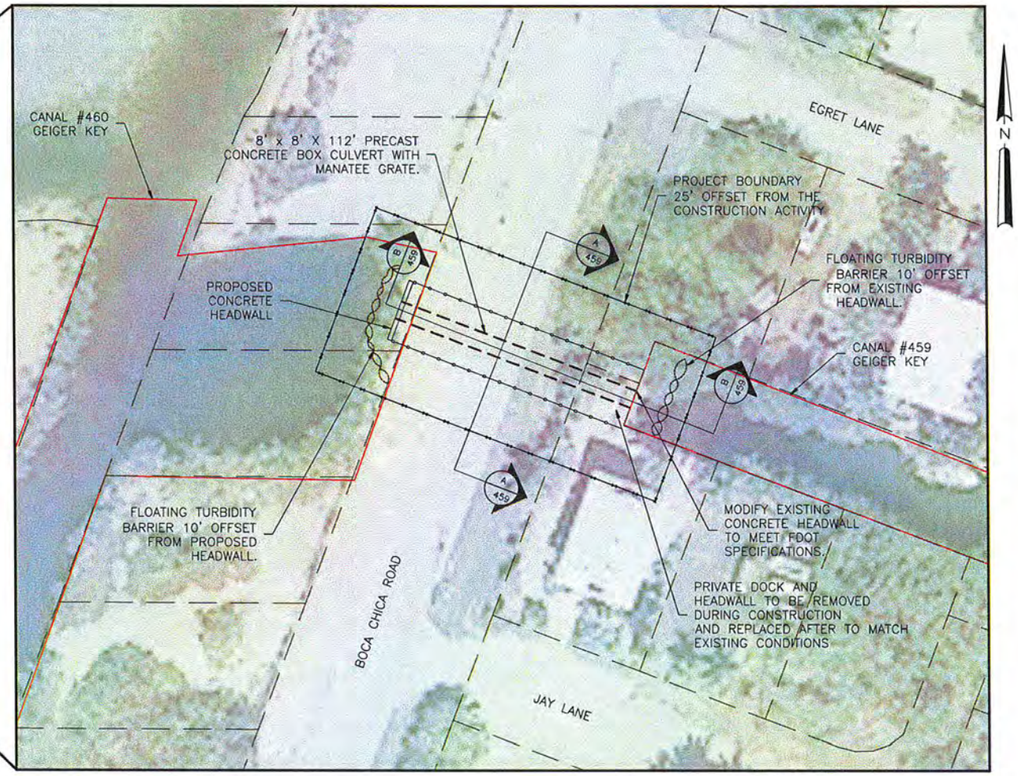
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



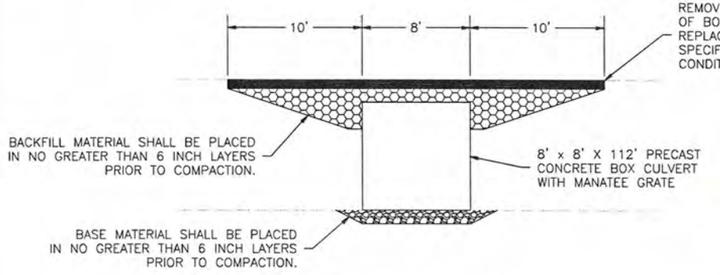
DETAIL SITE LAYOUT – CULVERT CONNECTION

0 30' 60'

SCALE:1"=30'

LEGEND

- BOX CULVERT
- EXCAVATION LIMITS
- FLOATING TURBIDITY BARRIER
- CANAL FOOTPRINTS
- MONROE COUNTY PARCELS, 2010



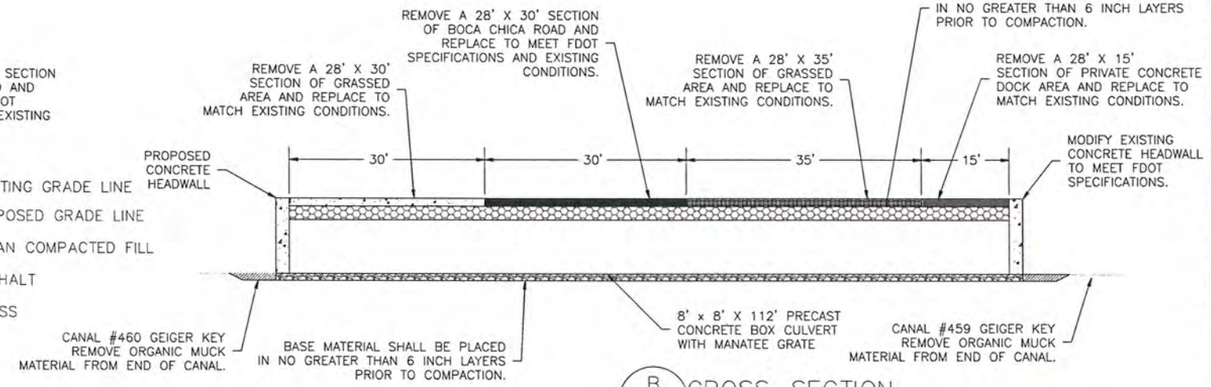
A 459 CROSS–SECTION

0 5' 10'

SCALE:1"=5'

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- CLEAN COMPACTED FILL
- ASPHALT
- GRASS



B 459 CROSS–SECTION

0 10' 20'

SCALE:1"=10'

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404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332–3318

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SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No:
6783–13–2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

CULVERT CONNECTION
CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 459	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for CULVERT INSTALLATION

Canal ID: 277 Big Pine Key

Location: MM 31 Tropical Bay (3rd Addition) subdivision, Bayside

Summary of Water Quality Impacts: This canal system has multiple water quality impacts; Primary – Lack of flushing due to long multi-fingered canal system; also weed wrack entry, accumulated organics and deep stagnant zones due to average depth of -10.3 and max depth of -21.04.

Restoration Technology: Primary - Culvert connection at north end of Sunset Drive to Bogie Channel to assist with flushing (also will assist with weed wrack not getting trapped at the dead end of the canal); Secondary - Organic removal from canal bottom to eliminate on-going source of organic decomposition; Tertiary – backfilling (For the purpose of eliminating deep oxygen depleted impaired water quality zone)

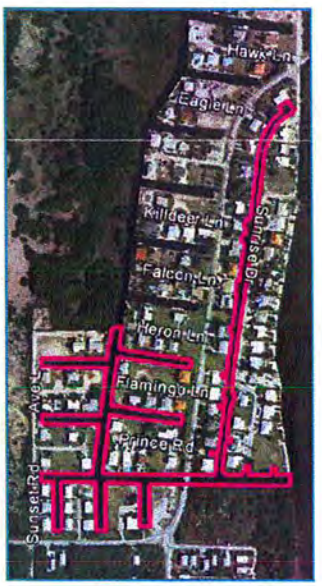
Site Conditions: The canal faces due east and discharges into Bogie Channel. Private ownership of the lands below the high-water mark is not reflected in the plat book.

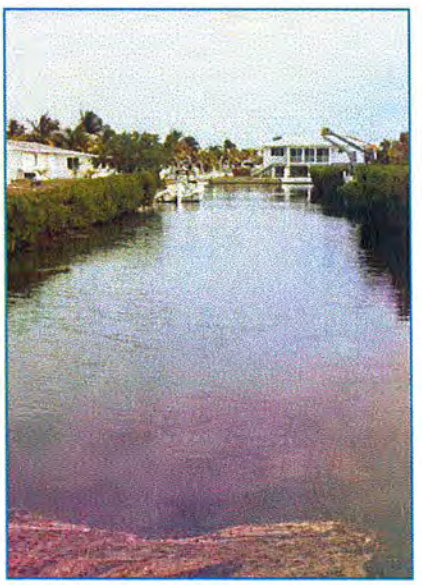
Existing Treatment: Culvert between 2 of the canal fingers; culvert appears undersized and possibly clogged.

Homeowner Communication: Numerous homeowners have submitted letters to Monroe County stating their request for demo canal cleanup funding. Some have suggested canal bottom organics removal.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.5 / 21% at 5 ft	0.89	Poor 111	63

Characteristics	
Size (acres)	5.44
Average Depth (ft)	-10.32
Min Depth (ft)	-21.04
Degree of Stagnation	1.2
Number of Mouths	1
Organic Thickness (ft)	1.15
Parcels	88
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
FKNMS Monitoring Station	1.52 miles





Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 277 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 14, Township 66 S, Range 29 E , (Latitude: 24°41'43.52" North; Longitude: - 81° 21'22.92" West). The information sheet and site location map (**Figure 7**) provide additional details.

Conceptual Design:

The purpose of the project is to hydrologically connect canal 277 to open water in Doctor's Arm to increase natural tidal flushing and reduce seaweed entrapment in the dead ends of the canal. At this stage in the project, the following design components have not been completed:

- Hydraulic models
- Geotechnical investigations
- Detailed topographic and bathymetric data

Therefore, for budgetary purposes, AMEC is proposing installation of an 8 feet high by 8 feet wide by 185 foot long precast concrete box culvert with a manatee grate and plastic netting placed from the Doctor's Arm to canal 277. The installation will entail using excavators to remove a 28 foot wide by 185 foot long section through an empty lot and across Sunrise Drive. Due to the removal of a portion of the road, maintenance of traffic plans will be created to ensure minimal impacts to local traffic. In the event the existing water lines may be impacted due to construction, a bypass system will be created to maintain service to the local residents. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

Construction Cost Estimate:

The approximate cost to construct the culvert connection as aforementioned will be $195,000.

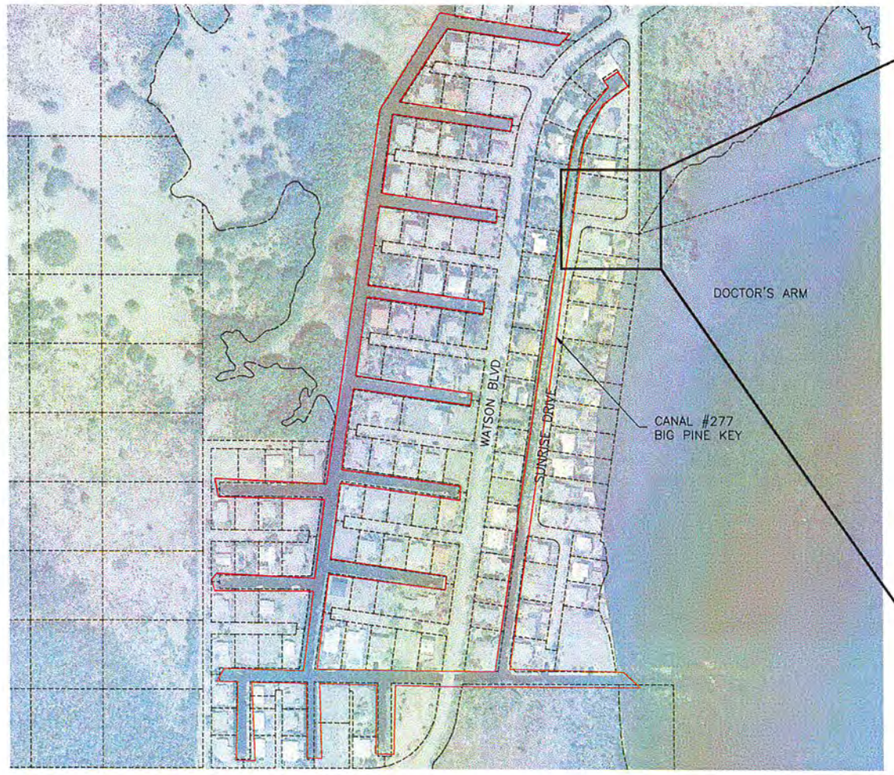
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Right of Way Permit
- Monroe County Building Permit

Access:

Based on field visits, an area located along within the empty lot adjacent to Sunrise Drive could be used as a construction staging area.

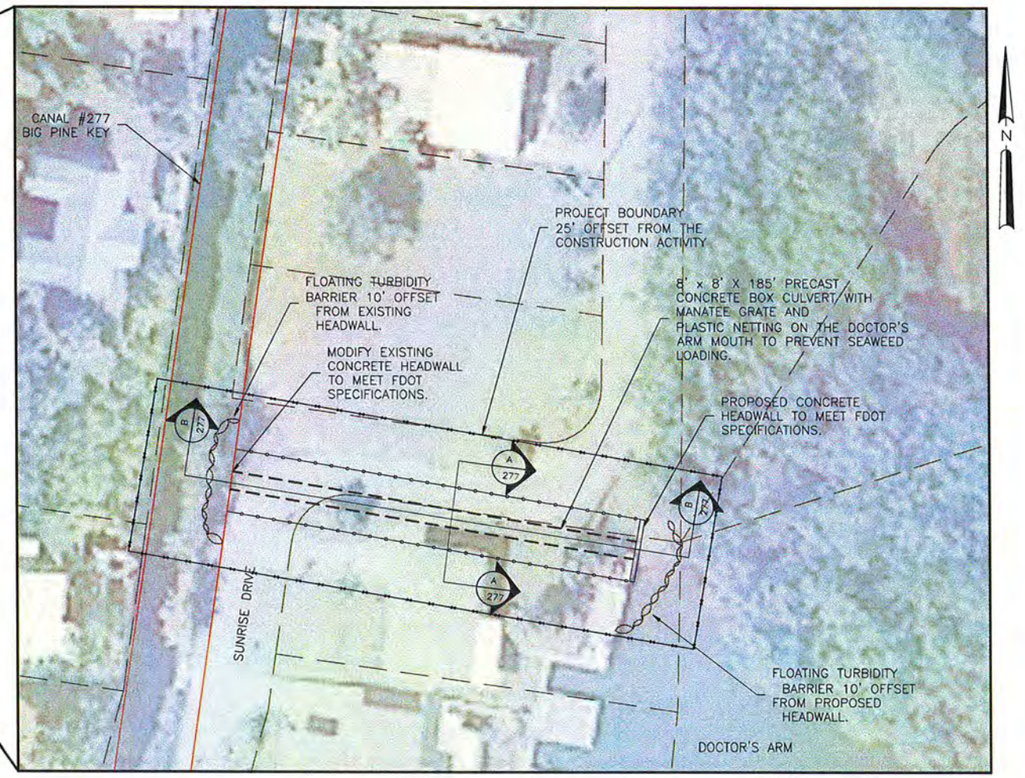
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



