St. Andrew Bay Watershed Stormwater Outfall Mapping Project

By Jason Baum

for

The St. Andrew Bay Environmental Study Team, Inc. (BEST, Inc.)

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St. Andrew Bay Watershed
Stormwater Outfall Mapping Project

St. Andrew Bay Environmental Study Team, Inc.
The Friends of St. Andrew Bay
Mike Brim
Lyman Barger
Corrine McElwain
Alice Guay

Florida State University
Mike Zinszer
Dr. Tom Kelley
Dr. Dale Nute
Matt Beard

Camp, Dresser, and McKee
Danielle Honour

US Fish and Wildlife Service

The Friends of Grand Lagoon

Lake Powell Citizens Alliance

Bay County

Municipal Cities of Bay County
Panama City
Panama City Beach
Parker
Callaway
Springfield
Lynn Haven
Cedar Grove

Introduction

Purpose

The Friends of St. Andrew Bay and the St. Andrew Bay Environmental Study Team (B.E.S.T.) created the Stormwater Outfall Mapping Project to bring together the seven cities, Panama City, Panama City Beach, Callaway, Parker, Springfield, Lynn Haven, and Cedar Grove, and the representatives of Bay County in unity to locate, manage, and maintain the stormwater system throughout the St. Andrew Bay watershed together in hopes that as a team future damage by stormwater to the St. Andrew Bay and surrounding bays could be averted.

For the Friends of St. Andrew Bay to be able to perform this task, the Stormwater Outfall Mapping Project was created to better organize and manage the volunteers needed to complete this task. The volunteer portion of this project started in the May 2008, and I, a graduate student intern from Florida State University (FSU), managed the project throughout the summer. I organized, planned, retrieved and inputted data into a format that could be used by the Geographic Information System (GIS) to map out the location of the stormwater outfalls visually throughout the watershed. The project was conducted in correlation as an extension of an arrangement with Camp, Dresser, and McKee (CDM) to develop a tool to rank sub-basins throughout the watershed.

This internship continued throughout the summer aiming to complete the entire watershed and input all the data. The project continued after the summer was up on a volunteer basis to complete this task and make sure the management position could be maintained throughout the appointed project time between the B.E.S.T. and CDM.

Background

The St. Andrew Bay watershed is over 700,000 acres and made up several different water systems extending throughout Bay County and surrounding counties. The watershed is comprised of several smaller bays, West Bay, East Bay, North Bay, St. Andrew Bay, and Deer Point Lake which is fed by the Econfina Creek. The reason this area is so vital, the watershed is fed the majority of its freshwater through the Deer Point dam by the Econfina Creek. The water is also filtered out by the Gulf of Mexico through one outlet located west of the St. Andrew Bay through the pass.

The initial goal of this project was to use $500,000 obtained from a Northwest Florida Water Management District grant and be able to turn that around into a $50,000,000 grant from the Federal Environmental Protection Agency to be divided and used between the municipal cities of Bay County that comprised the area of St. Andrew Bay. The initial grant was obtained in May of 2007 and kicked off the Stormwater Outfall Mapping Project. This money was initially used to obtain a contract with CDM to create a tool to be used with the GIS and gather and train volunteers to locate and gather information regarding the stormwater pipes throughout the watershed.

Methodology

Protocol for Training Volunteers

The following is the procedure and steps to managing and training the volunteers:

1. Before any volunteer is sent into the field, they must be registered as a volunteer with The Friends of St. Andrew Bay and gone through the Stormwater Outfall Mapping Training session.
    a. The first part of the training involves and in-class presentation on the importance of managing stormwater and what to expect out in the field.
        i. The presentation can be found as a PowerPoint labeled Training Prez. under the SWAT Training folder in the SWP Volunteer Training and Management folder.
        ii. Presentation lasts about 30 min. with three videos; 2 before and 1 after
            1. The computer used for the presentation must be connected to the internet in order for the videos to work; they will only be activated when clicked
    b. The second part of the training session consists of a dry field run through after the presentation.
        i. This lasts approximately 1 – 2 hours
            1. It can be conducted anywhere in field, the best location has been along Beach Dr.
        ii. Bring all equipment provided for in the equipment box so that volunteers can get a feel as to what they will be using and how to use when doing their survey
        iii. Be sure to inform volunteers of the field work prior to the training session
        iv. Be sure to go over any and all questions while in the field before they are sent out.
2. Use the GIS to provide maps and locations of the area that the volunteers will survey.
3. Set up the field box that the volunteers will be taking with before they arrive for the training session, that way they will be comfortable with the exact equipment they will be using. Will also save time for you and volunteers so they are not driving back and forth.
    a. The procedures for equipment use and fieldwork are listed below and can be found in the Appendix.
4. Prepare Datasheets to be used for volunteers.
    a. A copy can be found in the Appendix.

Data Entry

Procedure

All data that was inputted into the GIS had to be in a spreadsheet format. With the large amounts data that was generated by the volunteers, starting with an Access form and table proved to be the easiest way since the data could be copied right off the data sheet. The GIS could only support data that was entered in a Dbase IV format; the data had to be extracted and converted to Excel then to DBase IV. Listed below are the steps to which the data should be entered and sent to the GIS computer.

Data Entry:

- □ Open Microsoft Access file Stormwater Project Volunteer Data
  - This file is located in C://BEST/BESTPhotos/Steering Committee/StormwaterTeam/SWPVolunteerTrainingandManagement/Access
- □ Go to Forms : GIS Table
  - Input data with new BEST number at the end of the form
  - The BEST number corresponds with the current row of data
  - Picture identification formats should appear as BXXXXXSW_x_IIII.jpg
    - X = BEST number
    - x = number of picture in sequence; 1… 2… 3…
    - IIII = Hydrologic Unit
    - This should also be the corresponding label for your picture.
- □ Once the data is entered, verify the hydrologic unit by following the steps below under Sending Data.
- □ You can edit this data later in the Form view or Table view.

