Summary Preliminary Engineering Report

Including

Opinion of Probable Cost, Prioritization of Improvements
And Implementation Plan

For

Stormwater Management Facilities
Mill Creek / Cloud Branch

City of Sanford, Florida

July 1992

by:

Conklin Porter and Holmes-Engineers, Inc.

TABLE OF CONTENTS

B - Cloud Branch Drainage Basin - Topographic Map with System Boundaries and Proposed Stormwater Management System Improvements

C - Overall System Aerial/Wetlands Map

D - Mill Creek Drainage Basin (Pre Condition) Nodal Diagram w/ Water Surface Elevation and Associated Flows - 25 Year/6 Hour Storm Event

E - Cloud Branch Drainage Basin (Pre Condition) Nodal Diagram w/ Water Surface Elevation and Associated Flows - 25 Year/6 Hour Storm Event

F - Mill Creek Drainage Basin (Pre Condition) Nodal Diagram w/ Water Surface Elevation and Associated Flows - 25 Year/24 Hour Storm Event

G - Cloud Branch Drainage Basin (Pre Condition) Nodal Diagram w/ Water Surface Elevation and Associated Flows - 25 Year/24 Hour Storm Event

H - Mill Creek Drainage Basin (Post Condition) Nodal Diagram w/ Water Surface Elevation and Associated Flows - 25 Year/6 Hour Storm Event

I - Cloud Branch Drainage Basin (Post Condition) Nodal Diagram w/ Water Surface Elevation and Associated Flows - 25 Year/6 Hour Storm Event

J - Mill Creek Drainage Basin (Post Condition) Nodal Diagram Indicating Performance of the Proposed 25 Year / 6 Hour Storm Event Stormwater Management Facilities Under a 25 Year / 24 Hour Storm Event

K - Cloud Branch Drainage Basin (Post Condition) Nodal Diagram Indicating Performance of the Proposed 25 Year / 6 Hour Storm Event Stormwater Management Facilities Under a 25 Year / 24 Hour Storm Event

Summary and Recommendations

Area Description and History:

The north central and northwestern portions of the City of Sanford contain stormwater drainage systems generally tributary to two existing, natural drainage ways. These two streams are Mill Creek and Cloud Branch.

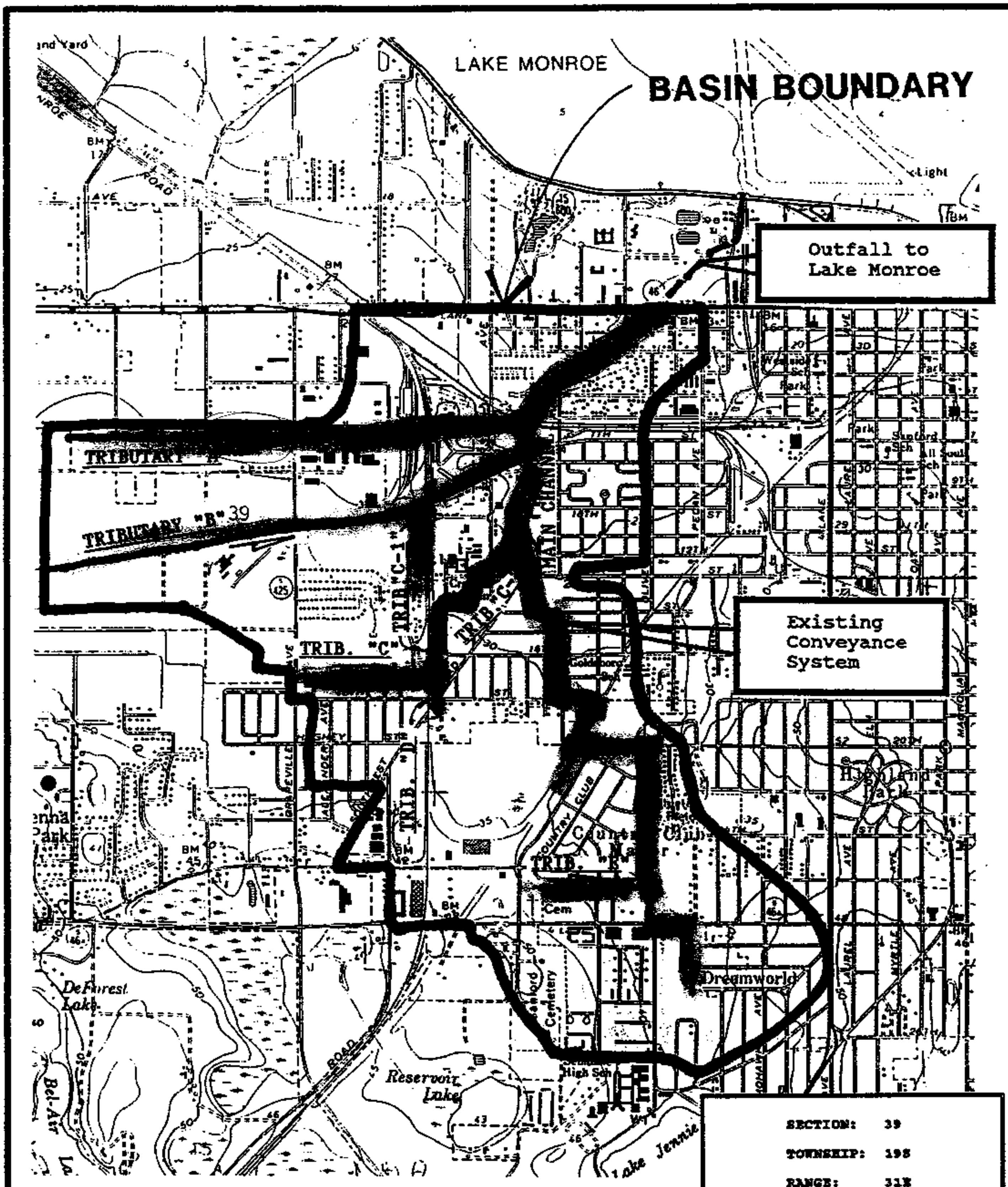
The Mill Creek system drains the northwestern portion of the City of Sanford roughly bounded by Lake Monroe to the north, 25th Street on the south, Airport Boulevard and Bevier Road on the west, and Olive Avenue on the east. The Cloud Branch system is generally bounded by Lake Monroe on the north, 25th Street on the south, Park Avenue and Sanford Avenue on the east, and Olive Avenue on the west. See Maps 1 and 2 for a pictorial representation of these two basins.

Both of these basins drain from south to north and are natural, relic, drainage channels which have been substantially modified for agricultural use and later for development purposes by the inclusion of road crossing culverts, regrading, basin diversions, channel relocations, rechannelization, and other activities. In most cases, rights-of-way for the creeks and the associated structures do not presently exist, except through prescriptive rights or where the channels follow or cross street rights-of-way. There is no retention or detention provided in the system except that occurring in the channels themselves or in some smaller, lower floodplain areas through which channels pass.

Most of the buildings, streets and improvements in the Mill Creek basin came about without any appreciable governmental regulation. Because of the natural streams which ran through the area, it was ideal for agricultural purposes. The community of Goldsboro sprang up around the various railroad lines. It became populated and grew into the incorporated community of Goldsboro, and was incorporated as the Village of Goldsboro in 1891. It was not brought into the City of Sanford until 1911, and had approximately 5,000 people in the Village at the time it was incorporated in 1891.

The areas surrounding these two channels are currently thoroughly developed, economically depressed, and are mostly comprised of black and lower income housing, neighborhood commercial, railroad, and industrial land use. Repeated hazardous flooding problems exist in these areas because of the very inadequate drainage system. In many cases, homes and other structures are built right on the streams and ditches, and the public health and safety have always been a major problem as well as the flooding damage.

On July 13, 1991, the Mill Creek/Cloud Branch area, as well as the rest of Sanford, was hit by an extreme rainfall event. At the Water Reclamation Facility located at the confluence of Cloud Branch and Mill Creek streams (at Lake Monroe), 0.2" of rainfall fell from midnight until 8:00 a.m. From 8:00 a.m. until 1:00 p.m., an additional 5.8" of rainfall was measured. The storm

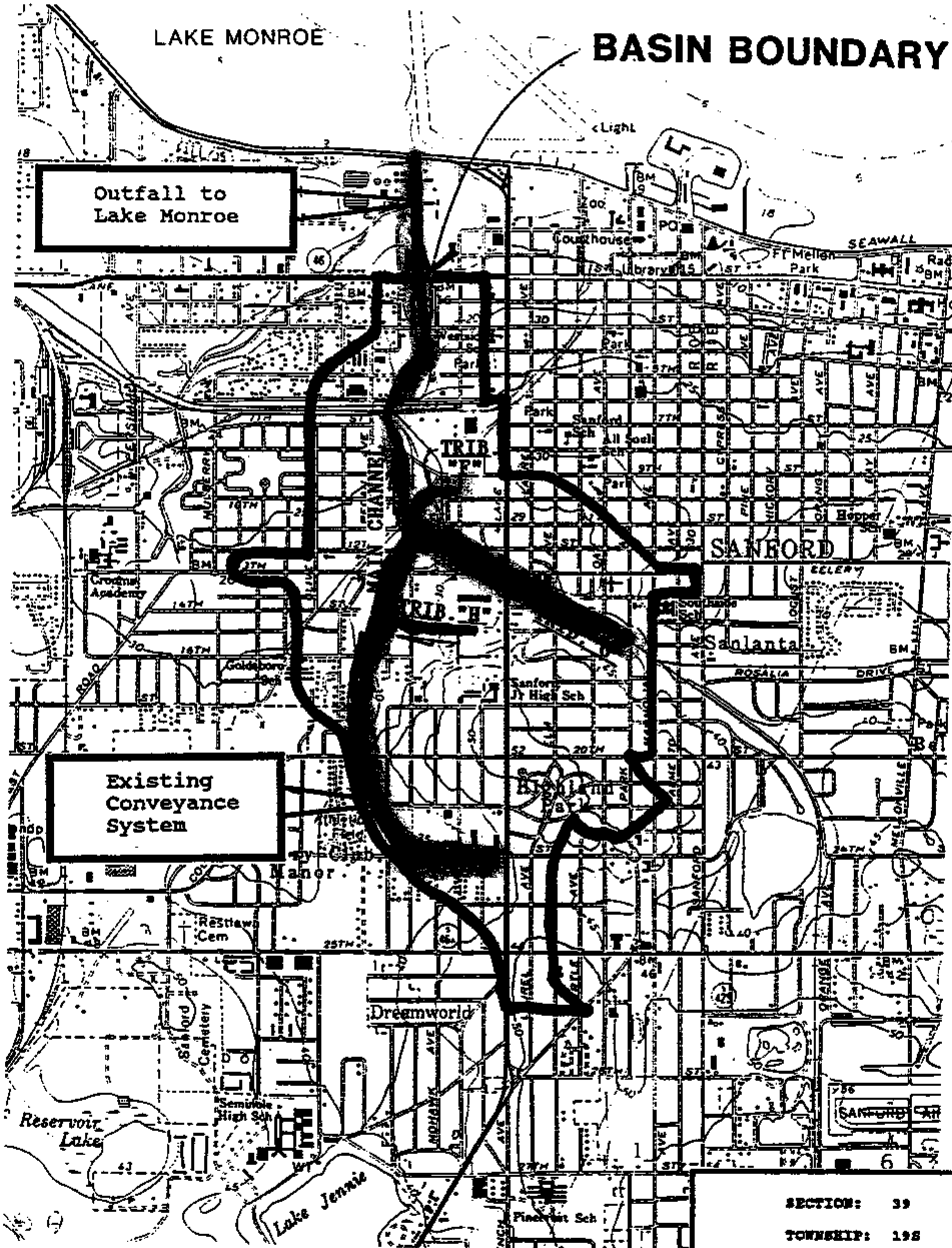


SCALE: 1" = 2000'

MILL CREEK DRAINAGE BASIN: PROJECT LOCATION & TOPO MAP

MAP No. 1

Conklin Porter and Holmes
ENGINEERS, INC.



SECTION:	35
TOWNSHIP:	19S
RANGE:	31E

SCALE: 1" = 2000'

CLOUD BRANCH DRAINAGE BASIN: PROJECT LOCATION & TOPO MAP

MAP No. 2

Conklin Porter and Holmes
ENGINEERS, INC.
cph

was preceded by an extended wet period of regular, heavy rainfalls and the ground was completely saturated and the runoff very high. Flooding of streets, homes, and buildings was very widespread and a great amount of property damage, misery and hazard was experienced by the area businesses and citizens. The public has been highly disturbed by this and previous occurrences and the newspaper and residents have exerted pressure to obtain some relief. Unfortunately, over the years, there have been a number of reported drownings in the streams which run through these two basins which are located close to homes and areas where children play. Luckily, no drownings occurred in the recent flooding of July 13, 1991.

In the past, there has never been a revenue source sufficient to even partly remedy the existing drainage problems. For example, some of the streets in the areas surrounding the channels have not been paved because it would take a drainage solution immediately preceding or coincidental with any pavement improvements to take care of the major ditches in the area and the water courses that run in the street rights-of-way. As a result, streets that badly need paving have been left unpaved and the drainage has not been fixed as the costs involved are extremely high and there has been no revenue source available. The City has recently adopted a Stormwater Utility Ordinance and has implemented the system and is collecting revenue. A portion of the funds from the new source are proposed to be used in the upgrading of the Mill Creek and Cloud Branch Stormwater Management Systems.

Purpose of the Program and Statement of Intent:

It is the intent of the consultants, City Staff and Officials, and residents to get the main drainage system in Goldsboro and Cloud Branch areas upgraded; to eliminate major flooding and the attendant property damage and public health hazards; and to reasonably comply with environmental and regulatory concerns.

With every increased level of protection provided by an increasing scope of drainage facilities, there is an attendant increase in cost. It is absolutely imperative to examine the level of protection and criteria to be applied to make absolutely certain that the optimum level of protection in relation to the cost is being provided for the following reasons:

- The area is an old, existing, minority, completely developed area with relatively little undeveloped or vacant land.
- It has severe drainage problems and generally high water table and poor soils conditions.
- Right-of-ways and land required for most of the existing and proposed improvements are not in public ownership and will have to be obtained.
- Any solution of the problem involves extremely high cost.
- Very limited funds will be available.

The intent is to accomplish the program to a satisfactory level consistent with the needs, intent of the regulatory requirements, and fund availability that may be generated through the City's Stormwater Utility and other, already strained, revenue sources.

Previous Studies:

1968 Study:

The City's Consulting Engineer studied these basins in 1968 and prepared a Drainage Study which proposed solutions to the drainage problems which were never implemented because of cost and unavailability of funds. Two subsequent straw votes of the City's citizens indicated unwillingness to pay the cost to correct City-wide drainage problems at the time. A considerable amount of base information is available from this Study as the basins have not changed very much since that time. The 1968 Study was prior to the existence of current regulatory requirements of the SJRWMD and others for retention/detention, pollution abatement, and other current criteria and regulations.