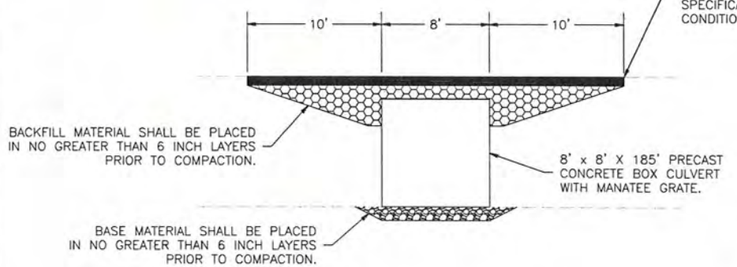
DETAIL SITE LAYOUT – CULVERT CONNECTION

0 30' 60'

SCALE:1"=30'

LEGEND

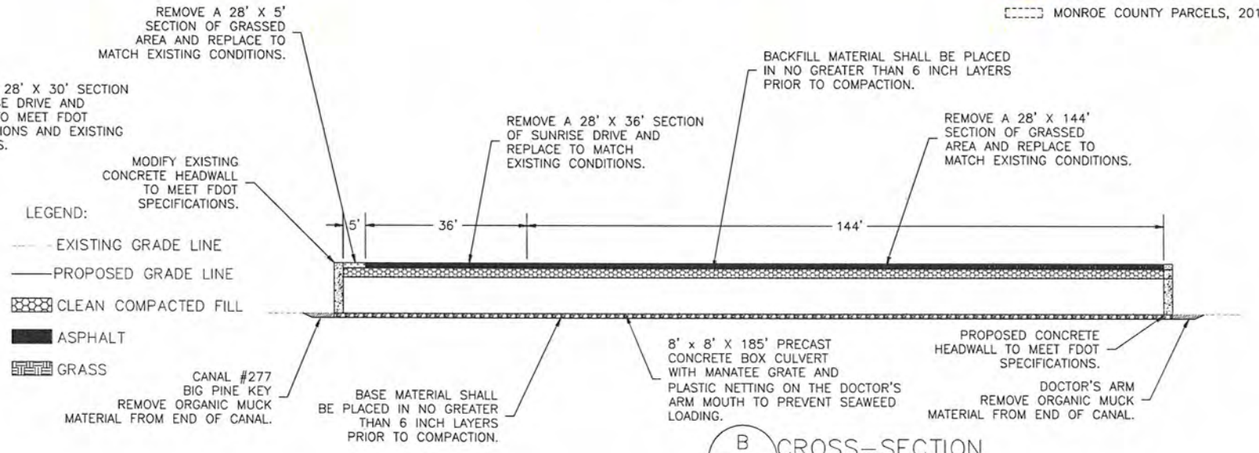
- BOX CULVERT
- EXCAVATION LIMITS
- FLOATING TURBIDITY BARRIER
- CANAL FOOTPRINTS
- MONROE COUNTY PARCELS, 2010



A 277 CROSS-SECTION

0 5' 10'

SCALE:1"=5'



B 277 CROSS-SECTION

0 15' 30'

SCALE:1"=15'

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404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT
SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No:
6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

CULVERT CONNECTION CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 277	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for CULVERT INSTALLATION

Canal ID: 472 Geiger Key

Location: MM 10 Geiger Mobile Homes subdivision, Oceanside

Summary of Water Quality Impacts: This canal system has multiple water quality impacts including weed wrack entry, accumulated organics and deep stagnant zones due to average depth of -11.79 and max depth of -15.79.

Restoration Technology: Although there are multiple technologies that could improve the water quality of this canal (e. g. weed barrier, organic removal and backfilling), culvert installation was selected because of the potential connection under Boca Chica Road with connection to Canal # 470 Geiger Key to assist with flushing (which will also assist with weed wrack not getting trapped at the dead end of the canal).

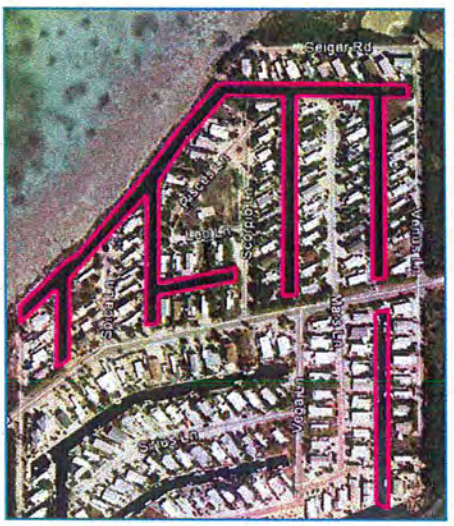
Site Conditions: The canal faces due south and discharges into Similar Sound. No information is available on submerged land ownership.

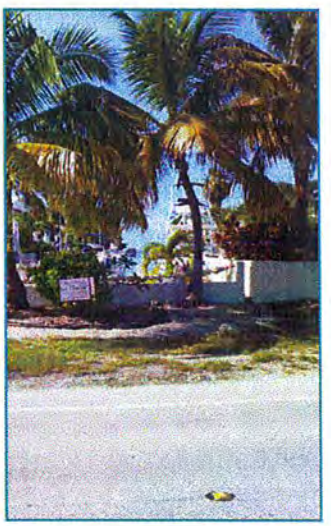
Existing Treatment: None

Homeowner Communication: AMEC spoke with Glen Owens (305) 293 0153 – past HOA president and owner of the property at the proposed culvert location. He is willing to help get the culvert installed. Had information about plans to install culvert when the subdivision was being constructed, but never got installed due to contractual differences between the developer and contractor. Current president is Don Riggs.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.28 / 20.7 % at 5 ft	0	Poor 100	51

Characteristics	
Size (acres)	0.59
Average Depth (ft)	-11.79
Min Depth (ft)	-15.27
Degree of Stagnation	-0.7
Number of Mouths	1
Organic Thickness (ft)	0.86
Parcels	21
WBID	6014C Not Impaired
WWT	FKAA/Big Coppitt
FKNMS Monitoring Station	2.64 miles





Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 472 Geiger Key

Project Location:

The project area is located south of US1 in Monroe County, Geiger Key, Florida; Section 27, Township 67 S, Range 26 E, (Latitude: 24°34'48.85" North; Longitude: - 81° 39'19.92" West). The information sheet and site location map (**Figure 15**) provide additional details.

Conceptual Design:

The purpose of the project is to hydrologically connect canal 472 and 470 to increase natural tidal flushing and reduce seaweed entrapment in the dead ends of the canal. At this stage in the project, the following design components have not been completed:

- Hydraulic models
- Geotechnical investigations
- Detailed topographic and bathymetric data

Therefore, for budgetary purposes AMEC has proposed installing an 8 feet high by 8 feet wide by 120 foot long precast concrete box culvert with a manatee grate under Boca Chica Road. The project also entails removing a 100' wide portion of the berm along the northern boundary of canal 470. The installation for the box culvert will entail using excavators to remove a 28 foot wide by 120 foot long section perpendicular to Boca Chica Road between Venus Lane and Mars Lane. The removal of the berm will entail using a barge and excavator system to create the cut to allow for increased flushing. Due to the removal of a portion of the main access road when installing the box culvert, maintenance of traffic plans will be created to ensure minimal impacts to local traffic. In the event the existing water and sewer lines need to be removed for the box culvert construction, a bypass system will be created during construction to ensure minimal outage to the local area. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

Construction Cost Estimate:

The approximate cost to construct the culvert connection as aforementioned will be $150,000.

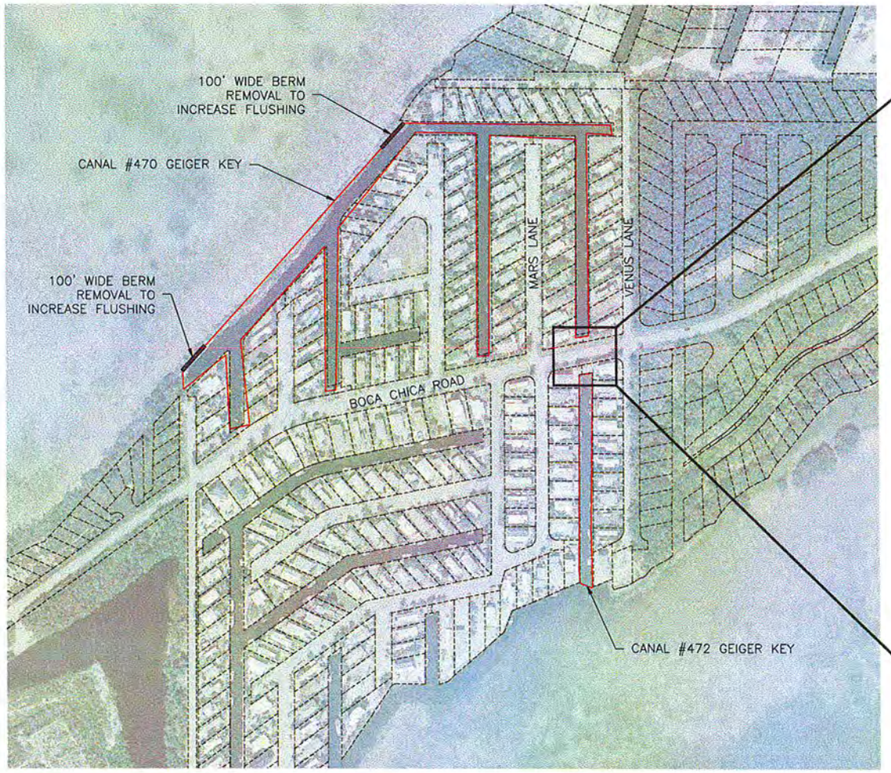
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Right of Way Permit
- Monroe County Building Permit

Access:

Based on field visits, an area located along Venus Lane could be used as a construction staging area with minor vegetation trimming.

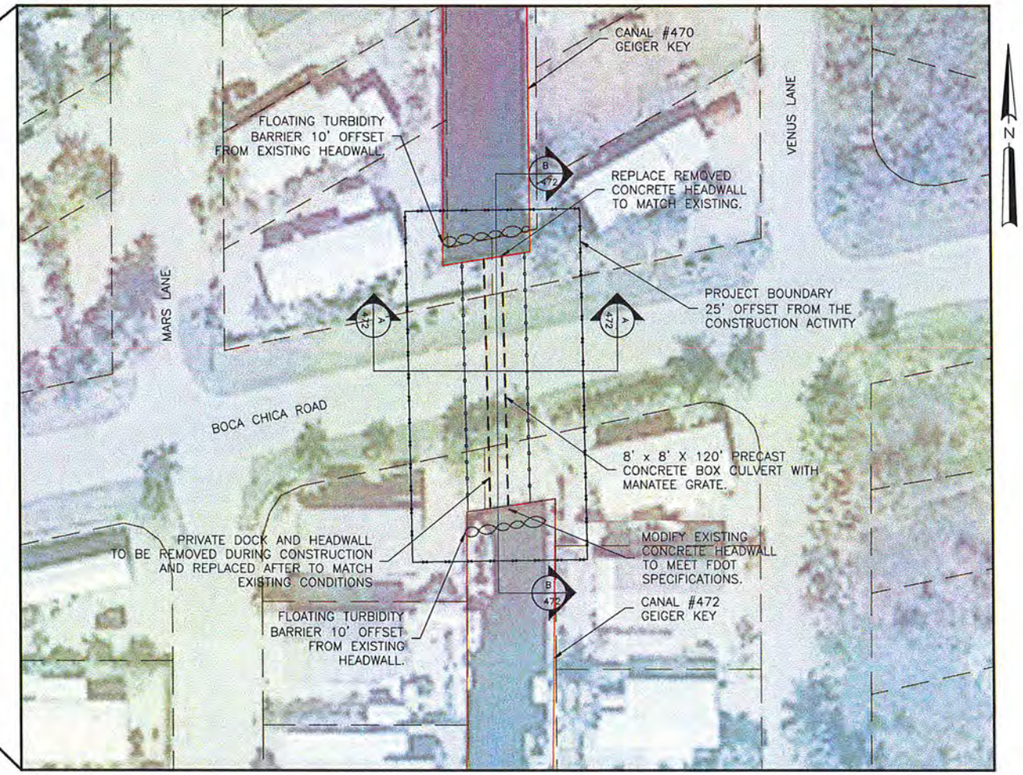
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



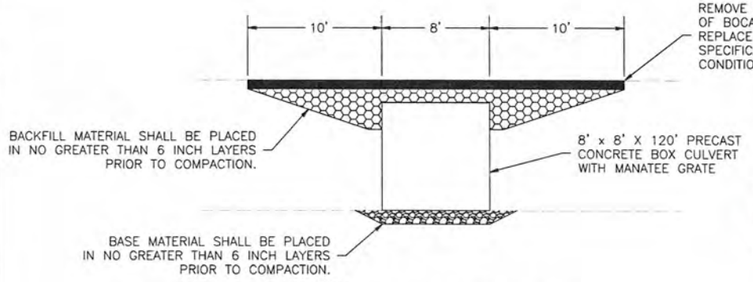
DETAIL SITE LAYOUT – CULVERT CONNECTION

0 30' 60'

SCALE:1"=30'

LEGEND

- BOX CULVERT
- EXCAVATION LIMITS
- FLOATING TURBIDITY BARRIER
- CANAL FOOTPRINTS
- MONROE COUNTY PARCELS, 2010



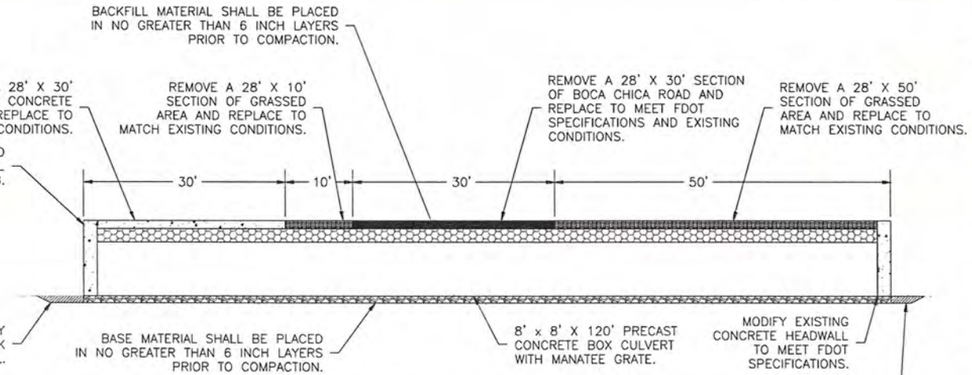
A 472 CROSS-SECTION

0 5' 10'

SCALE:1"=5'

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- CLEAN COMPACTED FILL
- ASPHALT
- GRASS



B 472 CROSS-SECTION

0 10' 20'

SCALE:1"=10'

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404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

CULVERT CONNECTION CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 472	
SHEET OF SHEETS	

PUMPING

Monroe County Selection of Demonstration Canals for PUMPING

Canal ID: 286 Big Pine Key

Location: MM 31 Whispering Pines subdivision, Bayside

Summary of Water Quality Impacts: There are multiple sources causing water quality impacts in this canal including: canal configuration that limits flushing, weed wrack entry, accumulated organics on the canal bottom; deep stagnant zones (with an average depth of -11.77 and minimum depth of -22.10); and a 24 inch corrugated pipe discharging stormwater into the canal.