Sending Data:

- □ Once the data has been entered follow these steps to successfully format the data for the GIS.
  - Open the Query, GIS Export Table Query
  - Click on File, Export
    - Edit the name of your data and save under your desired folder
    - The file must be save in the following format with the save formatted box checked.
      - Change the Save As Type: to Microsoft Excel 97-2003
  - Open the file that was just saved as a Microsoft Excel spreadsheet
    - Make sure the Latitude and Longitude column formats have been changed to Number with 5 decimal places.
    - Remove any excess or undesired data from the spreadsheet.

- Go to File, Save As
  - Save file with the proper name and under the desired folder
  - Change the Save As Type: to DBase (IV)
  - Click Yes after Pop-up box appears
- Your file is ready to be sent to the GIS computer via email or disk.

Fieldwork

Methods

The procedures for gathering the data and using the equipment are listed in the Standard Operating Procedures that have been included in the Appendix.

See Appendix :: Fieldwork SOP
See Appendix :: Sony Digital Camera SOP
See Appendix :: GPS SOP

Materials

The data sheets used to collect the data and equipment used are listed in the Appendix as follows.

See Appendix :: Outfall Mapping data sheet v.2
See Appendix :: Field Checklist

Results

Presentation

The data gathered represents only a small part of the St. Andrew Bay watershed. The Appendix lists a sampling of the data gathered as well as a graphical representation of the data as compared to the St. Andrew Bay watershed.

Descriptive Statistics

Number of Volunteers: 26
Volunteer Train Hrs: 36 Hrs
Volunteer Field Hrs: 516.19 Hrs
Volunteer Data Processing: 271
Data Points Collected: 623
Percentage of watershed covered: 5%

Discussion

Even though the amount of data appears minute when looking at the entire watershed, the concentration of efforts on important parts of the waterway that see the damage from stormwater have been mapped out successfully. These areas are greatly inhabited and produce some of the greatest residue in terms of pollution that is exposed to the bay on regular intervals. Therefore when using the tool for this area, the data will be very helpful and can be used to prove the success of the ability of the tool as an effective instrument.

Conclusion

Aspects

From an academic standpoint the internship provided me with the chance to take on a series of leadership, political, investigative, and technical roles. The positions are useful and relate to criminal investigative field work when handling a team during an investigation. The leadership was maintained while training and working with the volunteers. It provided unique situations and gave me the experience of dealing with people in a real world environment. I found out that not everything happens exactly as planned, but having a set plan and standards provides a strong guideline with which to resolve conflicts both in the field and in the office.

The political role came into place when participating in meetings with the Stormwater Committee and municipal leaders and representatives. It gave me a unique aspect when dealing with government situations. One of the most important things to maintain when handling people of the political situation is to realize that a person needs to have a strong mentality and focus, because in most cases not everybody will be right or agree with your opinion, but staying calm and strong about your position often leads to a positive outcome.

The investigative portion came in when working in the field collecting data and went hand in hand with the technical aspect as well. It involved the planning, and conducting of the assignments throughout the St. Andrew Bay, and to be able to understand what is attainable and what plays the highest importance in collecting the data in an orderly fashion. In the more technical aspect, during the course of the internship I was given the opportunity to take a course with U.S. Fish and Wildlife that dealt with the operation of the GIS program. I found that the GIS program could be used for more than just plotting points visually but provided the ability to evaluate the data in relationship to other data being plotted. This becomes invaluable when plotting environmental activities as well as criminal activities and understanding patterns of events.

Remarks

As far as the data collection and processing went, the overall progress of the data went smoothly. The amount of data collected equaled over 700 man hours averaging about 6 data points per hour, but about 40 points per volunteer and 5 man hours per volunteer. In totality this is a rather small number and the number of days with which the data was obtained should have led to a lot more. But with the accessibility of equipment and volunteers, the situation was handled without compromise to the success of the project.

There are but a few things that would have helped the project act with more success. The first would have been greater planning and preparation with how the data was to be assembled. The second is the attaining of equipment and proper procedures of the use of the equipment. With limited access to major equipment such as digital cameras and geographical positioning systems, it became difficult when there were large numbers of volunteers out in the field or to begin the project with limited equipment for training purposes. Overall the improvement of future projects should be started out with a set standard for all data as well as the accessibility and acquisition of priority equipment.

References

Federal Clean Water Act

http://www.fws.gov/laws/lawsdigest/FWATRPO.HTML

Appendix

The following documents are listed at the end of the report:

Project Photographs

Data Sample

Graphic Diagram of Data Points from GIS

Outfall Mapping data sheet v.2

Field Checklist

Fieldwork SOP

Sony Digital Camera SOP

GPS SOP

Appendix

St. Andrew Bay Environmental Study Team, Inc.
Stormwater Outfall Survey and Data Collection
Bay County Florida
Coastal Program Grant 401817G079
Photographs: January – September 2008

Figure 1 Volunteer Lyman Barger (l) and Project Manager Jason Baum(r) enter stormwater location data for a Panama City outfall into a GPS unit. *Bay County, Florida.*

Figure 2 After a recent rain, a stormwater ditch and culverts at the Panama City Mall. *Bay County, Florida.*

Figure 3 Stormwater run-off into Gulf of Mexico along the beaches of Panama City Beach. *Bay County, Florida*

Figure 4 Project Manager Jason Baum (r) measures outfall pipe in Panama City off of Beach Drive, while Lyman Barger (l) enters location data into GPS unit. *Bay County, Florida.* Protocols were developed as a training program for BEST/FSAB volunteers.