1988 Study:

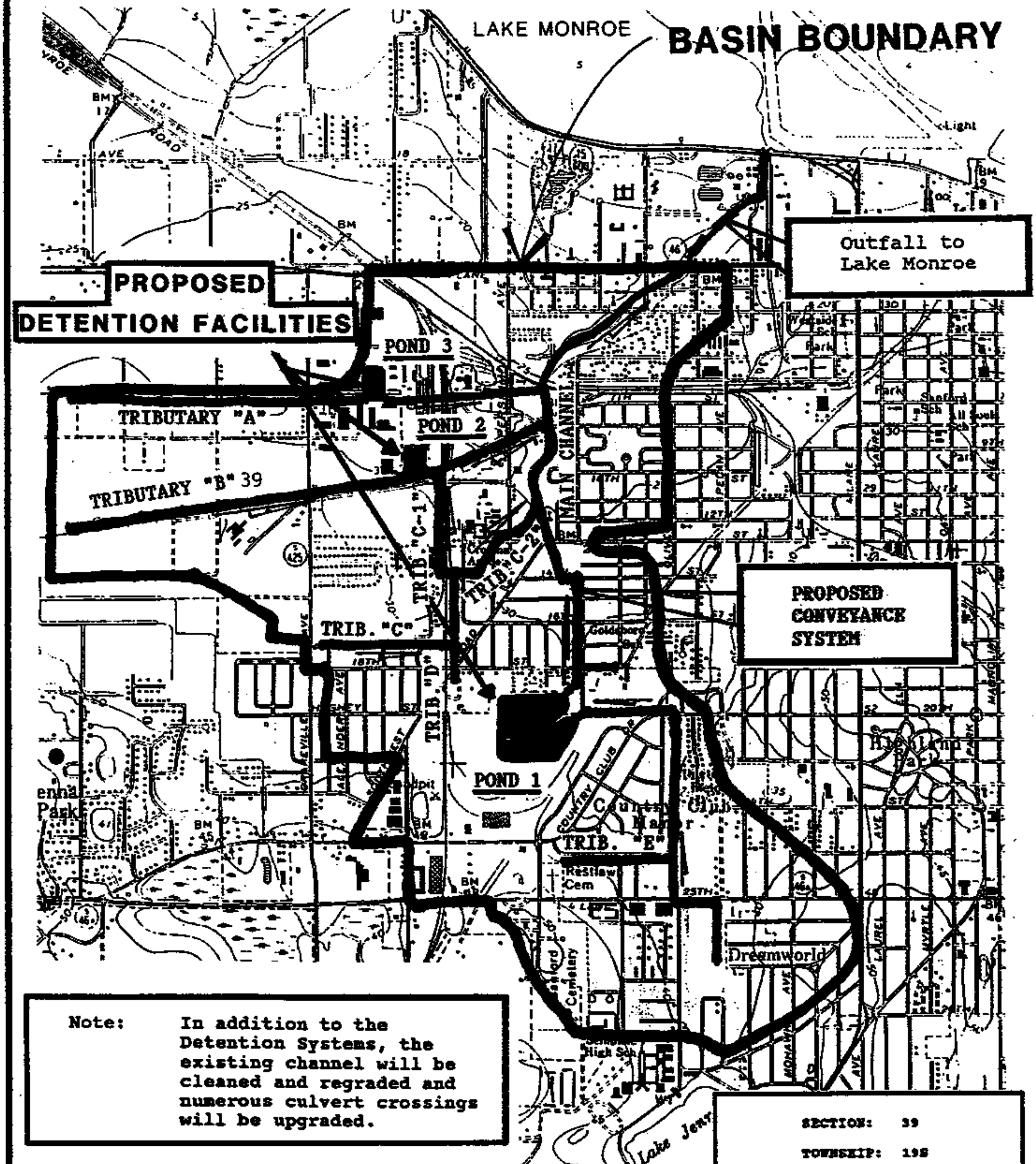
A follow-up Study, including strategically located detention facilities utilizing computer modeling was performed in 1988 for a 25 year / 6 hour storm event (6-inch rainfall).

Current Study:

The present Study is a Preliminary Engineering Study to refine designs, bring land and right-of-way needs and costs into the picture, and prepare Preliminary Engineering Plans. A staged implementation of drainage improvements, including land and right-of-way acquisition and construction of needed improvements including some detention facilities, is the result. (See Maps 3 and 4, following.)

Regulations and St. Johns River Water Management Conceptual Permit:

The SJRWMD Regulations contain Objectives and Standards from which criteria are established which presume that if these criteria are met, the standards and objectives will be met. It was the position of the Consultants, City Officials, and residents that certain of the standard SJRWMD Detailed Design Criteria were not appropriate (too severe) for the subject projects and not necessary to substantially meet the Objectives and Standards of the Rules. Furthermore, it was the City's opinion that applying the same design criteria to a "retrofit" situation as to new development is neither necessary, appropriate, nor financially feasible in this particular case. If the SJRWMD presumptive criteria were to be applied in an inflexible manner, it would have simply meant that the kinds of drainage problems previously experienced and the attendant property damage, human misery, and threat to the public health and safety, would have continued without being addressed because no substantial progress would have been attainable because of the extremely high cost to comply with the letter of the rules and regulations.



Note: In addition to the Detention Systems, the existing channel will be cleaned and regraded and numerous culvert crossings will be upgraded.

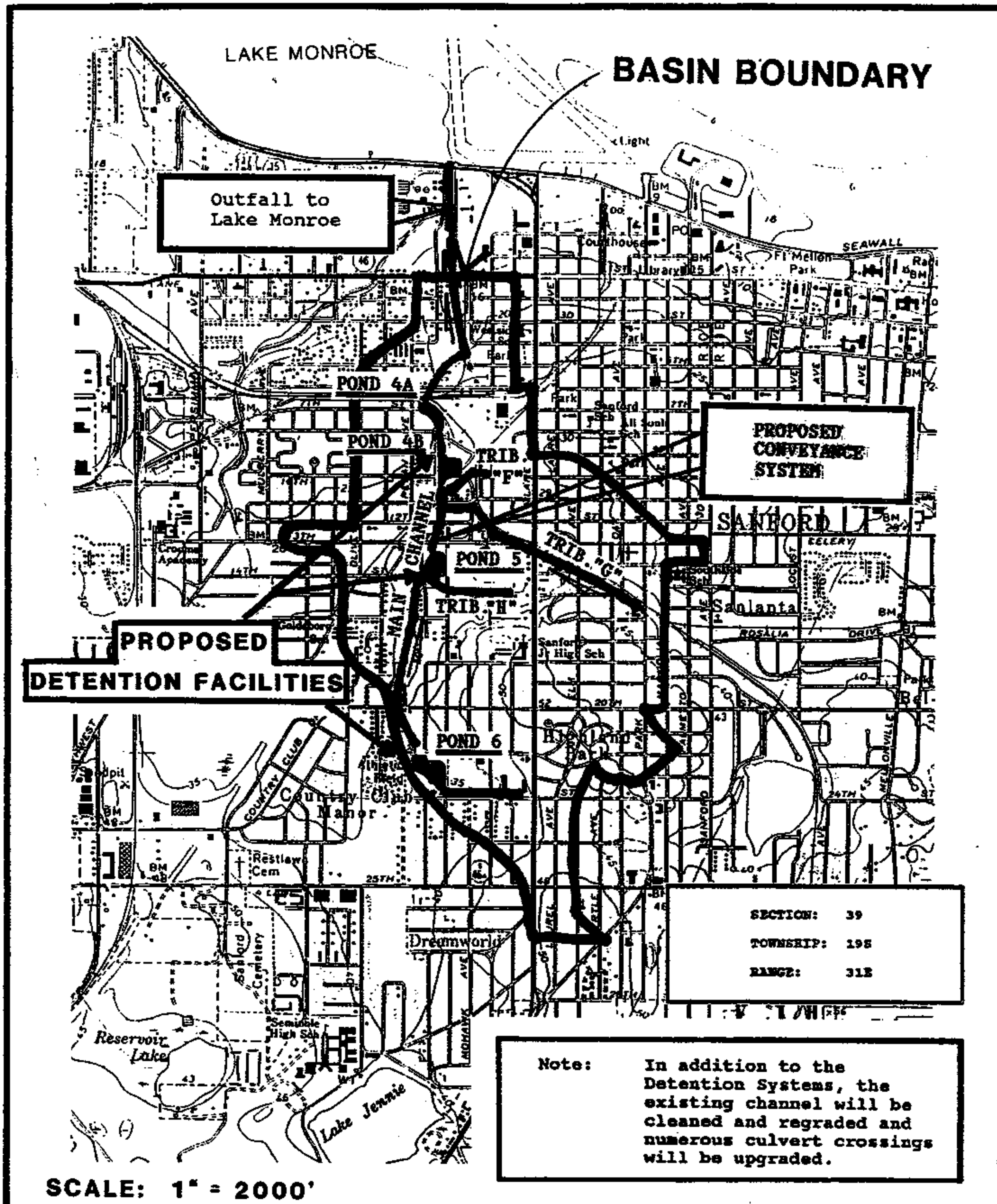
SCALE: 1" = 2000'

SECTION: 39
TOWNSHIP: 19S
RANGE: 31E

MILL CREEK DRAINAGE BASIN: PROPOSED IMPROVEMENTS

MAP No. 3

Conklin Porter and Holmes ENGINEERS, INC.



CLOUD BRANCH DRAINAGE BASIN: PROPOSED IMPROVEMENTS

MAP No. 4

Conklin Porter and Holmes
ENGINEERS, INC.
cph

In order to demonstrate that the Objectives and Standards of the District could be substantially met without meeting all of the detailed design criteria included in the SJRWMD Rules, the Consultants and City met on numerous occasions with SJRWMD personnel, toured the basins and discussed ways to accomplish most of the basic intent of the regulations without meeting the detailed criteria. The net result of these meetings, negotiations, and detailed engineering work including establishing special criteria and computer modeling of the basins, and sizing and costing various levels of improvements, was an Application For Conceptual Permit to the St. Johns River Water Management District. The Application and detailed documentation was approved by the District and is included in a large 3-ring notebook which has been separately furnished to the City. The approval of this Conceptual Permit is a very significant accomplishment because it establishes a lesser design storm of 25 year frequency and 6 hour duration and the use of detention and pollution abatement design criteria that are believed to be very advantageous to the City and its residents. The Conceptual Permit and its accompanying plan and criteria are good for 20 years, but some of the improvements called for in the program must be designed and construction initiated within 2 years of permit issuance to maintain the permit's valid status.

Proposed Criteria and Performance Standards:

The St. Johns River Water Management District Conceptual Permit allows the general use of a 25 Year / 6 Hour storm analysis for the main facilities in these basins where it is economically feasible to do so. The 25 Year / 6 Hour storm is 6" of rainfall in 6 hours, while the 25 year / 24 Hour standard SJRWMD storm is 8.6" of rainfall in 24 hours. Some strategically located detention facilities are provided in the permitted system, sized to attenuate or reduce peak flows. The basins will have bleed down devices to reestablish the basin storage capacity in 14 days or less. It is also proposed by the Conceptual Permit that post development runoff to the lake from the 25 Year / 24 Hour storm will not exceed the predevelopment runoff for the 25 Year / 24 Hour storm at the point of discharge even though the physical facilities in the system are to be designed for the 25 Year / 6 Hour (lesser storm).

The soils in the study area are poor percolating soils with high groundwater table and retention is not a practical alternative and not required by the Permit. Filtration also is not proposed nor required by the Permit, but pollution abatement by settling and oil and trash skimming, as well as peak flow mitigation, will be accomplished in the detention basins and system. The detention facilities in Coast Line Park and Pinehurst Park are to be designed and permitted as wet detention facilities, providing some pollution abatement, peak attenuation and recreational and aesthetic benefits as lakes or ponds. In addition for erosion control and pollution abatement, erosion protective measures including seeding and sodding will be extensively utilized. Also, junction structures at side streets will be dual compartment structures providing some pollution abatement function. Also, lateral drainage wherever feasible will be conveyed in swales on side streets. Direct discharge of lateral ditches, swales, sheet flow and pipes into the main system will be minimized. Raised inlets in grassed depressed areas or other similar measures will be utilized where practical to convey lateral drainage into the main system. The lateral drainage is not a part of this project, but can be separately accomplished where practically feasible over a period of years.

Some strategically located channels in close proximity to people and buildings are proposed to be closed, and where possible in less congested areas, channels or streams are left open. Many road crossings and culverts will have to be increased in size and/or replaced with bigger pipes or box culverts provided or lengthened, etc. Fencing will be utilized in selected, strategic locations at detention basins and open channels to reduce dumping and the hazard to children or others who live in close proximity to the facility.

Right-of-Way acquisition by establishment of prescriptive rights and acquisition of additional right-of-way width by donation, is contemplated. Land acquisition by purchase or condemnation will be required for most detention facilities and at many conveyance locations. Having dedicated, seeded and sodded rights-of-way will drastically improve maintenance and will result in better flow capability and pollution abatement with reduced erosion.

Preliminary Right-of-Way Maps:

Aerial right-of-way maps at a 1" = 30' scale have been prepared for the total system in both basins. On these right-of-way maps existing rights-of-way are shown as well as the total right-of-way needed for construction and maintenance of the system.

The total right-of-way needed for channels or conveyances where the City does not now have rights-of-way is 18.2 acres, of which the engineer has estimated the City may have prescriptive rights on approximately 5.7 acres. There is approximately 12.5 acres of right-of-way or easements in the two basins that need to be obtained by donation, developer dedication, negotiated purchase, or condemnation. There also are six designated detention sites in the system as follows (also refer to Maps 3 and 4):

Mill Creek:

Pond 1 . . . 18th Street Site
Pond 2 . . . McCracken Road Site
Pond 3 . . . Tributary A, North Side

Cloud Branch:

Pond 4A . . North of Coastline Park (Pebble Junction)
Pond 4B . . Coastline Park
Pond 5 . . . 14th Street Site
Pond 6 . . . Pinehurst Park

Two of these ponds are on City owned land at Coastline and Pinehurst Parks. There is a total of 52.4 acres of land that needs to be obtained for the other detention ponds in both basins. Two other areas on Cloud Branch from 19th Place to 14th Street are low, natural pocketed vegetated areas, that we propose to continue to use as shallow natural overflow water storage areas as they currently function. Acquisition of the land in these natural overflow areas is not felt to be necessary at this time. However, the matter may need to be reviewed from legal and other perspectives. There may be a possibility of their dedication as conservation and flowage easements, either now or in the future in connection with an adjacent development. Also please refer to Pages 20 and 26 (Tables 1 and 2), for additional information on land, rights-of-way and easements as well as the 29 sheet set of aerial right-of-way maps for the total system.

Preliminary Plan of Improvements:

Aerial plan/profile sheets at 1" = 30' scale, consisting of 57 sheets showing the total system have been prepared as a part of this project and have been separately furnished to the City. The improvements consist of detention basins, open channels, pipes, box culverts and all appurtenances. See Maps 3 and 4 in this Summary along with the plan and plan/profile sheets separately furnished to the City for all of the channels and tributaries as well as the six detention sites.

Preliminary Opinion of Cost for Land and Improvements:

There are $6,851,396 of land, improvements and project costs required in the Mill Creek Basin and $3,241,293 on the Cloud Branch Basin, giving a total of $10,092,689 for both basins. Please refer to Pages 15 - 26, for an itemized breakdown of the total costs involved in both basins.

Prioritization of Improvements and Implementation Plan:

The Engineer has prioritized the improvements and land acquisition required and arrived at a phased Implementation Plan that calls for three years of funding from the Stormwater Utility on a "Pay As You Go" basis prior to revenue bond issues of $3.2, $2.7, and $2.5 Million each in Years 4, 8, and 12 of the program. (See Table on following page.)

Revenue bond issues must be delayed for a few years until the Utility has established itself and has a proven revenue stream in order to satisfy bond issuers and buyers.