Restoration Technology: Primary - Pumping (to prevent the buildup of oxygen depleted impaired water). Oxygenated water from near shore can be pumped into the end of the canal to enhance flushing. Additional restoration technologies that could assist with improving the water quality in this canal include: installation of a weed barrier, organic removal, backfilling and elimination of the stormwater pipe.

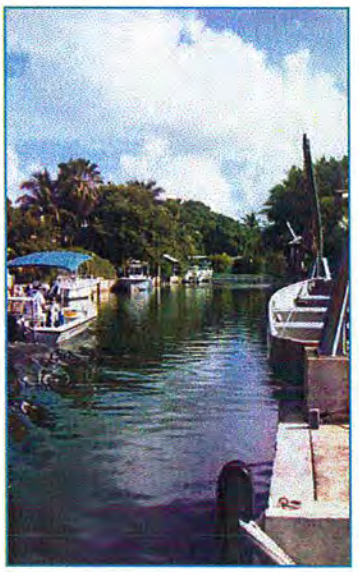
Site Conditions: The canal discharges to the northeast into Bogie Channel. Private ownership of lands below the high-water mark is not reflected in the plat books. The mouth of this canal discharges adjacent to Big Pine Key Park.

Existing Treatment: None

Homeowner Communication: Curtis Brown, President of the HA 305-872-8989 has attended numerous Canal Restoration Advisory Subcommittee meetings and sent emails indicating his interest in water quality improvements. Other residents have also sent emails stating their interest to be a part of the canal restoration demonstration project.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.69 / 27.0% at 5 ft	Not Measured	Poor 86	58

Characteristics	
Size (acres)	5.1
**Average Depth (ft)	-11.77
**Min Depth (ft)	-22.10
Degree of Stagnation	1.2
Number of Mouths	1
Organic Thickness (ft) Average	0.82
Parcels	71
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
KFNMS Monitoring Station	1.0 miles



Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 286 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 23 and 24, Township 66 S , Range 29 E , (Latitude: 24°40'46.97" North; Longitude: -81°20'50.98" West). The information sheet and site location map (**Figure 9**) provide additional details.

Conceptual Design:

The purpose of the project is to increase flushing by pumping from Bogie Channel to canal 286 resulting in increased dissolved oxygen and decreased stagnation. At this stage in the project, the following design components have not been completed:

- Hydraulic Modeling
- Detailed bathymetric data

Therefore, for budgetary purposes, AMEC used a 1.2 degree of stagnation for canal 286, which was calculated by first normalizing the values for area, length, number of convolutions, and area to length ratio, where normalization was calculated by subtracting the mean and dividing by the standard deviation for the respective attribute. Since the degree of stagnation was greater than one standard deviation above the mean it was considered to be significantly stagnant, and that increased circulation through a circulation pump system is proposed.

The pumping connection will be accomplished by installing 2 -6 horse power pumps and wet wells, 2 – 5 kilowatt solar arrays, approximately 3,100 linear feet of 12 inch PVC pipe, and approximately 2,800 linear feet of 6 inch PVC pipe. The installation will entail using a barge to install the approximately 5,900 linear feet of PVC pipe along the bottom center of the canal system with an anchor system. The intake of the pump will be placed at the mouth of the canal system and will have a screen to prevent impingement or entrainment of marine life. The discharge PVC pipes will be equipped with diffusers and other scour protection best management practices (BMP's). Due to the area outside the limits of the canal system designated as a Florida Outstanding Waters the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background during construction, until the area has been stabilized.

Other pumping system designs will be evaluated during the final design of the project.

Construction Cost Estimate:

The approximate cost to construct the pumping system as aforementioned will be $255,000.

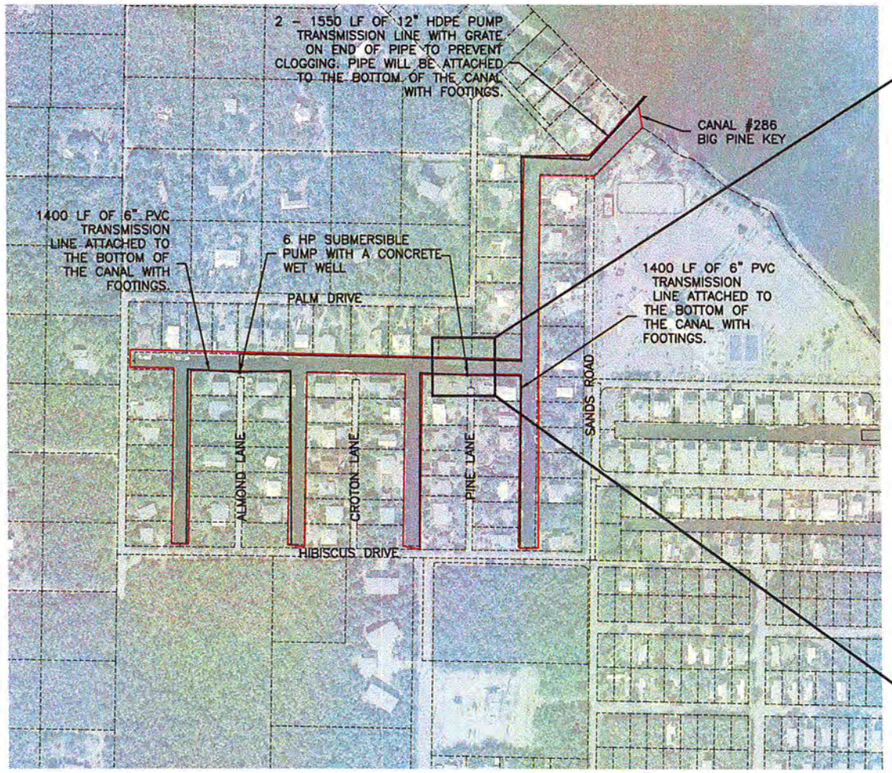
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot at the end of Pine Lane that could be used as a construction staging area.

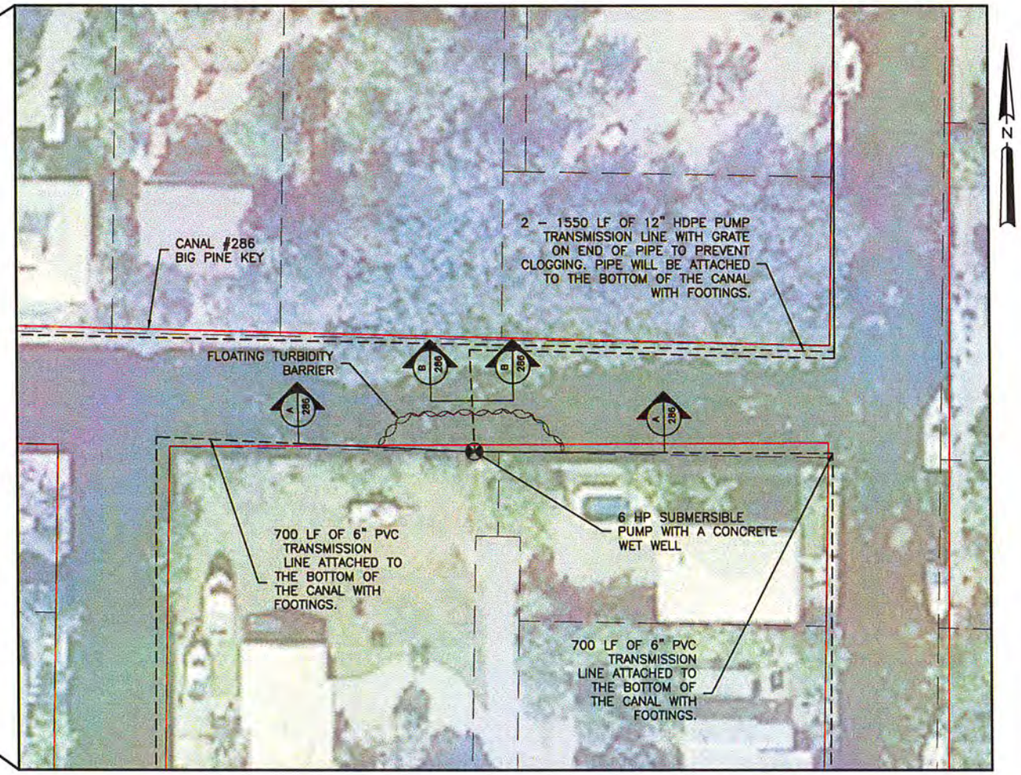
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



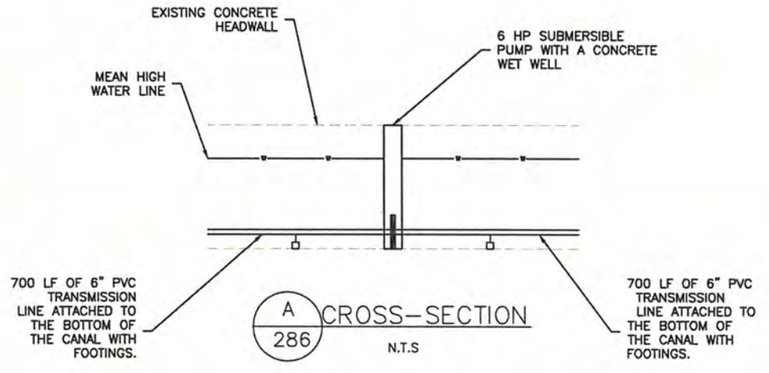
DETAIL SITE LAYOUT - PUMPING

0 30' 60'

SCALE:1"=30'

LEGEND

- PUMPING TRANSMISSION LINE
- CANAL 286 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

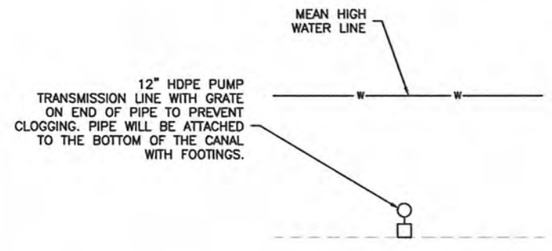


A/286 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE



B/286 CROSS-SECTION

N.T.S

amec

ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No:
6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

PUMPING CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 286	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for PUMPING

Canal ID: 278 Big Pine Key

Location: MM 30 Eden Pines Colony (1st Addition), Bayside

Summary of Water Quality Impacts: Primary – Extremely long canal with numerous convolutions (25) and high density of development (494 parcels) that has substandard flushing; Secondary - accumulated organics on canal bottom; Tertiary – some weed wrack entry in summer according to homeowner questionnaire.

Restoration Technology: Primary – Pumping (to prevent the buildup of oxygen depleted impaired water). Oxygenated water from the near shore area can be pumped into the ends of the canal fingers to enhance the flushing. Secondary – removal of organics from canal bottom to eliminate on-going source of organic decomposition.

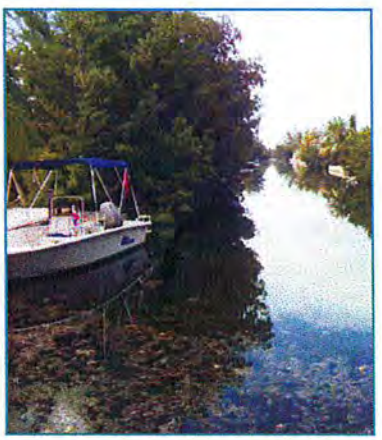
Site Conditions: The canal discharges to the west into Pine Channel. Private ownership of lands below the high-water mark is not reflected on the plat book; however, the aerials indicate a small area of submerged shoreline is privately claimed. Further investigation is needed.

Existing Treatment: None

Homeowner Communication: Questionnaires (7) from homeowners submitted indicating need for water quality improvements in this canal. Donna Lorenzo 305-872-2189 has attended numerous Canal Restoration Advisory Subcommittee meetings and stated her interest in being a part of the canal demonstration project.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.79 / 26.7 % at 9 ft	0.43	Poor 91	35

Characteristics	
Size (acres)	21.6
**Average Depth (ft)	-7.87
**Min Depth (ft)	-13.18
Degree of Stagnation	5.7
Number of Mouths	1
Organic Thickness (ft) Average	1.03
Parcels	494
WBID	6012A Impaired
WWT	FKAA/Cudjoe Regional - Not Completed
KFNMS Monitoring Station	1.69 miles



Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 278 Big Pine Key

Project Location:

The project area is located north of US1 in Monroe County, Big Pine Key, Florida; Section 15, Township 66 S , Range 29 E , (Latitude: 24°41'36.86" North; Longitude: - 81°22'47.38" West). The information sheet and site location map (**Figure 8**) provide additional details.

