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DESTIN HARBOR MANAGEMENT PLAN CITY OF DESTIN, FLORIDA

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DESTIN HARBOR MANAGEMENT PLAN CITY OF DESTIN, FLORIDA

SEPTEMBER 8, 1987

LANDERS-ATKINS PLANNERS, INC.

IN ASSOCIATION WITH
Connelly & Wicker, Inc.

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EXECUTIVE SUMMARY

The following Destin Harbor Management Plan represents a comprehensive approach to alleviating the problems facing a body of water which, at present is known to have deteriorated from its past condition. The plan is also intended to maintain the Harbor as the economic center of the city as well. This plan has been prepared in response to the Northwest Florida Coastal Resource Management Plan as well as a special element of the City's Comprehensive Plan. Addressed in the Management Plan are several of the key elements required of the City in the establishment of the Coastal Management element of the afore mentioned Comprehensive Plan.

Included in the plan are a review of past studies and research, a complementary analysis of the existing situation, and, finally, policy and action recommendations by which the City of Destin may preserve and protect its Harbor. This plan is the culmination of four interim reports and represents input from the local and state governments and the local community. The following recommendations are listed in order of priority based upon the degree of severity of conditions addressed as well as the degree of positive benefit to be achieved by each recommendation. In summary, the major recommendations of the plan are as follows:

- ° Support actions which will increase the flushing and circulation of salt-water through the Harbor, including implementation of the Northwest Florida Water Management District's pipe system, and further analyze effects of widening the Harbor's mouth.
- ° Encourage compliance by local petroleum tank owner/operators in the State of Florida's E.D.I. program, which addresses potential petroleum contamination of local waters.
- ° Undertake specific actions to treat all possible sources of stormwater discharge, currently responsible for the major in-flow of pollutants in the Harbor, including:
 - Continued enforcement of the city's first one-inch of runoff rule for all new development and redevelopment.
 - Undertake engineering studies to evaluate and implement alternative treatment approaches for U.S. 98 outfall D, located at the eastern end of the Harbor.
 - Install retention/treatment basins at U.S. 98 outfalls A, B and C.
 - Install grassed swales and other treatment devices on City's streets draining into U.S. 98 and on streets in the Holiday Isle area.
 - Require boat maintenance facilities to meet local stormwater retention requirements, and additionally, to periodically clean and remove harmful sediments from the retention system.
 - Require reef material storage areas to meet City's stormwater retention rule.
 - Encourage alteration of private developments which discharge directly into the Harbor to provide treatment.

- ° Ensure provision of sewer service to all areas around the Harbor.
- ° Undertake an urban redevelopment study of the central Destin north shore area determine specific redevelopment actions available, including tax increment financing, to improve conditions on the north shore, including sewage and stormwater collection and treatment.
- ° Establish a Marina Ordinance to control the operation and construction of existing and proposed marina facilities.
- ° Investigate the nature of bottom sediment conditions in the Harbor to determine the need for corrective measures to alleviate potential problems.
- ° Enact local policy governing the abandonment of docks and their subsequent removal.
- ° Support actions that result in increased littoral grass bed areas around the Harbor.
- ° Increase public awareness of the litter problem and continue voluntary clean-up measures.
- ° Encourage boater participation in the Coast Guard Auxiliary's Courtesy Marine Examination (CME) program.
- ° Encourage property owners adjacent to the canals to support actions to improve circulation of the water in the finger canals connected to the Harbor.

Implementation strategies depend upon both local and state level action. The City's efforts with the Harbor Ordinance, Harbor Master, and local stormwater quality rules can be expanded to cover general stormwater improvements, litter control, and marina and boat operations. The Harbor flushing program and improvements to the U.S. 98 stormwater discharges should be headed by the Northwest Florida Water Management District.

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I. BACKGROUND HISTORY

The Destin Harbor was originally the pass from the Gulf of Mexico to Choctawhatchee Bay. The Old Pass was closed by a hurricane in the 1930's. In April 1931 the East Pass channel was completed. The 6 by 100 foot channel was authorized by the River and Harbor Act of 1930. The channel was improved in 1952 to 12 by 180 feet and a 6 by 100 foot access channel into Destin Harbor was completed. The jetties were constructed in the 1960's to stabilize the East Pass entrance. The East Pass and Destin Harbor channels are maintained by the U.S. Army Corps of Engineers.

Destin and Holiday Isle developed rather slowly until the 1960's. In 1966, U.S. Highway 98 was four-laned from the Destin bridge to approximately the current location of the "Donut Hole" Restaurant. Three direct stormwater outfalls were constructed in conjunction with the expansion. Two of these outfalls discharge into the Harbor and one is in East Pass. The Holiday Isle development began in this time period, including the dredging of the finger canals. The canals and other docking facilities with the accompanying boating activity steadily began impacting the Harbor.

The second four-lane expansion on U.S. 98 was undertaken in 1979 from the 1966 terminus to Airport Road. The stormwater collection system for this section of the highway has one outfall at the end of a canal leading to Sandpiper Cove. This outfall has the capacity to discharge large volumes of stormwater, and it discharges into the portion of Destin Harbor with the least amount of natural circulation.

The construction boom in the late 1970's and early 1980's affected all facets of the Harbor with development occurring along large portions of the harbor shoreline, including docks and marinas. Boating activity continued to increase proportionally with new development and continues to impact the Harbor significantly, today.

The final four lane expansion was completed in 1986. This project provided a new highway parallel to Old U.S. 98. The extreme western end of the project is connected to the Harbor outfall. The stormwater system treats a limited volume and then overflows into the adjacent collection system during major storms. This adds to the potential volume of stormwater entering Sandpiper Cove.

Current local development regulations are in place to help the City of Destin control future development and upgrade sites which redevelop around the Harbor. The improved sewage treatment plant (Destin Water Users, Inc.) will help in the Harbor. The Harbor Board and the Harbor Master have helped increase public awareness of the Harbor's pollution problems.

CHOCTAWHATCHEE BAY

TO FORT
WALTON BEACH

CALHOUN AVE.

SIBERT AVE.

STALMAN AVE.

MOUNTAIN DR.

U. S. HIGHWAY 98

BENNING DR.

BEACH DR.

LEGION DR.

30" OUTFALL
A

36" OUTFALL
B

30" OUTFALL
C

1966

1979

EAST

DESTIN HARBOR

HARBOR
DRAINAGE
BASIN

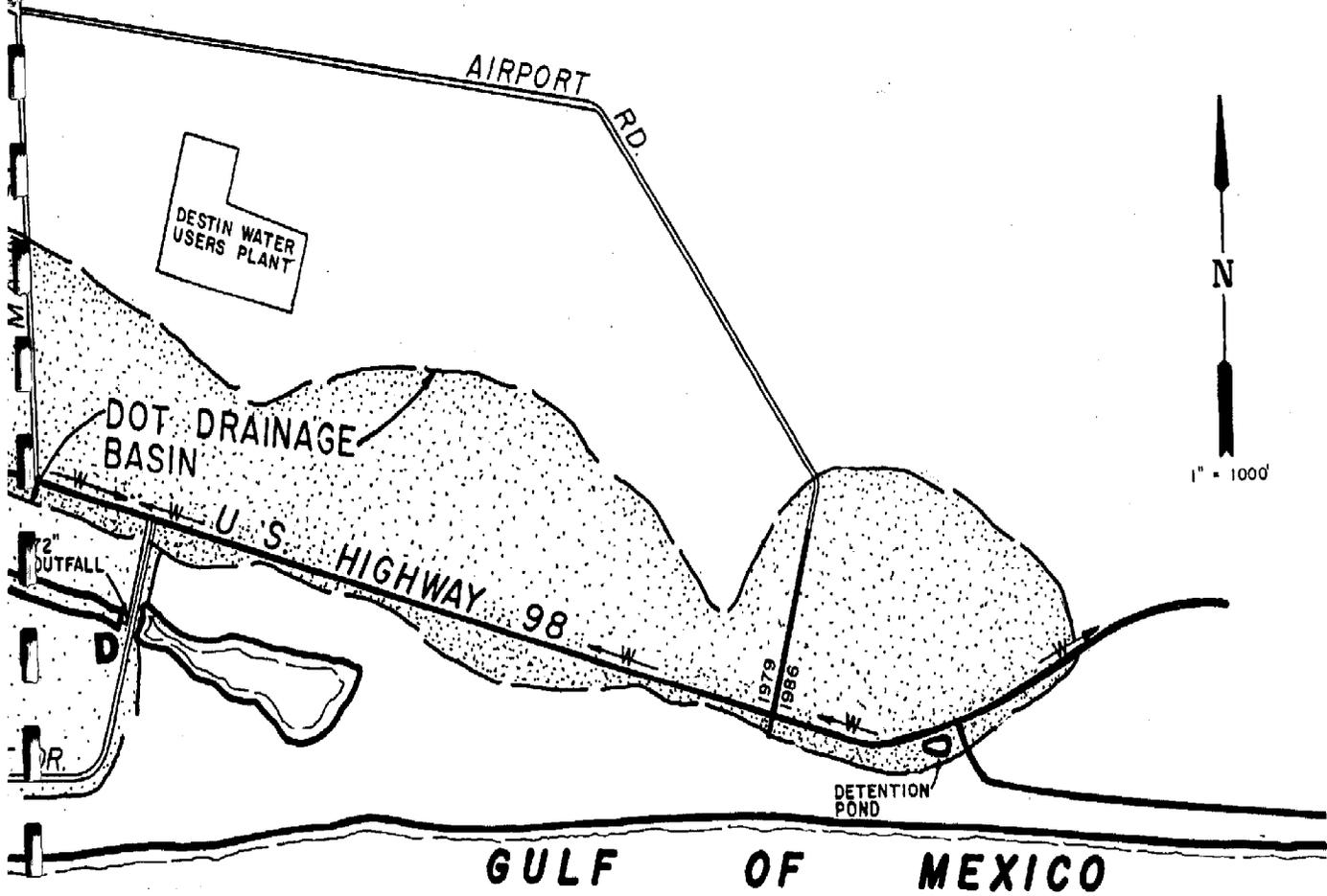
SANDPIPER
COVE

PASS

GULF SH

PROPOSED
FLUSHING
PIPELINE

DESTIN HARBOR Drainage Basins



BACKGROUND

CURRENT USE, ECONOMIC BASE

Destin is located in one of the most rapidly growing coastal areas of the Florida Panhandle. The City and its harbor, offer an array of amenities for both residents and vacationers. The mouth of Destin Harbor lies less than one mile north of the Gulf of Mexico, via the East Pass channel.

Because of this ease of access to open Gulf waters and the popularity of fishing in the area, Destin Harbor is home to the largest charter fleet in the state. This sports fishing fleet is a primary attractor of tourist activity to the City and may well be the largest "industry" in the City. The fleet clearly displays the prime significance of Destin Harbor and the interrelationship between a sound economy and a quality environment. The fleet's large docking facilities are also a strong base on which to build expanded economic and tourist activity on the north shore of the harbor.

The harbor also offers excellent dockage and marina facilities for transient craft coming to Destin from all parts of the country. Add to this activity the multitude of other commercial and recreational craft, and the result is an extremely busy harbor. Land borne activity adjacent to the harbor is also thriving. Along the north bank is a variety of restaurants serving up the local catch and offering excellent views of the entire harbor. In this same area can be found various shops and stores catering to area residents and vacationers. East of this commercial area and still on the north bank is a mixed density residential strip. This area consists primarily of single family detached housing, with several multi-family structures. The eastern and southern shores of the lagoon are taken up by various density residential uses as well, from single family detached homes to mid-rise condominiums. Two series of finger canals have been cut into the south bank and are lined with single family homes with private boat slips. Several of the newer condominiums on the south bank also have multi-slip marinas. These south bank residential areas occupy the most desirable real estate in the city.

Just as Destin Harbor is the traditional focal point of the city, it also serves as the economic core. Without the Harbor, the city loses much of its uniqueness over nearby coastal towns such as Santa Rosa Beach, Panama City Beach, and Pensacola Beach. Conservative estimates of winter (off-season) to summer population increases are in the range of 6 times, with between 5 and 6 thousand visitors in the winter, and over 25,000 in the warmer months. These numbers represent individuals and families who pour into the area each year and who pour money into local businesses, making Destin's economy work.

The Harbor also holds economic significance in a second way, and one which is equally as important as its influence on the private sector. The main source of revenue for any municipality comes in the form of property tax collection. The Harbor and its shores are totally contained within the city limits of Destin, and being the primary amenity for the city, land in proximity to the Harbor holds high value. This land, then, serves to further increase the tax base for the City, making the Harbor even more economically important.

BACKGROUND GROWTH OF CONCERN

That water quality in Destin Harbor has deteriorated is no sudden revelation. Certain events and actions have heightened the public's awareness, and governmental awareness as well, to the problems that exist in this unique body of water. These events and actions have not only increased awareness but have also served to begin to address potential measures aimed at correcting the problems at hand.

The first major indication of problems that received public attention was an extended fish kill in the lagoon in the fall of 1982. This incident prompted the County Commissioners to seek assistance in determining the causes and possible solutions to the problems in the lagoon. The cause of the fish kill was determined to be an algal bloom, but more importantly, it pointed to the potential for other problems with the lagoon water.