Year	$ Amount	Stormwater Utility Funding
1	$468,670	Pay As You Go
2	$603,260	Pay As You Go
3	$652,028	Pay As You Go
4	$3,243,120	Revenue Bond Issue
8	$2,742,025	Revenue Bond Issue
12	$2,453,586	Revenue Bond Issue

Additional detail on the Implementation Plan is available on Pages 30 through 33.

<u>Recommendations:</u>

The Engineer recommends the following:

1) Adoption of the general Conceptual Plan included herein by the City Commission for the improvement of drainage facilities in the Mill Creek / Cloud Branch areas of the City of Sanford.

2) Pursue acquisition of land and easements for priority detention sites and rights-of-way by formalizing prescriptive rights, donation, negotiated purchase and condemnation, if necessary.

3) Authorize the Year 1 Phased Program consisting of:

- <u>Land and Easement Acquisition</u>
    - Pond 1 - 18th Street Detention Basin (partial payment)
    - Mill Creek Main Channel from Railroad spur just North of 8th Street to 10th Street at Westside Recreational Center
    - Cloud Branch main channel from south of 13th Street to Railroad north of 8th Street (partial payment)

- <u>Final Design and Construction</u>
    - 8th Street Crossing of Mill Creek
    - Channel improvements on Mill Creek from North of 8th Street to 10th Street
    - Cloud Branch crossing of the Railroad north of 8th Street
    - Safety fencing (partial)
- <u>City-Wide Master Stormwater Planning (Partial)</u>
    - In other parts of the City not previously planned

4) Organize a Public Awareness program to present the program to the media, interested citizen groups, key organizations or corporations in the area and to follow through and keep the public and particularly the citizens in the area, interested and involved in the program.

5) Be alert for other funding or ways to accomplish the program more economically and expeditiously:
    - Developer donations of improvements, and or land
    - Donation by residents of needed easements and rights-of-way. The City in cooperation with Civic, Church or Improvement Associations in the areas affected could undertake this very critical part of the plan.
    - C.D.B.G. (Community Development Block Grant) and other grant or loan programs that are or may become available.
    - Consider ways for City forces and citizens to participate in the program thereby expediting the program and accomplishing it at lower cost.

Alternate Designs

Alternate designs were performed for the detention basins at:

- 18th Street on Main Channel of Mill Creek
- McCracken Road on Tributary B of Mill Creek
- West of SCL Mainline on Tributary A of Mill Creek
- The confluence of Tributaries A&B with the Main Channel of Mill Creek north of 8th Street and south of the railroad
- Coastline Park and adjacent area on Cloud Branch
- 14th Street and Roundtree on Cloud Branch
- Pinehurst Park on Cloud Branch

The detention site at the confluence of Tributaries A & B with the main channel of Mill Creek north of 8th Street and South of the railroad was added as an alternative design. Although the site is strategically located to reduce downstream peak flows and there is a considerable expanse of railroad land undeveloped and potentially available, and a substantial water storage depth could be accommodated at the site, the basin site was abandoned because an examination of the inflow and outflow hydrographs showed that the inflows had accumulated to such a large magnitude at this location that only minimal reduction in the peak flow was accomplished by the basin even utilizing all the available undeveloped land. The peak was delayed in time somewhat, but the basin was not judged to be very effective and was dropped from further consideration.

The 18th Street basin on Mill Creek was sized at two different sizes (23 acres and 35 acres), and analyzed as to effectiveness in reducing peak flows and effect on the sizing of downstream facilities. The effect was also evaluated to a lesser degree, on the upstream facilities. The alternate designs were costed with a larger basin (35 acres) and smaller outletting pipes all the way to north of 13th Street. A second alternate was preliminarily designed and costed with a smaller sized pond (23 acres) and larger sized outletting pipes. A third alternate, utilizing a yet smaller basin (18 acres) and larger pipes, was also costed and compared in the early stages of this study but not included in the refined, more detailed subsequent studies. Land values for the detention site were included, as well as construction costs for the alternates. The most cost effective overall result including both land and physical facility costs, was the 35 acre sized site.

Similar analysis was done at the Coastline Park location, and the most cost effective solution there required obtaining additional land for detention north of the park and south of the railroad in order to gain sufficient peak attenuation to reduce the effect on the railroad crossing and to ensure that the peak flow from the 25 year - 24 hour storm is not increased in the post-project condition over the pre-project condition at the measuring point. The measuring point as established by the St. Johns River Water Management District was the confluence of the two streams at the sewage treatment plant.

Alternates were modeled with and without detention storage at 14th Street and Roundtree; with and without detention at Pinehurst Park; with and without detention at the site west of the SCL mainline on Tributary A;, and with and without detention at McCracken Road. In the end it was necessary to provide detention at all these locations in order to control the peak flows at the measuring point and reduce the load on downstream, existing facilities to make them function without major enlargement. These basins were also instrumental in meeting the St. Johns river Water Management District pre/post criteria at the measuring point and in providing an overall cost effective solution.

Land Acquisition

The Engineer, with the approval of the City, employed Kirchhoff and Associates as real estate subconsultants to provide advice concerning the feasibility of obtaining certain parcels needed in the program. They also provided rough valuation guidelines (ranges in property value) to use in making comparisons of alternative preliminary designs involving different sizes of detention basins with differing sizes of conveyance piping resulting. They also prepared general land and easement acquisition rough valuations to use for the selected solutions.

Following preparation of right-of-way maps and aerial maps of the detention sites, the real estate subconsultant made rough square foot valuations of the detention sites and gave approximate square footage valuations for easements needed along the channels, streams and pipes of the system needed to supplement existing right-of-way and prescriptive land rights where they may exist. This matter of additional stream easements or right-of-way, is rather complicated and subjective. The overall easement needed is reasonably well defined as a result of this preliminary engineering work, supplemented by the widths needed for maintenance as provided by the City Public Works Department. However, the public records are not very clear nor complete on where the City has existing right-of-way, land, or easements in many locations. Also, the amount of the total easement requirement that the City may have claim to by prescriptive right is certainly not very clear. Until the actual channels and maintenance paths or roads alongside the channels are surveyed, maintenance maps prepared and filed with the County, and the claim withstands the test of time, these rights will not be firmly established. Also, see Page 27 for additional information on rights-of-way, easements and land acquisition matters.

The Engineer has utilized the best information readily available without benefit of surveys and utilized his judgement and the square footage valuations for various areas provided by the real estate consultant in arriving at land costs for drainage easements or right-of-way along the streams, channels and pipes of the system.

Opinion of Probable Cost for Land and Improvements

Mill Creek Drainage Basin . . . . $ 6,851,396

Cloud Branch Drainage Basin . . . . $ 3,241,293

OPINION OF PROBABLE CONSTRUCTION COST: MILL CREEK DRAINAGE BASIN

25-YEAR/6-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
A. CHANNEL CLEANING, RELOCATIONS, REGRADING AND MISCELLANEOUS APPURTENANT CONSTRUCTION			
1. Mill Creek Channel & Tributaries	25,000 LF	$ 5	$ 125,000
2. Stripping, Sodding, Seeding, Mulching, Channel Section Sodding, and Erosion Control (Fabriform, Etc.)	1 LS	195,250	195,250
3. Channel Section Fencing	5,000 LF	10	50,000
		SUBTOTAL:	**$ 370,250**
B. DETENTION POND SYSTEMS			
1. <u>18th Street Detention System</u>			
A. Excavation/Disposal (On-Site) (9.0' Avg. Cut)	400,000 CY	1.50	600,000
B. Seeding and Mulching	115,000 SY	0.35	40,250
C. System Control Structure	1 LS	50,000	50,000
D. Fencing of Site (6000 LF @ $10/LF + 2 Gates)	1 LS	62,000	62,000
E. Sodding of Side Slopes	30,000 SY	2	60,000
F. Erosion Control (Fabriform)	1 LS	30,000	30,000
G. Construction of Maint. Roadway and Pond Berm	1 LS	60,000	60,000
		SUBTOTAL:	**$902,250**
2. <u>McCracken Road/RR Detention System (South Side Channel - Tributary B)</u>			
A. Excavation/Disposal (On-Site) (9.0' Avg. Cut)	85,000 CY	5.00	425,000
B. Seeding and Mulching	25,000 SY	0.35	8,750
C. System Control Structure	1 LS	50,000	50,000
D. Fencing of Site (2825 LF @ $10/LF + 2 Gates)	1 LS	30,250	30,250
E. Sodding	14,000 SY	2	28,000
F. Erosion Control (Fabriform)	1 LS	30,000	30,000
G. Construction of Maint. Roadway and Pond Berm	1 LS	50,000	50,000
H. 48" RCP	98 LF	100	9,800
I. 54" RCP	64 LF	115	7,360
J. Extension of existing box culvert	1 LS	1,500	1,500
K. Culvert System Headwalls	1 LS	12,000	12,000
L. Asphalt Road Restoration	1 LS	4,100	4,100
M. Removal of railroad tracks	1 LS	5,000	5,000
N. Inflow/Outflow Separator Wall	1 LS	50,000	50,000
		SUBTOTAL:	**$ 711,760**

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
3. Tributary A - North Side Channel Detention System			
A. Excavation/Disposal (On-Site) (6.5' Avg. Cut)	35,000 CY	5.00	175,000
B. Seeding and Mulching	9,600 SY	0.35	3,360
C. System Control Structure	1 LS	20,000	20,000
D. Fencing of Site (1700 LF @ $10/LF + 2 Gates)	1 LS	19,000	19,000
E. Sodding	4,500 SY	2	9,000
F. Erosion Control (Fabriform)	1 LS	20,000	20,000
G. Construction of Maint. Roadway and Pond Berm	1 LS	30,000	30,000
		SUBTOTAL:	**$276,360**
C. UPGRADING OF CULVERT AT 20TH STREET & GOLDSBORO (MAIN CHANNEL)			
1. Triple 48" RCP	360 LF	$ 300	$108,000
2. Demolition/Removal of Existing Culvert	1 LS	4,000	4,000
3. Culvert System Headwalls	1 LS	10,000	10,000
4. Sodding	1,100 SY	2.00	2,200
5. Storm Inlets & Junction Boxes	1 LS	20,000	20,000
6. Asphalt Road Restoration	1 LS	10,000	10,000
7. Erosion Protection	1 LS	6,000	6,000
8. Tree Removal/School Sign/ Detention Pond Modifications/ Miscellaneous	1 LS	7,500	7,500
9. Force Main Relocation	1 LS	5,000	5,000
		SUBTOTAL:	**$172,700**
D. UPGRADING OF STORMWATER SYSTEM AT 18TH STREET (MAIN CHANNEL)			
1. Modifications to Existing Stormwater System	1 LS	$ 10,000	$ 10,000
2. Miscellaneous (Grading, Grouting)	1 LS	1,500	1,500
3. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 15,000**
E. BACKFILLING OF DITCH FROM 20TH TO 18TH ST. (MAIN CHANNEL, MC)			
1. Backfill and Compaction	1 LS	$ 10,000	$ 10,000
2. Sodding	3,900 SY	2.00	7,800
3. Miscellaneous (Grading, Etc.)	1 LS	2,200	2,200
		SUBTOTAL:	**$ 20,000**
F. CULVERT CROSSING-EXISTING COUNTY DITCH TO 18TH ST. DETENTION POND (MAIN CHANNEL)			
1. 4.0' x 9.0' Box Culvert	240 LF	$ 275	$ 66,000
2. Culvert System Headwalls	1 LS	7,500	7,500
3. Sodding	1250 SY	2.00	2,500
4. Energy Dissipation System	1 LS	1,000	1,000
5. Restoration	1 LS	7,500	7,500
6. Erosion Protection	1 LS	3,500	3,500
7. Conflict Structure	1 LS	12,500	12,500
		SUBTOTAL:	**$100,500**

	ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
G.	**PIPING OF MILL CREEK FROM 18TH ST. TO NORTH OF 13TH ST. (MAIN CHANNEL)**			
1.	Dual 48" RCP Culverts	1,855 LF	$ 200	$371,000
2.	Dual 36" RCP	760 LF	145	110,200
3.	4.0' x 7.0' Box Culvert	240 LF	225	54,000
4.	Demolition/Removal of Existing Culvert @ 13th St.	1 LS	5,000	5,000
5.	Storm Inlets and Junction Boxes	1 LS	40,000	40,000
6.	Culvert System Headwall	1 LS	5,000	5,000
7.	Sodding	1 LS	20,000	20,000
8.	Asphalt Road Restoration	1 LS	20,000	20,000
9.	Dirt Road Restoration	1 LS	10,000	10,000
10.	Sheeting/Shoring/Traffic Control	1 LS	150,000	150,000
11.	Realignment of Existing Water and Sewer Utilities	1 LS	100,000	100,000
12.	Flow Control Boxes	3 EA	10,000	30,000
13.	Miscellaneous Restoration	1 LS	25,000	25,000
14.	Erosion Protection	1 LS	5,000	5,000
			SUBTOTAL:	**$ 945,200**
H.	**UPGRADING OF CULVERT AT 8TH STREET (MAIN CHANNEL)**			
1.	Dual 60" RCP	53 LF	$ 275	$ 14,575
2.	Demolition/Removal of Existing Culvert and Filling of Existing Ditch	1 LS	5,000	5,000
3.	Culvert System Headwalls	1 LS	7,000	7,000
4.	Sodding	100 SY	2.00	200
5.	Asphalt Road Restoration	1 EA	4,200	4,200
6.	Erosion Protection	1 LS	3,500	3,500
			SUBTOTAL:	**$ 34,475**
I.	**UPGRADING OF CULVERT AT MEISCH ROAD (NORTH SIDE CHANNEL - Tributary A)**			
1.	1.5' x 10.0' Box Culvert	40 LF	$ 200	$ 8,000
2.	Demolition/Removal of Existing Culvert	1 LS	1,000	1,000
3.	Culvert Headwalls	1 LS	7,500	7,500
4.	Sodding	200 SY	2.00	400
5.	Asphalt Road Restoration	1 LS	2,500	2,500
6.	Erosion Protection	1 LS	3,500	3,500
			SUBTOTAL:	**$ 22,900**
J.	**UPGRADING OF CULVERT AT -BEVIER ROAD (NORTH SIDE CHANNEL - Tributary A)**			
1.	1.5' x 10.0' Box Culvert	40 LF	$ 200	$ 8,000
2.	Demolition/Removal of Existing Culvert	1 LS	1,000	1,000
3.	Culvert Headwalls	1 LS	7,500	7,500
4.	Sodding	200 SY	2.00	400
5.	Asphalt Road Restoration	1 LS	2,500	2,500
6.	Erosion Protection	1 LS	3,500	3,500
			SUBTOTAL:	**$ 22,900**