Conceptual Design:

The purpose of the project is to increase flushing by pumping from Pine Channel to 278 resulting in increased dissolved oxygen and decreased stagnation. At this stage in the project, the following design components have not been completed:

- Hydraulic Modeling
- Detailed bathymetric data

Therefore, for budgetary purposes, AMEC used a 5.7 degree of stagnation for canal 278, which was calculated by first normalizing the values for area, length, number of convolutions, and area to length ratio, where normalization was calculated by subtracting the mean and dividing by the standard deviation for the respective attribute. Since the degree of stagnation was greater than one standard deviation above the mean it was considered to be significantly stagnant, and that increased circulation through a circulation pump system is proposed.

The pumping connection will be accomplished by installing a 2 -6 horse power pump and concrete wet well, approximately 200 linear feet of 24-inch HDPE pipe, approximately 1,965 linear feet of 12 inch PVC pipe and approximately 2,660 linear feet of 10 inch PVC pipe. The installation will entail using a barge to install the approximately 4,625 linear feet of PVC pipe along the bottom center of the canal system with an anchor system. The intake of the pump will be placed at the mouth of the canal system and will have a screen to prevent impingement or entrainment of marine life. The discharge PVC pipes will be equipped with diffusers and other scour protection BMP's. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background during construction, until the area has been stabilized..

Other pumping systems will be evaluated during the final design of the project.

Construction Cost Estimate:

The approximate cost to construct the pumping system as aforementioned will be $195,000.

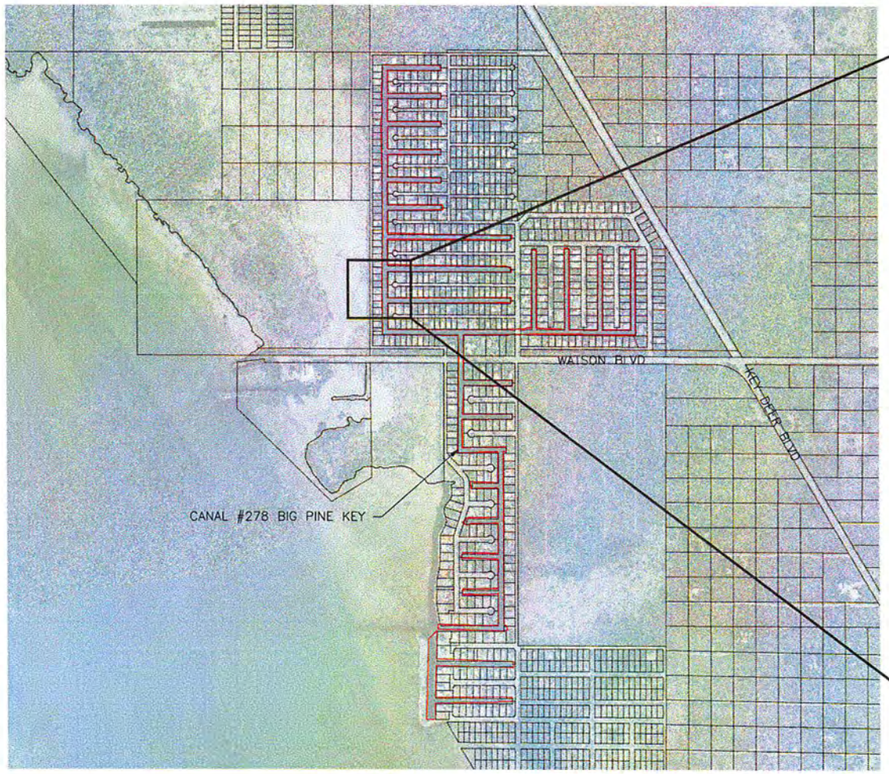
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot along Narcissus Avenue that could be used as a construction staging area.

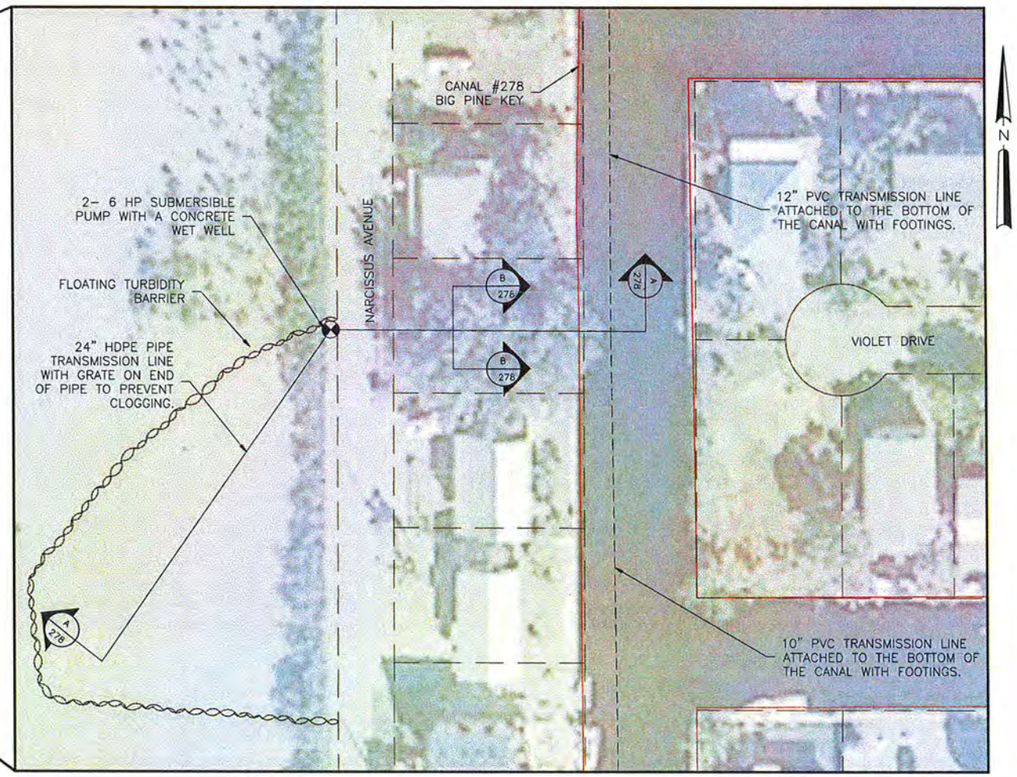
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 600' 1200'

SCALE:1"=600'



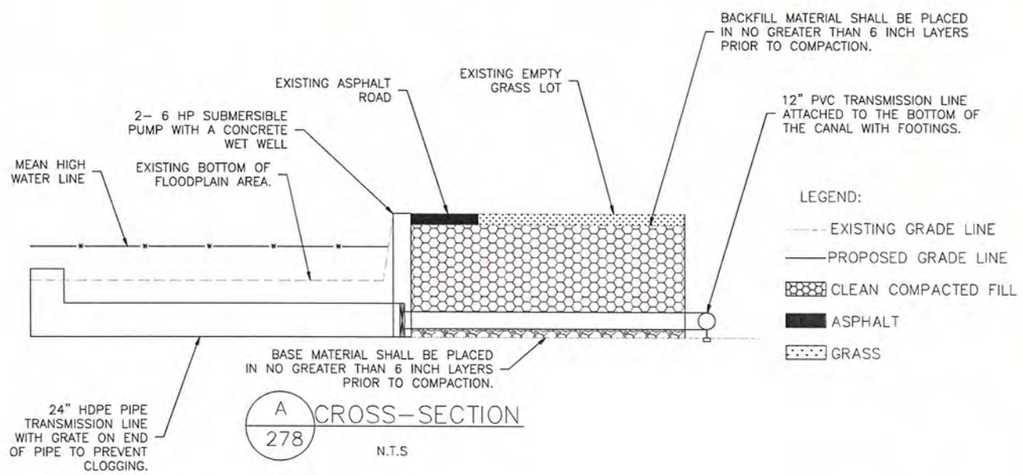
DETAIL SITE LAYOUT – PUMPING

0 30' 60'

SCALE:1"=30'

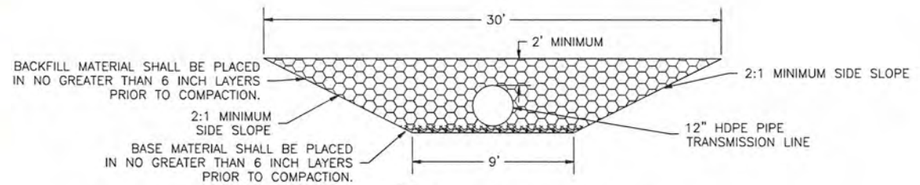
LEGEND

- PUMPING TRANSMISSION LINE
- CANAL 278 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A 278 CROSS–SECTION

N.T.S



B 278 CROSS–SECTION

N.T.S

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332–3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783–13–2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

PUMPING CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 278	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for PUMPING

Canal ID: 47 Key Largo

Location: MM 103 Bermuda Shores subdivision, Bayside

Summary of Water Quality Impacts: Primary – Long canal with numerous convolutions that does not flush well; Secondary – deep stagnant zone with an average depth of -11.62 and minimum depth of -20.65. The small finger along Bowie Lane is mostly restricted in discharge due to the land owner filling in the canal for all except a kayak depth discharge.

Restoration Technology: Primary - Pumping (to prevent the buildup of oxygen depleted impaired water). Oxygenated water from the near shore west of Shaw Drive can be pumped into the end of the canal to enhance the flushing.

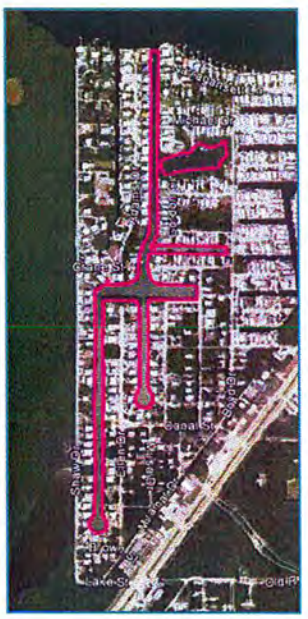
Site Conditions: This canal discharges north into Blackwater Sound. Private ownership of lands below the high-water mark is not asserted from the plat books; however, the aerials indicate a small area of submerged shoreline is privately claimed on part of the plugged canal. Further investigation is needed.

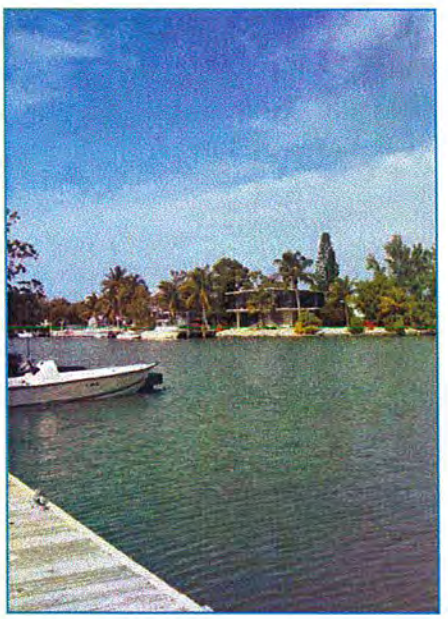
Existing Treatment: None presently. Canal used to have a culvert to Canal Key Largo 45 but it collapsed; aerators were installed in 1991 but are no longer operating.

Homeowner Communication: Several homeowners have contacted Monroe County to state the poor water quality conditions in this canal.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.3 / 4.4 % at 10 ft	9.93	Poor 79	26

Characteristics	
Size (acres)	13.4
**Average Depth (ft)	-11.62
**Min Depth (ft)	-20.65
Degree of Stagnation	3.3
Number of Mouths	1
Organic Thickness (ft) Average	0.74
Parcels	182
WBID	6006A Impaired
WWT	KLWTD
KFNMS Monitoring Station	None





Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 47 Key Largo

Project Location:

The project area is located north west of US1 in Monroe County, Key Largo, Florida; Section 15, Township 61 S , Range 39 E , (Latitude: 25°07'43.03" North; Longitude: - 80°24'49.11" West). The information sheet and site location map (**Figure 4**) provide additional details.

Conceptual Design:

The purpose of the project is to increase flushing by pumping from Backwaters Sound to canal 47 resulting in increased dissolved oxygen and decreased stagnation. At this stage in the project, the following design components have not been completed:

- Hydraulic Modeling
- Detailed bathymetric data

Therefore, for budgetary purposes, AMEC used a 3.3 degree of stagnation for canal 47, which was calculated by first normalizing the values for area, length, number of convolutions, and area to length ratio, where normalization was calculated by subtracting the mean and dividing by the standard deviation for the respective attribute. Since the degree of stagnation was greater than one standard deviation above the mean it was considered to be significantly stagnant, and that increased circulation through a circulation pump system is proposed.

The pumping connection will be accomplished by installing a 20 horse power pump and concrete wet well, approximately 450 linear feet of 24-inch HDPE pipe, and approximately 550 linear feet of 12 inch HDPE pipe. The installation will entail using a barge to install the 550 linear feet of PVC pipe along the bottom center of the canal system with an anchor system. The intake of the pump system will be placed in the floodplain area to the west of Shaw Drive and will have a screen to prevent impingement or entrainment of marine life. The discharge HDPE pipe will be equipped with diffusers and other scour protection BMP's. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background during construction, until the area has been stabilized.

Other pumping systems will be evaluated during the final design of the project.

Construction Cost Estimate:

The approximate cost to construct the pumping system as aforementioned will be $155,000.