Figure 5 Volunteer Len Banks of Friends of Grand Lagoon records storm drain location on Grand Lagoon in Panama City Beach. *Bay County, Florida.*

Figure 6 FSU volunteer intern Matt Beard prepares to record data at stormwater outfall pipes located in the City of Parker. *Eastern Bay County, Florida.*

Figure 7 Outfall pipe at Botheration Bayou in West Bay. *Bay County, Florida*

Figure 8 Outfall pipe and corresponding data, located in Southport. *Northern Bay County, Florida*

Figure 9 Los Angeles film crew from Cloverland, Inc. on RMA boat behind Shell Island in St. Andrew Bay, filming a portion of the stormwater documentary for BEST/FSAB. *Bay County, Florida*

Figure 10 Film crew from Cloverland, Inc., and BEST Inc Executive Director Mike Brim, take a helicopter flight to obtain aerial footage of the St. Andrew Bay Watershed. *Bay County, Florida*.

Figure 11 Outfall units shown on GIS map representing the St Andrew Bay Watershed in Bay County Florida. Volunteer field survey teams collected the data show. Volunteer Lyman Barger entered the data into the GIS system.

BEST_No	Date_Out	Time_Out	Date In	Time In	Sub_Basin	Hydrologic	Marked
B00001SW	21-Mar-08	13:00	21-Mar-08	15:30	Hathaway	Hath01	No
B00002SW	21-Mar-08	13:00	21-Mar-08	15:30	Hathaway	Hath01	No
B00003SW	21-Mar-08	13:00	21-Mar-08	15:30	Hathaway	Hath01	No
B00004SW	21-Mar-08	13:00	21-Mar-08	15:30	Hathaway	Hath01	No
B00005SW	21-Mar-08	13:00	21-Mar-08	15:30	Hathaway	Hath01	No
B00006SW	21-Mar-08	13:00	21-Mar-08	15:30	Hathaway	Hath01	No
B00007SW	21-Mar-08	13:00	21-Mar-08	15:30	Hathaway	Hath01	No
B00008SW	21-Mar-08	13:00	21-Mar-08	15:30	Hathaway	Hath01	No
B00009SW	21-Mar-08	13:00	21-Mar-08	15:30	Hathaway	Hath01	No
B00010SW	21-Mar-08	13:00	21-Mar-08	15:30	Hathaway	Hath01	No
B00011SW	21-Mar-08	13:00	21-Mar-08	15:30	Hathaway	Hath01	Yes
B00012SW	21-Mar-08	13:00	21-Mar-08	15:30	Hathaway	Hath01	Yes
B00013SW	28-Mar-08	12:30	28-Mar-08	16:00	Hathaway	Hath01	No
B00014SW	28-Mar-08	12:30	28-Mar-08	16:00	Hathaway	Hath01	No
B00015SW	28-Mar-08	12:30	28-Mar-08	16:00	Hathaway	Hath01	No
B00016SW	28-Mar-08	12:30	28-Mar-08	16:00	Hathaway	Hath01	No
B00017SW	28-Mar-08	12:30	28-Mar-08	16:00	Hathaway	Hath01	No
B00018SW	28-Mar-08	12:30	28-Mar-08	16:00	Harrison Bayou	HB01	No
B00019SW	28-Mar-08	12:30	28-Mar-08	16:00	Harrison Bayou	HB01	No
B00020SW	28-Mar-08	12:30	28-Mar-08	16:00	Harrison Bayou	HB01	No
B00021SW	28-Mar-08	12:30	28-Mar-08	16:00	Harrison Bayou	HB01	No
B00022SW	28-Mar-08	12:30	28-Mar-08	16:00	Harrison Bayou	HB01	No
B00023SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	Yes
B00024SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	No
B00025SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	No
B00026SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	Yes
B00027SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	No
B00028SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	No
B00029SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	No
B00030SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	No
B00031SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	No
B00032SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	No
B00033SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	No
B00034SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	No
B00035SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	No
B00036SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	No
B00037SW	11-Apr-08	10:30	11-Apr-08	14:00	Harrison Bayou	HB01	No
B00038SW	23-Apr-08	12:30	23-Apr-08	14:15	Harrison Bayou	HB01	No
B00039SW	23-Apr-08	12:30	23-Apr-08	14:15	Harrison Bayou	HB01	No
B00040SW	23-Apr-08	12:30	23-Apr-08	14:15	Harrison Bayou	HB01	No
B00041SW	23-Apr-08	12:30	23-Apr-08	14:15	Harrison Bayou	HB01	No
B00042SW	23-Apr-08	12:30	23-Apr-08	14:15	Harrison Bayou	HB01	No
B00043SW	23-Apr-08	12:30	23-Apr-08	14:15	West Bay	WB01	No
B00044SW	23-Apr-08	12:30	23-Apr-08	14:15	Harrison Bayou	HB01	No
B00045SW	03-May-08	14:00	03-May-08	15:00	Panama City	PC08	No
B00046SW	03-May-08	14:00	03-May-08	15:00	Panama City	PC08	No