Late in 1983, Governor Graham established the Northwest Florida Coast Resource Planning and Management Committee and charged it to make policy recommendations to deal with escalating local development and its effect on the environment and infrastructure of the Moreno Point area. A subcommittee of this group was established to specifically address water quality problems in Destin Harbor, or Old Pass Lagoon. The committee studied conditions in the Harbor and presented recommendations to the state for improving water quality. These recommendations came in the form of the now adopted "Resource Management Plan".

A third indication of growth of concern over the Harbor came in 1984. A referendum was held incorporating the Destin area as a municipality. The major motivating force for this action was local concern as to the development of the area and how it was impacting the natural environment. Incorporation has allowed the City to enact local legislation and develop local infrastructure to begin to deal with growth management and environmental quality control. These measures include the establishment of a Harbor Board and the hiring of a full-time Harbor Master. Incorporation has also required the City to comply with the Local Government Comprehensive Planning and Land Development Regulation Act, as amended in 1985. The intent of the law is to allow local governments to plan for their future growth and development, to adopt and amend comprehensive plans and to implement plans via the adoption of land development regulations.

The City of Destin currently is involved in preparing their Comprehensive Plan. To help guide Destin and other local governments in their efforts and to ensure that local plans are consistent with regional and state planning goals, the West Florida Regional Planning Council has formulated a Comprehensive Regional Policy Plan. Such measures have been taken on the state, regional, and local levels to put the City of Destin and its harbor on the road to a prosperous future.

II. ANALYSIS SUMMARY

From the review of existing studies, interviews with agency representatives and the Agency Workshop, it is clear that there is reason for concern about water quality in Destin Harbor. It is also clear that, in the words of one Agency Workshop participant, "there has been more positive action in the last two years than in the previous forty". Whether it is an exaggeration or not, there is agreement that trends have been reversed recently with the improvements in Destin Water Users effluent disposal system, the attention afforded a number of issues by the presence of the Harbor Master, and the beginnings of general public awareness and concern.

Problems do remain and need to be addressed. These can be summarized as follows:

Toxic and Other Materials in Bottom Sediments: Studies point to the potential for a number of toxic materials - particularly heavy metals - being found in the bottom materials of the Harbor. Given the closed nature of the system and the number of activities feeding into the system one would anticipate that such problems exist. Unfortunately, no study has been undertaken to define the extent of toxic materials, potential sources, and, most importantly, if they pose health or environmental threats. Studies also indicate that there is a high organic content in the sediments analyzed. High organic levels, coupled with low mixing rates can lead to abnormally and dangerously low dissolved oxygen levels. At this point, it is recommended that a study design be obtained for an analysis which would better define these situations and that funds be sought to undertake this analysis.

Pollutant Loading: Pollutants are being introduced into the Harbor by several means: untreated stormwater discharge, litter, intermixing with Choctawhatchee Bay water, discharges from boat toilets and bilges, groundwater migration, accidental petroleum spills, and boat marina and maintenance operations. The studies indicate that the discharge of untreated stormwater is probably the largest source of a wide range of pollution input, with the outfalls from the U.S. 98 drainage system constituting the most significant single source. Potential policies and actions identified in the following section reflect need for a broad based attack on all potential sources. Continued long term attention to all sources will be required to achieve and maintain positive results.

Harbor Configuration/Flushing: A review of the studies performed on the Harbor and Agency Workshop discussions indicate that improved flushing is an important action for improving water quality in the Harbor. The Harbor is a confined system that has been created and affected by human actions. The flushing pipe and pump system proposed by the Northwest Florida Water Management District should be implemented. Studies should be undertaken on opening and/or stabilizing the inlet, on muck deposits in the Harbor, and on the deep pockets in the bottom of the Harbor.

III. GOALS

The establishment of goals is vital to the creation of the Harbor Management Plan. Goals serve as indicators of what is expected to be accomplished once the plan is executed. Goals also serve as measures of plan effectiveness over time. The question of goals was posed both to the city officials and to interested citizens who attended the first Harbor Management Plan Community Workshop held in February. The preliminary goals were reviewed at a second Community Workshop in March, at a City Council Workshop in April, and at a Harbor Board workshop in May. The responses to the question of goals are as follows:

City Identified Goals:

1. Continued "Joint Coordinating Committee" meetings with all agencies concerned with activity in and around the Harbor.
2. Preserve and enhance the vitality of the local fishing industry.
3. Continued overall economic vitality of the Harbor.
4. Improved water quality which would both promote a viable ecosystem and which would allow people to swim and recreate. (DER Class III Standards)

Community Identified Goals:

1. Restore the blue-green color to the Harbor that existed 15 to 20 years ago.
2. Restore the water quality to a swimmable state. (DER Class III Standards)
3. Eliminate pollution sources, be it through engineering, funding, and/or political measures.

Goals:

Based upon the above, the following goals are to be pursued in this Plan:

1. Restore water quality to DER Class III Standards. (See Appendix B)
2. Continued overall economic vitality of the Harbor.
3. Preserve and enhance the vitality of the local fishing industry.
4. Intergovernmental cooperation among all agencies and levels of government exercising jurisdiction over activity in and around Destin Harbor.

IV. POLICY DEVELOPMENT

The initial efforts in preparing this Management Plan consisted of the identification of the various issues potentially affecting the Harbor. To further aid in understanding these issues and their relative importance, an Agency Workshop was conducted on January 9, 1987. Participants included city officials, consultants, and representatives from an array of state and regional agencies which exercise regulatory powers over Destin Harbor. (See Appendix 'C' for a list of attendees). The major outcome of this workshop was the refinement of the issues affecting the Harbor.

A Community Workshop was conducted on February 11, 1987. The primary purpose of this workshop was to interface with the local community as to the consultants findings concerning the existing condition of the Harbor. Those attending the workshop were presented an Analysis Summary and were then asked what they felt that the goals of the Management Plan should be. The preceding 'goals' section of this report summarizes this discussion.

The identification of pertinent issues and goals concerning the Harbor led to the next stage of the planning process, Policy Development. A second community workshop was held on March 12, 1987. The purpose of this workshop was to discuss with the local community alternative policies and actions which were being considered by the consultants for inclusion in the Harbor Management Plan. The Issue Development matrix used in the first two interim reports served as a basis on which potential policies were developed. For each identified issue, existing policies were examined, and based on their adequacy at promoting improved conditions in the Harbor, potential policies and potential actions were proposed. For some issues, existing policies were deemed sufficient. In general, though, there were one or several alternative policies recommended for each issue along with potential actions that would support the policy(s). Since this was the initial discussion of the range of potential policy measures, none were discounted for reasons of funding, politics, or logistics. The task at hand was then to determine which policies and actions the City believed should be included in the Management Plan.

Policy and Action alternatives were also presented at a City Council workshop on March 30, 1987, and at a meeting with the Harbor Board on May 22, 1987. The intent of both of these meetings was to inform and interface with the local governing bodies about which policies and actions would actually be recommended in the final Management Plan. The format for the final matrix is essentially the same as that used in the interim reports, with the addition of the plan policy category for each of the discussed topics concerning the Harbor. These policies and implementation actions constitute a comprehensive and long term approach to solving the water quality problems facing Destin Harbor.

**V. POLICY & ACTION
MATRIX**

EXISTING POLICY	PLAN POLICY	PLAN ACTIONS
<p>Florida law and the Harbor ordinance prohibit discharge of waste into the Harbor.</p> <p>The Harbor Board has published a pamphlet showing pumpout facility locations.</p> <p>The City is pursuing a Federal EPA "No-Discharge" designation for the Harbor.</p>	<p>It shall be the policy of the City of Destin to encourage all vessels using the harbor to participate in the Coast Guard Auxiliary's CME (Courtesy Marine Examination) program.</p>	<p>The city shall pursue whatever steps necessary to provide the Harbor Master with enforcement powers of local ordinance concerning the harbor.</p>
<p>Florida law and local ordinance prohibit discharge of petroleum laden (oily) bilge water into the Harbor.</p>	<p>See above.</p>	<p>See above.</p>
<p>Florida Law and local ordinance prohibit discharge of any petroleum products into Destin Harbor.</p> <p>The City is currently pursuing an oil containment plan and the purchase of equipment for cleanup of oil spills. The Harbor Master has researched and is knowledgeable of the various types of spill containment apparatus available, and the relative limitations of each. A close daily observation of the Harbor for spills should be included in the Harbor Master's duties.</p>	<p>See 'Heads' above.</p>	<p>See 'Heads' above.</p>
<p>It is prohibited by state law and by local ordinance to pump out holding tanks directly into the Harbor. The city has applied to EPA for a federal "No Discharge Zone" designation, adding federal jurisdiction to the load on direct discharge into the harbor.</p> <p>The City of Destin currently allows storage of reef building materials adjacent to the Harbor only during the winter off-season months.</p>	<p>It shall be the policy of the City of Destin that operation of all commercial marinas be subject to local permitting. Via the annual issuance of an operating permit, the City will have regulatory power over marina operations such as fueling stations, associated spill abatement plans and equipment, pump-out facilities, stormwater management, and the storage of reef building materials.</p> <p>It shall be the policy of the City of Destin that all reef material storage areas must meet local 1" stormwater run-off requirements.</p>	<p>The Harbor Master shall continue to periodically inspect pump out facilities in the harbor for proper operation. In addition the City shall actively pursue public education as to the potential problem of direct pumping out of boat tanks into area waters.</p> <p>The City shall study the benefits and feasibility of a public sponsored reef building program.</p>

POLICY & ACTION RECOMMENDATIONS

ISSUES	EXISTING CONDITION	SIGNIFICANCE
<p>MARINA OPERATIONS(cont.) Petroleum</p>	<p>Several of the marinas have associated over-the-water fueling stations. These stations are a potential spill source, but are routinely inspected by the Harbor Master. These stations also have associated with them upland fuel storage tanks which could pose potential pollution hazards. There are no future fueling facilities planned for the harbor at present.</p>	<p>With the operation of fueling stations there is the constant threat of spillage. The upland storage tanks are also a source of potential pollution. Some sort of spill containment should be in place before any additional fueling facilities are allowed.</p>
<p>BOAT MAINTENANCE</p>	<p>Boat maintenance is conducted in the immediate area of the Harbor. Maintenance activities, such as bottom cleaning and painting, are known to create various potentially harmful by-products. In-water boat maintenance, specifically boat bottom scraping, is also a potential source of pollution. The process of bottom scraping introduces excessive organic materials (i.e. barnacles) and toxic materials (bottom paints) into the water. Future maintenance operations will be potential sources of toxic pollutants just as existing maintenance operations are now.</p>	<p>Maintenance activities are taking place in the water or in areas which have stormwater runoff leading directly into the lagoon. These activities are a potential source of toxic and hazardous wastes entering the lagoon. Future boat maintenance operations must be monitored, as need by existing operations, for pollution impacts they may be creating for the harbor.</p>
<p>LITTER</p>	<p>It is unlawful to litter in the Harbor. Litter is and will continue to be a problem, though, as long as people use it.</p> <p>Boating operations continue to be a major contributor to the litter problem. Upland parking lots, highways (storm sewer), and construction materials from dock building and other projects also contribute to the litter problem.</p>	<p>Public awareness is potentially the best tool in litter control, once formal legislation is in place.</p> <p>The litter problem is an area of concern which will require public education as the best solution.</p> <p>There is no one-time measure which will solve the problem.</p>

EXISTING POLICY

It is prohibited by State law and local ordinance to discharge any petroleum product into the harbor. In addition, the DER "Early Detection Incentive" program was created to assist owners and operators of petroleum storage facilities. Also, the Harbor Master routinely inspects over-the-water fueling stations for potential problems. The City of Destin could expand upon local policy concerning petroleum spills over the water, delegating responsibility for clean-up of said spills and possibly providing assistance for same.

Discharge of hazardous waste into waters of the state is illegal and falls under DER jurisdiction. Not enough is known at present to determine if violations exist, and if they do, who is at fault.

Existing local stormwater management requirements should prevent runoff pollution by hazardous/toxic sediments from future Boat Maintenance facilities.

Under State and Local laws, it is illegal to litter in the City and its harbor. There have been periodic voluntary clean-up operations carried out and they have been effective, but only for a certain length of time and the problem becomes apparent again.

PLAN POLICY

It shall be the policy of the City of Destin that operation of all commercial marinas be subject to local permitting. Via this permitting, the City will have regulatory power over marina operations including fueling stations, associated spill abatement, plans and equipment, pump-out facilities, and the storage of reef building materials.

The City of Destin shall expand the local Harbor ordinance to include no in-water bottom cleaning of boats in the harbor.

It shall be the policy of the City of Destin that all out-of-water boat maintenance facilities shall be paved and shall meet existing local 1" stormwater retention requirements, and in addition, shall install a serviceable (cleanable) sediment trap which shall periodically cleaned to ensure proper maintenance.

The City shall affect policy to increase public awareness of the litter problem and should create incentives for voluntary community participation in clean-up measures.

The City shall expand the local Harbor ordinance, in effect, requiring all craft operating within the harbor to have wind-proof litter containment means on board of sufficient capacity, as warranted by the size and nature of use of the craft. The ordinance shall also be expanded to require that all docks provide wind-proof trash containers. (i.e. provision of 'X' number of trash containers per 'Y' number of slips.)

PLAN ACTIONS

The city should seek funding for an effective spill containment system to be available for all portions of the lagoon. See "Potential Action "for" Boating Operations, Petroleum."