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
K. UPGRADING OF CULVERT AT AIRPORT BLVD. - Tributary B)			
1. Dual 42" RCP Culverts	98 LF	$ 150	$ 14,700
2. Demolition/Removal of Existing Culvert	1 LS	1,000	1,000
3. Culvert Headwalls	1 LS	7,500	7,500
4. Sodding	150 SY	2.00	300
5. Asphalt Road Restoration	1 EA	3,000	3,000
6. Erosion Protection	1 LS	3,500	3,500
7. Junction Manhole & Culvert Extension	1 LS	3,500	3,500
		SUBTOTAL:	**$ 33,500**
L. UPGRADING OF CULVERT AT PERSIMMON AVENUE - Tributary B)			
1. Dual 60" RCP	60 LF	$ 300	$ 18,000
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert Headwalls	1 LS	8,000	8,000
4. Sodding	250 SY	2.00	500
5. Asphalt Road Restoration	1 EA	5,000	5,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 37,500**
M. UPGRADING OF CULVERT AT 8TH ST. - Tributary B)			
1. Dual 60" RCP	60 LF	$ 300	$ 18,000
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert Headwalls	1 LS	8,000	8,000
4. Sodding	175 SY	2.00	350
5. Asphalt Road Restoration	1 EA	6,000	6,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 38,350**
N. REGRADING/REDIRECTION/CULVERT CROSSING OF CHANNEL @ RR/MCKEE AREA - Tributary C			
1. Ditch Filling/Grading/Sodding, Etc.	1 LS	$ 10,000	$ 10,000
2. Bore & Jack: Railroad	1 LS	7,500	7,500
3. Dual 48" RCP Culverts	56 LF	200	11,200
4. Culvert System Headwalls	2 EA	7,500	15,000
5. Sodding	150 SY	2.00	300
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 47,500**
Total Construction Cost Mill Creek & Tributaries		**$3,751,145**	
Construction Contingency (15%)		**562,672**	
Project Costs (surveying, soils, engineering, legal, construction admin, RPR, mapping, etc) 20%		**862,763**	
Land Costs Detention Sites **See Detail on Following Page**		**1,291,118**	
Land Costs Easements **See Detail on Following Page**		**383,698**	
TOTAL ESTIMATED COST		**$6,851,396**	

[redacted]

MILL CREEK	Land/Easement/Rights-of-Way Cost Description	Acres/ Sq.Ft.	Price Per Acre/ Sq.Ft.	Total Cost
DETENTION SITES				
	18th Street Site - Pond 1	35 acres	$26,136	$914,760
	McCracken Road Site - Pond 2	7.75 acres	$26,136	202,554
	Tributary A N.Side - Pond 3	6.65 acres	26,136	173,804
MAIN CHANNEL				
Panel 1	Rail Road to 8th St	33,450 sq.ft.	0.60	20,070
Panel 2	8th St to 10th St	18,980 sq.ft.	0.60	11,388
Panel 3	10th St to 13th St	28,200 sq.ft.	0.85	23,970
Panel 4-7A	13th St to 18th St Detention Site	4,710 sq.ft. 7,140 sq.ft.	2.00 1.10	9,420 7,854
Panel 7B-8	Detention Pond #1 to 20th St Crossing	31,800 sq.ft.	0.60	19,080
Panel 9-12	20th St Crossing to 25th St	12,700 sq.ft.	1.40	17,780
TRIBUTARY A				
Panel 34-36	Main Channel to Pond #3	87,470 sq.ft.	0.85	74,350
Panel 37-41	Pond #3 to West of Meisch Rd	188,940 sq.ft.	0.60	113,364
TRIBUTARY C-2				
Panel 15-17	Main Channel to Rail Road	27,530 sq.ft.	0.85	23,400
TRIBUTARY C-1				
Panel 18,19,23	Pond #2 to Tributary C	17,530 sq.ft.	0.85	14,900
TRIBUTARY C				
Panel 20-22	Rail Road to West of Airport	41,600 sq.ft.	1.12	46,592
TRIBUTARY D				
Panel 33	Rail Road to 18th Street	1,800 sq.ft.	0.85	1,530

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST: CLOUD BRANCH DRAINAGE BASIN

25-YEAR/6-HOUR STORM EVENT

	ITEM DESCRIPTION	QUANTITY	UNIT	ITEM COST	ITEM COST
A.	**CHANNEL CLEANING, RELOCATIONS, REGRADING AND MISCELLANEOUS APPURTENANT CONSTRUCTION**				
1.	Cloud Br. Channel & Tributaries	11,000 LF		$ 4	$ 44,000
2.	Stripping, Sodding, Seeding, Mulching, Channel Section Sodding, and Erosion Control (Fabriform, Etc.)	1 LS		96,450	96,450
3.	Channel Section Fencing	2,000 LF		10	20,000
				SUBTOTAL:	**$ 160,450**
B.	**DETENTION POND SYSTEMS**				
1.	<u>Pinehurst Park Detention System</u>				
A.	Excavation & Disposal (10.0' Avg. Cut)	55,000 CY		5	275,000
B.	Seeding and Mulching	1 LS		5,000	5,000
C.	System Control Structure	1 LS		50,000	50,000
D.	Sodding		17,000 CY	2	34,000
E.	Erosion Control	1 LS		20,000	20,000
F.	Construction of Maint. Roadway and Pond Berm	1 LS		20,000	20,000
G.	Realignment of Existing Storm System	1 LS		23,000	23,000
H.	48" RCP Culvert	60 LF		100	6,000
I.	Headwalls	1 LS		4,000	4,000
J.	Misc. Restoration & Landscaping		1 LS	5,000	5,000
K.	Demolition & Removal of Existing Culvert	1 LS		500	500
				SUBTOTAL:	**$442,500**
2.	<u>14th St./Roundtree Detention System</u>				
A.	Excavation/Disposal (On-Site) (7.0' Avg. Cut)	18,000 CY		5	90,000
B.	Seeding and Mulching	6,100 SY		.35	2,135
C.	System Control Structure	1 LS		50,000	50,000
D.	Fencing of Site (1285 LF @ $10/LF + 2 Gates)	1 LS		14,850	14,850
E.	Sodding	4,500 SY		2	9,000
F.	Erosion Control (Fabriform)	1 LS		10,000	10,000
G.	Construction of Maint. Roadway and Pond Berm	1 LS		15,000	15,000
H.	Fill Existing Drainage Ditch & Provide a Swale System for Local Drainage	1 LS		2,500	2,500
I.	Stormwater Inlet	1 LS		2,000	2,000
J.	18" RCP	42 LF		18	756
				SUBTOTAL:	**$196,241**

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
3. <u>Coastline Park Detention System</u>			
A. Excavation & Disposal	50,000 CY	5	250,000
B. System Control Structure	1 LS	50,000	50,000
C. Sodding	15,000 SY	2	30,000
D. Erosion Control (Fabriform) and energy dissipation system	1 LS	25,000	25,000
E. Construction of Maint. Roadway and Pond Berm	1 LS	25,000	25,000
F. Demolition/Removal/Modification of Existing Storm Sewer System	1 LS	7,500	7,500
G. Landscaping	1 LS	10,000	10,000
H. Tree Removal	1 LS	5,000	5,000
I. Site Fencing (1230 LF @ $10/LF and 2 Gates	1 LS	14,300	14,300
J. Relocation of Power Line	1 LS	50,000	50,000
K. Remove Existing 12" Reclaimed Water Line & Reroute New Line Around Pond (825 LF)	1 LS	13,000	13,000
L. Ditch Regrading South of Pond and Erosion Protection	1 LS	5,000	5,000
		SUBTOTAL:	**484,800**

C. UPGRADING OF CULVERT AT 20TH STREET

1. 30" RCP Culvert	68 LF	$ 50	$ 3,400
2. Culvert System Headwalls	1 LS	4,000	4,000
3. Sodding	150 SY	2	300
4. Asphalt Road Restoration	1 LS	2,300	2,300
5. Erosion Protection	1 LS	4,000	4,000
6. Demolition/Removal of Existing Headwalls	1 LS	1,000	1,000
		SUBTOTAL:	**$15,000**

D. UPGRADING CULVERT CROSSING AT 19TH PLACE

1. Triple 30" RCP Culverts	65 LF	$ 150	$ 9,750
2. Culvert System Headwalls	1 LS	4,000	4,000
3. Erosion Protection (Fabriform)	1 LS	5,000	5,000
4. Asphalt Road Restoration	1 LS	4,200	4,200
5. Sodding	100 SY	2	200
6. Demolition of Existing Culverts / Headwalls	1 LS	1,000	1,000
		SUBTOTAL:	**$24,150**

E. UPGRADING CULVERT CROSSING AT 16TH STREET

1. Demolition/Removal of Existing Culvert System	1 LS	$ 1,500	$ 1,500
2. 3' x 8' Box Culvert	60 LF	230	13,800
3. Culvert System Headwalls	1 LS	4,000	4,000
4. Sodding	150 SY	2	300
5. Asphalt Road Restoration	1 LS	3,000	3,000
6. Erosion Protection (Fabriform)	1 LS	5,000	5,000
		SUBTOTAL:	**$27,600**

	ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
F.	**UPGRADING CULVERT SYSTEM AT 14TH STREET**			
1.	Demolition/Removal of Existing Culvert	1 LS	$ 2,500	$ 2,500
2.	3' x 8' Box Culvert	120 LF	230	27,600
3.	Culvert System Headwalls	1 LS	4,000	4,000
4.	Sodding	250 SY	2	500
5.	Road Restoration	1 LS	2,000	2,000
6.	Erosion Protection (Fabriform)	1 LS	3,000	3,000
7.	Energy Dissipation System	1 LS	1,000	1,000
8.	Demolition/Removal of Existing 30" RCP	1 LS	1,000	1,000
			SUBTOTAL:	**$41,600**
G.	**UPGRADING CULVERT SYSTEM AT LAKE AVENUE**			
1.	Dual 30" RCP	290 LF	100	29,000
2.	Culvert System Headwall/MES	1 LS	3,000	3,000
3.	Erosion Control (Fabriform)	1 LS	3,000	3,000
4.	Sodding	550 SY	2	1,100
5.	Energy Dissipation System	1 LS	1,000	1,000
6.	Sidewalk Restoration	25 LF	10	250
7.	Misc. Restoration/Landscaping	1 LS	5,000	5,000
			SUBTOTAL:	**$42,350**
H.	**PIPING OF CLOUD BRANCH FROM 14TH ST. TO COASTLINE PARK**			
1.	Dual 48" RCP Culverts	1,085 LF	$ 200	$217,000
2.	Storm Inlets/Junction Boxes	6 EA	5,000	30,000
3.	Culvert System Headwalls	1 LS	7,500	7,500
4.	Sodding	2,500 SY	2	5,000
5.	Asphalt Road Restoration	1 LS	2,500	2,500
6.	Dirt Road Restoration	1 LS	4,000	4,000
7.	Sheeting/Shoring/Traffic Control	1 LS	25,000	25,000
8.	Miscellaneous Restoration/ Landscaping	1 LS	15,000	15,000
9.	Energy Dissipation System	1 LS	1,000	1,000
			SUBTOTAL:	**$307,000**
I.	**IMPROVEMENTS AT 13TH STREET**			
1.	Stormwater Inlets	1 LS	5,000	5,000
2.	24" RCP	30 LF	27	810
3.	36" RCP	175 LF	67	11,725
4.	Filling of Ditch / Construction of Swale	1 LS	2,000	2,000
5.	Sodding	320 SY	2	640
6.	Demolition / Removal of Existing Culvert System	1 LS	3,000	3,000
7.	Road Restoration	1 LS	7,500	7,500
8.	Miscellaneous Restoration	1 LS	1,500	1,500
			SUBTOTAL:	**$32,175**

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
J. IMPROVEMENTS AT 12TH STREET			
1. Stormwater Inlet	1 LS	2,500	2,500
2. 24" RCP	125 LF	27	3,375
3. Demolition / Removal of Existing 42" Culvert	1 LS	1,000	1,000
4. Dirt Road Restoration	1 LS	2,500	2,500
5. Sodding	150 SY	2	300
		SUBTOTAL:	**$9,675**
K. IMPROVEMENTS AT 11TH STREET			
1. Stormwater Inlet	1 LS	$ 2,500	$2,500
2. 24" RCP	81 LF	27	2,187
3. Filling of Ditch / Construction of Swale	1 LS	4,000	4,000
4. Sodding	500 SY	2	1,000
		SUBTOTAL:	**$9,687**
L. COASTLINE PARK POND EQUALIZATION SYSTEM			
1. Dual 72" RCP	520 LF	$ 350	$182,000
2. Culvert System Headwalls	1 LS	5,000	5,000
3. Sodding	1,500 SY	2	3,000
4. Asphalt Road Restoration	1 LS	5,000	5,000
5. Miscellaneous Restoration	1 LS	2,000	2,000
		SUBTOTAL:	**$197,000**
M. IMPROVEMENTS ALONG POPLAR AVENUE			
1. Earthwork Fill existing ditch along Poplar Avenue with soils from Coastline Park Pond and form swale to convey drainage to 8th Street	1 LS	$ 7,800	$ 7,800
2. Sodding	2,000 SY	$ 2	$ 4,000
3. Demolition/Removal of existing headwall at 10th Street	1 LS	$ 1,000	$ 1,000
		SUBTOTAL:	**$ 12,800**
N. IMPROVEMENTS AT 8th STREET			
1. Junction box with inlet	2 EA	$ 2,500	$ 5,000
2. 24" RCP	35 LF	$ 27	$ 945
3. Miscellaneous Restoration	1 LS	$ 1,000	$ 1,000
		SUBTOTAL:	**$ 6,945**

	ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
O.	**SCL RAILROAD CROSSING AT 7TH STREET**			
1.	Dual 48" RCP	150 LF	$ 200	$ 30,000
2.	5'x10' box culvert	38 LF	$ 300	$ 11,400
3.	2. Bore and Jack	160 LF	500	80,000
4.	Culvert System Headwalls	1 LS	5,000	5,000
5.	Erosion Protection (Fabriform)	1 LS	7,500	7,500
6.	Sodding	1 LS	500	500
7.	Energy Dissipation System	1 LS	1,000	1,000
8.	Miscellaneous Restoration	1 LS	5,000	5,000
9.	Junction Box	1 LS	7,500	7,500
			SUBTOTAL:	**$147,900**

Total Construction Cost	**$2,157,873**
Construction Contingency (15%)	**323,681**
Project Costs (surveying, soils, engineering, legal, construction admin, RPR, mapping, etc) 20%	**496,311**
Land Costs Detention Sites **See Detail on Following Page**	**170,945**
Land Costs Easements **See Detail on Following Page**	**92,483**
TOTAL ESTIMATED COST	**$3,241,293**

[redacted]

CLOUD BRANCH	Land/Easement/Rights-of-Way Cost Description	Acres/ Sq.Ft.	Price Per Acre/ Sq.Ft.	Total Cost
DETENTION SITES				
	14th Street Site - Pond 5	1 lot/house 2 lots/houses Remaining Land - 85,500 sq.ft.	20,000 30,000 0.85	20,000 60,000 72,675
	North of Coastline Park (Pebble Junction) - Pond 4A	30,450 sq.ft.	0.60	18,270
MAIN CHANNEL				
Panel 42	Approaches to Rail Road Crossing (N&S of Rail Road)	7,925 sq.ft.	0.60	4,755
Panel 44	Detention Pond 4B to Detention Pond 5	28,000 sq.ft. (6 lots)	---	58,700
Panel 45 to 48	Detention Pond 5 to Detention Pond 6	29,275 sq.ft.	0.85	24,884
TRIBUTARY H				
Panel 55	Lake Avenue to Detention Pond 5	4,875 sq.ft.	0.85	4,144

Prioritization of Improvements

General

The program can not be constructed at one time for financial feasibility reasons. It is also important to realize that this preliminary work is concerned with only the main interceptor (through) main drainage facilities and does not include local drainage facilities along many individual streets or on individual land parcels. Also, some of the areas in the two basins are more subject to flooding than others and some of the improvements are more cost effective in solving the water management problems than others. Therefore, a prioritized, phased construction program is needed.