Unmarked	Date	Time	Sampler	Re_Sample	Outfall	In_or_Out	Construct
Yes	21-Mar-08	13:23	Chris Knight		Yes	☐	Concrete
Yes	21-Mar-08	13:38	Chris Knight		Yes	☐	Concrete
Yes	21-Mar-08	13:48	Chris Knight		Yes	☐	Plastic
Yes	21-Mar-08	14:18	Chris Knight		No	☑	Other
Yes	21-Mar-08	14:35	Chris Knight		Yes	☐	Concrete
Yes	21-Mar-08	14:41	Chris Knight		Yes	☐	Concrete
Yes	21-Mar-08	14:46	Chris Knight		Yes	☐	Concrete
Yes	21-Mar-08	14:50	Chris Knight		No	☑	Concrete
Yes	21-Mar-08	15:01	Chris Knight		Yes	☐	Other
Yes	21-Mar-08	15:10	Chris Knight		Yes	☐	Other
No	21-Mar-08	15:19	Chris Knight		No	☑	Concrete
No	21-Mar-08	15:28	Chris Knight		Yes	☐	Concrete
Yes	28-Mar-08	12:57	Chris Knight		Yes	☐	PVC
Yes	28-Mar-08	13:19	Chris Knight		Yes	☐	Other
Yes	28-Mar-08	13:41	Chris Knight		Yes	☐	PVC
Yes	28-Mar-08	14:13	Chris Knight		Yes	☐	Concrete
Yes	28-Mar-08	13:52	Chris Knight		Yes	☐	Concrete
Yes	28-Mar-08	14:25	Chris Knight		Yes	☐	Other
Yes	28-Mar-08	14:24	Chris Knight		Yes	☐	Other
Yes	28-Mar-08	15:02	Chris Knight		Yes	☐	Other
Yes	28-Mar-08	15:22	Chris Knight		Yes	☐	Other
Yes	28-Mar-08	15:41	Chris Knight		Yes	☐	Other
No	11-Apr-08	10:36	Chris Knight		Yes	☐	Metal
Yes	11-Apr-08	10:44	Chris Knight		Yes	☐	Concrete
Yes	11-Apr-08	11:18	Chris Knight		Yes	☐	Other
No	11-Apr-08	11:28	Chris Knight		Yes	☐	Other
Yes	11-Apr-08	11:40	Chris Knight		Yes	☐	Other
Yes	11-Apr-08	11:58	Chris Knight		Yes	☐	Other
Yes	11-Apr-08	12:07	Chris Knight		Yes	☐	Metal
Yes	11-Apr-08	12:10	Chris Knight		Yes	☐	Corrugated
Yes	11-Apr-08	12:17	Chris Knight		Yes	☐	Corrugated
Yes	11-Apr-08	12:39	Chris Knight		Yes	☐	Other
Yes	11-Apr-08	12:54	Chris Knight		Yes	☐	Other
Yes	11-Apr-08	13:10	Chris Knight		Yes	☐	Other
Yes	11-Apr-08	13:33	Chris Knight		Yes	☐	Other
Yes	11-Apr-08	13:40	Chris Knight		Yes	☐	Other
Yes	11-Apr-08	13:55	Chris Knight		Yes	☐	Other
Yes	23-Apr-08	12:34	Chris Knight		Yes	☐	Other
Yes	23-Apr-08	12:53	Chris Knight		Yes	☑	Concrete
Yes	23-Apr-08	13:10	Chris Knight		Yes	☐	Other
Yes	23-Apr-08	13:18	Chris Knight		Yes	☑	Metal
Yes	23-Apr-08	13:55	Chris Knight		Yes	☐	Metal
Yes	23-Apr-08	13:53	Chris Knight		Yes	☐	Other
Yes	23-Apr-08	14:13	Chris Knight		Yes	☐	Concrete
Yes	03-May-08	14:07	JRB		No	☑	Metal
Yes	03-May-08	14:13	JRB		No	☑	Metal

Describe_Const	Ownership	Condition
	Panama City Beach	Excellent
ROUND PIPE	Unknown	Fair
CORRUGATED	Unknown	Good
SEWER DRAIN	Panama City Beach	Fair
VERY SHALLOW DITCH RAINING END OF STREET	Private	Good
STORMDRAIN	Panama City Beach	Good
STORMDRAIN	Panama City Beach	Good
STORM DRAIN	Panama City Beach	Good
STORMWATER POND W/ OUTLET TO SOUTHEAS	Panama City Beach	Excellent
SW POND W/ NO OUTLET	Panama City Beach	Good
FRENCH DRAIN W/ 3 PIPES COMING IN	Panama City Beach	Excellent
STORMDRAIN/ STORM POND	Panama City Beach	Good
	Panama City Beach	Excellent
DITCH	Panama City Beach	Poor
	Panama City Beach	Excellent
	Panama City Beach	Fair
	Private	Good
DITCH	Private	Fair
DITCH	Private	Poor
DITCH	Private	Poor
DITCH	Private	Poor
DITCH	Private	Poor
DITCH AND PIPE	Private	Poor
DITCH AND PIPE	Private	Poor
DITCH	Private	Poor
DITCH	Private	Poor
DITCH	Private	Poor
DITCH	Private	Poor
DITCH W/ METAL PIPE	Private	Poor
UNDER RD	Private	Poor
	Private	Poor
DITCH	Private	Good
DITCH	Private	Poor
DITCH	Private	Poor
DITCH	Private	Poor
DITCH	Private	Poor
DITCH	Private	Poor
DITCH	Private	Poor
WIER ACROSS ROAD	Private	Good
DITCH	Private	Poor
	Private	Poor
2 PIPES	Private	Poor
DITCH ACROSS ROAD N - S	Private	Poor
	Private	Good
	Lynn Haven	Fair
STEEL GRATE	Lynn Haven	Good

Describe_Cond	L_Meas_In	W_Meas_In	Occlusion	GPS_Unit
	48	48	0 %	Personal
OLD BUT GOOD	12	12	20 %	Personal
NEW	15	18	0 %	Personal
	2	24		Personal
	1	24	0 %	Personal
	4	36		Personal
	4	36		Personal
	4	36		Personal
NO ACCESS TO PIPE DUE TO DOT SW FENCE			0 %	Personal
NO ACCESS TO PIPE IN POND				Personal
	48	60	0 %	Personal
	48	48	0 %	Personal
	18	18	50 %	Personal
NATURAL	72	12		Personal
	30	30	0 %	Personal
	18	18	10 %	Personal
	18	18	0 %	Personal
NATURAL	2	6		Personal
ERODED	24	120		Personal
OLD	12	72		Personal
OLD	6	48		Personal
OLD	12	60		Personal
OLD	8	36	50 %	Personal
	12	36		Personal
OLD	12	84		Personal
	6	72		Personal
OLD	6	36		Personal
OLD	6	48		Personal
OLD	12	72	50 %	Personal
COLLAPSED IN MIDDLE	24	24	25 %	Personal
COLLAPSED IN MIDDLE	24	24	50 %	Personal
	24	216		Personal
OLD	12	86		Personal
OLD	6	48		Personal
OLD	6	48		Personal
OLD	12	86		Personal
OLD	12	86		Personal
OLD	12	48		Personal
OLD	90	264		Personal
OLD	12	120		Personal
	24	24	50 %	Personal
	48	48	50 %	Personal
OLD	6	48		Personal
	24	24	30 %	Personal
	36	51	10 %	2
	36	51	30 %	2