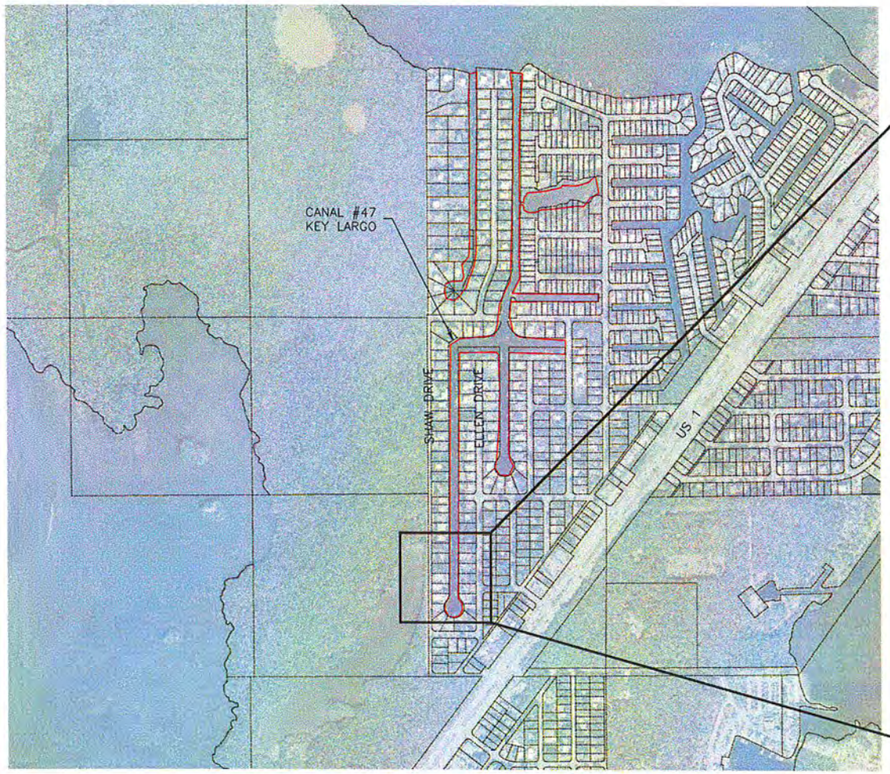
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit
- Monroe County Building Permit

Access:

Based on field visits, there is an empty lot along Shaw Drive that could be used as a construction staging area, with minor tree and shrub trimming.

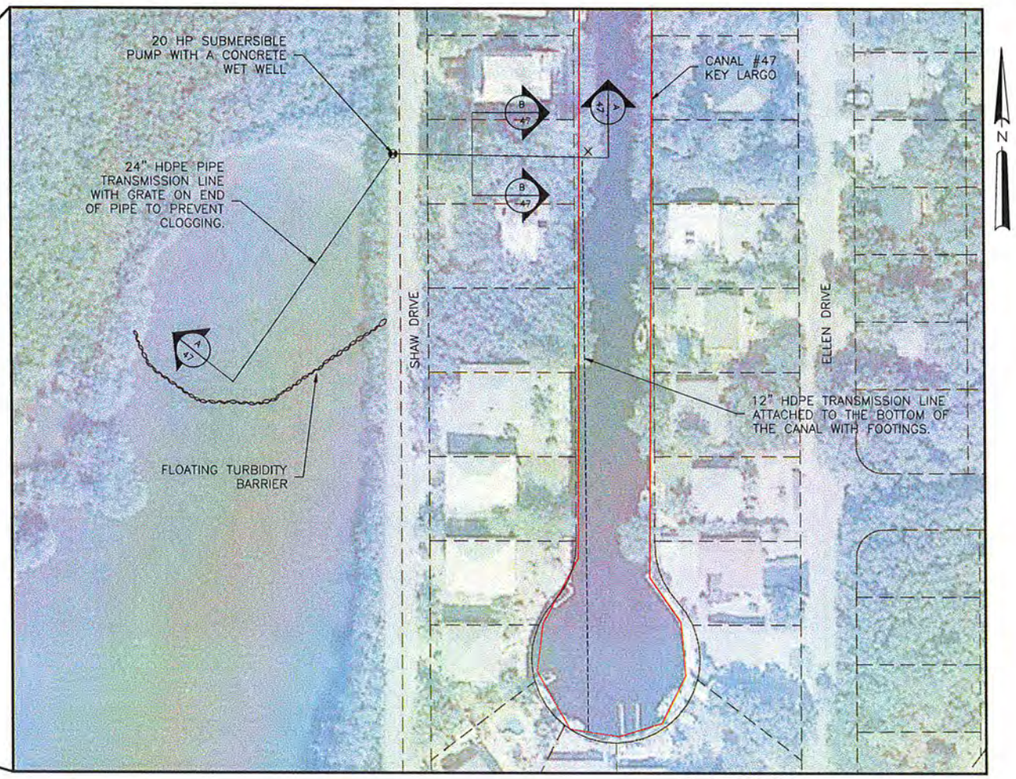
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 500' 1000'

SCALE:1"=500'



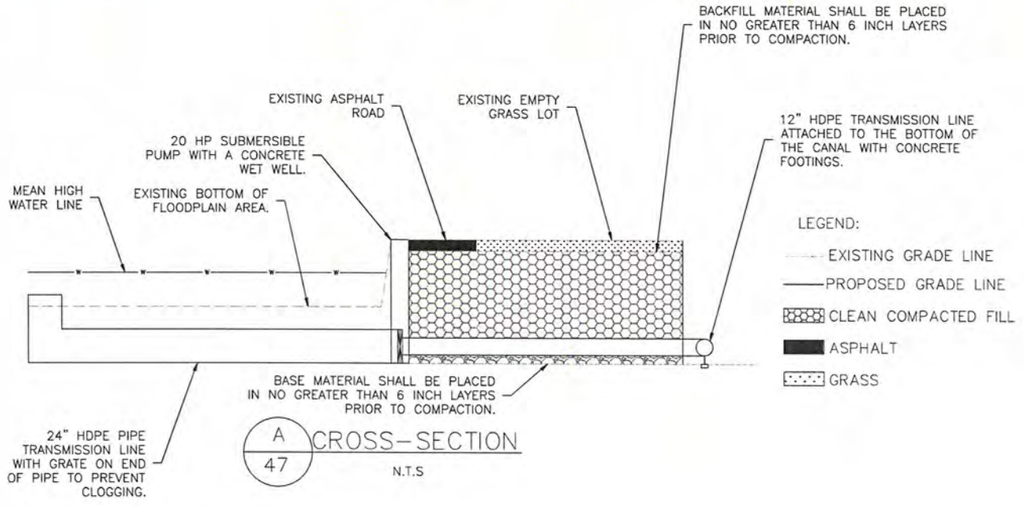
DETAIL SITE LAYOUT – PUMPING

0 60' 120'

SCALE:1"=60'

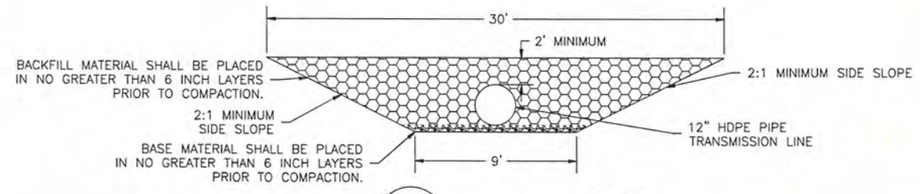
LEGEND

- PUMPING TRANSMISSION LINE
- CANAL 47 FOOTPRINT
- MONROE COUNTY PARCELS, 2010



A/47 CROSS–SECTION

N.T.S



B/47 CROSS–SECTION

N.T.S

amec
ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332–3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783–13–2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

PUMPING CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 47	
SHEET OF SHEETS	

Monroe County
Selection of Demonstration Canals for
Water Quality Improvements
AMEC Project No. 6783-13-2507
November 8, 2013

BACKFILLING

Monroe County Selection of Demonstration Canals for BACKFILLING

Canal ID: 29 Key Largo

Location: MM 106 Sexton Cove Estates subdivision, Bayside

Summary of Water Quality Impacts: Primary – Deep stagnant zone with an average depth of -19.44.

Restoration Technology: Backfilling (For the purpose of eliminating deep oxygen depleted impaired water quality zone).

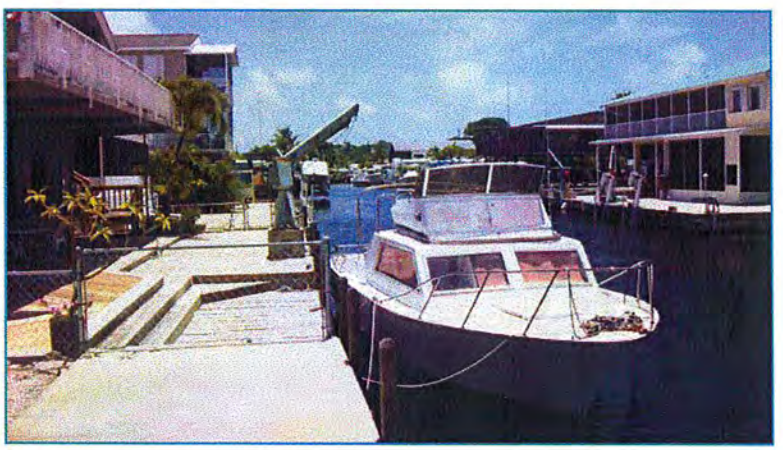
Site Conditions: The canal has an orientation pointing due west and discharges into Sexton Cove. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: Aerator

Homeowner Communication: David Gilbert, president of the Sexton Cove Property Owners Association, 305-451-2020, emailed Monroe County stating interest in a demonstration project for backfilling in the Sexton Cove canals.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
3.05 / 43.5% at 3 ft	0	Poor 92	64

Characteristics	
Size (acres)	0.86
**Average Depth (ft)	-19.44
**Min Depth (ft)	-32.33
Degree of Stagnation	-0.6
Number of Mouths	1
Organic Thickness (ft) Average	1.41
Parcels	26
WBID	6006A Impaired
WWT	KLWTD
FKNMS Monitoring Station	None



Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 29 Key Largo

Project Location:

The project area is located west of US1 in Monroe County, Key Largo, Florida; Section 1, Township 61 S , Range 39 E, (Latitude: 25°09'50.32" North; Longitude: - 80°23'01.28" West). The information sheet and site location map (**Figure 2**) provide additional details.

Conceptual Design:

The purpose of the project is to backfill canal 29 to an average depth of 8 feet mean low water elevation to increase dissolved oxygen and reduce deep stagnation zones. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Method to prevent suspension of bottom sediments

Therefore, for budgetary purposes, AMEC used the surface area of the canal and average depth of the bathymetric center line profile of the canal to estimate the 21,000 tons to backfill the canal to the target elevation. It is assumed at this time that the source of the backfill will be a commercial quarry. The following is the backfill material specifications for the various layers:

- Top 1' of Material: Screening sand or A3 Sand Fill from Quarry.

- Subbase Material: Shall be clean, well-graded material free from debris, peat, roots, seeds of nuisance or exotic species, organic material, clods, and stones with a diameter greater than 3 inches (76 mm) in any direction. Backfill shall have an average organic content of not more than 5%. Backfill shall meet the following Unified Soil Classification System (ASTM D2487) designations: SW, SP, SP-SM, and SP-SC (These are coarse-grained soils with greater than 50% by dry weight retained on a No. 200 sieve; SP and SW have less than 5% finer than a No. 200 sieve; SP-SM and SP-SC have 5-12% finer than a No. 200 sieve).

- Base Material (thickness to be determined at each canal location): Backfill shall be clean, well-graded material, that is thoroughly mixed and free from debris, clods, seeds of nuisance or exotic species, and stones with a maximum 6-inch diameter in any direction. Backfill shall have an organic content of less than 5% by weight and shall meet the following Unified Soil Classification System (ASTM D2487) designations: SP, SP-SM, and SP-SC.

The project will entail using earthmoving and mechanical equipment to place the material on a barge from the canal shoreline while minimizing environmental impacts to existing mangrove fringe. An excavator will also be used to place the fill material into the canal system. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity to backfill the canal to the target elevation will be verified once detailed bathymetric cross section data is gathered.

Construction Cost Estimate:

The approximate cost to install fill in the canal as aforementioned will be approximately $1,800 per linear foot of canal (722 linear feet) or $1.3 million total for Canal 29.

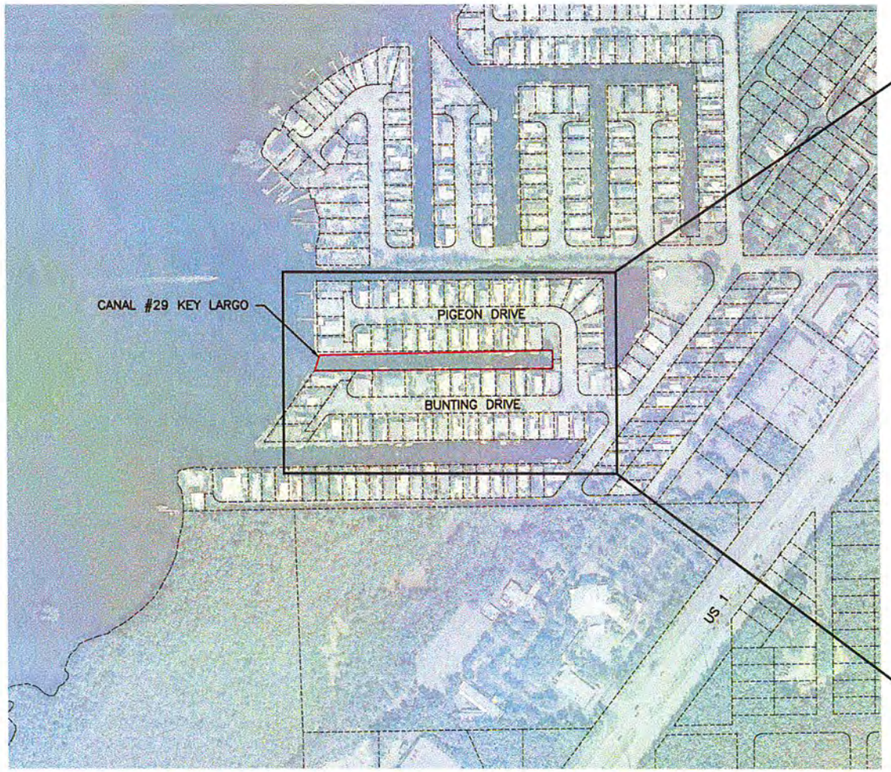
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit

Access:

Based on field visits, there is an empty lot at the end of the canal adjacent to Pigeon Drive that could be used as a construction staging area.