The City shall actively pursue further studies to investigate the presence of toxic/hazardous wastes in the water and sediments of the lagoon.

The City shall pursue public education as to potential sources and consequences of toxic sediments which may well be present in the harbor.

The City shall institute "Clean Harbor" days at various times throughout the year, and make cleaning up the harbor area of trash a community event.

The City shall establish some sort of local recognition for those people or businesses who exert exemplary effort in local litter control.

POLICY & ACTION RECOMMENDATIONS

ISSUES	EXISTING CONDITION	SIGNIFICANCE
<p>FISH CLEANING</p>	<p>The fish cleaning problem has been reduced substantially since the problem was identified.</p> <p>Any future fish cleaning stations installed must be upland from the Harbor and fish carcasses must be disposed of upland.</p>	<p>Fish cleaning is a problem when the fish remains are dumped into the Harbor in larger quantities than natural processes can remove the remains.</p> <p>The problem has been identified and measures have been taken to effectively deal with it.</p>
<p>HARBOR CONDITIONS Marina/Dock Construction</p>	<p>The permitting process currently requires a net positive environmental benefit (NPEB) program for construction of marinas.</p> <p>Construction activities are a potential pollution source including fuel spills, soil erosion, sedimentation, litter, etc.</p> <p>The circulation patterns of the Harbor could be effected by the construction of additional docks.</p> <p>The NWFMD/FSU study of Choctawhatchee Bay and the Harbor raised concerns about the potential negative impacts of the materials used to preserve wood dock pilings. In an extensive literature search, there were no studies discovered that established a relationship between the presence of treated wood pilings and degraded water quality.</p>	<p>NPEB's currently have not had a significant effect on the Harbor due to the youth of the program and non-compliance.</p> <p>The construction activities will likely continue to be a problem in the future. Construction permits should include plans and specification for erosion and sedimentation control.</p>
<p>Sediments</p>	<p>Preliminary analysis conducted on samples taken from the harbor indicate a potential for organic from bottom sediments. The exact cause of the high input is not known. While there have not been a detailed analysis performed of toxic materials, such as heavy metals, the FSU study indicates some presence of such materials.</p>	<p>The existing body of knowledge on bottom sediments is insufficient to determine (if a problem exists or) if corrective measures need be undertaken.</p>

EXISTING POLICY

Both the DER and local ordinance require all fish cleaning stations to be upland.

Marina and dock construction is currently under the jurisdiction of DER, Corps of Engineers, Destin Harbor Board and the Coast Guard.

Destin's current policy allows one boat slip per 8 L.F. of shoreline in the Harbor proper and 2 slips per 45 L.F. in the finger canals residential lot. By direct application of the standards, up to 3,125 boats (2700 in the Harbor; 425 in the canals) could be accommodated given redevelopment of all dock areas and minimal impact of the Harbor width standards of the ordinance. This is estimated to be six times the present peak season boat count.

DER Class III Waters criteria provides for allowable levels of various substances in surface waters. (See Appendix B)

PLAN POLICY

No additional policy required.

The City of Destin shall draft a 'Marina Ordinance' to regulate the construction and operation of such facilities. These regulatory measures within said ordinance shall reflect the intent of the current Harbor Ordinance and shall ensure that Marinas are built and maintained in a manner not detrimental to the Harbor.

It shall be the policy of the City of Destin that the nature of bottom conditions should be ascertained and, if needed, corrective measures undertaken.

PLAN ACTIONS

The proposed North Shore sewage system presently under consideration could provide the disposal means for fish cleaning operations, via the installation of grinder pumps at the point of entry of fish remains and carcasses.

The proposed Harbor Auxiliary shall monitor fish cleaning activities reporting and documenting violators.

The City shall monitor all new dock and marina construction as to their potential impacts on the Harbor, especially in terms of water circulation and navigation.

The City shall further review the implications of current policies on the potential number of boats in the harbor and evaluate further objectives for docking capacity.

The City shall actively pursue further studies to ascertain the extent to which hazardous and toxic substances exist in the water and sediments of the harbor.

The City shall seek to amend the proposed F.S.U. study of Choctawhatchee Bay sedimentation to include additional harbor sampling points.

POLICY & ACTION RECOMMENDATIONS

ISSUES	EXISTING CONDITION	SIGNIFICANCE
<p>SEWAGE-DIRECT DISCHARGE</p>	<p>Raw sewage indicators (coprostanol) were not found to be present in water and sediment samples run on the Harbor.</p>	<p>Raw sewage is not a problem at present. Improvements to the DWU sewage system has served to help curb any potential problems which may have been building.</p>
<p>GROUNDWATER MIGRATION Sewage/Septic Systems</p>	<p>There are a small number of sewage generating uses surrounding the harbor which are using septic tank systems. The largest concentration is in the north shore area with 10 to 12 facilities. Septic tanks do not appear to contribute appreciably to water quality problems in the lagoon. Septic tanks in this area are not suitable for commercial uses. In this same area, there are also several commercial establishments with no restroom facilities, despite Health Department requirements. These conditions are compounded by the lack of local sewer service lines with which the problems could best be corrected.</p>	<p>That residential septic tanks are not a problem could be related to the fact that DWU has extended its sewer service to include the Holiday Isle area. The conditions that exist along the north shore of the harbor, however, warrant immediate attention. The proximity of these facilities to the harbor and the high volume generated by commercial and restaurant uses presents a high potential for problems.</p>
<p>Effluent Ponds</p>	<p>Studies have shown that the DWU effluent ponds have been a source of nutrient loading specifically nitrogen, into the Harbor due to ground water flow patterns in the vicinity. Improvements in the sewage treatment system have served to greatly reduce this problem. Specifically, the affecting ponds have been either lined, relocated or terminated. DER/DWU Monitoring now shows that the ponds are no longer a source of loading in the lagoon.</p>	<p>Groundwater nutrient loading is one area of water quality degradation for which a source has been identified and action has been taken and has been effective in reducing the impact.</p>
<p>Hazardous Wastes/Petroleum</p>	<p>There are indications that there may be an existing problem with petroleum storage in the vicinity of the Harbor. No other potential hazardous waste groundwater sources have been identified.</p>	<p>The extent of the problem is not known and warrants further investigation. The fact that there are storage tanks in the area poses a constant potential threat to area water quality, both in the Harbor and in the surficial aquifer.</p>

EXISTING POLICY

DER has regulatory control over any discharge into waters of the state. HRS also exercises water quality authority.

State Department of Health will not issue septic tank permits where sewer service is available. DWU encourages that existing septic tank users connect to sewer lines if they are available.

DWU has moved disposal to better ponds and is also currently spraying effluent onto the Indian Bayou Golf Course. DWU is also currently pursuing the use of the Destin Airport as an additional disposal site.

DER has the authority to deal with contamination from underground tanks. The State Underground Petroleum Environmental Response Act was passed in 1986, a major provision of which was funding for an Early Detection Incentive (EDI) Program.

PLAN POLICY

It shall be the policy of the City of Destin that all future development shall be connected to the DWU system, and that, when service is made available, all development currently serviced by septic tank systems shall connect to the DWU system.

It shall be the policy of the City of Destin to ensure provision of sewer service to all areas within the city.

It shall be the policy of the City of Destin to continue to support the obtaining of alternative disposal sites and methods.

City of Destin shall encourage compliance by all underground petroleum storage tank owners/operators by educating those concerned as to the methods and benefits of participating in the State's EDI program. An advanced recommendation to the City has resulted from this study concerning implementation of DER's EDI program.

PLAN ACTIONS

See septic system below.

Install North Shore interceptor sewer system, sized for existing and future demand and adaptable for input from upland fish cleaning (grinder pump) facilities. The city can either install the system itself, encourage DWU to install the system, as part of a proposed north shore redevelopment program.

The City shall continue to review DER and DWU monitoring of effluent disposal.

The City shall monitor compliance by owners/operators.

The City shall undertake a general monitoring of the harbor for oil contamination, via the Harbor Master.

POLICY & ACTION RECOMMENDATIONS

ISSUES	EXISTING CONDITION	SIGNIFICANCE
<p>HARBOR CONDITIONS (cont.) Water Circulation</p>	<p>Destin Harbor is a confined system the mid-to upper reaches of which are little affected by tidal action. The Harbor is long and has a very confined mouth. The tidal range in the Gulf is very small. This results in varying levels of salinity, stratification of saltwater and freshwater and retention of pollutants in the upper reaches of Sandpiper Cove and the several finger canals.</p> <p>Aeration Systems have been installed in the canals and Sandpiper Cove in an attempt to increase dissolved oxygen (DO) and reduce saltwater/freshwater stratification.</p> <p>Analysis studies indicate that improvements in DO levels are accomplished but that little mixing occurs, in the Harbor as a whole.</p>	<p>Studies by the Northwest Water Management District (NWFWD) have analysed several alternatives for increasing water circulation (flushing) of the Harbor. The studies indicate that increased flushing of the upper reaches of the Harbor is an essential action for improving water quality. The NWFWD has conducted an extensive study of the harbor and designed a pumped flushing system to bring water from the Gulf into Sandpiper Cove (See "<u>Water Resource Restoration of Old Pass Lagoon, Destin Florida</u>", NWFWD Water Resource Assessment 87-1, for complete details on this proposal).</p>
<p>Vegetation</p>	<p>There is little to no presence of aquatic vegetation - submerged and littoral - in the Harbor. There is also little evidence that the Harbor has supported such vegetation historically since it was formerly the main channel between the Gulf and Choctawhatchee Bay. Given the positive contribution of vegetation in a water system - increasing dissolved oxygen and providing habitat - it is desirable to increase the level of vegetative materials.</p>	<p>Research studies have shown very positive results from the creation of littoral grass beds (particularly <u>spartina juncus</u>) but poor results in planting submerged grasses. The establishment of littoral zones will require the modification of water depths and, possibly, the provision of protective substrate.</p>

EXISTING POLICY

There are no true policies related to circulation. The NFWMD has designed a flushing pipe and pumping system for installation between Sandpiper Cove and the Gulf, and is pursuing its implementation through State funding and permitting. The City Council has endorsed this proposal and committed to paying a portion of the annual operational costs. Jurisdiction on actions that would affect circulation is retained by DER, DNR, and COE and varies depending upon the specifics of the proposed action.

The City of Destin, through the Harbor Board, supports the development of littoral grass beds as a Net Positive Environmental Benefit (NPEB) through DER for private dredge and fill and marina construction activities.

PLAN POLICY

It shall be the policy of the City of Destin to support actions that will maintain and increase the flushing/circulation of salt-water through the Harbor. This policy includes marina design standards which will not impede flow and circulation. Docking structures should be designed with minimal piling and other structural impediments to water flow and natural bottom configuration.

It shall be the policy of the City of Destin to require provision of littoral grass beds as an NPEB for all dredge and fill and marina activities in the Harbor.

It shall be the policy of the City of Destin to support direct actions that result in increased littoral grass bed areas.

PLAN ACTIONS

The City of Destin shall continue to support construction of the flushing pipe and pumping system as proposed by the NFWMD.

The City of Destin shall seek funding or actions by others to analyze the mouth of the Harbor, to evaluate methods of stabilizing the channel, and to evaluate the potential effect that a widening of the mouth will have upon circulation/flushing action.

The City of Destin shall continue to publish educational literature on the purpose and protection of aeration devices so long as they are utilized in the Harbor.

The City shall establish design and construction standards for littoral grass beds as a guide to private developers/property owners.

The City shall undertake an analysis of the littoral zones of the Harbor to determine potential grass bed areas to classify potential areas by required degree or extent of construction and to prepare a development program including cost analysis.

The City shall prepare educational materials on the function of grass beds, their protection and the desirability of establishing additional beds.

The City shall establish effective NPEB standards and request adherence thereto.

POLICY & ACTION RECOMMENDATIONS

ISSUES	EXISTING CONDITION	SIGNIFICANCE
<p>HARBOR CONDITIONS (cont.) Debris</p>	<p>The term "debris" includes litter, abandoned dock pilings and boards, and discarded construction materials around and in the Harbor</p>	<p>Debris can be cumbersome and costly to remove from the Harbor. Some debris constitute hazards to navigation, as well.</p>
<p>STORMWATER Public existing</p>	<p>The DOT outfalls are the major stormwater discharge points. For the purpose of discussion, the 4 outfalls will hence be referred to as outfalls A, B, C and D, with outfall A being the outfall at the western most end of the Harbor (See Figure 12 in the following 'Stormwater Management' chapter). The DOT drainage system collects stormwater from within its right-of-way, from adjacent city street rights-of-way, along with significant private development contribution from adjacent properties draining into it. The private developments along U.S. 98 potentially are as detrimental in terms of water volume discharged to the Harbor as the highway and other street rights-of-way.</p> <p>The eastern outfall, D, is by far the largest single stormwater pollution source since it serves approximately 60% of the US 98 drainage basin. The impact is greatly increased by the outfall's location which is at the end of a canal leading into Sandpiper Cove. The naturally poor flushing of this body of water increases the impact further by allowing the stormwater pollutants to remain in the canal and cove.</p> <p>Some of the local streets on the north side of US 98 also discharge untreated stormwater into the Harbor via the US 98 system. In some cases, these local streets also serve as a conduit to the US 98 system for runoff from private development.</p>	<p>The DOT outfalls are very significant due to the "double" loading of public road rights-of-way and adjacent private developments. Any effort to deal with the treatment of the stormwater discharged via these outfalls must reflect the large volume of water to be treated and the diverse conditions of different portions of the overall discharge area.</p>

EXISTING POLICY

PLAN POLICY

PLAN ACTIONS

State and local litter laws govern the discarding of debris into the harbor, but do not address existing and abandoned dock pilings and larger trash items which already exist in the harbor area.