Theoretically, it would be advisable to construct conveyance type drainage facilities from the downstream end of the system first and subsequently move progressively upstream with the improvements. Likewise, it would be generally advantageous to construct detention facilities located in the upstream part of the system early in the program in order to attenuate peak flows and to lessen the load on the remaining, existing downstream facilities. Facilities that will most cost effectively reduce flooding and damage to property should be a high priority. Also of very high priority are safety improvements that would eliminate or reduce the hazard to children. Obtaining land and land rights at least for high priority projects or sections to be constructed early on in the program, is also a high priority. Donation and taking full advantage of prescriptive rights by filing maintenance maps, etc., to obtain rights should be pursued as a high priority. Legal opinions to the methodology necessary and the rights actually obtained by prescriptive right procedures is needed even to the degree of determining whether formalized prescriptive rights do away with the need for acquisition. Methods of right-of-way acquisition should include (1) developer contribution of right-of-way at time of future development, (2) acquisition of additional right-of-way by negotiated purchase, and (3) acquisition of additional right-of-way by condemnation. In some non-critical locations where drainage facilities are located in SCL undeveloped property or rights-of-way, or outside the City limits, or for other reasons, it may not be necessary nor advisable to immediately pursue right-of-way acquisition. In these cases, waiting for the property to develop requiring right-of-way dedication, and/or the County to obtain right-of-way, may be the appropriate action. In a number of the cases involving railroad right-of-way which is occupied by drainage ditches, the Engineers have not shown the need to acquire an easement nor included costs to do so in the project land and easement costs. See the aerial right-of-way maps for easements and right-of-ways included. The areas or widths shown on the right-of-way maps are the total needed from which the Engineer has deducted those areas where the City may have prescriptive rights, to obtain the net amount the City needs to acquire. The net amount is shown in the cost tables of Pages 20 and 26.

Establishment of Priorities

Based on the above general concepts, the following general priorities have been established separately for Mill Creek and Cloud Branch.

General Priority	Basin		Description
Priority One Reaches/Items	Mill Creek	1:	Selective safety fencing throughout both Basins including areas not included in the Study
		2:	South of 13th Street to railroad north of 8th Street
		3:	Closed System from 18th Street to south of 13th Street
		4:	Land for detention site southwest of Goldsboro School and right-of-way from 18th St. along main channel to railroad north of 8th Street
	Cloud Branch	1:	Railroad crossing north of Coastline Park
		2:	Closed piping system from south of 13th street to Coastline Park
		3:	Land for detention north of coastline park and south of railroad and right-of-way for reaches in Priority 1.
Priority Two Reaches	Mill Creek	1:	Detention basin and outlet to 18th Street southwest of Goldsboro School
		2:	South of 20th Street to detention basin southwest of Goldsboro School
		3:	Right of way for above
	Cloud Branch	1:	Detention basin at Coastline Park area
		2:	14th Street and Roundtree crossing
		3:	16th Street crossing
		4:	Detention basin at Pinehurst Park
		5:	Land and right-of-way for above

General Priority	Basin	Description
Priority Three Reaches	Mill Creek 1:	Railroad crossing east of Academy Manor and north across McCracken Road to detention site and on easterly to main stream of Mill Creek
	2:	McCracken Road detention site on Tributary B
	3:	Land and right-of-way involved
	Cloud Branch 1:	Detention basin between 13th, 14th, Roundtree and Lake
	2:	Natural detention basins south of 14th Street and south to 19th Place
	3:	19th Place and 20th Street Crossings
	4:	Land and right-of-way involved
Priority Four Reaches	Mill Creek 1:	Detention basin on Tributary A including inlet and outlet to railroad crossing
	2:	Airport Boulevard crossing at McCracken Road and reach on to detention site on Tributary B on McCracken Road
	Cloud Branch 1:	Outlet to Coastline Park detention area from 10th Street and 11th Street area and back along railroad toward Rich Foods
Priority Five Reaches	Mill Creek/ Cloud Branch 1:	Remainder of program including some improvements in the channels, obtaining rights-of-way, etc. north of Study area on both streams

Implementation Plan

General

Based on the costs included in the Opinion of Probable Costs for Land and Improvements, and the general prioritization of improvements shown in the previous Section, the Engineer has formulated a general recommended Implementation Plan. The Plan attempts to recognize the needs of the various prioritized improvements and arrange them in a time sequenced, phased Implementation Plan that has some reasonable relationship to the City's ability to fund the program.

The City has implemented a Stormwater Utility and is collecting significant revenues from that source, part of which may be available for the Mill Creek / Cloud Branch program. Obviously, there are City-wide operation and maintenance needs, as well as studies and drainage improvements needed in the downtown, Pump Branch and many other areas of the City which also need funding. These other needs will have to be evaluated in determining funds available for the Mill Creek / Cloud Branch program.

It also is noteworthy that major drainage expenditures requiring a revenue bond issue will have to wait until the Stormwater Utility has been in place a few years, until the Utility has become firmly established and the revenue stream proven to satisfy bond counsels, insurers and buyers. Therefore in the first few years, the program expenditures will have to be on an annual budget "pay as you go" basis. In arriving at the Implementation Plan to follow, this fact has to be recognized in choosing improvements that are implementable (and not too large) on a "pay as you go" basis.

It is also important to include some physical improvements in the early years that show demonstrable work and improved physical drainage improvements in the community, so that the public will see and experience some measurable improvement in the actual drainage.

Also, it is important that some physical part of the system be actually designed, permitted and construction initiated by March 10, 1994, as a condition of the St. Johns River Water Management District Conceptual Permit.

Based on very rough revenue and expense projections with growth and expense increases of two and one-half percent per year for the Stormwater Utility, with rate increases of $1/ERU every four years, and a bond issue every four years starting in year 4, it would take approximately 15 years to raise enough money to construct the Mill Creek / Cloud Branch program and obtain land and right-of-way at today's prices, without accounting for inflation in construction or land acquisition costs. This analysis was based on phased construction and a year one revenue projection for the total Stormwater Utility of $850,000 to $900,000, and operation and maintenance and construction and rehabilitation and minor improvements of $550,000. During the initial 3 years before revenue bonds could be issued, we have assumed that all excess revenues over the cost of City-wide operation and maintenance, would be put into "pay as you go" Mill Creek / Cloud Branch improvements as that area appears to have the biggest need, and that an additional, partial allocation would be made for each of three years to accomplish City-wide, overall drainage planning in other areas of the City. The analysis also assumes that after the first 3 years that there would be a reasonable stormwater utility revenue and operation and maintenance expense split between the Mill Creek / Cloud Branch area and the rest of the City and that the excess from Mill Creek and Cloud Branch area would be used for debt service of the bond issues in years 4, 8, and 12 to cover improvements in the Mill Creek / Cloud Branch areas only. The improvements needed in the rest of the City have not been determined or costed as of the time of this Report and therefore, could not be included in the analysis.

These assumptions result in a range of \$400,000 to \$600,000 being available in each of the first three years for the Mill Creek / Cloud Branch program and the City-wide drainage planning on a "pay as you go" basis. Then bond issue net proceeds of \$3.3, \$2.7, and \$2.5 Million each in Years 4, 8, and 12, would be required unless <u>other sources of revenue beyond the Stormwater Utility are located and made available, or the revenue and expense splits or other assumptions are modified</u>, or part of the physical facility or land acquisition program is not implemented.

The above very rough financial analysis is made only for purposes of obtaining a phased Implementation Plan that has some reasonable relationship to the City's ability to finance the program and the needs of other parts of the City. If the City (hopefully) chooses to implement the Plan faster, the physical improvements to be included in any phase of the accelerated program can be easily moved forward and grouped, utilizing the information presented in this Report.

Based on the very rough financial analysis described above, we have arranged improvements in an Implementation Plan that very roughly tries to match the funding availability. In determining improvement costs <u>to include in the first three years ("pay as you go" basis)</u>, we have shown the improvements plus City-wide drainage planning for a total of roughly \$400,000 to \$600,000, and utilized the following general criteria to determine included projects.

1. High priority, individual street crossings or short channel improvements (preferably downstream in the system) with necessary land and nearby channel improvements that would provide high flood relief in relation to cost

2. High priority street crossings and/or local channel improvements that the City could construct themselves at reduced cost.

3. Some fencing or other local safety improvements that would reduce local safety hazards to children.

4. High priority land acquisition for detention sites and/or drainage routes that are now available and might be lost to other near future land uses.

5. Smaller improvements of reasonably high priority that are inordinately high, continuing, maintenance problems.

6. Upstream detention improvements that would take the load off existing downstream facilities.

7. Engineering and surveying:
   a. Master Drainage Studies needed elsewhere in the City system
   b. Surveys and Maintenance Mapping needed to establish rights-of-way for acquisition
   c. Final design of "pay as you go" projects and advance work on the first bond issue project so it can be constructed expeditiously

Detailed Implementation Plan

The program in years 1, 2, and 3 (pay as you go) outlined is very aggressive. It allows some land acquisition, but concentrates as much as possible on delivering physical drainage relief to the residents by means of actual construction. If the program turns out to be too aggressive or not feasible for other reasons, it can be easily modified utilizing the general priorities shown in the Prioritization Section, and the detailed costs shown in the Opinion of Cost Section of this Report. Also, some of the improvements could be split funded between two fiscal years and in that way, supported by funding from more than one fiscal year. Also, it might be reasonable to fund the City-wide drainage planning or other program elements for this or other parts of the City from other supplementary sources.

Year 1 - Pay As You Go

- **City-wide Master Stormwater Planning**

(Partial)	$ 20,000

- **Land and Easement Acquisition (Partial)**

Mill Creek -

Pond 1 /18th Street Detention Basin (Partial)	100,000
Main Channel Approaches to 8th Street	6,500
Main Channel 8th Street to 10th Street	12,393

Cloud Branch -

Main Channel S of 13th St to Coastline Park (Partial)	25,000
Main Channel Approaches to Rail Road	4,800

- **Project Costs** -

Engineering, Soils, Surveys, Property Descriptions and Sketches, Maintenance Mapping, Construction Services, Inspection, Administrative, Legal, etc. (20%)	49,996

- **Construction**

Mill Creek - Main Channel 13th Street Through 8th Street

8th Street Crossing - Main Channel	34,475
Channel Improvements/Erosion Protection (8th St to 10th St)	30,000
Safety Fencing (Partial)	5,000
Construction Contingency (15%)	10,421

Cloud Branch - Main Channel

SCL Railroad Crossing N of Coastline Park	147,900
Construction Contingency (15%)	22,185

Total Year 1	$468,670

Note: The "City-wide Master Stormwater Planning" item is shown in the Implementation Plan for planning and budget purposes, but was not included in the Opinion of Probable Cost for Land and Improvements.

Year 2 - Pay As You Go

- **City-wide Master Stormwater Planning**

(Partial)	$	20,000

- **Land and Easement Acquisition**

Mill Creek -

Pond 1 - 18th Street Detention Basin (Partial)	100,000
Main Channel - 10th Street to South of 13th Street	36,500

Cloud Branch -

Main Channel South of 13th Street to Coastline Park (Partial)	30,000

- **Project Costs -**

Engineering, Soils, Surveys, Property Descriptions and Sketches, Maintenance Mapping, Construction Services, Inspection, Administrative, Legal, etc. (20%)	69,460

- **Construction**

Mill Creek - 13th Street Through 8th Street

Channel Improvements/Erosion Protection 13th St to 8th St	20,000
Safety Fencing	5,000
13th Street Crossing	277,000
Construction Contingency (15%)	45,300

Cloud Branch

None in Year 2	0

Total Year 2	$	603,260

Note: The "City-wide Master Stormwater Planning" item is shown in the Implementation Plan for planning and budget purposes, but was not included in the Opinion of Probable Cost for Land and Improvements.

Year 3 - Pay As You Go

- **City-wide Master Stormwater Planning**

(Partial) . . . . $	30,000

- **Land and Easement Acquisition**

<u>**Mill Creek Main Channel**</u> -

Pond 1 - 18th Street Detention Basin (Partial)	100,000

- **Project Costs -**

Engineering, Soils, Surveys, Property Descriptions and Sketches, Maintenance Mapping, Construction Services, Inspection, Administrative, Legal, etc. (20%)	87,004

- **Construction**

<u>**Mill Creek**</u>

None in Year 3	0

<u>**Cloud Branch - Main Channel**</u>

Piping from South of 13th Street to Coastline Park and local improvements at 13th, 12th, 11th, Poplar and 8th Streets	378,282
Construction Contingency (15%)	56,742

Total Year 3 . . . . $	652,028

Note: The "City-wide Master Stormwater Planning" item is shown in the Implementation Plan for planning and budget purposes, but was not included in the Opinion of Probable Cost for Land and Improvements.

Years 4, 5, 6 and 7 - $3.2 Million Revenue Bond Issue

- **Land and Easement Acquisition**

(Partial)	$ 1,000,000

- **Project Costs -**

Engineering, Soils, Surveys, Property Descriptions and Sketches, Maintenance Mapping, Construction Services, Inspection, Administrative, Legal, etc. (20%)	373,853

- **Construction**

Mill Creek

Piping Main Channel from South of 13th Street to 18th Street	$ 668,200
18th Street Piping Modifications	15,000
Channel Safety Fencing (Partial)	20,000
Pond 1 Detention Basin South of 18th Street	902,250
Construction Contingency (15%)	240,817

Cloud Branch

Safety Fencing (Final)	20,000
Construction Contingency (15%)	3,000

Total Years 4, 5, 6 and 7	$ 3,243,120

Years 8, 9, 10 and 11 - $2.7 Million Revenue Bond Issue

- **Land and Easement Acquisition**

(Final)	$	523,123

- **Project Costs -**

Engineering, Soils, Surveys, Property Descriptions and Sketches, Maintenance Mapping, Construction Services, Inspection, Administrative, Legal, etc. (20%)		369,817

- **Construction**

Mill Creek

Upgrading of Culverts at 20th Street and Goldsboro School	$	172,700
Backfilling Ditch from 20th Street to 18th Street . . .		20,000
Channel Safety Fencing (Partial)		20,000
Channel Improvements and Erosion Protection (Final) . .		100,000
Culvert Crossing into 18th Street Detention Basin . . .		100,500
Construction Contingency (15%)		61,980

Cloud Branch

Pond 4A and 4B - Detention Basin at Coastline Park	$	484,800
Coastline Park Equalization System		197,000
Channel Improvements and Erosion Protection (Partial) .		70,400
Pond 6 - Detention Basin at Pinehurst Park		442,500
Construction Contingency (15%)		179,250

Total Years 8, 9, 10 and 11	$2,742,025

Years 12, 13, 14 and 15 - $2.5 Million Revenue Bond Issue

- **Land and Easement Acquisition**

(Previously Acquired)	$	0

- **Project Costs -**

Engineering, Soils, Surveys, Property Descriptions and Sketches, Maintenance Mapping, Construction Services, Inspection, Administrative, Legal, etc. (20%)		408,931

- **Construction**

Mill Creek

Regrading/Redirection/Culvert Crossing of Channel @ RR/McKee Area - Tributary C		47,500
Pond 2 - McCracken Road Detention Site		711,600
Tributary A North side Detention System		276,360
Upgrading Meisch Road Culvert - Tributary A		22,900
Upgrading Bevier Road Culvert - Tributary A		22,900
Upgrading Airport Blvd Culvert - Tributary B		33,500
Upgrading Persimmon Avenue Culvert - Tributary B		37,500
Upgrading 8th Street Culvert - Tributary B		38,350
Channel Improvements and Erosion Protection (Partial) .		170,250
Construction Contingency (15%)		204,153

Cloud Branch

Pond 5 - Detention Basin Between 13th, 14th, Lake and Roundtree	$	196,241
14th Street and Roundtree Crossing		41,600
16th Street Crossing		27,600
Upgrading Lake Avenue Culvert		42,350
Upgrading 20th Street Culvert		15,000
Culvert Crossing at 19th Place		24,150
Channel Improvements and Erosion Protection (Final) . .		70,000
Construction Contingency (15%)		62,541

Total Years 12, 13, 14 and 15	**$**	**2,453,586**

MILL CREEK/CLOUD BRANCH STORMWATER MANAGEMENT SYSTEM IMPROVEMENTS

CONCEPTUAL PERMIT APPLICATION TO
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

NOTICE OF RECEIPT OF APPLICATION

DECEMBER 1991

Brett C. Collins
12/6/91

1205COV.TLB

CPH Project No. S0607.02

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

NOTICE OF RECEIPT OF APPLICATION

1206cov.tlb

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

NOTICE OF RECEIPT OF APPLICATION

Pursuant to Section 373.413, Florida Statutes, and Chapter 40C-4, Florida Administrative Code, the applicant is required to provide the following information for the purpose of public notice. Failure to provide all information will result in an incomplete application. This information is in addition to that required in other portions of the application form.