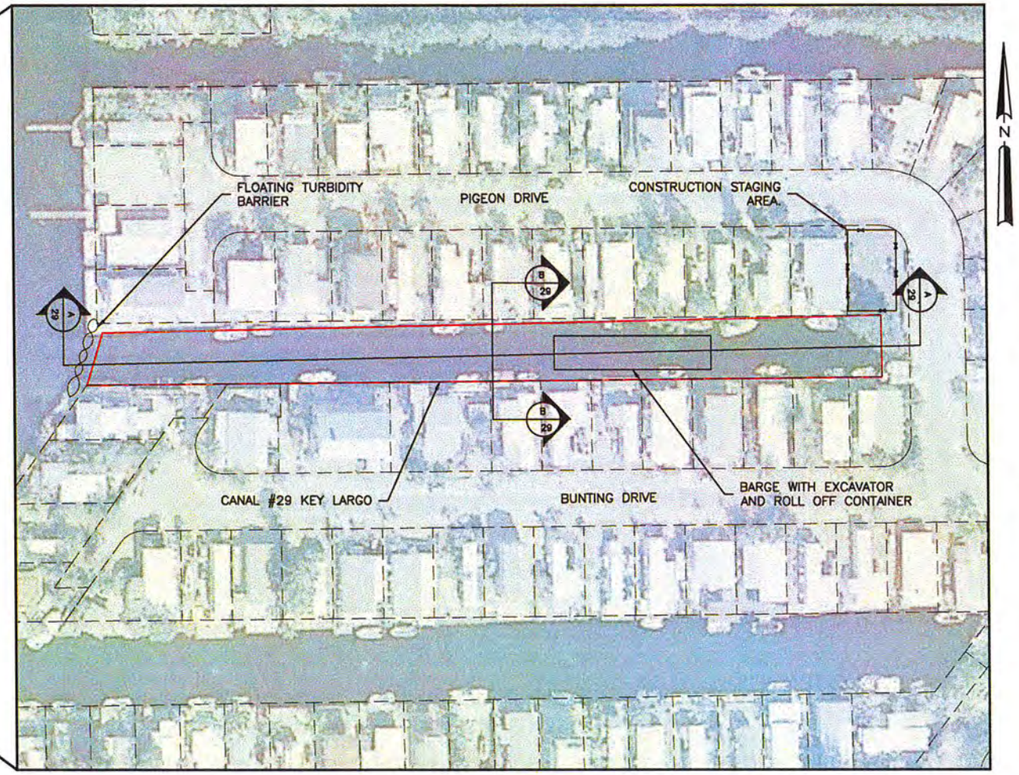
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



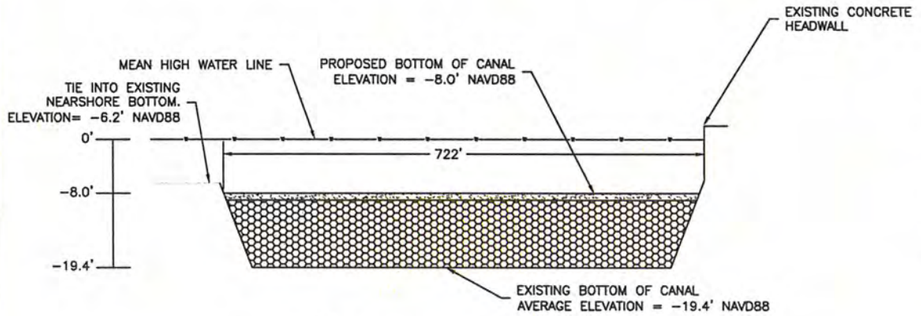
DETAIL SITE LAYOUT – BACKFILL

0 60' 120'

SCALE:1"=60'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #29 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

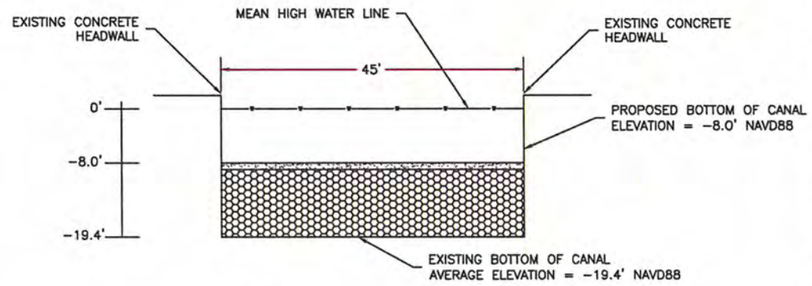


A/29 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- CLEAN COMPACTED FILL
- SCREENING SAND



B/29 CROSS-SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING BACKFILL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS -32.3 FEET AND THE MAXIMUM OBSERVED DEPTH IS -6.2 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

amec

ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

BACKFILL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 29	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for BACKFILLING

Canal ID: 27 Key Largo

Location: MM 106 Sexton Cove Estates subdivision, Bayside

Source of Water Quality Impacts: Primary – Deep stagnant zone with an average depth of - 29.77 feet.

Restoration Technology: Backfilling (For the purpose of eliminating deep oxygen depleted impaired water quality zone)

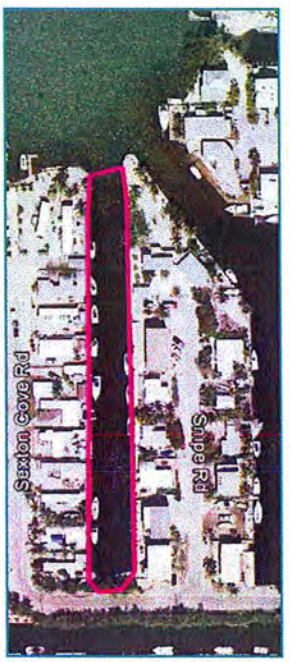
Site Conditions: The canal has an orientation pointing due north and discharges into Sexton Cove. Private ownership of the lands below the high-water mark is not reflected in the plat book.

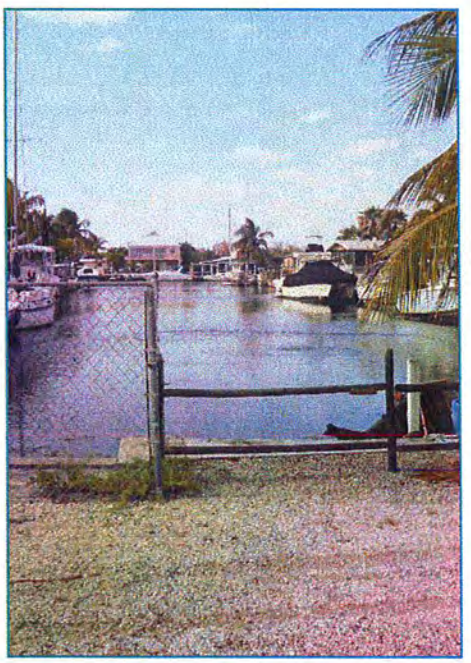
Existing Treatment: Aerators

Homeowner Communication: David Gilbert, president of the Sexton Cove Property Owners Association, 305-451-2020, emailed Monroe County stating interest in a demonstration project for backfilling in the Sexton Cove canals.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
1.98 / 31.1% at 8-10 ft	0	Poor 90	56

Characteristics	
Size (acres)	0.84
**Average Depth (ft)	-29.77
**Min Depth (ft)	-42.07
Degree of Stagnation	-0.7
Number of Mouths	1
Organic Thickness (ft) Average	3.50
Parcels	17
WBID	6006A Impaired
WWT	KLWTD
KFNMS Monitoring Station	None





Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 27 Key Largo

Project Location:

The project area is located west of US1 in Monroe County, Key Largo, Florida; Section 1, Township 61 S , Range 39 E, (Latitude: 25°09'54.40" North; Longitude: - 80°23'04.74" West). The information sheet and site location map (**Figure 1**) provide additional details.

Conceptual Design:

The purpose of the project is to backfill canal 27 to an average depth of 8 feet mean low water elevation to increase dissolved oxygen and reduce deep stagnation zones. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Method to prevent suspension of bottom sediments

Therefore, for budgetary purposes, AMEC used the surface area of the canal and average depth of the bathymetric center line profile of the canal to estimate the 38,000 tons to backfill the canal to the target elevation. It is assumed at this time that the source of the backfill will be a commercial quarry. The following is the backfill material specifications for the various layers:

- Top 1' of Material: Screening sand or A3 Sand Fill from Quarry.

- Subbase Material: Shall be clean, well-graded material free from debris, peat, roots, seeds of nuisance or exotic species, organic material, clods, and stones with a diameter greater than 3 inches (76 mm) in any direction. Backfill shall have an average organic content of not more than 5%. Backfill shall meet the following Unified Soil Classification System (ASTM D2487) designations: SW, SP, SP-SM, and SP-SC (These are coarse-grained soils with greater than 50% by dry weight retained on a No. 200 sieve; SP and SW have less than 5% finer than a No. 200 sieve; SP-SM and SP-SC have 5-12% finer than a No. 200 sieve).

- Base Material (thickness to be determined at each canal location): Backfill shall be clean, well-graded material that is thoroughly mixed and free from debris, clods, seeds of nuisance or exotic species, and stones with a maximum 6-inch diameter in any direction. Backfill shall have an organic content of less than 5% by weight and shall meet the following Unified Soil Classification System (ASTM D2487) designations: SP, SP-SM, and SP-SC.

The project will entail using earthmoving and mechanical equipment to place the material on a barge from the canal shoreline while minimizing environmental impacts to existing mangrove fringe. An excavator will also be used to place the fill material into the canal system. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity to backfill the canal to the target elevation will be verified once detailed bathymetric cross section data is gathered.

Construction Cost Estimate:

The approximate cost to install fill in the canal as aforementioned will be approximately $4,000 per linear foot of canal (590 linear feet) or $2.3 million total for Canal 27.

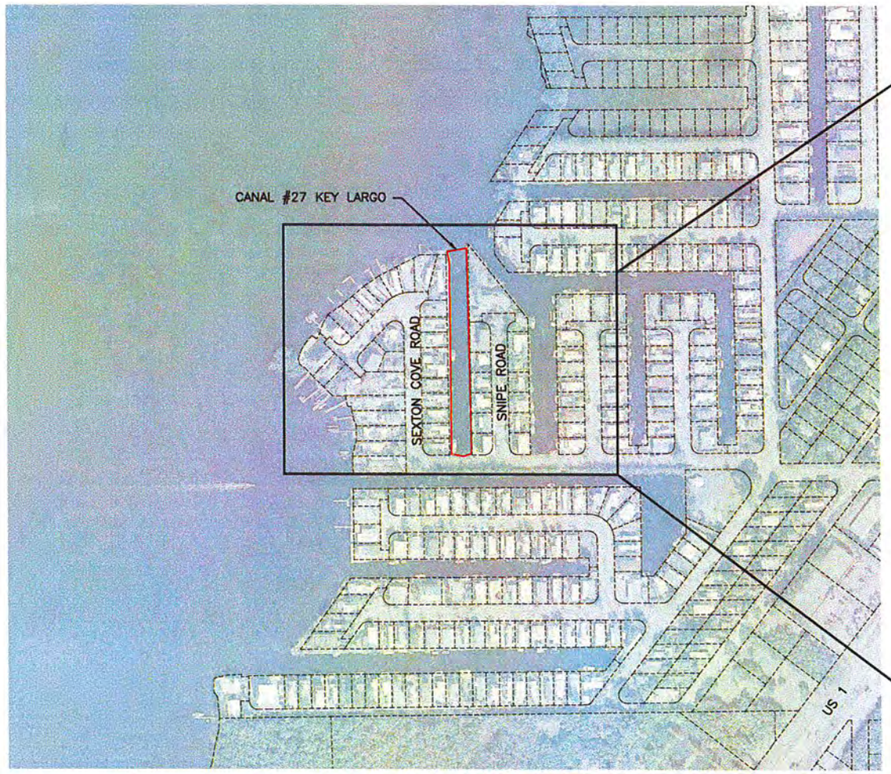
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit

Access:

Based on field visits, there is an empty lot at the end of Snipe Road that could be used as a construction staging area.