WayPt	Latitude	Longitude	Accuracy_Ft
HB 1	30.18836	-85.75033	
HB 2	30.18961	-85.75231	
HB 3	30.18892	-85.75167	
HB 4	30.18978	-85.75364	
HB 5	30.19431	-85.75694	
HB 6	30.19339	-85.75803	
HB 7	30.19439	-85.75975	
HB 8	30.19322	-85.76089	0
HB 9	30.18925	-85.75831	0
HB 10	30.18953	-85.75969	
HB 11	30.1915	-85.76147	
HB 12	30.19497	-85.76142	0
HB 13	30.19864	-85.75025	0
HB 14	30.19778	-85.74939	
HB 15	30.20147	-85.75025	
HB 17	30.20147	-85.76092	0
HB 16	30.19936	-85.75006	0
HB 18	30.20228	-85.76136	0
HB 19	30.20972	-85.75667	0
HB 20	30.20767	-85.75997	0
HB 21	30.21369	-85.76564	0
HB 22	30.21514	-85.76844	0
HB 23	30.21103	-85.782	0
HB 24	30.21333	-85.78181	0
HB 25	30.23319	-85.77908	0
HB 26	30.23433	-85.77503	0
HB 27	30.22717	-85.77694	0
HB 28	30.22575	-85.7745	0
HB 29	30.22553	-85.77536	0
HB 30	30.22506	-85.77592	0
HB 31	30.223	-85.77486	0
HB 32	30.24242	-85.78414	0
HB 33	30.24286	-85.79625	0
BB 1	30.23283	-85.81108	0
BB 2	30.23508	-85.80875	0
BB 3	30.23797	-85.80081	0
BB 4	30.23564	-85.80014	0
BB 5	30.22392	-85.81628	0
BB 6	30.21353	-85.80783	0
BB 7	30.21325	-85.81056	0
BB 8	30.21422	-85.81572	0
BB 9	30.21956	-85.82342	0
BB 10	30.22514	-85.83117	0
BB 11	30.21511	-85.82894	0
25	30.24641	-85.64294	101
26	30.24639	-85.64294	17

Describe_Contrib
DRAINS SOUTH WEST POND
DRAINS GRATE IN PARKING LOT TO WEST
DRAINS HI-RISE PARKING LOT
DRAINS ROAD
STREET IN NEIGHBORHOOD
DRAINS STREET
DRAINS STREET; ALSO IDENTICAL DRAIN DIAGONAL ACROSS STREET
DRAINS STREET
CONSTRUCTED TO MITIGATE NEW 98 CONSTRUCTION
CONNECTS KMART & TACO BELL PARKING LOT RUNOFF
DRAINS ROAD & K-MART
DRAINS SW FROM NORTH AND SOUTH
DRAINS ROAD FROM EAST-WEST
MARSH WHICH RECIEVES WATER FROM DITCH ALONG PAVED ROAD AND DOLPHIN BAY SUBDIV
END OF NORTHERNMOST DITCH ALONG ROAD
DRAINS BIG DADDY DRIVE
GRATE DRAINING SWALE IN ROAD
UPSTREAM DITCHES
DRAINS 3 MARSHES & DIRT ROAD GOING FROM GATE & DIRT; WILDWOOD RD; WOODS
DRAINS ALONG OIL WELL RD AND RD PERPENDICULAR
3 DITCHES INTERSECT
RD TO NORTH WEST
DRAINS DITCH ACROSS FROM ROAD
DRAINS DITCHES ALONG ROAD
DRAINS ACROSS RD W - E
FOREST
SEEMS TO BE WHERE ROAD DRAINS INTO MARSH
DITCH ALONG ROAD
DRAINS RD AND FOREST
FOREST AND MARSH
MARSH AND DITCHES
DRAINS WILDWOOD AND POINTS SOUTH WITHIN 1 MILE OF POWERLINE RD AND WOODS
DITCH DRAINING FROM SOUTH
ROAD
ROAD
BLUE COOLER RD AND DITCH FROM EAST
BLUE COOLER RD
ROAD AND SWAMP
MARSH/FOREST/WILDWOOD RD
FOREST; DITCH RUNS INTO ROAD DITCH THEN TO BB 6
WOODS
WOODS
WOODS
WOODS OF POWERLINE RD
LIFT STATION; SUBDIVISION
DRAINS STREETS AND SUBDIVISION