There are no existing policies or jurisdictions requiring existing public facilities to be upgraded to meet current regulations.

The City shall enact local policy governing the abandonment of docks and their subsequent removal, and shall also address the maintenance of construction activities in a manner which introduces no debris into the harbor.

It shall be the policy of the City of Destin that all due effort shall be taken to upgrade existing public stormwater systems to meet current local ordinance.

The City shall contract with a private concern the removal of all debris from the Harbor, and also the periodic maintenance of the Harbor, in a debris-free condition.

The City shall incorporate debris removal into proposed voluntary harbor clean-up programs.

The following 'Stormwater Management' chapter provides several retention/treatment designs which can be applied to the existing DOT outfalls as well as to local streets.

The City shall program stormwater management improvements as part of its local street improvements program with emphasis on streets which drain into the U.S. 98 system and streets on Holiday Isle.

The City shall work through the Northwest Florida Water Management District to design treatment facilities for U.S. 98 outfalls. A, B, C, and D, and to seek state funding for construction of these outfalls.

POLICY & ACTION RECOMMENDATIONS

ISSUES	EXISTING CONDITION	SIGNIFICANCE
<p>STORMWATER (cont.) future</p> <p>Private existing</p> <p>future</p>	<p>The public sector will be subjected to the same stormwater treatment requirements as the private sector.</p> <p>Stormwater management for private development currently falls into four categories: 1) that which discharges directly into the Harbor; 2) that which discharges indirectly through U.S. 98 stormwater outfalls without treatment; 3) that which is treated to DER 17-25 minimum (1/2" runoff) requirements; and 4) that which meets City of Destin stormwater treatment (1" runoff) requirements (NWRPC Resource Management).</p> <p>The western end of the Harbor is the most intensively developed land adjacent to the Harbor. It is the focal point of commercial and sports fishing business and the central business area of Destin. The ratio of impervious area is high and much of it drains either directly into the Harbor or via the US 98 system. Because of the intensity of this developed area and its significance to the Destin economy, special consideration should be given to enhancement of the quality of runoff from the area.</p> <p>The future development of private property will be required to meet the DER 17-25 and City of Destin stormwater rules and therefore should have limited impact on harbor pollution.</p>	<p>Any future expansion or modification of U.S. 98 should require the Department of Transportation to meet current City of Destin and DER stormwater regulations.</p> <p>The impact from developments in the direct and indirect discharge without treatment categories is substantial and should be alleviated as soon as possible. The indirect discharge category is a larger pollution problem than the direct discharge due to the larger number of contributors and the larger land area involved.</p> <p>Existing policies will result in future developments which have a minimal negative impact on water quality in the harbor.</p>

EXISTING POLICY**PLAN POLICY****PLAN ACTIONS**

Public facilities built in the future shall meet DER 17-25 and City of Destin rules. See discussion below under Stormwater - Private - existing.

All new construction is regulated by DER 17-25 rules. All redevelopment and new construction is regulated by the City of Destin stormwater ordinance. This ordinance meets the guidelines set by the Resource Management Plan (Northwest Florida Coast Resource Planning and Management Committee), i.e. it requires retention facilities to treat the first one inch (1") of runoff. It has been shown through considerable nationwide research that retention of the first 1" of a rainfall event achieves a very high level of removal of nutrients, oils, sediments, tracts and other pollutants which accumulate on paved, other impervious, and intensively landscaped areas.

DER 17-25 and City of Destin rules require new development to retain the first 1/2" and 1" of runoff, respectively. See discussion above under Stormwater - Private - existing.

The City of Destin shall maintain current 1" retention requirements.

The City of Destin shall require existing development to meet the city 1" runoff retention rule if and when such development applies for redevelopment, improvement or expansion permitting.

The City of Destin shall maintain current 1" retention requirements.

The City of Destin shall review all public projects performed within the drainage basin(s) of the Harbor for compliance with the City ordinance.

The City shall undertake an urban design/urban redevelopment study of north shore/central Destin business area to determine potential, specific redevelopment action, including various infrastructure improvements such as stormwater treatment/retention and sewage collection.

A portion of this study should be to analyze the potential qualification of the north shore/central Destin Business area as a Community Redevelopment Area under Chapter 163 F.S. including potential application of tax increment financing.

The following Stormwater Management chapter offers an in depth discussion of situations and solutions of private sector stormwater problems.

The City shall continue its current review program for all development, improvement and redevelopment projects on private property for conformance to the City ordinance.

VI. STORMWATER MANAGEMENT SUMMARY

The City of Destin has experienced significant growth over the past several years, particularly in the Destin Harbor drainage basin. Consequently, the harbor's water quality has been negatively impacted by development related factors, including stormwater runoff. There are three types of contributors for stormwater runoff 1) local streets; 2) U.S. Highway 98 (Florida D.O.T.); and 3) private development.

Local streets are maintained by the City of Destin. Many of these streets have inadequate stormwater treatment facilities and/or drainage facilities. Treatment facilities can be defined as providing for the treatment of stormwater in accordance with the City of Destin code (1" of runoff) or DER Chapter 17-25 (1/2" of runoff). Drainage facilities can be defined as structures that transport stormwater runoff to the treatment facilities.

The U.S. Highway 98 drainage system is the largest stormwater runoff contributor to the Harbor. This is magnified by the local streets and private developments that have stormwater runoff flowing directly into the U.S. 98 drainage system. Additionally, the current collection system does not provide a significant level of stormwater treatment.

The impact on the Harbor depends on two primary factors, volume of stormwater flow and distance of the outfall from the mouth of the Harbor. Thus, Outfall "A" is the least damaging and Outfall "D" is the most detrimental stormwater outfall. There have been several alternatives studied for each of the four major outfalls. Rerouting stormwater runoff, exfiltration systems and treatment near the point of discharge were alternatives studied for each outfall. Outfall "D" was looked at in greater detail, with more alternatives studied. In addition, the study concentrated on three evaluation factors for each alternative. These factors were: estimated cost, treatment level and disruption level.

Private development which took place prior to DER Chapter 17-25 stormwater rules (1982) and the City of Destin stormwater code (1986) generally do not meet current rules and regulations regarding stormwater runoff. The two types of private development of highest concern are those which yield direct runoff, without meeting current regulations, into the Harbor or the U.S. Highway 98 stormwater collection system. Typical solutions have been presented, such as retention basins and exfiltration systems. Several site specific solutions are also presented for areas such as the marine boatyard and the Sandpiper Cove Golf Course.

RECOMMENDATIONS

Based upon the findings of this investigation of stormwater runoff in the Destin Harbor drainage basin, it is recommended that the City of Destin take the following actions:

- The City Council adopt the recommendations contained in this study.
- The City continue efforts to upgrade and resurface local streets, and as part of these projects, upgrade stormwater treatment and drainage facilities to meet the City of Destin code. Streets in the Destin Harbor drainage basin should be given a higher priority than other streets in the City.
- The City work with the Northwest Florida Water Management District to seek funding from the Florida SWIM program and/or the Florida Department of Transportation to provide retention at Outfalls "A", "B", and "C" in a manner similar or equivalent to that shown on Figures 3, 4 and 5, with sufficient volume to retain the first 1/2" of runoff as an absolute minimum.
- The City work with the Northwest Florida Water Management District to seek funding from the Florida SWIM program and/or the Florida Department of Transportation to provide retention to Outfall "D" with the retention volume being adequate to retain at least 1" of runoff as an absolute minimum. Alternatives D4, D5, D7, and D8 should be studied further and the selected alternative implemented. These alternatives are described again as follows:
 - D4 - Route to existing lake with overflow to Harbor.
 - D5 - Route to existing lake with overflow to Gulf.
 - D7 - Use existing conduit as wet well and pump to upland retention area.
 - D8- Use existing lake as storage and pump to upland retention area.
- The City continue to require private developers to meet City of Destin code requirements when a site is redeveloped or developed.

Previous interim reports, supplemented by workshops, have gradually evolved into the following findings and study recommendations. The stormwater problems can be separated into three broad categories. The first category relates to the drainage issues in the City of Destin as a result of the City's responsibility for maintaining local streets. The most extensive category is discussed in the second section and concerns the Florida Department of Transportation's U.S. 98 corridor. The U.S. 98 drainage system has 4 major outfalls that impact the Destin Harbor directly. The third category addresses private development.

LOCAL STREETS

The City of Destin is responsible for maintaining local streets with some funding derived from a dual taxation agreement with the county. As part of the City's drive to upgrade and resurface their streets, they should strive to provide adequate stormwater management facilities for each street. The streets adjacent to U.S. 98 and Destin Harbor should be given a higher priority than other streets more remote from the water.

The existing roadways north of U.S. 98, as a whole, have inadequate drainage facilities judged by current City standards for stormwater retention. Two general problems exist north of U.S. 98. The first is typically 2-lane roads running north from U.S. 98 with very small or no swales. The second situation also involves roads running north from U.S. 98, but consists of pavement extending from right-of-way line to right-of-way line because of wide commercial drive entrances and parking. The solution to the first situation is simply to improve the swales providing stormwater retention in accordance with current stormwater regulation of the City. The second situation will require an analysis of traffic and parking as well as grading and drainage. This will entail narrowing the access driveways to efficiently channel traffic to parking and/or service areas, removing excess pavement within the right-of-way, and then providing stormwater retention through the use of swales, retention basins, exfiltration pipes, or other means, depending upon the particular site conditions.

Holiday Isle, south of U.S. 98, has several right-of-ways that directly affect Destin Harbor. In addition, Gulf Shore Drive has temporary ponding problems during most storms due to prior drainage of the roadway. Most of the roads on Holiday Isle have enough right-of-way for the construction of swales for stormwater retention. The life of the pavement and traffic safety in the ponding areas would also be improved by providing better drainage along the paved roadways. (See Figures 1 and 3, Appendix A).

U.S. HIGHWAY NO. 98

The U.S. 98 drainage system through the Destin Harbor basin has four (4) major outfalls. The outfalls have been labeled as "A", "B", "C" and "D" for the purposes of this study. The first three outfalls, "A", "B", and "C", have been flowing into Destin Harbor since 1966 when U.S. 98 was originally four-laned. Outfall "D" was constructed at its current location and size in 1979. The U.S. 98 drainage basin was effectively enlarged in 1986 when the U.S. 98 By-Pass was constructed. The last expansion was not detrimental in most cases since the area was designed to meet DER stormwater requirements. The three older outfalls do not treat a significant quantity of the stormwater runoff.

The most recent study to be published on the Destin Harbor (Water Resource Restoration of Old Pass Lagoon, Destin, Florida, 1987 by NFWMD) indicated that the bay was the largest source of nitrogen and phosphorous introduction into the harbor. This indicates that the City of Destin should also be concerned about the water quality of the bay. This study has investigated a concept which calls for rerouting Outfalls "B", "C", and possibly "D" along U.S. 98 to Outfall "A". This concept does not provide any stormwater treatment. It simply relocates the points of discharge away from the Harbor. Although this would reduce the direct pollutant loading on the harbor, an increase of pollutants at the mouth of the harbor and the tidal action in this area would still have a negative impact on the harbor. When considering the bay's pollution contribution to the Harbor, it becomes apparent that any stormwater system modification should, as a minimum, meet DER state standards.

The concept of rerouting the stormwater from Outfalls "B", "C" and "D" into Outfall "A", in addition to not providing stormwater treatment, is expensive to construct and would be very disruptive to the City of Destin during construction. The Harbor Board requested that this study look at the possibility of constructing a collector in the harbor instead of in the U.S. 98 right-of-way. This would significantly reduce the disruption to the City. Boating activities in the area of construction could be affected and the cost of construction would still be very high. The lack of effective stormwater treatment under this rerouting concept remains a major disadvantage of this concept.

The Water Resource Restoration of Old Pass Lagoon, Destin, Florida, 1987 report contains statistics on sources of fresh water to the harbor. According to the report, 11 percent of the fresh water introduced to the harbor is stormwater. This is a significant proportion of the fresh water supply. If the stormwater was filtered using retention basins and subsequently introduced into the groundwater, the water chemistry of the harbor would be favorably influenced. This would not, however, significantly change the fresh water makeup of the harbor. Conversely, the concept of rerouting all of the stormwater from the harbor basin would adversely affect the bay and lower the fresh water percentage in the harbor significantly, which could be detrimental to the harbor. This is therefore another major disadvantage of the rerouting concept which would redirect all of the U.S. 98 right-of-way stormwater from the Harbor into the bay.

Outfall "A" is located adjacent to the Destin Bridge, near the mouth of Destin Harbor. The drainage sub-basin for this outfall is the smallest of the four with approximately 1,550 linear feet of the U.S. 98 corridor flowing into the system. The impact of this outfall on the Harbor is relatively small when compared to the other outfalls. The actual direct impact of this particular outfall varies greatly, depending upon the tidal flow through East Pass. If the tide is going out of the bay, the stormwater runoff will flow back into the Harbor. When the tide is flowing into Choctawhatchee Bay, this stormwater flow and the majority of its pollutants will end up in the bay.