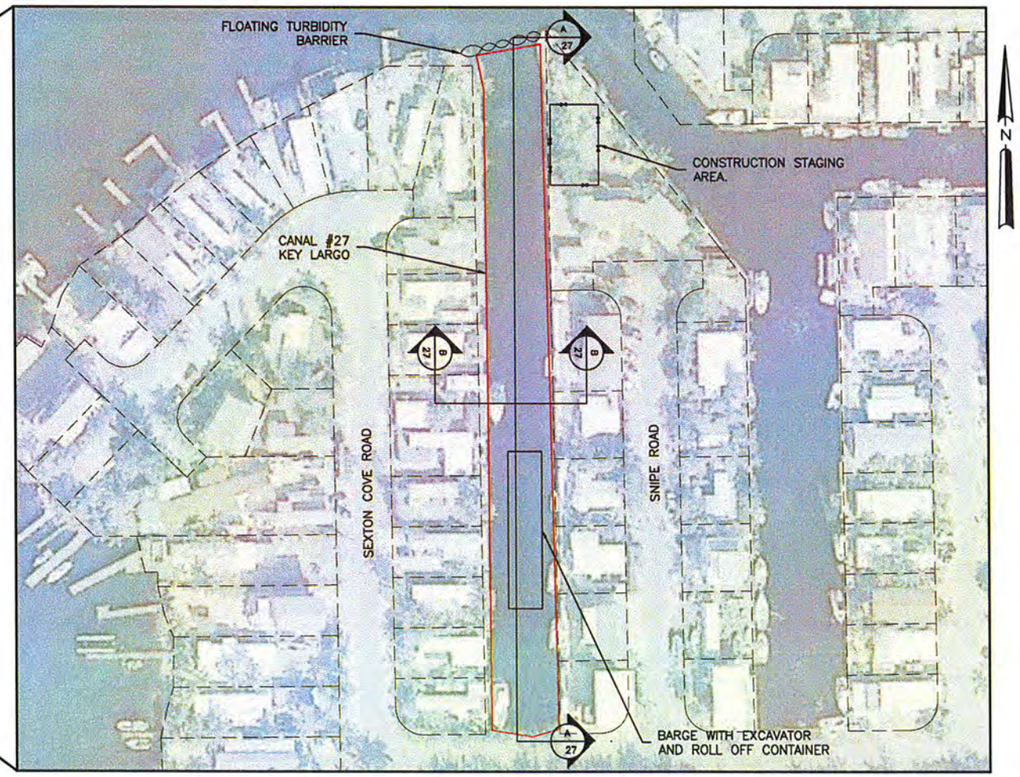
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



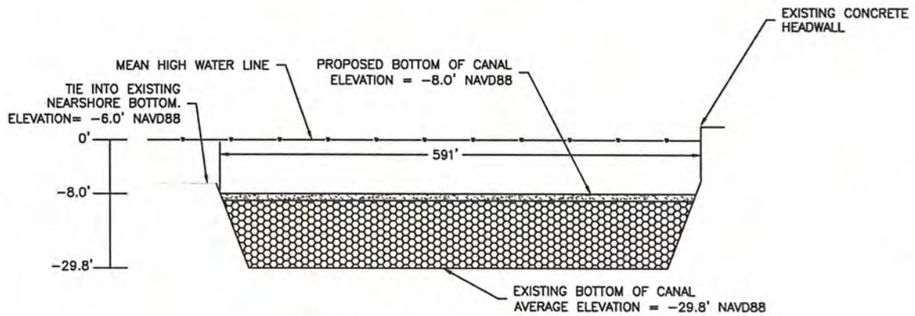
DETAIL SITE LAYOUT – BACKFILL

0 60' 120'

SCALE:1"=60'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #29 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

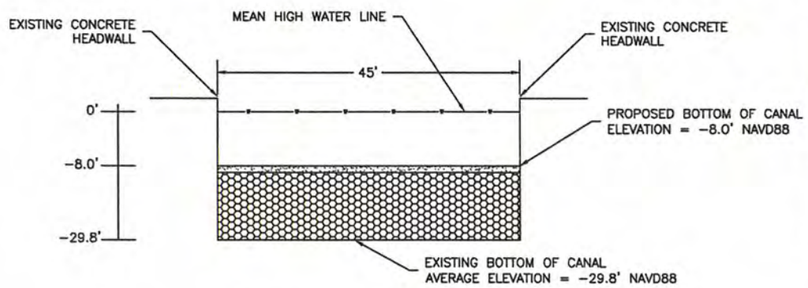


A 27 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- CLEAN COMPACTED FILL
- SCREENING SAND



B 27 CROSS-SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING BACKFILL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS -42.1 FEET AND THE MAXIMUM OBSERVED DEPTH IS -6.1 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

amec

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TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

BACKFILL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 27	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for BACKFILLING

Canal ID: 37 Key Largo

Location: MM 105 Key Largo Mobile Home Site Plat 4 subdivision, Oceanside

Summary of Water Quality Impacts: Primary – Deep stagnant zone with an average depth of -17.05; Secondary – Substandard flushing.

Restoration Technology: Backfilling (For the purpose of eliminating deep oxygen depleted impaired water quality zone).

Site Conditions: The canal faces due east and discharges into a tributary of Largo Sound. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: None

Homeowner Communication: AMEC spoke with homeowners on Lance Lane to gain access to the private dock area. No communications concerning interest in water quality improvements.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
2.12 / 33.4% at 5 ft	Not Measured	Poor 84	54

Characteristics	
Size (acres)	0.98
**Average Depth (ft)	-17.05
**Min Depth (ft)	-21.64
Degree of Stagnation	-0.2
Number of Mouths	1
Organic Thickness (ft) Average	1.29
Parcels	26
WBID	6006A Impaired
WWT	KLWTD
FKNMS Monitoring Station	5.65 miles

Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 37 Key Largo

Project Location:

The project area is located west of US1 in Monroe County, Key Largo, Florida; Section 1, Township 61 S , Range 39 E, (Latitude: 25°09'50.32" North; Longitude: - 80°23'01.28" West). The information sheet and site location map (**Figure 3**) provide additional details.

Conceptual Design:

The purpose of the project is to backfill canal 37 to an average depth of 8 feet mean low water elevation to increase dissolved oxygen and reduce deep stagnation zones. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Method to prevent suspension of bottom sediments

Therefore, for budgetary purposes, AMEC used the surface area of the canal and average depth of the bathymetric center line profile of the canal to estimate the 22,000 tons to backfill the canal to the target elevation. It is assumed at this time that the source of the backfill will be a commercial quarry. The following is the backfill material specifications for the various layers:

- Top 1' of Material: Screening sand or A3 Sand Fill from Quarry.

- Subbase Material: Shall be clean, well-graded material free from debris, peat, roots, seeds of nuisance or exotic species, organic material, clods, and stones with a diameter greater than 3 inches (76 mm) in any direction. Backfill shall have an average organic content of not more than 5%. Backfill shall meet the following Unified Soil Classification System (ASTM D2487) designations: SW, SP, SP-SM, and SP-SC (These are coarse-grained soils with greater than 50% by dry weight retained on a No. 200 sieve; SP and SW have less than 5% finer than a No. 200 sieve; SP-SM and SP-SC have 5-12% finer than a No. 200 sieve).

- Base Material (thickness to be determined at each canal location): Backfill shall be clean, well-graded material that is thoroughly mixed and free from debris, clods, seeds of nuisance or exotic species, and stones with a maximum 6-inch diameter in any direction. Backfill shall have an organic content of less than 5% by weight and shall meet the following Unified Soil Classification System (ASTM D2487) designations: SP, SP-SM, and SP-SC.

The project will entail using earthmoving and mechanical equipment to place the material on a barge from the canal shoreline while minimizing environmental impacts to existing mangrove fringe. An excavator will also be used to place the fill material into the canal system. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity to backfill the canal to the target elevation will be verified once detailed bathymetric cross section data is gathered.

Construction Cost Estimate:

The approximate cost to install fill in the canal as aforementioned will be approximately $1,500 per linear foot of canal (820 linear feet) or $1.2 million total for Canal 37.

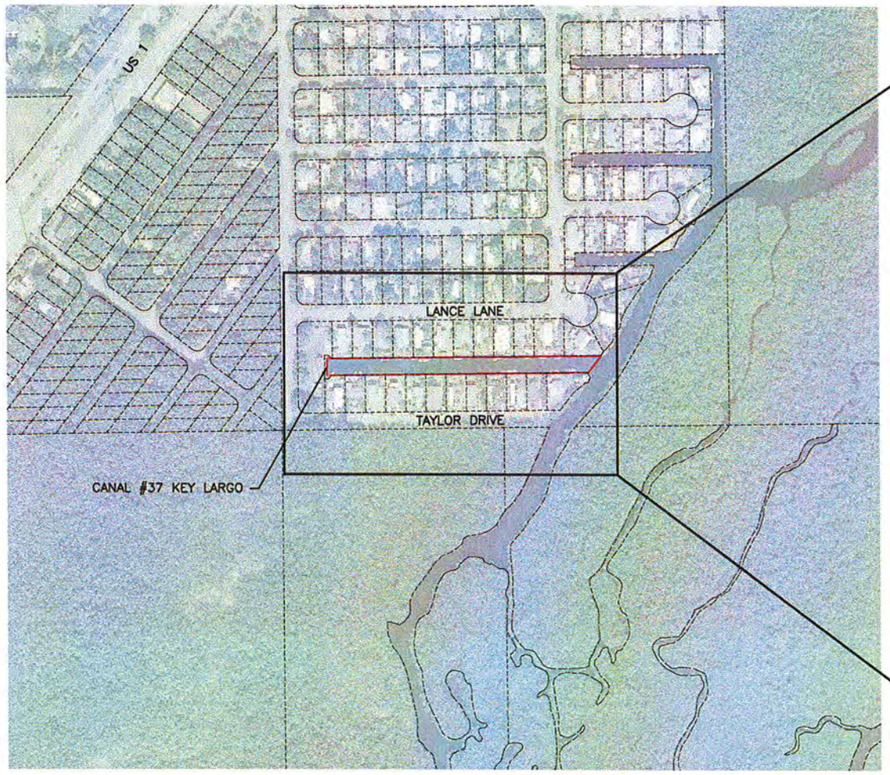
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit

Access:

Based on field visits, there is an empty lot adjacent to Taylor Drive that could be used as a construction staging area.

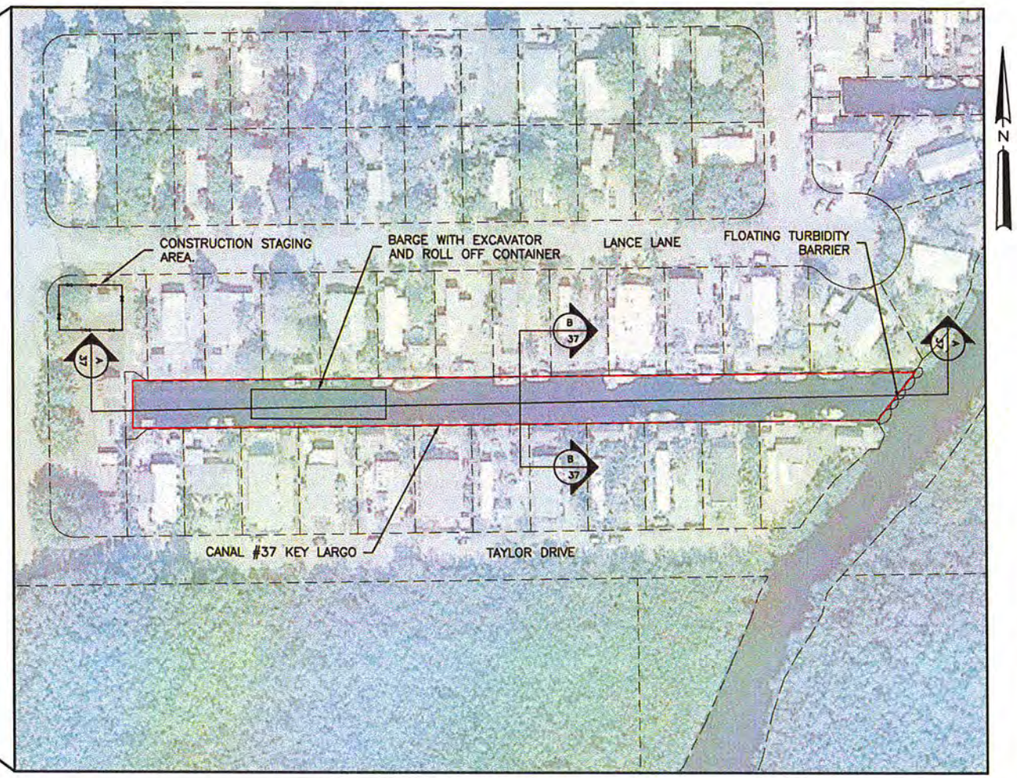
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



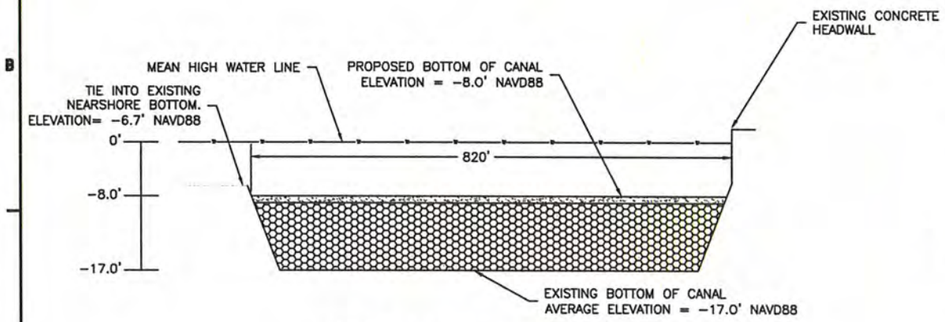
DETAIL SITE LAYOUT – BACKFILL

0 70' 140'

SCALE:1"=70'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #37 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

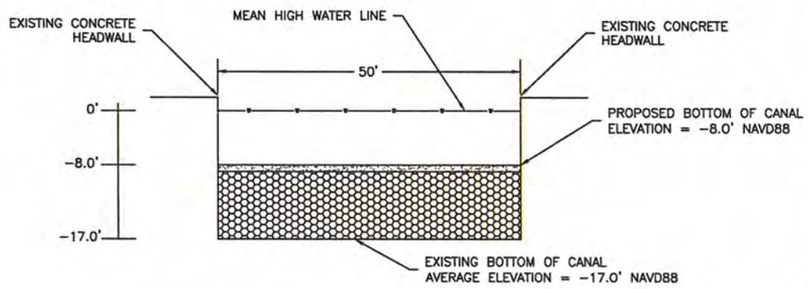


A/37 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- CLEAN COMPACTED FILL
- SCREENING SAND



B/37 CROSS-SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING BACKFILL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS -21.6 FEET AND THE MAXIMUM OBSERVED DEPTH IS -6.7 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.
2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

amec

ENVIRONMENT AND INFRASTRUCTURE
404 SW 140TH TERRACE
NEWBERRY, FL 32669
TEL: (352) 332-3318

NOT VALID WITHOUT SIGNATURE AND DATE

PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

BACKFILL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 37	
SHEET OF SHEETS	

Monroe County Selection of Demonstration Canals for BACKFILLING

Canal ID: 92 Tavernier

Location: MM 93 Hammer Point Park subdivision, Bayside

Summary of Water Quality Impacts: Primary – Deep stagnant zone with an average depth of - 23.65 feet.