Describe_Out	Camera_No	Photo
Rip-rap, directly into bay	Personal	B00001SW_1_Hath01.jpg
St. Andew Bay	Personal	B00002SW_1_Hath01.jpg
St. Andrew Bay	Personal	B00003SW_1_Hath01.jpg
Drains to unnamed bayou to west	Personal	B00004SW_1_Hath01.jpg
St. Andrew Bay	Personal	B00005SW_1_Hath01.jpg
Drains to N - S finger of unnamed inlet	Personal	B00006SW_1_Hath01.jpg
St. Andrew Bay	Personal	B00007SW_1_Hath01.jpg
St. Andrew Bay	Personal	B00008SW_1_Hath01.jpg
Stormwater pond	Personal	B00009SW_1_Hath01.jpg
Stormwater pond; does not seem to be any outfall to bay	Personal	B00010SW_1_Hath01.jpg
Outlet to large pipe	Personal	B00011SW_1_Hath01.jpg
Concrete ditch flows east into canal	Personal	B00012SW_1_Hath01.jpg
Tidal pool at south end of canal	Personal	B00013SW_1_Hath01.jpg
Trash, bushes, salt marsh	Personal	B00014SW_1_Hath01.jpg
End of canal	Personal	B00015SW_1_Hath01.jpg
Flows south in ditch to end of canal	Personal	B00016SW_1_Hath01.jpg
Pipe in seawall	Personal	B00017SW_1_Hath01.jpg
Marsh	Personal	B00018SW_1_HB01.jpg
Ditch ending in marsh	Personal	B00019SW_1_HB01.jpg
Marhs	Personal	B00020SW_1_HB01.jpg
Flow to NE	Personal	B00021SW_1_HB01.jpg
Marsh	Personal	B00022SW_1_HB01.jpg
Ditch	Personal	B00023SW_1_HB01.jpg
Into woods	Personal	B00024SW_1_HB01.jpg
Marsh at head of Harrison Bayou	Personal	B00025SW_1_HB01.jpg
Into marsh	Personal	B00026SW_1_HB01.jpg
Marsh w/ logs, debris piled up	Personal	B00027SW_1_HB01.jpg
Into marsh facing West Bay Point	Personal	B00028SW_1_HB01.jpg
Marsh	Personal	B00029SW_1_HB01.jpg
Marsh	Personal	B00030SW_1_HB01.jpg
Marsh	Personal	B00031SW_1_HB01.jpg
Marsh SE of Basin Bayou	Personal	B00032SW_1_HB01.jpg
Marsh at Breakfast Pt.	Personal	B00033SW_1_HB01.jpg
To E - W ditch to South	Personal	B00034SW_1_HB01.jpg
To South into E - W ditch	Personal	B00035SW_1_HB01.jpg
Ditch	Personal	B00036SW_1_HB01.jpg
Runs NW into woods	Personal	B00037SW_1_HB01.jpg
Ditch drains west into marsh	Personal	B00038SW_1_HB01.jpg
Marsh into Botheration Bayou	Personal	B00039SW_2_HB01.jpg
Marsh	Personal	B00040SW_1_HB01.jpg
Sand into woods	Personal	B00041SW_1_HB01.jpg
Marsh	Personal	B00042SW_2_HB01.jpg
Marsh	Personal	B00043SW_1_WB01.jpg
Ditch into woods	Personal	B00044SW_1_HB01.jpg
Pipe drains from subdivision to bayou	102	None
Outflows to lake/ bayou	102	None

Photo_1	Photo_2	Photo_3
B00001SW_1_Hath01.jpg		
B00002SW_1_Hath01.jpg		
B00003SW_1_Hath01.jpg		
B00004SW_1_Hath01.jpg		
B00005SW_1_Hath01.jpg		
B00006SW_1_Hath01.jpg		
B00007SW_1_Hath01.jpg		
B00008SW_1_Hath01.jpg	B00008SW_2_Hath01.jpg	B00008SW_3_Hath01.jpg
B00009SW_1_Hath01.jpg		
B00010SW_1_Hath01.jpg		
B00011SW_1_Hath01.jpg		
B00012SW_1_Hath01.jpg		
B00013SW_1_Hath01.jpg		
B00014SW_1_Hath01.jpg		
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B00017SW_1_Hath01.jpg		
B00018SW_1_HB01.jpg		
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B00037SW_1_HB01.jpg		
B00038SW_1_HB01.jpg		
B00039SW_1_HB01.jpg	B00039SW_2_HB01.jpg	
B00040SW_1_HB01.jpg		
B00041SW_1_HB01.jpg		
B00042SW_1_HB01.jpg	B00042SW_2_HB01.jpg	
B00043SW_1_WB01.jpg		
B00044SW_1_HB01.jpg		

Photo_1_Desc	Photo_2_Desc	Photo_3_Desc	Photo_1_Dir
OUTFALL			UPSTREAM
OUTFALL			DOWNSTREAM
OUFALL			DOWNSTREAM
STORMDRAIN			UPSTREAM
DRAIN			UPSTREAM
STORMDRAIN			SW UPSTREAM
STORMDRAIN			UPSTREAM
STORMDRAIN	STORMDRAIN	STORMDRAIN	WEST
STORMPOND W/ INLET			EAST TOWARD DRAIN
STORMPOND W/ INLET			
FRENCH DRAIN			SOUTH
STORMDRAIN			UPSTREAM
OUTFALL			EAST
DITCH			WEST
OUTFALL			FROM ABOVE
PIPE			EAST
PIPE			DOWN
DITCH			EAST
DITCH			FROM SIDE
DITCH			NW
PERP TO DITCH			?
DITCH			
DITCH			NE
DITCH			NE
DITCH			NW
ROAD W/ DITCHES ALONGSIDE			DWON RD TOWARDS LONG PT.
DITCHES IN RD			NORTH
DITCH			NW
DITCH			NORTH
PIPE			WEST
ROAD W/ PIPE AND OVERFLOW			EAST
DITCH			WEST
DITCH - UPSTREAM			SOUTH
DITCH			SOUTH
DITCH			SOUTH
DITCH			WEST
DITCH			NW
DITCH FLOW INTO MARSH			WEST
DITCH	WIER		NW
DITCH			SOUTH
PIPE			NORTH
DITCH OUTLOW	PIPE IN DITCH		NORTH
DITCH			NORTH
PIPE			SOUTH