Three approaches were considered for handling the stormwater at Outfall "A". The first approach continues the current discharge at the south of the harbor. It also considers the diversion of stormwater from Outfalls "B", "C" and possibly "D" to Outfall "A" for direct discharge into the bay as discussed above. No stormwater treatment is provided.

The second approach considered provides for treatment of the first inch of runoff from the highway right-of-way. Exfiltration (see Figure 8, Appendix A) parallel to the highway could easily be designed to meet City of Destin standards. The construction of this system would significantly disrupt the immediate area and the cost are estimated to be approximately \$238/linear foot in 1987 dollars.

A third and the most cost effective alternative is to modify the existing structure at Outfall "A" to direct the stormwater runoff to a retention basin as illustrated in Figure 7 in Appendix A. The retention basin can be constructed to the southeast of the outfall behind the existing bulkhead. Optionally, this retention area could be filled with coarse aggregate and/or covered with a boardwalk in a manner similar to that shown in Figure 3 in Appendix A. The biggest advantages of this solution are the low cost of construction, the relatively insignificant disruption of daily business in Destin, and the capability of treating at least the first 1/2" of runoff from the U.S. 98 right-of-way.

Outfall "B"

Outfall "B" discharges in an area where the north shore bank has a relatively gradual incline to the water's edge. The drainage sub-basin for this outfall is approximately 2,800 linear feet in length along the U.S. 98 right-of-way. The impact of this outfall on the Harbor is about equal to that of Outfall "C".

Outfall "C" is smaller in area, but also extends further into the stagnate waters of the Harbor, thereby offsetting the benefit of having less stormwater runoff.

An exfiltration system is a viable solution for Outfall "B". The cost is moderately high when compared to retention basins, but this is a very effective method of stormwater treatment. The design would be similar to Figure 8, and run parallel to U.S. 98. The existing collection system could be used as an overflow for large volume storms. Land acquisitions costs would be very low since most of the construction would take place within the highway right-of-way.

The property immediately west of Outfall "B" is undeveloped and has potential for use as a standard retention basin similar to that shown on Figure 7 in the Appendix. Figure 4 shows a landscaped retention area, including a boardwalk along the Harbor's edge, that could serve as an aesthetic amenity as well as stormwater treatment. The largest portion of the cost for developing this treatment facility would be land acquisition.

Outfall "C"

Outfall "C" currently discharges under an existing dock as illustrated by Figure 5, Appendix A. Immediately east of the outfall is a small, steeply inclined parcel of land which could easily be converted into a stormwater treatment facility. The sketch shows a new deck constructed over the structure. The new deck could just as easily be constructed as part of a "Harbor Walk". From an economic standpoint, the deck has the potential, as an aesthetic amenity, to improve the commercial value of the area. An exfiltration system and the outfall rerouting discussed above are also possible options for this outfall.

Outfall "D"

The 72" outfall, Outfall "D", is by far the second greatest pollution problem in Destin Harbor. The Harbor's biggest problem is a lack of flushing. Interim Report 2 introduced eight ideas for providing treatment facilities at Outfall "D". With input from the community workshops, the list was modified, replacing some of the original concepts with new ones to study. Interim Report 3, accompanied another workshop with the new list of ideas presented. The analyses considered estimated costs, treatment factors and disruption factors, and are discussed in the following (See Figure 6, Appendix A).

The first alternatives proposed an exfiltration system in the same manner as described for the other outfalls. This would provide a high level of treatment meeting City of Destin standards. The disruption factor is at a moderate level while the cost is moderately high.

The second alternative proposed a rerouting of the stormwater from Outfalls "D", "C" and "B" to Outfall "A". As discussed earlier, any proposed stormwater improvements should provide treatment of the runoff. Relocating the point of discharge simply moves the problem to the bay and it involves considerable disruption to local businesses as well as being extremely expensive. At the Destin Harbor Board workshop, a proposal was made to reroute the outfall to a retention basin to the east. An investigation of this proposal indicated that there was not enough topographic relief to accomplish this diversion and thereby, this stormwater treatment alternate.

The existing treatment structure (a concrete sediment trap and oil skimmer) is grossly undersized. As a third alternative, the capacity of the structure could be significantly increased by utilizing the last 200 feet of the canal for construction of a filtering structure and an additional oil and trash rack. This could treat up to 1/4" of runoff, depending upon the final design. The first 1/4" of runoff has a substantial portion of the pollutants carried by stormwater due to the initial "wash" effect of small rain storms. It should, however, be the City of Destin's policy to meet DER standards (1/2") as a minimum. The permitting for this concept would be difficult to impossible because it would not meet current stormwater treatment regulations. The disruption factor is low but treatment effectiveness is also low.

The lake located immediately east of Destin Harbor could be converted into a treatment facility using the wet detention approach. The lake acreage is adequate to act as a stormwater treatment facility for the entire Outfall "D" drainage basin. The asbestos bulkhead, which poses a potential health hazard due to the cancer-causing effects of asbestos, should be removed and a littoral zone (shallow water with plants) created to improve the lake's water quality. The outfall to the lake should have an oil and trash skimmer with a sediment basin of adequate size for the outfall. This fourth alternative provides for rerouting Outfall "D" into the lake. An overflow back into the Harbor would be constructed parallel to the pipe diverting stormwater into the lake. This would provide good stormwater treatment with a low disruption factor.

The fifth alternative is very similar to the fourth alternative with the overflow diverted into the Gulf of Mexico. This alternative rates as excellent for removing the stormwater runoff from the Harbor. The disruption factor is low, but the decrease of freshwater could be a disadvantage and the cost would be relatively high.

A vacant parcel of land is situated just east and north of the 72" outfall. The use currently proposed for this land is the construction of the Admiralty Condominium. This site is the best possible location for a single, large retention basin and is considered as the sixth alternative. One major drawback to this site is the high land value because of the proposed land use. An overflow into the lake and then into the harbor could be constructed to complete the treatment system. This solution has a good treatment factor and moderate disruption factor.

The existing 72" outfall and the associated storm sewer provide a large storage volume if they are considered as being empty when a rainfall event occurs. A seventh alternative could take advantage of this storage capability, if three modifications were made to the current outfall system. First, the outfall would have to be sealed to keep Harbor waters from backing up into the pipe. Next, the pipe joints would have to be repaired to prevent infiltration of groundwater. Finally, a pump station, force main, and an upland retention area would be necessary. Good treatment for the right-of-way area could be provided with the drawback of higher operation and maintenance costs.

The eight alternative investigated for Outfall "D" also utilized the existing lake east of Destin Harbor as a storage and surge basin. However, instead of providing discharge into the harbor or gulf, the stormwater could then be pumped to an upland retention area similar to the seventh alternative. Excellent treatment levels could be expected along with the relatively low factor of disruption. It is however, a costly alternative.

BRIEF REVIEW OF INDIVIDUAL SOLUTIONS

The various approaches have been grouped by combining similar solutions for Outfalls "A", "B" and "C". Outfall "D" has been studied in more depth based on the higher impact on the Harbor, and eight possible solutions are presented for consideration.

- ABC 1 Exfiltration trench for Outfall A, B, & C watersheds
- ABC 2 Reconstruct B & C Outfalls to discharge at East Pass (Outfall A)
- ABC 3 Retention at each existing outfall
- D1 Exfiltration trench for Outfall D watershed
- D2 Reconstruct B, C, & D Outfalls to discharge at East Pass (Outfall A)
- D3 Construct Wier & Underdrain in canal
- D4 Route to existing lake with overflow to harbor
- D5 Route to existing lake with overflow to Gulf
- D6 Upland retention with overflow to existing lake and harbor
- D7 Use existing conduit as wet well and pump to upland retention area
- D8 Use existing lake as storage and pump to upland retention area

Construction costs, treatment factors and disruption factors are presented in Table 1. The left hand column lists the eight alternatives for Outfall "D". The second column from the left displays the construction cost in millions of dollars, the treatment factor (T.F.) as defined below, and the disruption factor (D.F.) as defined below for each of the eight alternatives. The top row displays construction cost, treatment factor and disruption factor for each of the three alternatives in the same manner as the second column displayed these factors for Outfall "D". The remaining boxes present the combined construction cost for each combination of alternatives shown by row and column. For Example, alternative D1 at \$2.357 Million and solution ABC1 at \$1.425 Million when combined total \$3,800 Million in the third column from the left.

Table 2 graphically presents the combined treatment and disruption factors in the matrix portion of the table. The upper left corner illustrates the level of treatment. The lighter shades represent high levels of treatment and darker shades represent lower levels of treatment. The lower right corner illustrates the level of disruption caused by construction. Darker shades represent heavier disruption impact on the City than lighter shades.

A cost benefit analysis is presented in Table 3. The numbers shown in the second row and second column were derived by multiplying construction costs (millions) times the treatment factor times the disruption factor. The numbers in the matrix portion are derived by adding the numbers in the second row and the second column for each combination of alternatives. These numbers are an indication of the relative costs of the three factors with the lowest cost being the probable best combination of solutions for the City.

A combination of alternative ABC 3 with alternatives D4, D5, D7 and D8 consistently stand out in all three tables as the most beneficial solutions. This indicates that the City should study these further and approach the Florida Department of Transportation for funding assistance for the selected improvement program.

TREATMENT FACTORS

<u>FACTOR</u>	<u>RATING</u>	<u>DEFINITION</u>
0.7	Excellent	At least 1/2" treated and discharge route away from the harbor
1	Good	At least 1/2" treated
1.21	Fair	1/4" to 1/2" treated
1.60	Poor	Less than 1/4" treated

DISRUPTION FACTORS

<u>FACTOR</u>	<u>RATING</u>	<u>DEFINITION</u>
1	Low	Low levels of inconvenience to residents, business and tourists in a limited construction zone for short period of time (days)
2	Moderate	Low to moderate levels of inconvenience to residents, businesses and tourists in a larger construction zone for moderate periods of time (weeks)
3	High	High levels of inconvenience to residents, businesses and tourists in the fully developed U.S. 98 corridor for long periods of time (months)

		ABC 1	ABC 2	ABC 3
		1.425 T.F. 1 D.F. 3	2.200 T.F. 1.60 D.F. 3	0.155 T.F. 1 D.F. 1
D1	2.375 T.F. 1 D.F. 2	3.800	4.575	2.530
D2	8.200 T.F. 160 D.F. 3	9.625	8.200	N/A
D3	0.035 T.F. 1.21 D.F. 3	1.460	2.235	0.190
D4	0.500 T.F. 1 D.F. 1	1.925	2.700	0.655
D5	1.000 T.F. 0.70 D.F. 1	2.425	3.200	1.155
D6	3.100 T.F. 1 D.F. 2	4.525	5.300	3.255
D7	0.200 T.F. 0.7 D.F. 1	1.625	2.400	0.355
D8	0.500 T.F. 0.7 D.F. 1	1.925	2.700	0.655

CONSTRUCTION COSTS, TREATMENT FACTORS AND DISRUPTION FACTORS
(CONSTRUCTION COSTS IN MILLIONS OF DOLLARS)

TABLE 1

		ABC 1	ABC 2	ABC 3
		1.425 T.F. 1 D.F. 3	2.200 T.F. 1.60 D.F. 3	0.155 T.F. 1 D.F. 1
D1	2.375 T.F. 1 D.F. 2			
D2	8.200 T.F. 1.60 D.F. 3			
D3	0.035 T.F. 1.21 D.F. 3			
D4	0.500 T.F. 1 D.F. 1			
D5	1.000 T.F. 0.70 D.F. 1			
D6	3.100 T.F. 1 D.F. 2			
D7	0.200 T.F. 0.7 D.F. 1			
D8	0.500 T.F. 0.7 D.F. 1			

CONSTRUCTION COSTS, TREATMENT FACTORS AND DISRUPTION FACTORS
(GRAPHICAL REPRESENTATION)

TABLE 2

		ABC 1	ABC 2	ABC 3
		4.275	10.560	0.155
D1	4.750	9.025	15.310	4.905
D2	39.360	43.635	39.360	N/A
D3	0.042	4.317	10.602	0.197
D4	0.500	4.775	11.060	0.655
D5	0.700	4.975	11.260	0.855
D6	6.200	10.475	16.760	6.355
D7	0.140	4.415	10.700	0.295
D8	0.350	4.625	10.910	0.505

COST/BENEFIT ANALYSIS

TABLE 3

PRIVATE DEVELOPMENT

The stormwater requirements for the private sector have in the past been unregulated and therefore many of the older developments retain or detain inadequate volumes of stormwater at best. The Department of Environmental Regulation is responsible for statewide enforcement of Chapter 17-25 of the Florida Administrative Code (Regulation of Stormwater Discharge). The City of Destin has developed its own stormwater ordinance based on the Northwest Florida Coast Resource Planning and Management Committee's Resource Management Plan. These criteria exceed that of the Department of Environmental Regulation.

The City of Destin has several options to consider for regulating developed sites which do not meet current stormwater rules. The first option is to maintain the statutes quo, which requires an upgrading of stormwater facilities to meet minimum design standards when site is redeveloped. Another alternative is to require all sites in non-conformance to meet City of Destin rules by some specified date in the future. The third viable option is for the City of Destin to develop a "North Shore Development Area" and/or set up a tax increment district along the north shore area in an effort to collectively solve the problems in that area encountered by both private and public sectors. The tax increment district would then generate capital funds for redevelopment of the North Shore Area and subsequently upgrade the stormwater facilities in the area.