Five copies of this form and all attachments must be submitted.

This section will be completed by the District.

Application Number: ____________________

Date of hearing, if any : ________________

Earliest possible date for agency action: ________________

Date to be posted: ____________ Date to be removed: ____________

Written objections must filed by: ____________________

---

1. Attach a location map, showing the boundary of the proposed activity and its relationship to any other portions of the project. Map size must be no larger than 11" by 17" referenced to Section, Township, and Range. Map scale must be 1" = 2000' (plot on USGS quad maps). Attach multiple sheets, if necessary.
See Maps 1 and 2 attached and description of project area.

2. Attach a depiction (plan) of the work, works, dams, impoundments, stormwater management systems, or other regulated facilities proposed to be constructed under the permit. Depiction size must be no larger than 11" by 17". Depiction scale should be sufficient to show location and type of works (at least 1" = 2000', (plot on USGS quad). Attach multiple sheets, if necessary.
See Maps 3 and 4 and additional response of Description of Proposed Project.

3. Specify acreage of wetlands, if any, that are proposed to be disturbed, filled, excavated, or otherwise impacted by the proposed surface water management system: 3.18 ac ________ See separate sheet for additional response on Wetland Areas and also see Maps No. 9 and 10.

4. Provide a brief statement describing any wetland mitigation proposed to be undertaken (attach additional sheets if necessary): Please refer to Maps 9 and 10 ~~showing existing wetlands as taken from SJRWMD maps.~~ Very little effective wetlands are involved or to be affected so mitigation should not be a significant issue. ~~This is a~~ [redacted] Also see additional response.

5. Provide the names of all streams, lakes, wetlands, or other watercourses that are proposed to be impounded, diverted, drained, discharged into (either directly or indirectly), or otherwise impacted by the proposed activity: Mill Creek, Cloud Branch and Lake Monroe. See attached additional response on Wetlands Areas Affected, and Maps 3, 4, 9 and 10.

6. Indicate the source of any water to be contained on site: Stream base flow and stormwater runoff ; the volume of water to be contained on site: see attached response (acre-feet); the use to be made of the water and any other limitation thereon: ________

Persons interested in the above described application should contact the St. Johns River Water Management District at P. O. Box 1429, Palatka, Florida 32178-1429, or in person at its office on State Highway 100 West, Palatka, Florida, 904/328-8321. Written objections to the application may be made no later than the date specified above. Written objections should identify the objector by name and address, and fully describe the nature of the objection to the application. All timely filed written objections will be presented to the Board for consideration prior to the Board taking action on the application. Filing a written objection does not entitle one to a Chapter 120, Florida Statutes, administrative hearing. Only those persons whose substantial interests are affected by the application and who file a petition meeting the District's requirements after receipt of notice of intended action or final action may obtain an administrative hearing (see section 40C-1.511, F.A.C.). The requirements relating to timing and content of such petitions are set forth in Chapter 40C-1, F.A.C., Parts I and V.

Effective Date ________

INSTRUCTIONS FOR COMPLETING THE MANAGEMENT AND STORAGE OF SURFACE WATERS (MSSW) PERMIT
(CONCEPTUAL APPROVAL)

GENERAL Fill in all spaces of application form. The phrase "Not Applicable" (N/A) should be used to indicate those questions which do not pertain to the proposed system. Include application fee and four sets of all necessary plans and calculations with this application form. This form is to be used for projects to be permitted under Conceptual Surface Water Permits. Refer to Chapters 40C-4, 40C-40, 40C-41 for appropriate thresholds. The District will provide assistance in interpreting questions and in completing this form. You may also wish to schedule a preapplication conference prior to filling out this application.

OWNER Provide the name, street address or post office box as appropriate, city or town, county, state, zip code and telephone number of the property owner. The owner is identified as the person or persons having title, deed or similar interest in said property.

APPLICANT Provide the applicant's name, street address or post office box as appropriate, city or town, county, state, zip code and telephone number. If the applicant is not the owner of the involved property, then a copy of the document indicating the right to submit this application must be attached to the application. The permit will be issued to the applicant.

CONSULTANT or ENGINEER When applicable, provide the name of the individual, engineering firm, or SCS District Conservationist who designed the project and who can be contacted regarding the application; include the name, address and telephone number. If the consultant or engineer is acting as the agent, please fill in the consultant or engineer section of the application, indicate the firm acting as the agent and leave the applicant's section blank.

ATTORNEY OF RECORD: When applicable provide the name of the individual or law firm who can be contacted regarding the application; include the address and telephone number.

PROJECT INFORMATION Provide the name by which the project will be known. Provide the size of the project in acres. If the total land area owned differs from the project area, provide the size of the total land area owned in acres.

The location of the project is to be identified by the nearest city and the county where located. Section, township and range must be given. Identify the USGS Quadrangle (Quad) map on which the project is located.

DESCRIPTION OF PROJECT Describe the overall project scope: e.g., agricultural, multi-family, single family subdivision phase, etc. Attach extra sheets as necessary.

DESCRIPTION OF SURFACE WATER WORKS Describe the proposed surface water works; i.e., pumped system, retention, detention, curb and gutter. Attach extra sheets if necessary. Describe the proposed stormwater management system (water quality treatment), e.g., retention, detention with filtration swales, wet detention.

Provide the name of the water body which will receive discharge from the system. Indicate whether the discharge will be directly discharged to groundwater.

Provide date that construction is anticipated to begin and end. Designation of the month and year is sufficient.

If the application is for alteration of a permitted system or for modification of permit conditions, provide existing permit number.

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
NOTICE OF RECEIPT OF APPLICATION

"ADDITIONAL RESPONSES
TO
NOTICE OF RECEIPT OF APPLICATION"

t206cov2.tlb

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
NOTICE OF RECEIPT OF APPLICATION

Additional Responses to "Notice of Receipt of Application"

Item 1: Description of Project Area:

The areas surrounding the Mill Creek / Cloud Branch water courses are currently thoroughly developed, economically depressed, and are mostly comprised of black and lower income housing, neighborhood commercial, railroad, and industrial land use (see Map Numbers 9 and 10). Repeated, hazardous flooding problems exist in these areas because of the very inadequate drainage system. In many cases, homes and other structures are built right on the streams and ditches, and public health and safety has always been a major problem as has been regular flooding damage.

The following statements describe the Mill Creek / Cloud Branch Drainage areas and pertinent factors affecting the project:

- The area is an old, existing, minority, completely developed area with relatively little undeveloped or vacant land

- The area has severe drainage and flooding problems, a generally high water table, and poor soils conditions

- Right-of-ways and land required for most of the existing and proposed improvements are not in public ownership

- The project is a maintenance and upgrading (retrofitting) of a highly deficient, existing public system which is an entirely different circumstance than an all new, private enterprise land development and should not be subject to strict enforcement of the same rules and criteria

- The people of the area were seriously flooded on July 13, 1991 and have called for improvements by means of committees, petitions, appearances before City Commission, and in the newspapers

- Any solution of the problem involves extremely high cost

- Very limited fund availability for this and other drainage projects

- The City has just implemented a stormwater utility with a charge of $3/ERU, but drainage improvements are needed throughout the City. The $3 charge will not completely fund the needed Mill Creek / Cloud Branch improvements, let alone those needed throughout the City, but it is a start at a new funding source

Project location and topographic maps for the Mill Creek and Cloud Branch Drainage Basins are presented in Map Numbers 1 and 2, respectively.

<u>Item 2:</u> <u>Description of Proposed Project:</u>

Master Stormwater Management Plans for the Mill Creek and Cloud Branch Drainage Basins are presented in Map Numbers 3 and 4, respectively.

The project consists of providing maintenance and improvements to the existing, open drainage conveyances of Mill Creek and Cloud Branch through a developed, urban area consisting of approximately 2,056 acres. The purpose is to alleviate flooding, eliminate property damage and protect the health, safety, and welfare of the existing inhabitants and businesses. The proposed improvements include work on the existing systems, consisting of channel maintenance, cleaning and excavation; erosion protection; closing some open water courses that are in very close proximity to residences and buildings; providing drainage detention and control facilities; all in an already developed, low income, minority area. No new residential, commercial, industrial or governmental land development of any kind is included in this project. <u>It is purely a governmental drainage and water management project to improve deplorable, existing conditions.</u>

<u>Item 3:</u> <u>Wetlands Areas:</u>

The existing water courses of Mill Creek and Cloud Branch traverse very few wetlands areas as shown on Maps 9 and 10, taken from [redacted]. Some maintenance, cleaning, channel enlargement and modifications in some of the areas will be required for hydraulic conveyance purposes. Most of the wetlands that now exist along these streams and ditches have been so drastically altered and disturbed that they are not effective wetlands any longer and are not so classified.

One of the main existing wetland areas is on Cloud Branch from north of 19th Street to about 14th Street. The intent is to use this wetland in its natural state as much as reasonably possible without major modifications, as it naturally provides a considerable water storage volume and serves other natural wetland purposes.

Wetlands within the Mill Creek/Cloud Branch Drainage Basins are presented in Table 3-1. They are classified as follows:

1. Forested Wetlands (FW)
2. Shrub Wetlands (SW)
3. Herbaceous Wetlands (HW)
4. Aquatic Wetlands (AW)
5. Disturbed Wetlands Within the Channel

In addition, Table 3-1 identifies the total area of wetlands which will be altered and/or impacted (via clearing and excavation) as a result of the proposed stormwater management for the Mill Creek and Cloud Branch Drainage Basins.

<u>Item 4:</u> Wetlands will be studied further and addressed in more detail as to jurisdiction, mitigation, effectiveness, etc., in connection with individual permits which will follow this conceptual permit.

<u>Item 5:</u> <u>Wetland Areas Affected:</u>

A long, narrow, unnamed wetland north of 19th Street and south of 14th Street on Cloud Branch is essentially to be left as is, but may be impacted to a small degree. Also, an unnamed wetland on Mill Creek, west and south of Goldsboro School and south of 18th Street, may be slightly impacted by the proposed detention facility planned just north of the wetland. Jurisdiction and affected wetlands and mitigation will be addressed in more detail in individual permits to follow.

TABLE 3-1

MILL CREEK AND CLOUD BRANCH DRAINAGE BASINS
MASTER STORMWATER MANAGEMENT SYSTEM
ON-SITE WETLANDS

DRAINAGE BASIN	WETLAND TYPE	WETLAND ACREAGE (AC)	WETLANDS TO REMAIN (AC)	WETLANDS TO BE FILLED (AC)	WETLANDS TO BE EXCAVATED (AC)	TOTAL WETLAND AREA TO BE IMPACTED (AC)
MILL CREEK	Forested Wetlands (FW)	6.51	6.51	0.00	0.00	0.00
	Herbaceous Wetlands (HW)	7.80	5.38	0.00	2.42	2.42
	Aquatic Wetlands (AW)	1.94	1.94	0.00	0.00	0.00
	Disturbed Wetlands Within the Channel*	0.57	0.00	0.00	0.57	0.57
	Total Wetland Acreage (AC)	16.82	13.83	0.00	2.99	2.99
CLOUD BRANCH	Forested Wetlands (FW)	3.07	3.07	0.00	0.00	0.00
	Shrub Wetlands (SW)	5.64	5.64	0.00	0.00	0.00
	Disturbed Wetlands Within the Channel*	0.19	0.00	0.00	0.19	0.19
	Total Wetland Acreage (AC)	8.90	8.71	0.00	0.19	0.19

* Disturbed wetlands within channel estimated based on aerial photography, limited field reconnaissance, and City documentation.

NOTE: Refer to Map No. 9 (Mill Creek) and Map No. 10 (Cloud Branch) which identify land uses and wetlands within the project boundaries.

Item 6: Volume of Water to Be Completed On-Site:

The Mill Creek and Cloud Branch Drainage Basins encompass approximately 1,392 acres and 664 acres respectively (2,056 acres total). Approximately 40 acres are proposed for storage (detention) providing 96.1 acre-feet of storage (25-year/6-hour storm event) in the Mill Creek Drainage Basin.

The Cloud Branch Drainage Basin consists of areas of natural storage as well as proposed detention facilities. The proposed detention facilities and natural storage areas account for approximately 9.4 acres and 4.0 acres, respectively. The two systems provide a combined 39.6 acre-feet of storage (25-year/6-hour storm event) within the Cloud Branch Basin.

The water is being stored to attenuate peak flows and to provide pollution abatement.