Restoration Technology: Backfilling (For the purpose of eliminating deep oxygen depleted impaired water quality zone).

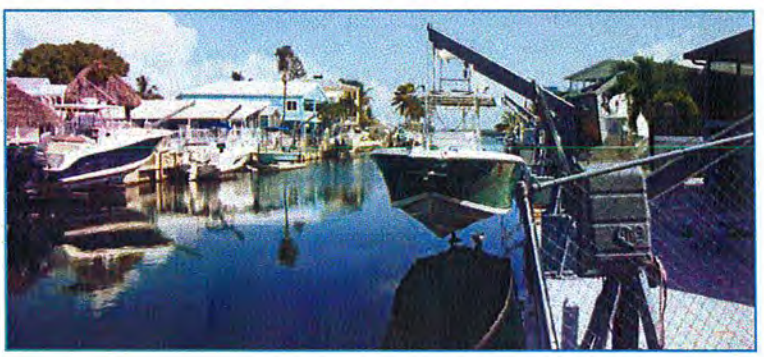
Site Conditions: The canal faces due north and discharges into Florida Bay. Private ownership of the lands below the high-water mark is not reflected in the plat book.

Existing Treatment: None

Homeowner Communication: AMEC spoke with the homeowner on the corner of Guilford Ct and Wellington Drive. They indicated they thought the water quality was fine. There is a HOA.

Water Quality Summary*			
D.O. (mg/L / % Saturation)	Turbidity (NTU)	W.Q. Summary & CMMP Ranking	Demo Ranking
0.06 / 0.9% at 10 ft	Not Measured	Poor 78	52

Characteristics	
Size (acres)	0.93
**Average Depth (ft)	-23.65
**Min Depth (ft)	-27.08
Degree of Stagnation	-0.6
Number of Mouths	1
Organic Thickness (ft) Average	0.76
Parcels	21
WBID	6006A Impaired
WWT	KLWTD
FKNMS Monitoring Station	None



Abbreviations: Dissolved Oxygen (D.O.); Nephelometric Turbidity Unit (NTU); milligrams per liter (mg/L); Water Body Identification (WBID); waste water treatment (WWT); Feet (ft).

*Information presented in the 2013 Monroe County Canal Management Master Plan.

**Data collected during the 2013 Monroe County Canals Bathymetric Survey.

Canal ID: 92 Tavernier

Project Location:

The project area is located north west of US1 in Monroe County, Tavernier, Florida; Section 22, Township 62 S, Range 38 E , (Latitude: 25°01'35.27" North; Longitude: - 80°30'33.39" West). The information sheet and site location map (**Figure 5**) provide additional details.

Conceptual Design:

The purpose of the project is to backfill canal 92 to an average depth of 8 feet mean low water elevation to increase dissolved oxygen and reduce deep stagnation zones. At this stage in the project, the following design components have not been completed:

- Detailed bathymetric cross section data
- Method to prevent suspension of bottom sediments

Therefore, for budgetary purposes, AMEC used the surface area of the canal and average depth of the bathymetric center line profile of the canal to estimate the 30,000 tons to backfill the canal to the target elevation. It is assumed at this time that the source of the backfill will be a commercial quarry. The following is the backfill material specifications for the various layers:

- Top 1' of Material: Screening sand or A3 Sand Fill from Quarry.

- Subbase Material: Shall be clean, well-graded material free from debris, peat, roots, seeds of nuisance or exotic species, organic material, clods, and stones with a diameter greater than 3 inches (76 mm) in any direction. Backfill shall have an average organic content of not more than 5%. Backfill shall meet the following Unified Soil Classification System (ASTM D2487) designations: SW, SP, SP-SM, and SP-SC (These are coarse-grained soils with greater than 50% by dry weight retained on a No. 200 sieve; SP and SW have less than 5% finer than a No. 200 sieve; SP-SM and SP-SC have 5-12% finer than a No. 200 sieve)

- Base Material (thickness to be determined at each canal location): Backfill shall be clean, well-graded material that is thoroughly mixed and free from debris, clods, seeds of nuisance or exotic species, and stones with a maximum 6-inch diameter in any direction. Backfill shall have an organic content of less than 5% by weight and shall meet the following Unified Soil Classification System (ASTM D2487) designations: SP, SP-SM, and SP-SC.

The project will entail using earthmoving and mechanical equipment to place the material on a barge from the canal shoreline while minimizing environmental impacts to existing mangrove fringe. An excavator will also be used to place the fill material into the canal system. Due to the area outside the limits of the canal system designated as a Florida Outstanding Water the contractor will install primary and secondary turbidity curtains to ensure 0 NTU's above background.

The estimated quantity to backfill the canal to the target elevation will be verified once detailed bathymetric cross section data is gathered.

Construction Cost Estimate:

The approximate cost to install fill in the canal as aforementioned will be approximately $2,800 per linear foot of canal (656 linear feet) or $1.8 million total for Canal 92.

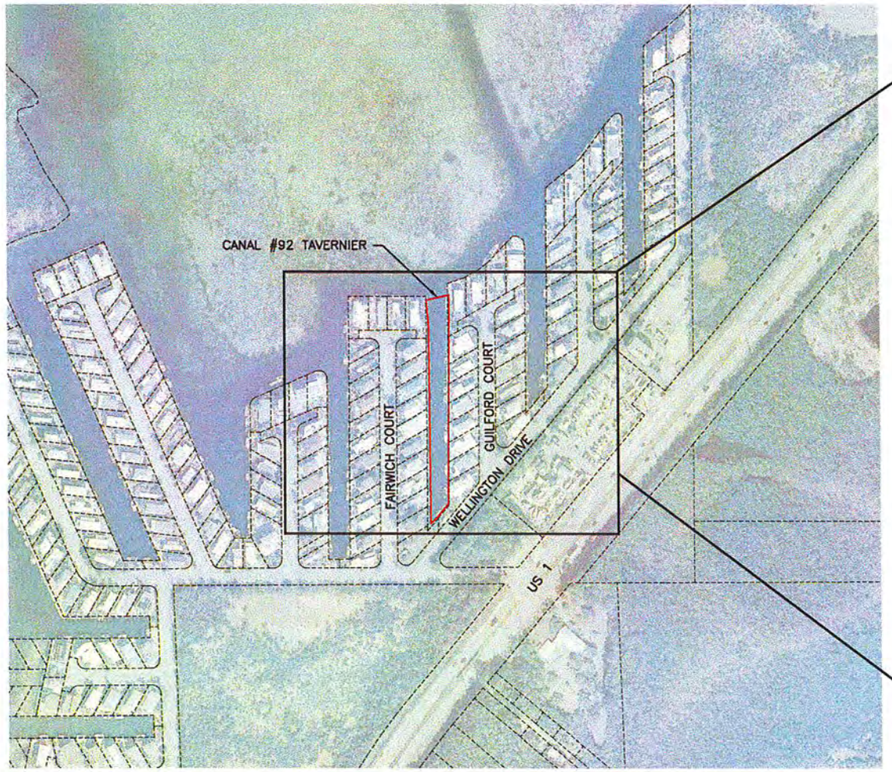
Permits:

- South Florida Water Management District Environmental Resource Permit
- Army Corps of Engineers Permit
- Florida Key's National Marine Sanctuary Permit

Access:

Based on field visits, there is an empty lot adjacent to Sunrise Drive that could be used as a construction staging area.

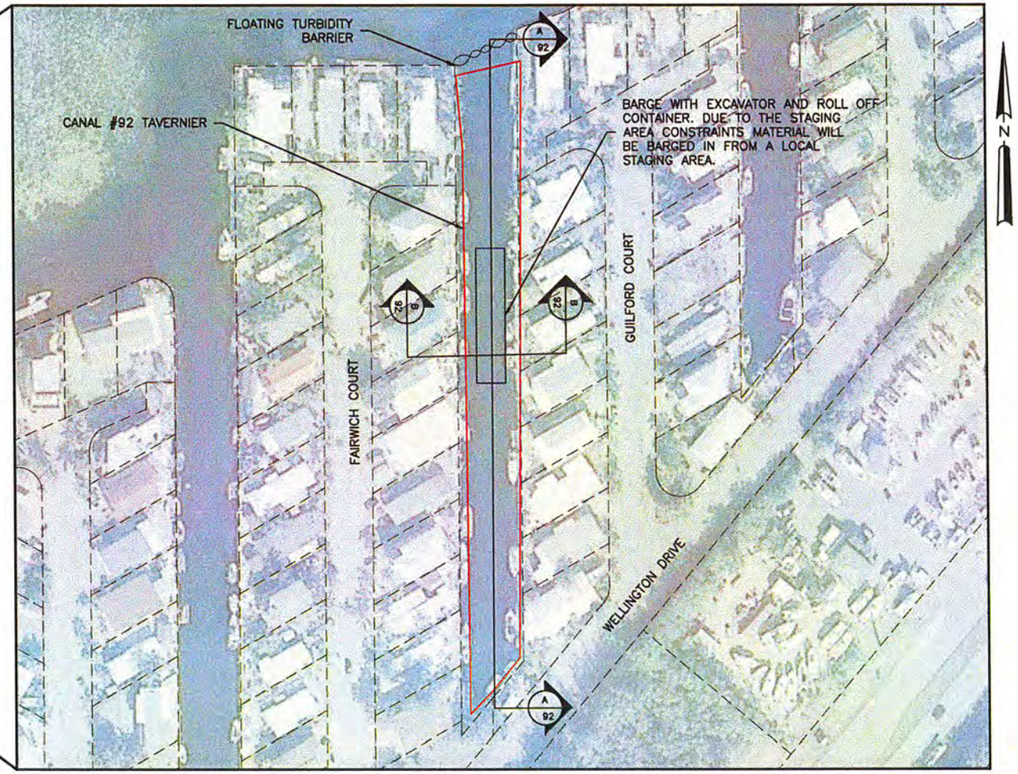
Conceptual Drawing: See attached



OVERALL SITE LAYOUT

0 200' 400'

SCALE:1"=200'



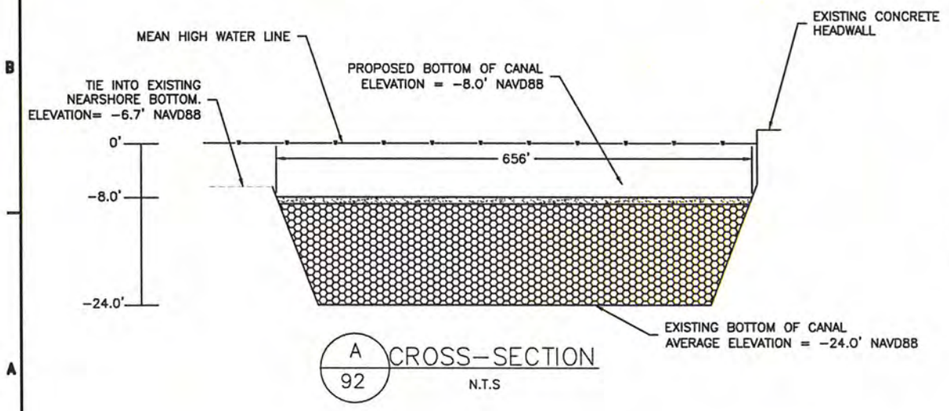
DETAIL SITE LAYOUT – BACKFILL

0 70' 140'

SCALE:1"=70'

LEGEND

- FLOATING TURBIDITY BARRIER
- CANAL #92 FOOTPRINT
- MONROE COUNTY PARCELS, 2010

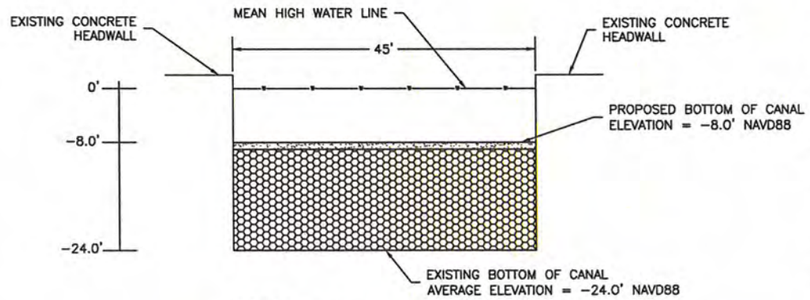


A 92 CROSS-SECTION

N.T.S

LEGEND:

- EXISTING GRADE LINE
- PROPOSED GRADE LINE
- CLEAN COMPACTED FILL
- SCREENING SAND



B 92 CROSS-SECTION

N.T.S

NOTES:

1) THE AVERAGE CANAL DEPTHS WERE USED IN CALCULATING BACKFILL VOLUMES AND ARE SHOWN ABOVE. THE MINIMUM OBSERVED DEPTH IS -27.1 FEET AND THE MAXIMUM OBSERVED DEPTH IS -17.6 FEET. THE CONTRACTOR SHALL REVIEW THE BATHYMETRY DATA SET TO DETERMINE ACTUAL CENTERLINE ELEVATIONS.

2) ALL ELEVATIONS ARE SHOWN IN NAVD88.

amec

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PROJECT:

MONROE COUNTY DEMO CANALS CONCEPTUAL DRAWINGS

APPLICANT:

AMEC PROJECT No: 6783-13-2507

REVISIONS			
NO.	DATE	BY	APPROVED

DESIGNED BY:	WCG/SJH/GWC
DRAWN BY:	GWC
CHECKED BY:	WCG/SJH
APPROVED BY:	CAS
DATE:	10/11/2013

SHEET TITLE:

BACKFILL CONCEPTUAL PLAN

SHEET NUMBER:	REV. #
CANAL 92	
SHEET OF SHEETS	