Stormwater retention can be accomplished utilizing a variety of methods. Retention basins are the most common and economical method of stormwater management. All future stormwater facilities should be sized to provide a storage volume equivalent to one inch of runoff in accordance with present City of Destin requirements. The cost of retention basins could be as high as \$10,000 for each acre of land developed. However, if retention basins are provided in green space areas required by the City of Destin code, their cost could be negligible since the primary expense involved is the land. Exfiltration systems are a viable alternative to retention basins where open land is limited. They may also prove feasible in locations where the ground water table is deep. Exfiltration systems are basically perforated or slotted pipe set in a gravel and sand bed to allow the stormwater to percolate into the ground. Cost per acre of development is estimated at \$15,000.

The aggregate trap (Figure 3) is suitable for inlets not located in heavily traveled portions of parking lots. This type of treatment facility is for relatively small drainage areas. Many existing developments may use various combinations of retention basins, exfiltration systems, aggregate traps, or other methods to meet City of Destin retention requirements.

The landscaped island retention basin illustrated on Figure 4 shows an existing stormwater inlet within a grassed island. The inlet accepts direct flow from the parking lot via the grassed island with no retention. A retention basin can be created by simply excavating as shown on Figure 4 leaving the inlet to act as an overflow. An option would be to excavate around the inlet and replace with clean coarse aggregate to create retention.

There are several landscaped areas, including a golf course, that slope toward the Harbor. Their stormwater runoff has the potential to carry undesirable nutrients from fertilizers applied to those areas. Figure 5 illustrates a berm system that would require very little earthwork and cost.

There are a few light industrial areas in the study area. Some of these, including a marine boatyard, are located along the edge of the Harbor. Because of the increased heavy metal and hydrocarbon pollutants that might be expected from these areas, some extra measures are included. To prevent leaching of pollutants into the Harbor, impervious paving is recommended. The site's runoff should be directed away from the harbor to a retention basin with a filter media bottom equipped with an overflow structure and an oil skimmer device. The filter media should be replaced to regular intervals. The estimated cost of these measures is approximately \$43,000 per acre of development including paving.

The importance of private developers treating stormwater runoff generated by their sites cannot be over emphasized. It is comparable to the City and State treating the stormwater runoff generated which their facilities generate. When runoff is not treated at the source, the burden on the downstream owner(s) is proportionally increased. This significantly reduces the efficiency of the downstream owner's treatment system to the extent that the system may become completely ineffective. As an example, many of the developments along U.S. 98 do not retain any stormwater, and therefore, the DOT stormwater system collects and discharges this runoff into the Destin Harbor. Considering the limited alternatives and the extremely high respective costs for a U.S. 98 stormwater treatment system, private development must provide stormwater treatment prior to discharge into the DOT system as part of a viable overall solution to the stormwater runoff problems into Destin Harbor.

VII. APPENDICES

APPENDIX A

STORMWATER CONCEPT DESIGNS

INDEX OF SKETCHES

FIGURE NO.