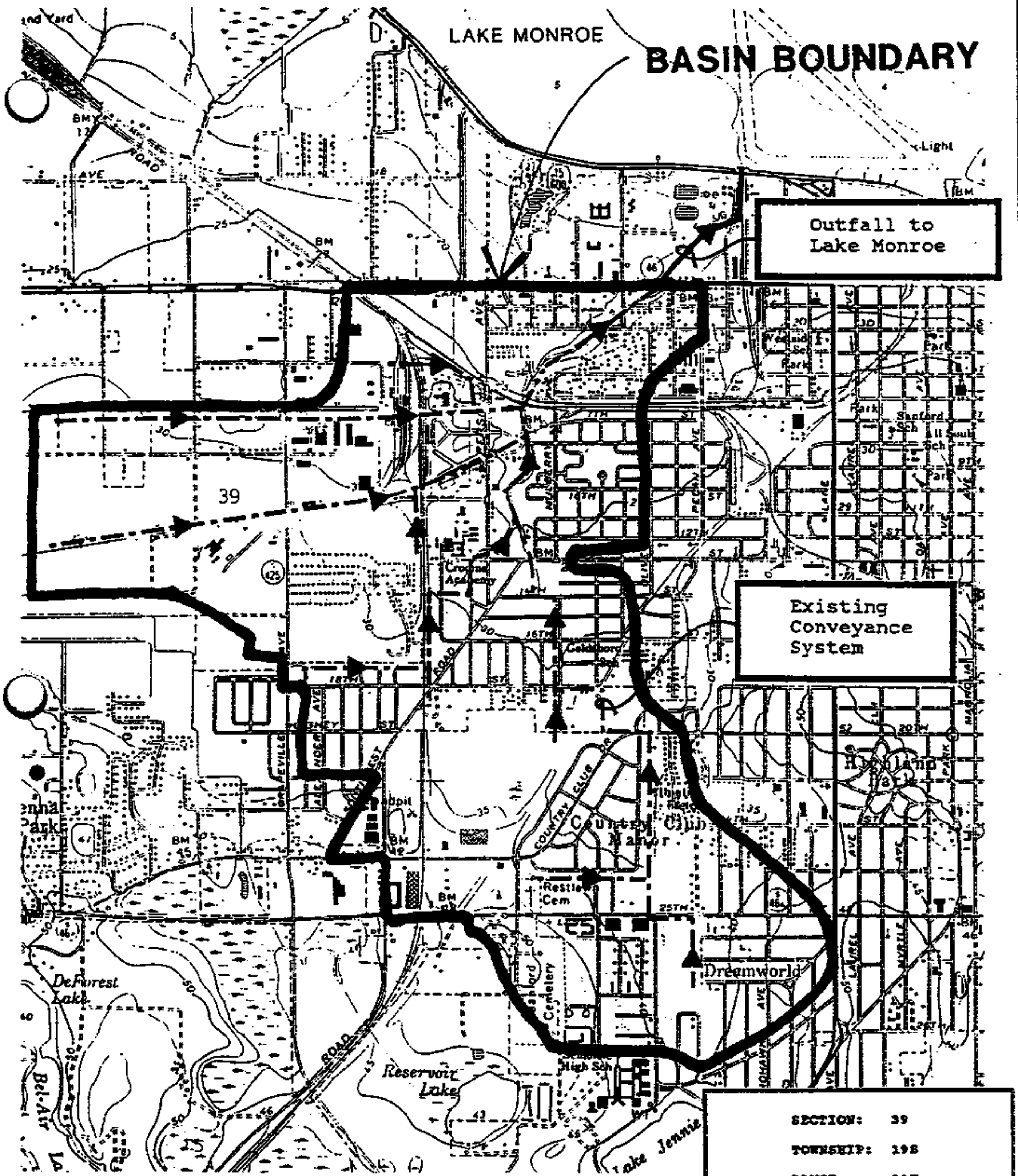
millclou.tlb

MAPS

MAPS

The following supplemental information is being provided, in graphical form, as part of the "Notice of Receipt of Application":

Map No.	Map Description
1	Mill Creek Drainage Basin: Project Location & Topo Map
2	Cloud Branch Drainage Basin: Project Location & Topo Map
3	Mill Creek Drainage Basin: Proposed Improvements
4	Cloud Branch Drainage Basin: Proposed Improvements
5	Mill Creek Drainage Basin: Flood Prone Map
6	Cloud Branch Drainage Basin: Flood Prone Map
7	Mill Creek Drainage Basin: S.C.S. Soils Map (1966)
8	Cloud Branch Drainage Basin: S.C.S. Soils Map (1966)
9	Mill Creek Drainage Basin: Land Use Map With Wetlands
10	Cloud Branch Drainage Basin: Land Use Map With Wetlands

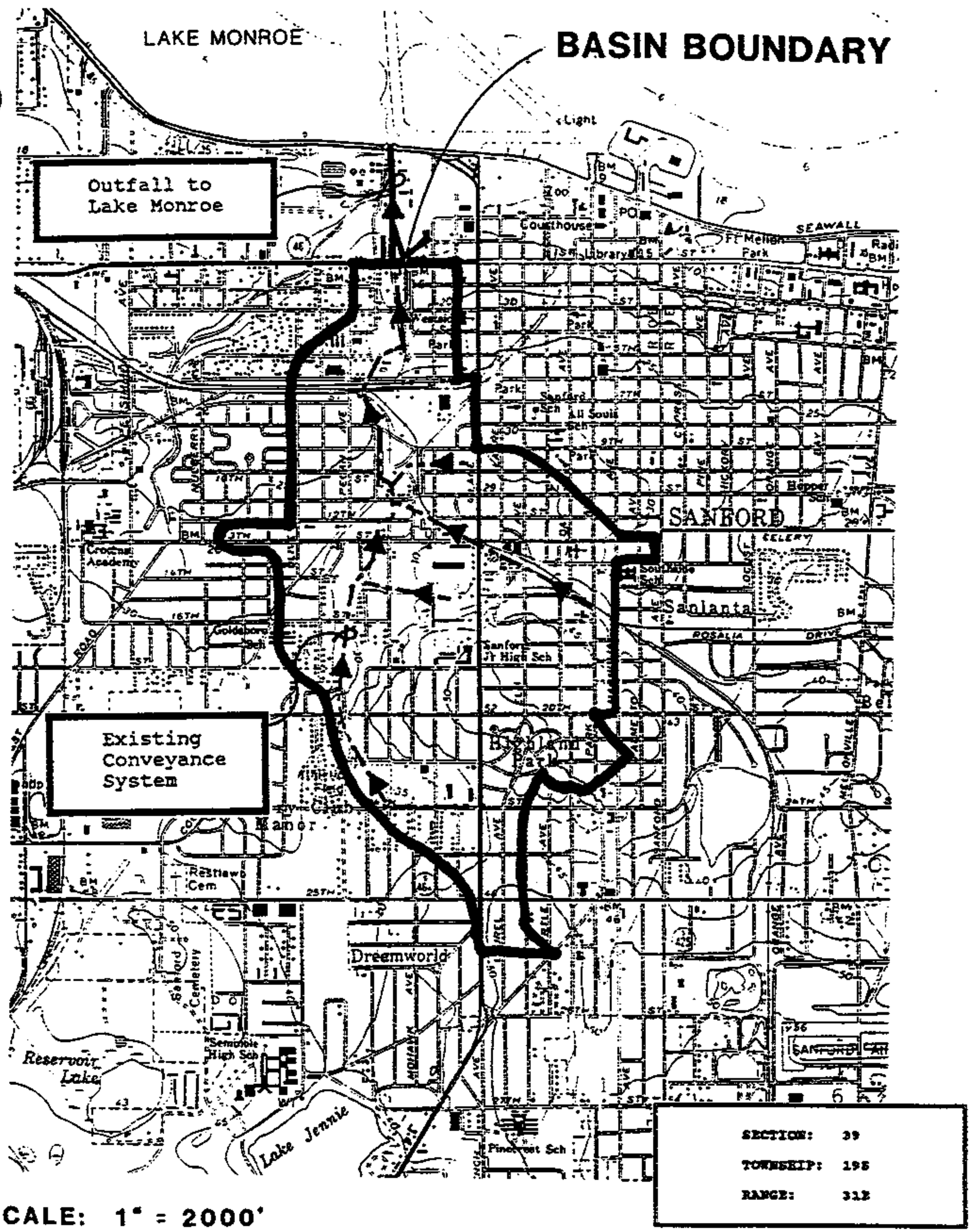


SCALE: 1" = 2000'

MILL CREEK DRAINAGE BASIN: PROJECT LOCATION & TOPO MAP

MAP No. 1

Conklin Porter and Holmes
ENGINEERS, INC.
cph

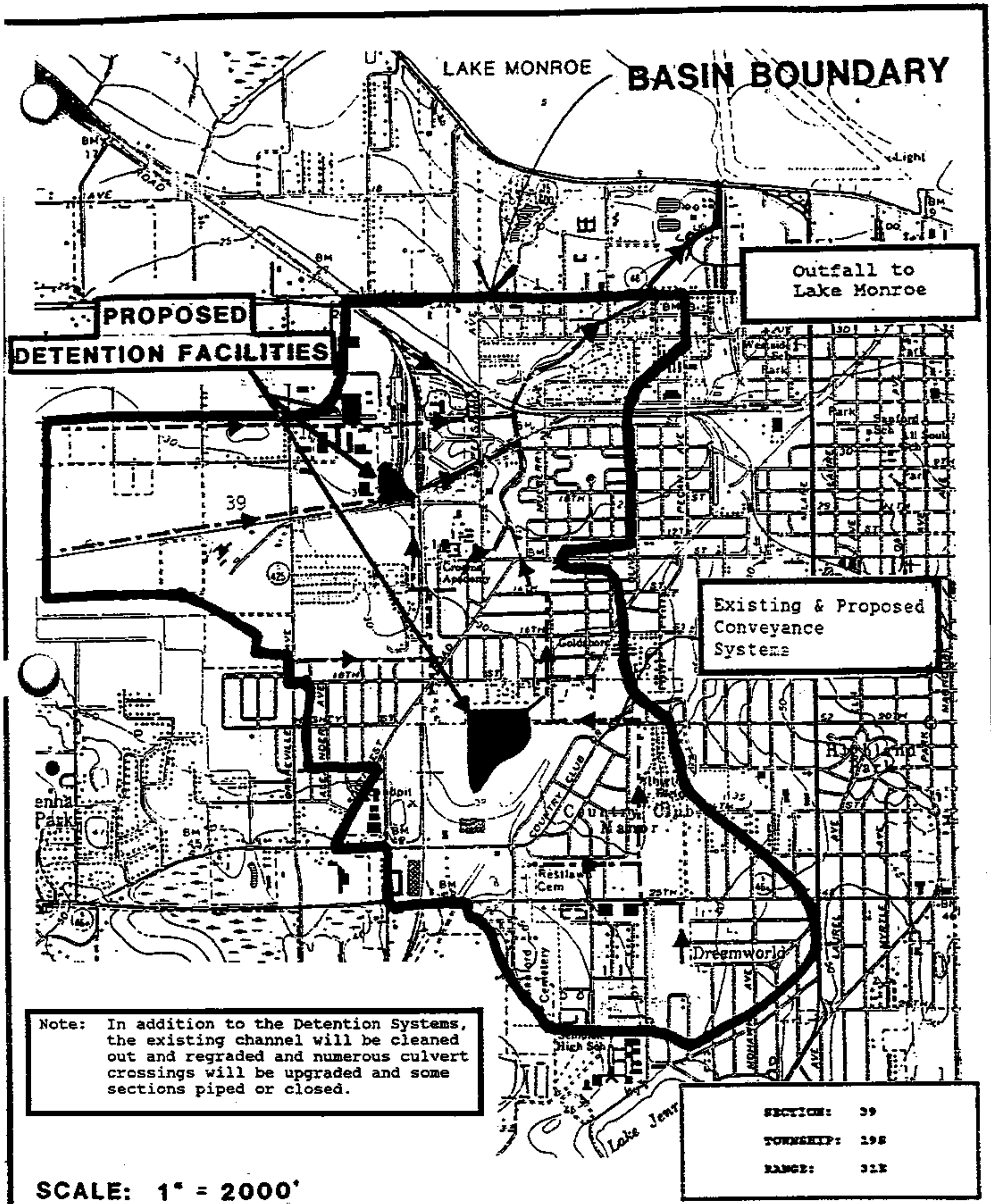


SCALE: 1" = 2000'

CLOUD BRANCH DRAINAGE BASIN: PROJECT LOCATION & TOPO MAP

MAP No. 2

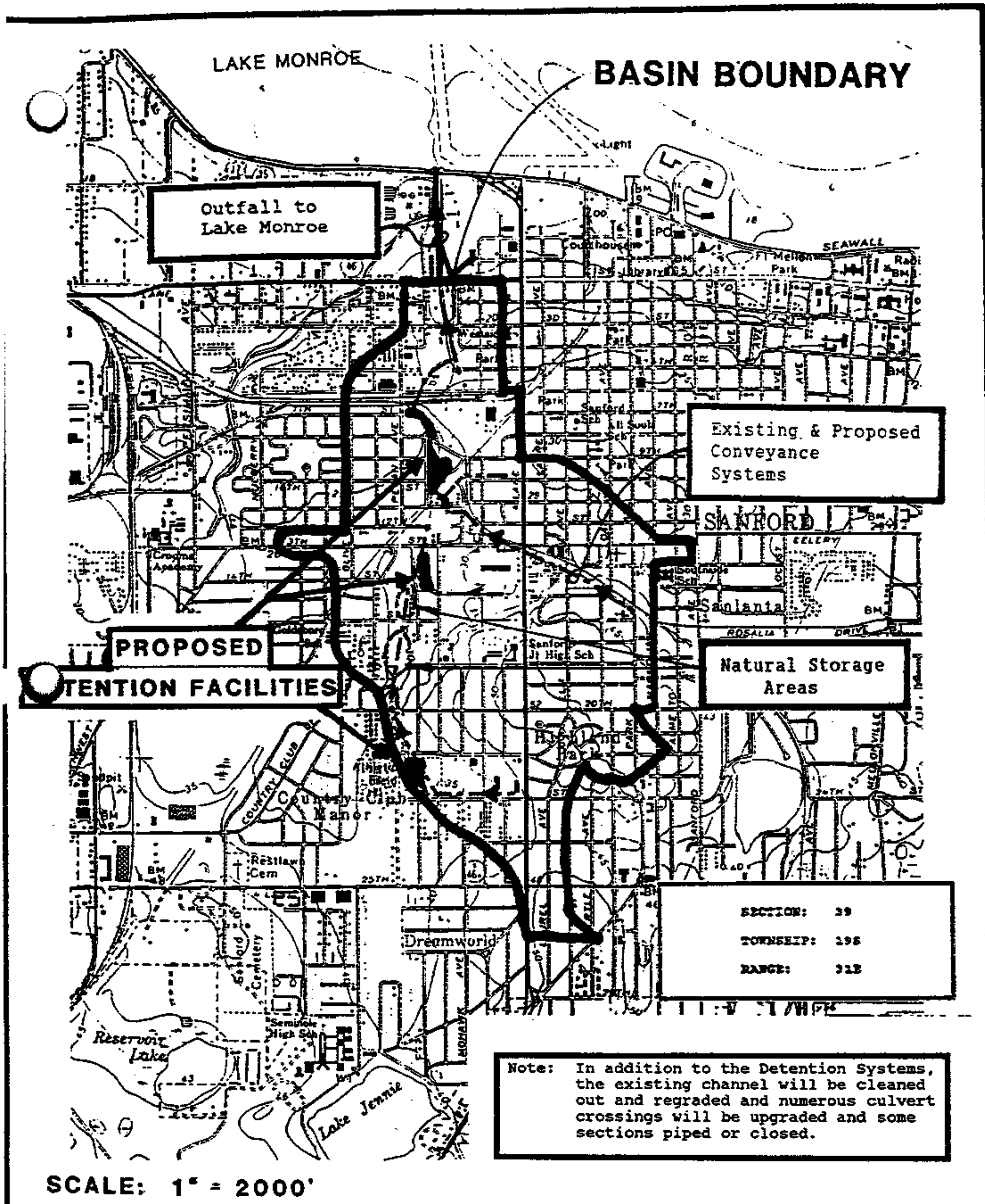
Conklin Porter and Holmes ENGINEERS, INC.