Photo_2_Dir	Photo_3_Dir
SE	NE
EAST	
SOUTH	

Notes
10" WATERMARK, 1" FLOW;
<20 GALLONS/MINUTE; ABANDONED FORMER MOTEL, NOT USED; OCCLUDED BY OYTSTERS;
<20 GALLONS / MINUTE;
APPEARS TO CONNECT TO CONCRETE PIPE GOING NORTH; ALSO 1 IDENTICAL DRAIN DIAGONA
3 DRAINS, ONE ON WEST, ONE ON SE, ONE ON NE OF INTERSECTION CONNECT TO ONE MANH(
DOT SW POND ~1 ACRE; GPS LOCATION TAKEN IN NW CORNER;
3" WATERMARK
CONNECTS TO HB 11; 10" WATERMARK
PIPE FROM SOUTH?; SEDIMENT IMPEDES OCCLUSION;
2 PIPES IN SEAWALL;
4" WATERMARK W/ 2" STAGNANT WATER
TIDAL W/ 3" WATERMARK
15" WATERMARK
9" WATERMARK W/ 6" STAGNANT WATERMARK
6" WATERMARK
3" WATERMARK
5" WATERMARK
2' PIPE UNDER RD; 1/2 FULL W/ SGD OTHER 1/2 - ALL FLOW
2 18" CONCRETE PIPES W/ 2 DITCHES
6" WATERMARK
2 DITCHES; 1" WATERMARK; ROAD IS IMPASSABLE FROM HERE
2 DITCHES; 3" WATERMARK
3" WATERMARK
12' METAL PIPE; 6" WATERMARK
50/50 STAGNANT TO FLOW RATIO
500 GAL/MIN; 1 24" PIPE W/ 3" WATERMARK; 2 24" WIDE DITCHES W/ 3" WATERMARK EACH
15" WATERMARK
1' WATERMARK; TIDAL
6" WATERMARK
6" WATERMARK; 2 DITCHES W/ IN 200' OF GPS; IDENTICAL
6" WATEMARK
6" WATERMARK
1203 GAL /MIN; 8" WATERMARK
6" WATERMARK; SOME TIDAL; 52" FROM WATER
6" WATERMARK
REST IS FLOWABLE
FLOW 4' x 6" UPSTREAM; 898 GAL/MIN
898 GAL/MIN
12" WATER; 8" WATERMARK; 551 FT/MIN
Camera dead
Camera dead

GPS_Appr	Photo_Appr
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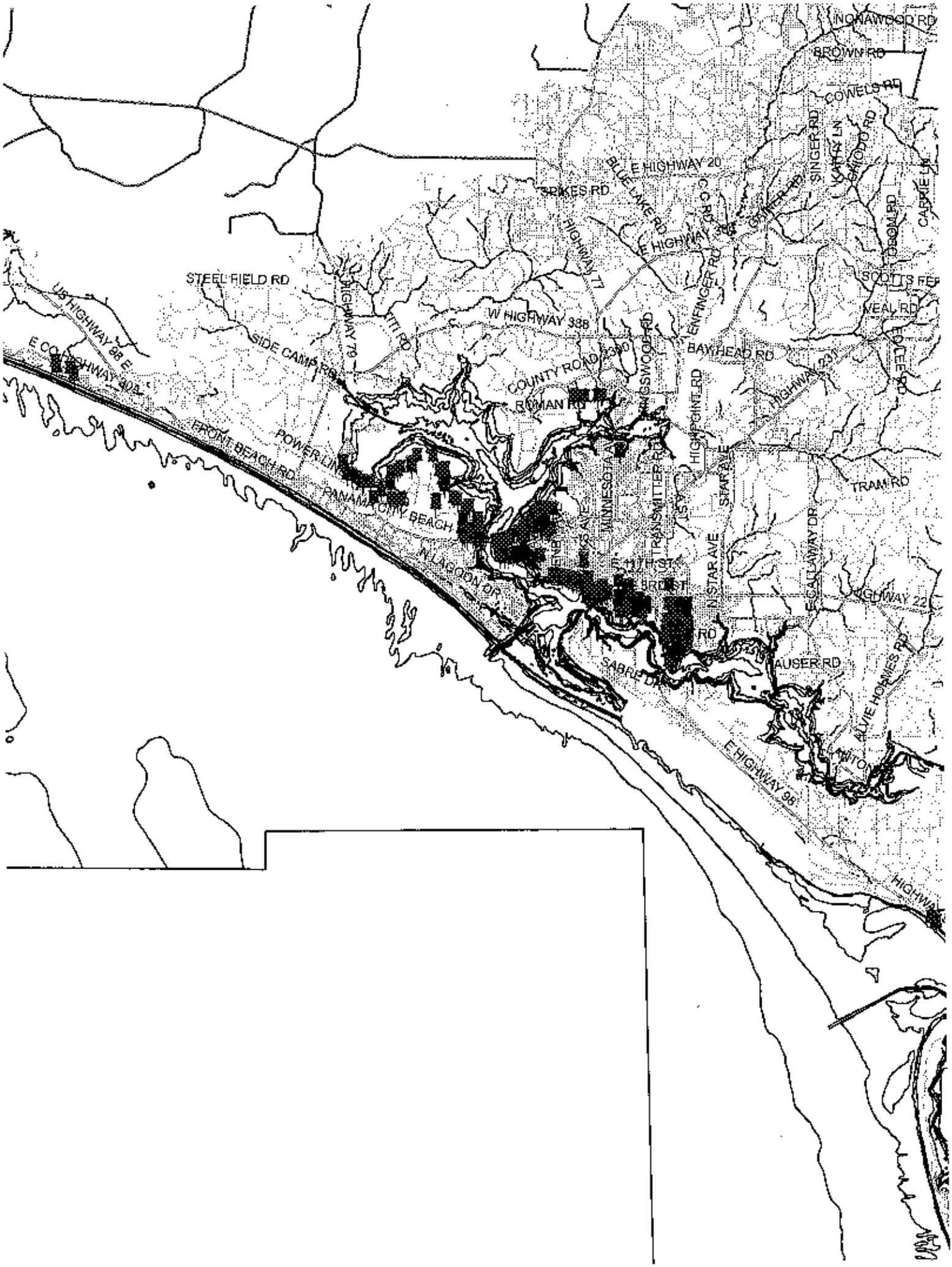
INGRAWOOD RD
BROWN RD
COWELS RD
E HIGHWAY 20
SPIKES RD
BLUE LAKE RD
C O RD
E HIGHWAY 388
GAINER RD
SINGER RD
KATHY LN
GLENWOOD RD
CARRIE LN
STEEL FIELD RD
HIGHWAY 77
W HIGHWAY 388
ENFINGER RD
SCOTTS FER
VEAL RD
US HIGHWAY 98 E
E COUNTY HIGHWAY 30A
SIDE CAMP RD
111TH RD
COUNTY ROAD 2300
BAYHEAD RD
HIGHWAY 79
COLLEGE
ROMAN RD
HIGHPOINT RD
FRONT BEACH RD
POWER LINE
PANAMA CITY BEACH
N LAGOON DR
MINNESOTA AVE
TRANSMITTER RD
LISA
STAR AVE
TRAM RD
E 11TH ST
BROAD ST
N STAR AVE
E CALLAWAY DR
HIGHWAY 22
RD
SABRE DR
AUSER RD
ALVIE HOLMES RD
E HIGHWAY 98
HIGHWAY