DESCRIPTION

1

ROADSIDE SWALES

2

RETENTION CHECK DAM FOR ROADWAY
WITH SWALES

3

OUTFALL "A" TREATMENT

4

OUTFALL "B" TREATMENT

5

OUTFALL "C" TREATMENT

6

DESTIN HARBOR DRAINAGE BASINS,
OUTFALL "D" TREATMENT ALTERNATIVES

7

RETENTION BASIN

8

EXFILTRATION TRENCH

9

AGGREGATE TRAP

10

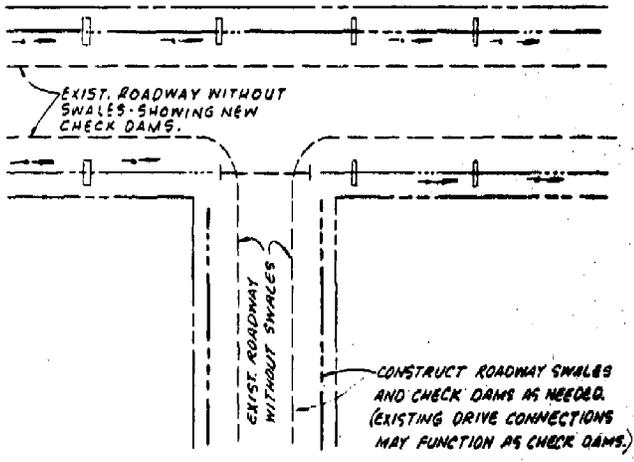
GRASSED ISLAND RETENTION BASIN IN
EXISTING PARKING LOT

11

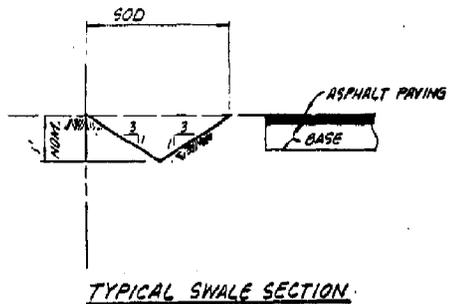
RETENTION AREA AND BERMING FOR
GOLF/GREEN SPACE AREAS ADJACENT TO
HARBOR

12

MARINE BOATYARD

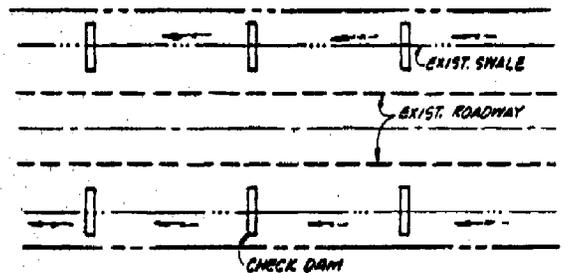


PLAN

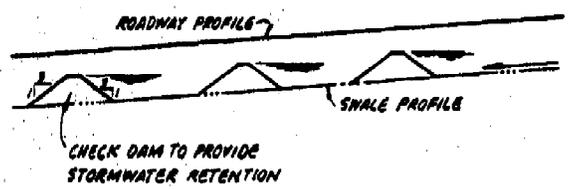


TYPICAL SWALE SECTION

FIGURE 1



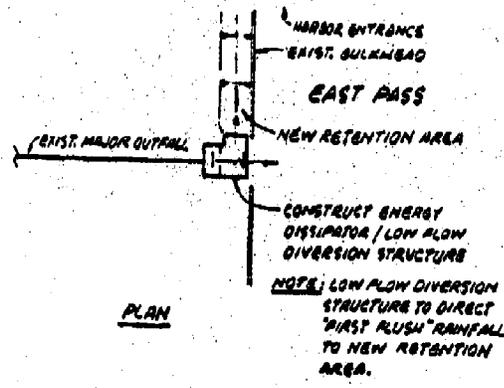
PLAN



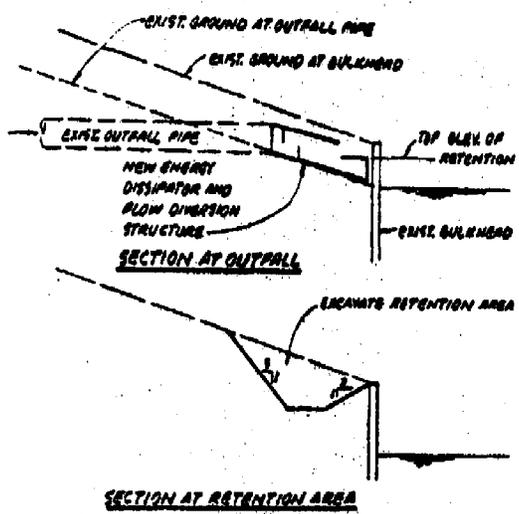
PROFILE

RETENTION CHECK DAM FOR ROADWAY WITH SWALES

FIGURE 2

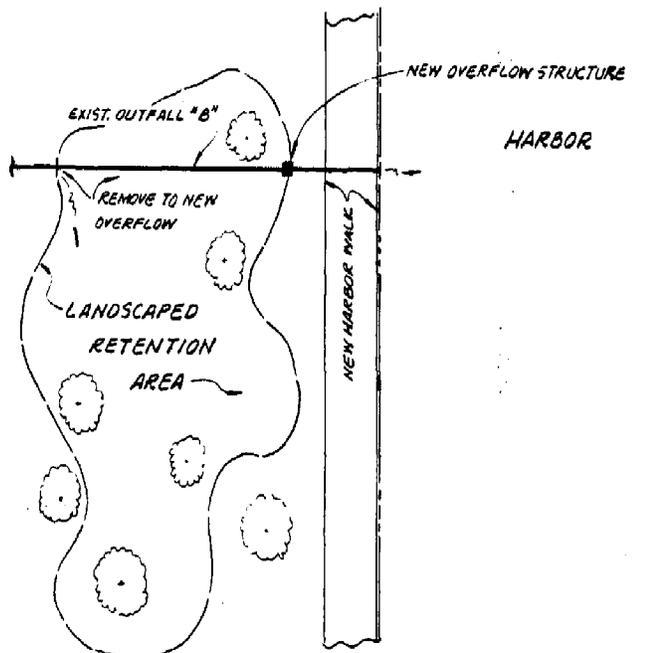


PLAN

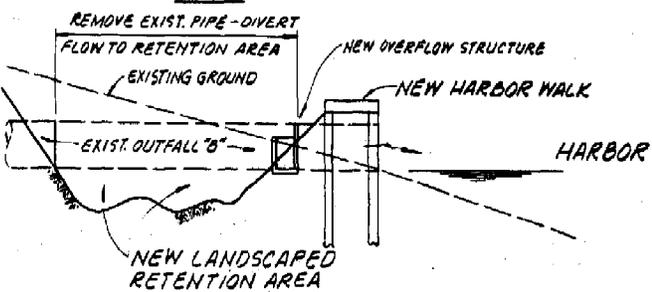


OUTFALL "A" TREATMENT

FIGURE 3



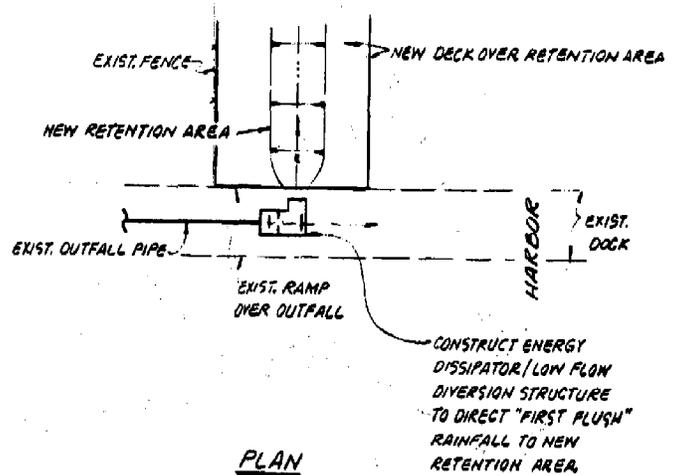
PLAN



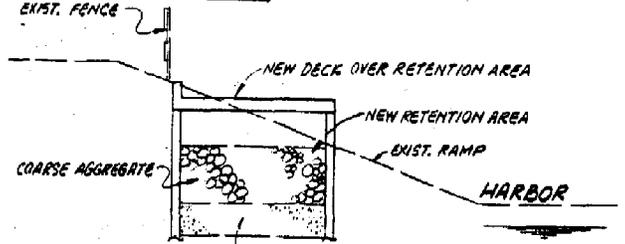
SECTION

OUTFALL "B" TREATMENT

FIGURE 4



PLAN



SECTION AT RETENTION AREA

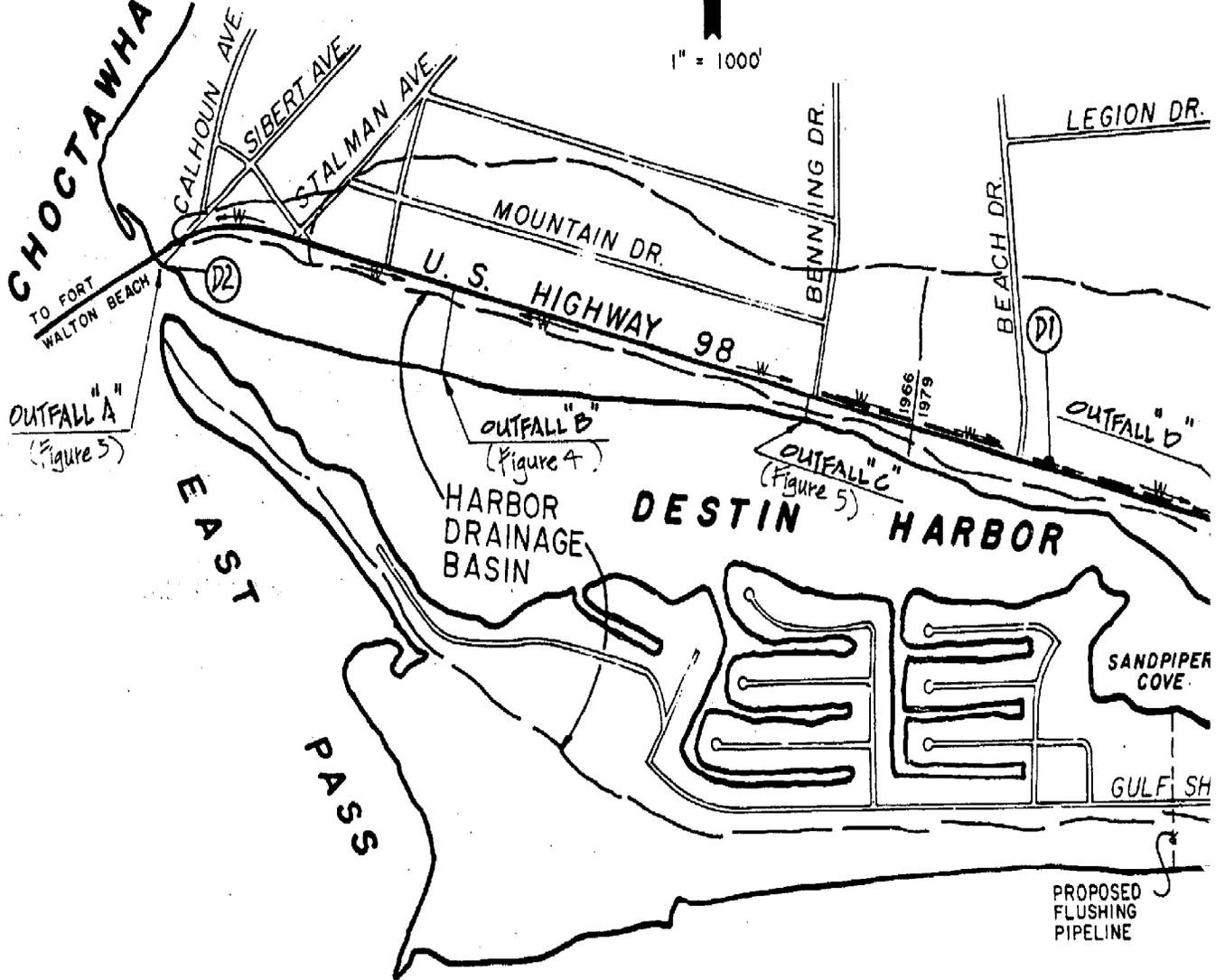
OUTFALL "C" TREATMENT

FIGURE 5

CHOCTAWHATCHEE BAY

N

1" = 100'



OUTFALL "A"
(Figure 3)

OUTFALL "B"
(Figure 4)

OUTFALL "C"
(Figure 5)

OUTFALL "D"

EAST
PASS

HARBOR
DRAINAGE
BASIN

DESTIN HARBOR

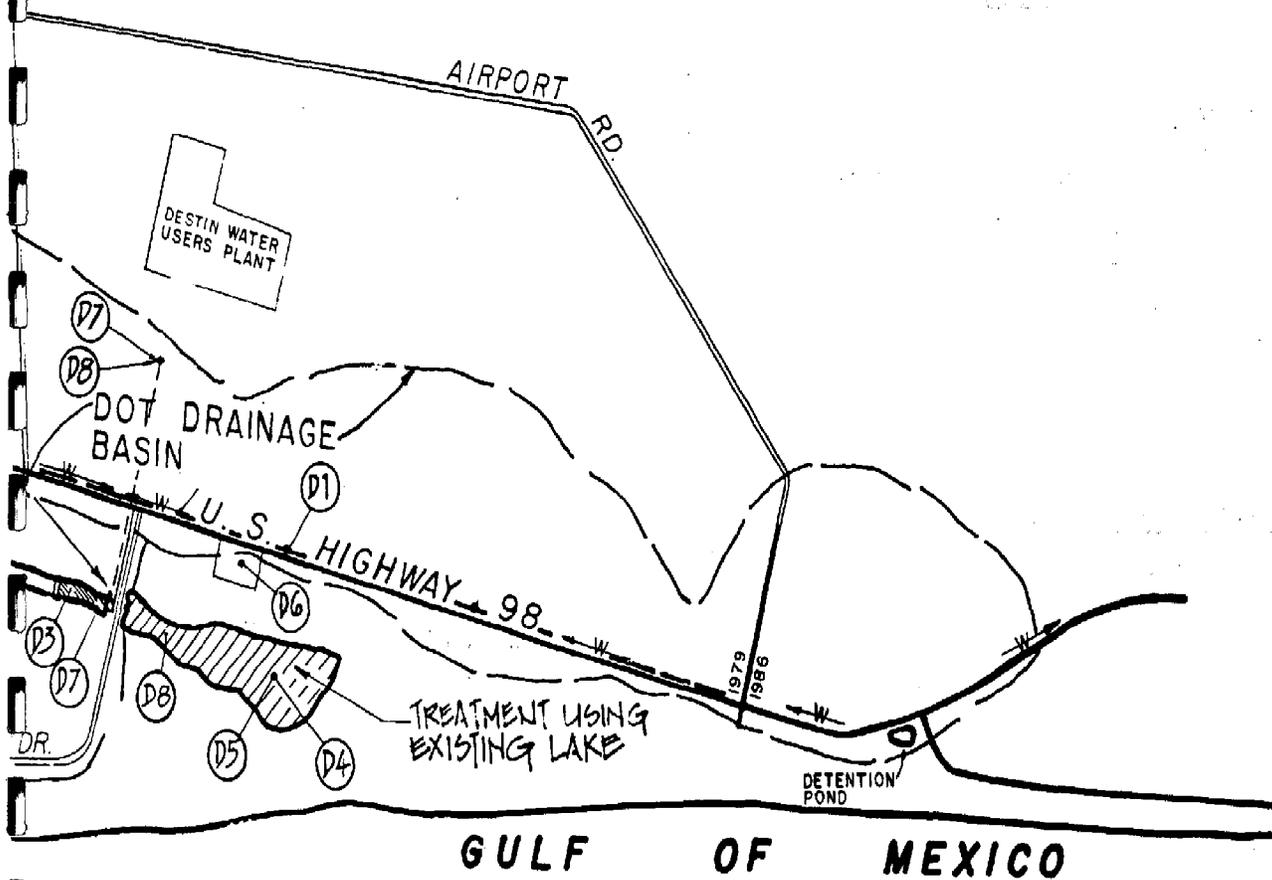
SANDPIPER
COVE

GULF SH

PROPOSED
FLUSHING
PIPELINE

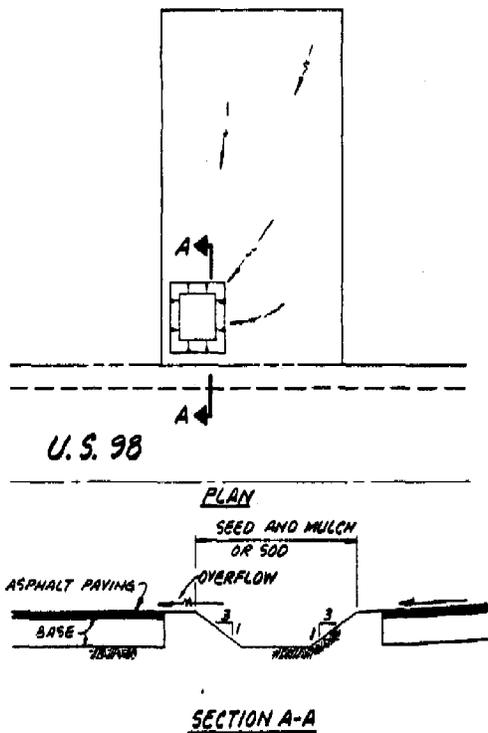
TREATMENT OPTIONS

- D1. EXFILTRATION TRENCH
- D2. B, C & D TO DISCHARGE AT A
- D3. IMPROVE TREATMENT AT EXISTING OUTFALL
- D4. TREATMENT IN LAKE WITH OVERFLOW INTO HARBOR
- D5. TREATMENT IN LAKE WITH OVERFLOW INTO GULF
- D6. UPLAND RETENTION WITH OVERFLOW INTO LAKE, HARBOR
- D7. EXISTING CONDUIT AS STORAGE, PUMP TO UPLAND RETENTION
- D8. LAKE AS STORAGE, PUMP TO UPLAND RETENTION



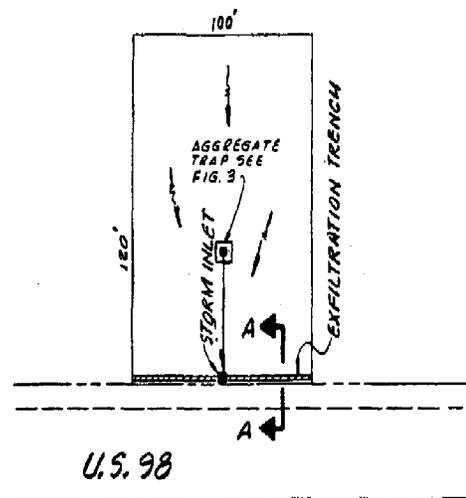
**DESTIN HARBOR DRAINAGE BASINS
TREATMENT ALTERNATIVES AT OUTFALL "D"**

FIGURE 6

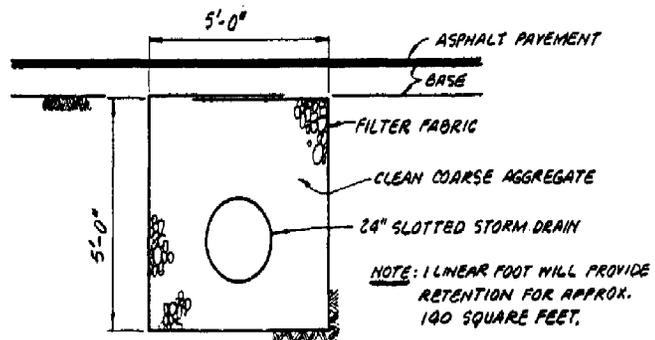


NOTE: APPROX. 0.2 CU. FT. RETENTION
REQUIRED FOR 100 SQUARE
FEET.

RETENTION BASIN
FIGURE 7



PLAN

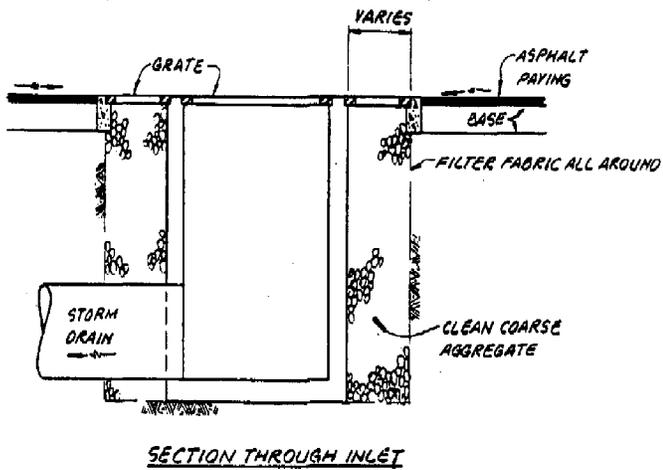
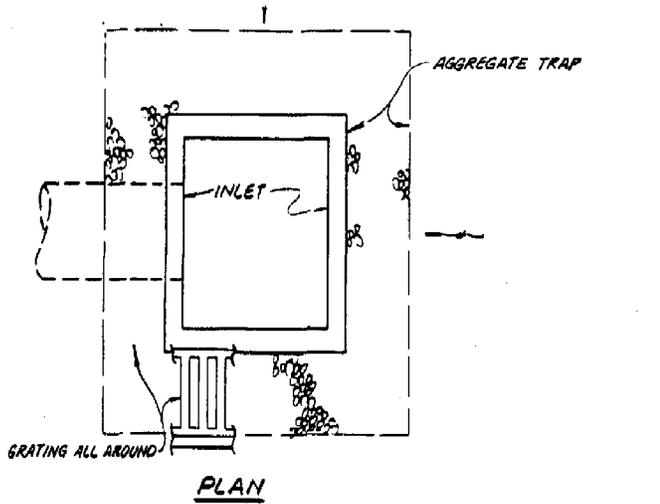


NOTE: 1 LINEAR FOOT WILL PROVIDE
RETENTION FOR APPROX.
100 SQUARE FEET.

SECTION A-A

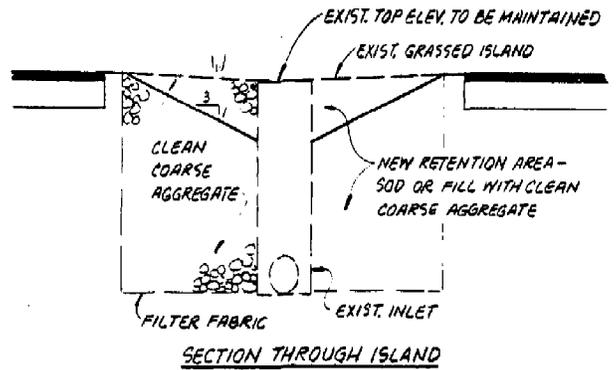
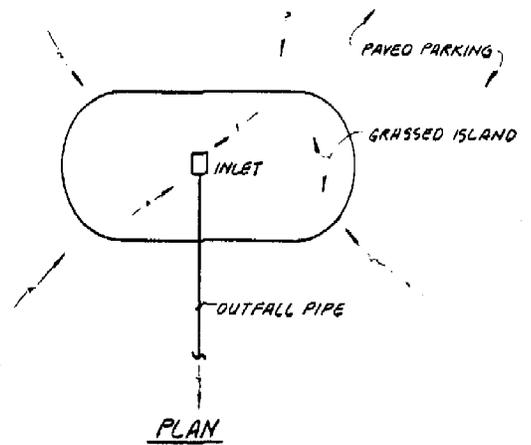
EXFILTRATION TRENCH

FIGURE 8



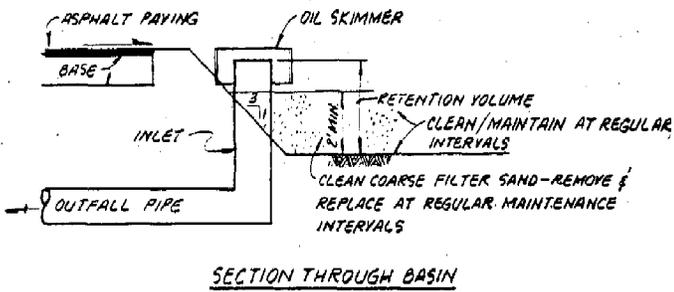
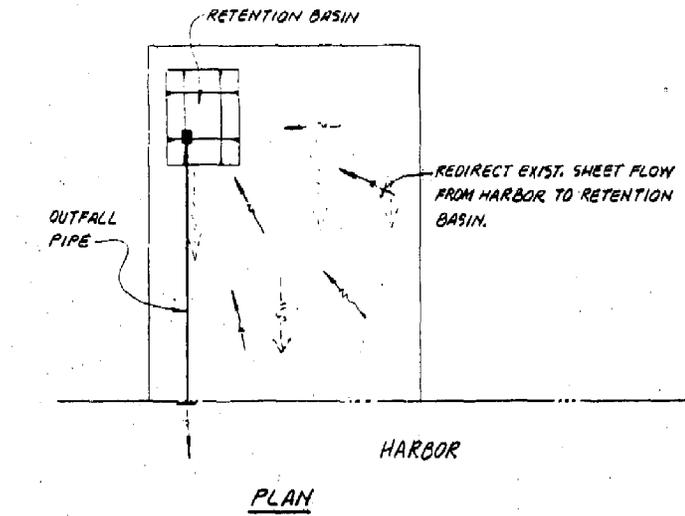
AGGREGATE TRAP

FIGURE 9



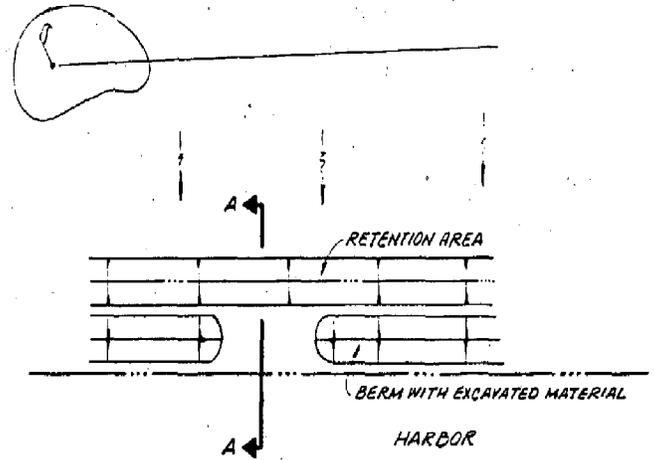
GRASSED ISLAND RETENTION BASIN IN EXISTING PARKING LOT

FIGURE 10



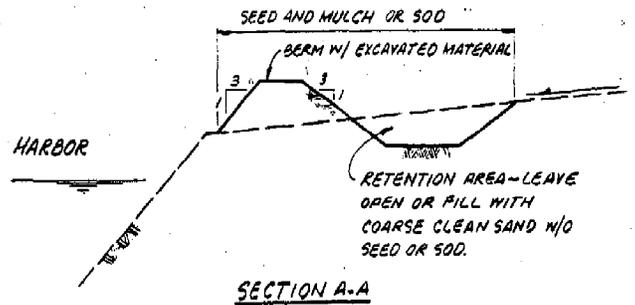
MARINE BOATYARD

FIGURE 11



NOTE: CONSTRUCT RETENTION AREA & BERMS IN CURVILINEAR PATTERN FOR AESTHETICS.

PROVIDE BREAKS IN BERM FOR DRAINAGE.



RETENTION AREA AND BERMING FOR GOLF/GREEN SPACE AREAS ADJACENT TO HARBOR

FIGURE 12

APPENDIX B

**DER CLASS III
STANDARDS FOR WATER QUALITY**

(25) Transparency - the depth of the compensation point for photosynthetic activity shall not be reduced by more than 10% as compared to the natural background value.

Specific Authority: 403.061, 403.062, 403.087, 403.504, 403.704, 403.804, F.S. Law Implemented: 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.182, 403.502, 403.702, 403.708, F.S. History: Formerly 28-5.08, 17-3.08, Amended 6-10-72, 8-30-72, 7-3-73, Amended and Renumbered 3-1-79, Amended 2-1-83.

17-3.12 Definitions.

Specific Authority: 403.061, F.S. Law Implemented: 403.021, 403.031, 403.061, 403.101, F.S. History: Formerly 28-5.12, Amended and Renumbered as 17-3.021, 3-1-79.

17-3.121 Criteria: Class III Waters - Recreation - Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife. The criteria listed below are for surface waters classified as Class III. The standards contained in Sections 17-3.051 and 17-3.061, F.A.C., also apply to all waters of this classification unless additional or more stringent criteria are specified below. The following criteria are to be applied except within zones of mixing.

(1) Alkalinity - shall not be depressed below 20 milligrams per liter as CaCO_3 in predominantly fresh waters.

(2) Aluminum - shall not exceed 1.5 milligrams per liter in predominantly marine waters.

(3) Ammonia (un-ionized) - shall not exceed 0.02 milligrams per liter in predominantly fresh waters.

(4) Antimony - shall not exceed 0.2 milligrams per liter in predominantly marine waters.

(5) Bacteriological Quality - fecal coliform bacteria shall not exceed a monthly average of 200 per 100 ml of sample, nor exceed 400 per 100 ml of sample in 10 percent of the samples, nor exceed 800 per 100 ml on any one day, nor exceed a total coliform bacteria count of 1,000 per 100 ml as a monthly average, nor exceed 1,000 per 100 ml in more than 20 percent of the samples examined during any month, nor exceed 2,400 per 100 ml at any time. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30 day period. Either MPN or MF counts may be utilized.

(6) Beryllium - in predominantly fresh waters shall not exceed 0.011 milligrams per liter in waters with a hardness equal to or less than 150 (in milligrams per liter of CaCO_3) and shall not exceed 1.10 milligrams per liter in harder waters.

(7) Biological Integrity - the Shannon-Weaver diversity index of benthic macroinvertebrates shall not be reduced to less than 75 percent of established background levels as measured using organisms retained by a U.S. Standard No. 30 sieve and, in predominantly fresh waters, collected and composited from a minimum of three Hester-Dendy type artificial substrate samplers of 0.10 to 0.15 m^2 area each, incubated for a period of four weeks; and, in predominantly marine waters, collected and composited from a minimum of three natural substrate samples, taken with Ponar type samplers with minimum sampling area of 225 square centimeters.

(8) Bromine and Bromates - free (molecular) bromine shall not exceed 0.1 milligrams per liter in predominantly marine waters, and bromates shall not exceed 100 milligrams per liter in predominantly marine waters.

(9) Cadmium - shall not exceed 5.0 micrograms per liter in predominantly marine waters; shall not exceed 0.8 micrograms per liter in predominantly fresh waters in water with a hardness (in milligrams per liter of CaCO_3) of less than 150, and shall not exceed 1.2 micrograms per liter in harder waters.

(10) Chlorine (total residual) - shall not exceed 0.01 milligrams per liter.

(11) Copper - shall not exceed .015 milligrams per liter in predominantly marine waters; shall not exceed .03 milligrams per liter in predominantly fresh waters.

(12) Cyanide - shall not exceed 5.0 micrograms per liter.

(13) Dissolved Oxygen - in predominantly fresh waters, the concentration shall not be less than 5 milligrams per liter. In predominantly marine waters, the concentration shall not average less than 5 milligrams per liter in a 24-hour period and shall never be less than 4 milligrams per liter. Normal daily and seasonal fluctuations above these levels shall be maintained in both predominantly fresh waters and predominantly marine waters.

(14) Fluorides - shall not exceed 5.0 milligrams per liter in predominantly marine waters.

(15) Iron - shall not exceed 1.0 milligrams per liter in predominantly fresh waters; 0.3 milligrams per liter in predominantly marine waters.

(16) Lead - shall not exceed .03 milligrams per liter in predominantly fresh waters.

(17) Mercury - shall not exceed 0.1 micrograms per liter in predominantly marine waters; shall not exceed 0.2 micrograms per liter in predominantly fresh waters.

(18) Nickel - shall not exceed 0.1 milligrams per liter.

(19) Nutrients - In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna.

(20) Pesticides and Herbicides:

(a) Aldrin plus Dieldrin - shall not exceed 0.003 micrograms per liter.

(b) Chlordane - shall not exceed 0.01 micrograms per liter in predominantly fresh waters and shall not exceed 0.004 micrograms per liter in predominantly marine waters.

(c) DDT - shall not exceed 0.001 micrograms per liter.

(d) Demeton - shall not exceed 0.1 micrograms per liter.

(e) Endosulfan - shall not exceed 0.003 micrograms per liter in predominantly fresh waters and shall not exceed 0.001 micrograms per liter in predominantly marine waters.

(f) Endrin - shall not exceed 0.004 micrograms per liter.

(g) Guthion - shall not exceed 0.01 micrograms per liter.

(h) Heptachlor - shall not exceed 0.001 micrograms per liter.

(i) Lindane - shall not exceed 0.01 micrograms per liter in predominantly fresh waters and shall not exceed 0.004 micrograms per liter in predominantly marine waters.

(j) Malathion - shall not exceed 0.1 micrograms per liter.

(k) Methoxychlor - shall not exceed 0.03 micrograms per liter.

(l) Myrex - shall not exceed 0.001 micrograms per liter.

(m) Parathion - shall not exceed 0.04 micrograms per liter.

(n) Toxaphene - shall not exceed 0.005 micrograms per liter.

(21) pH - shall not vary more than one unit above or below natural background of predominantly fresh waters and coastal waters as defined in 17-3.05(1)(c), F.A.C., or more than two-tenths unit above or below natural background of open waters as defined in 17-3.05(1)(c), F.A.C., provided that the pH is not lowered to less than 6 units in predominately fresh waters, or less than 6.5 units in predominately marine waters, or raised above 8.5 units. If natural background is less than 6 units, in predominately fresh waters or 6.5 units in predominately marine waters, the pH shall not vary below natural background or vary more than one unit above natural background of predominately fresh waters and coastal waters, or more than two-tenths unit above natural background of open waters. If natural background is higher than 8.5 units, the pH shall not vary above natural background or vary more than one unit below natural background of predominately fresh waters and coastal waters, or more than two-tenths unit below natural background of open waters.

(22) Phosphorus (elemental) - shall not exceed 0.1 micrograms per liter in predominantly marine waters.

(23) Phthalate Esters - shall not exceed 3.0 micrograms per liter in predominantly fresh waters.

(24) Polychlorinated Biphenyls - shall not exceed 0.001 micrograms per liter.

(25) Selenium - shall not

exceed 0.025 milligrams per liter.

(26) Silver - shall not exceed 0.07 micrograms per liter in predominantly fresh waters and 0.05 micrograms per liter in predominantly marine waters.

(27) Total Dissolved Gases - shall not exceed 110% of the saturation value for gases at the existing atmospheric and hydrostatic pressures.

(28) Transparency - the depth of the compensation point for photosynthetic activity shall not be reduced by more than 10% compared to the natural background value.

(29) Zinc - shall not exceed .03 milligrams per liter in predominantly fresh waters.

Specific Authority: 403.061, 403.062, 403.087, 403.504, 403.704, 403.804, F.S. Law Implemented: 403.021, 403.061, 403.087, 403.088, 403.141, 403.161, 403.182, 403.502, 403.702, 403.708, F.S. History: Formerly 28-5.09, 17-3.09, Amended 6-10-72, 8-30-72, 7-3-73, Amended and Renumbered 3-1-79, Amended 2-1-83.

17-3.13 Drainage Wells, Permits.

Specific Authority: 403.061, F.S. Law Implemented: 403.021, 403.031, 403.061, 403.182, F.S. History: Formerly 28-5.13, Repealed 3-1-79.

17-3.131 Criteria: Class IV Waters - Agricultural Water Supplies.

The criteria listed below are for surface waters classified as Class IV. The standards established in Sections 17-3.051 and 17-3.061, F.A.C., also apply to all waters of this classification, unless additional or more stringent criteria are specified below. The following criteria are to be applied except within zones of mixing.

17-3.121(20)(1) -- 17-3.131

APPENDIX C

AGENCY WORKSHOP ATTENDEES

Agency Workshop
Destin
January 9, 1986

PARTICIPANTS

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J.B. Anderson	
<u>DER:</u>	
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APPENDIX D

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