B.E.S.T. # DATE/TIME OUT: DATE/TIME IN:

Verification
GPS: ____
Photos: ____

Stormwater Outfall / Inlet Mapping Data Sheet

Sub-basin: _____
Hydrologic Unit: _____
Unmarked: _____
Marked: _____

Date: _____ Time: _____
Sampler: _____
Re-sampled for: _____
_____
_____

Stormwater Outfall / Inlet Description:

Construction Materials:
☐ Concrete
☐ Metal ☐ Corrugated
☐ Clay
☐ PVC
☐ Plastic ☐ Corrugated
☐ Other (Describe below)

Flow/Type(s):
☐ Outfall
☐ Inlet
☐ Pipe
☐ Storm Drain
☐ SW Pond

Ownership:
☐ Municipal _____
☐ Private
☐ Unknown

Condition:
☐ Excellent
☐ Good
☐ Fair
☐ Poor

Describe: _____
_____
_____

Describe: _____
_____
_____

Horizontal measure: _____ inches

Vertical measure: _____ inches

Occlusion: _____ %

GPS Unit No.: _____

Waypoint / Mark Number: _____

Latitude: _____ Decimal Degrees North
Longitude: _____ Decimal Degrees West
Accuracy: _____ feet

Describe contributing water input sources: _____
_____
_____

Describe outfall area (stormwater pond, bayous, etc.): _____
_____
_____

Photos: Camera # _____

Image Label	Photo Description	Facing Direction
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

Notes:

Field Checklist

Supply Box:

Check-Out:	Items:	Check-In:	Signature
☐	Clipboard w/ Field Packet Pens and Pencils Approval Letter Map Data Sheets S.O.P's Field S.O.P. G.P.S. S.O.P. Digital Camera S.O.P. Mileage Sheet Supply List and Contact numbers	☐	
☐	Blackboard with dry erase marker	☐	
☐	Global Positioning System (GPS) w/ spare batteries	☐	
☐	Waterproof digital / film camera w/ lanyard	☐	
☐	Flashlight / Binoculars	☐	
☐	Yardstick / Tape measure	☐	
☐	2 Pairs of Gloves	☐	
☐	2 Pairs of Gaiters	☐	
☐	Bug Spray	☐	
☐	First Aid kit w/ whistle	☐	

Recommended Personal Gear:

Proper Clothing
- Closed toed shoes (Boots, etc.)
- Pants w/ protective leggings (Jeans, etc.)
- Facial covering (Hat, etc.)

Water Bottle(s) / Snacks
Cell Phone
Walking Stick

Emergency: 911

Police, Fire, EMS

Contact Numbers:

Project Manager: Cell # - (803) 240-8305
B.E.S.T.: (850) 215-5592
Police: Florida Highway Patrol – 872-4150
Bay County Sherriff – 747-4700
Poison Control – 1-800-222-1222
Animal Control – 784-4005
U.S. Coast Guard – 234-2475

Stormwater Fieldwork S.O.P.

1. Identify the pipe and assess the location.

2. Identify any potential hazards visually. Use the yardstick, digital camera, and / or flashlight to discern any potential inhabitants that could be a threat.

3. Mark date and time on data sheet as well as the location of the pipe.

4. Turn on the GPS and let it warm up for about 5 min.

5. Use the yardstick to measure the vertical and horizontal distances between the inside of the pipe. Record all data on the data sheet provided.

6. Set-up the blackboard display.

7. Use the camera to obtain 3 pictures of the pipe. One with the blackboard, one with the yardstick, one without.

8. Use the G.P.S. to mark the location of the pipe. Make sure the G.P.S. is as close to the pipe as possible.

9. Take any additional photos of the pipe and surrounding area to identify the conditions leading to and away from the pipe. Take any additional photos as needed.

10. Any questions or concerns in the field, call the Project Manager.

Sony Digital Camera S.O.P.

1. Keep camera in waterproof case unless downloading pictures or making adjustments inside.

2. Turn on camera. (Button is located on top, closest to aperture)

3. DO NOT make adjustments. Camera is set on auto adjust and focus for best optimization.

4. Use the zoom buttons (W/T) to increase or decrease the desired size of the object within view.

5. Press the snapshot button. (Located on top beside the power button.)

6. Press the photo select button next to the selection wheel to obtain photo ID. ID is located in the bottom right of the picture and is labeled 102-XXXX with the XXXX being the photo number. Record the ID on the data sheet.

7. Press the same button again to return to the viewfinder screen and resume taking pictures.

8. Re-Charge Battery Every Night.

GPS S.O.P.

1. Turn on GPS prior to arriving at site location.

2. Press the Page Button till the screen labeled 2D / 3D GPS Location is displayed.

3. Hold GPS as close as possible to the intended item to be marked (i.e. storm pipes)

4. Wait till the GPS stabilizes with an accurate reading. Watch for the accuracy to stabilize in the upper right corner.

5. Hold the Enter Button down to create a waypoint for the location. Record the accuracy displayed at the time the waypoint was marked and the waypoint information onto the data sheet.

6. Press the Enter Button again to save the waypoint and return to the GPS Location page.

Sony Digital Camera S.O.P.

1. Keep camera in waterproof case unless downloading pictures or making adjustments inside.

2. Turn on camera. (Button is located on top, closest to aperture)

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