MILL CREEK DRAINAGE BASIN: PROPOSED IMPROVEMENTS

MAP No. 3

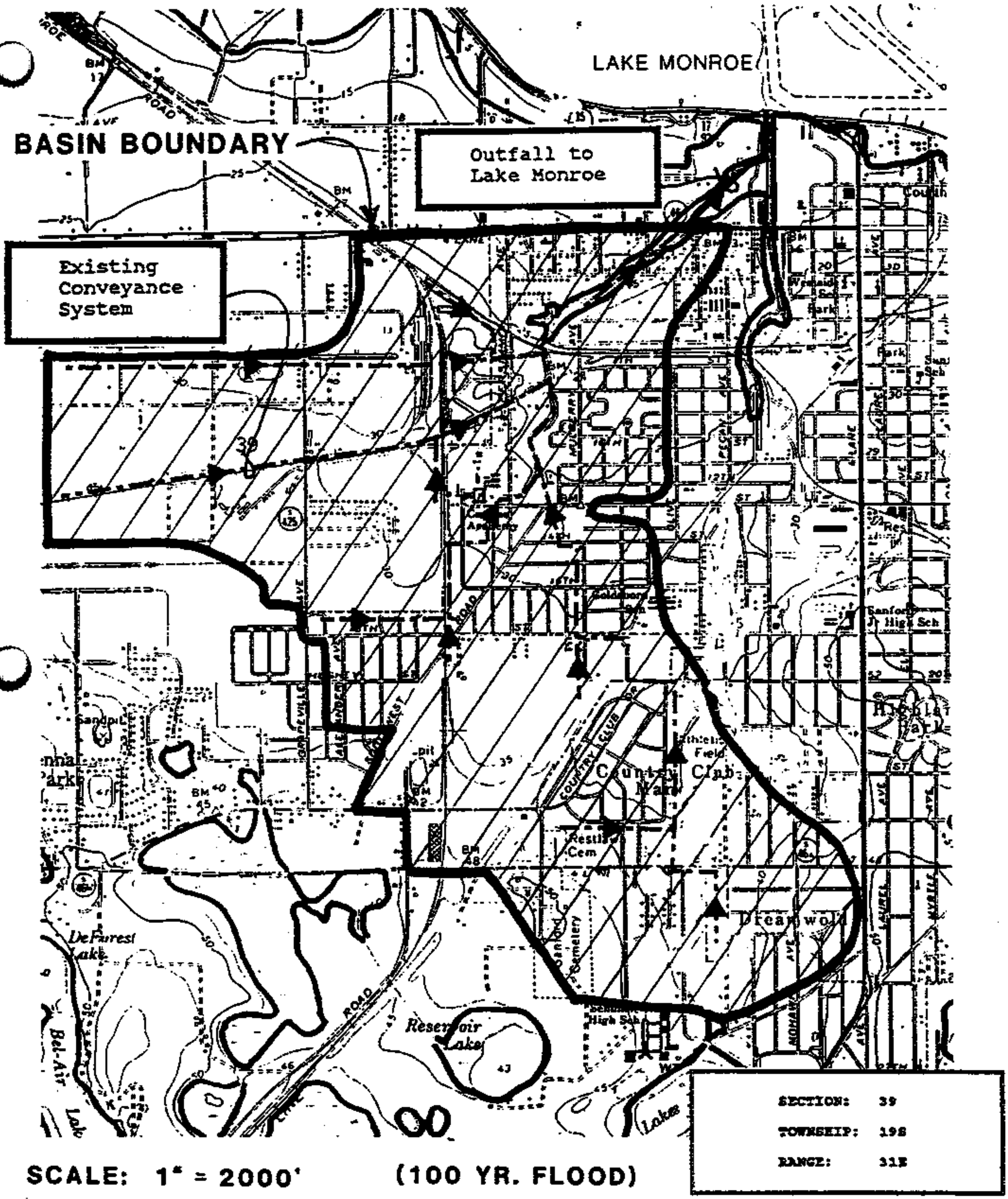
Conklin Porter and Holmes ENGINEERS, INC.



CLOUD BRANCH DRAINAGE BASIN: PROPOSED IMPROVEMENTS

MAP No. 4

Conklin Porter and Holmes ENGINEERS, INC.

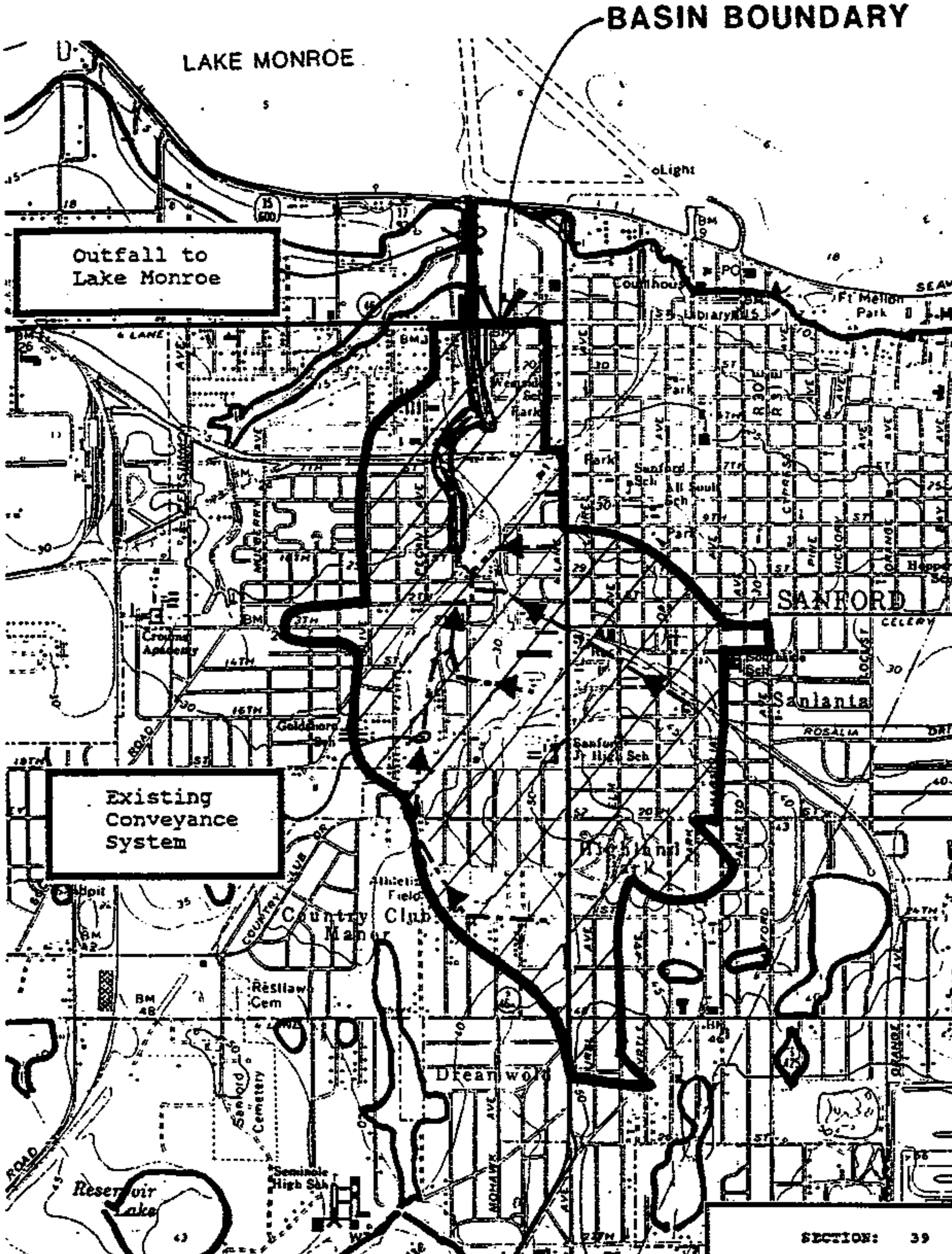


SCALE: 1" = 2000' (100 YR. FLOOD)

MILL CREEK DRAINAGE BASIN: FLOOD PRONE MAP (FEMA)

MAP No. 5

Conklin Porter and Holmes ENGINEERS, INC.
cph



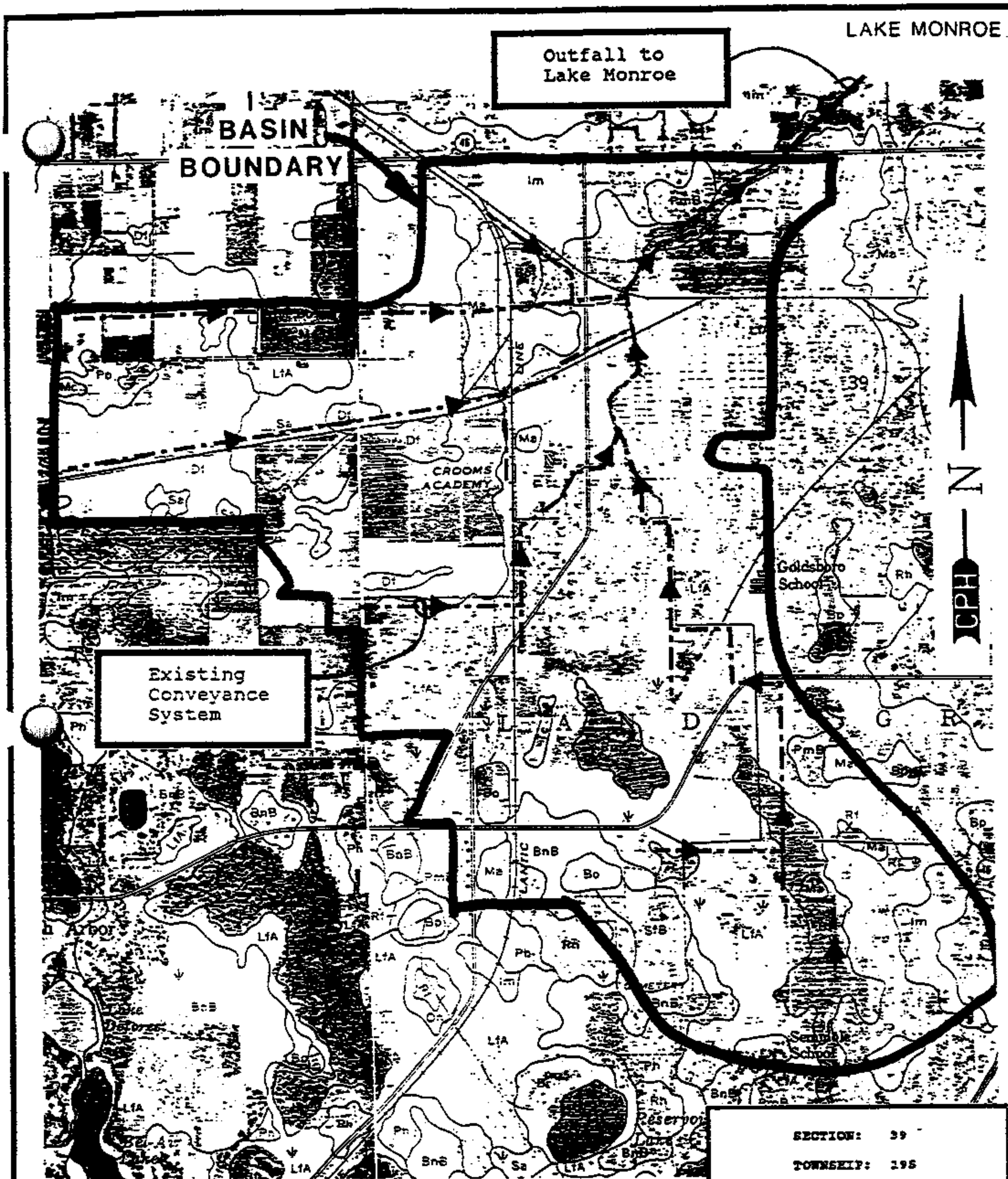
SCALE: 1" = 2000' (100 YR. FLOOD)

SECTION: 39
TOWNSHIP: 19S
RANGE: 31E

CLOUD BRANCH DRAINAGE BASIN: FLOOD PRONE MAP (FEMA)

MAP No. 6

Conklin Porter and Holmes
ENGINEERS, INC.



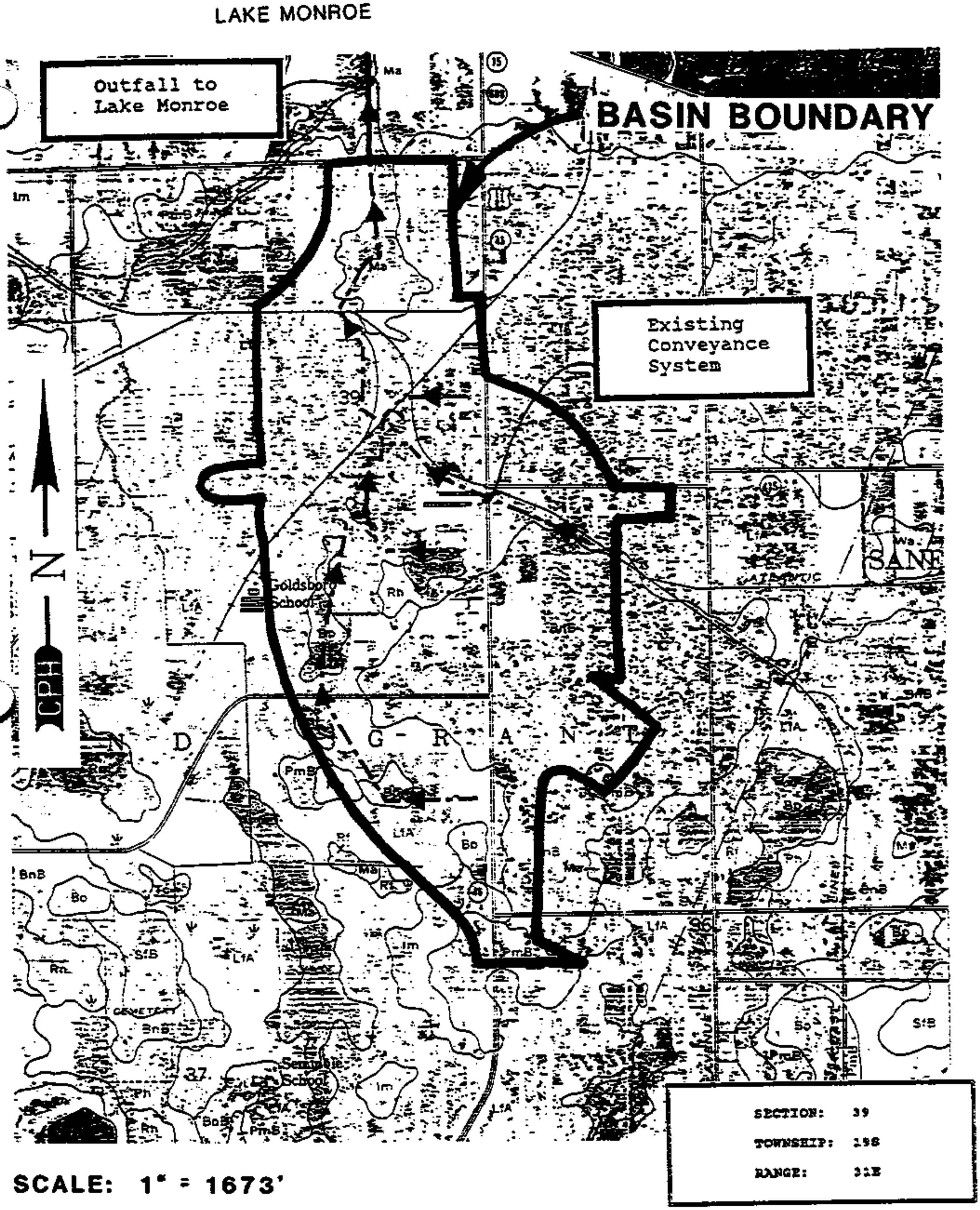
SCALE: 1" = 1673'

SECTION: 39
TOWNSHIP: 19S
RANGE: 31E

MILL CREEK DRAINAGE BASIN: S.C.S. SOILS MAP (1966)

MAP No. 7

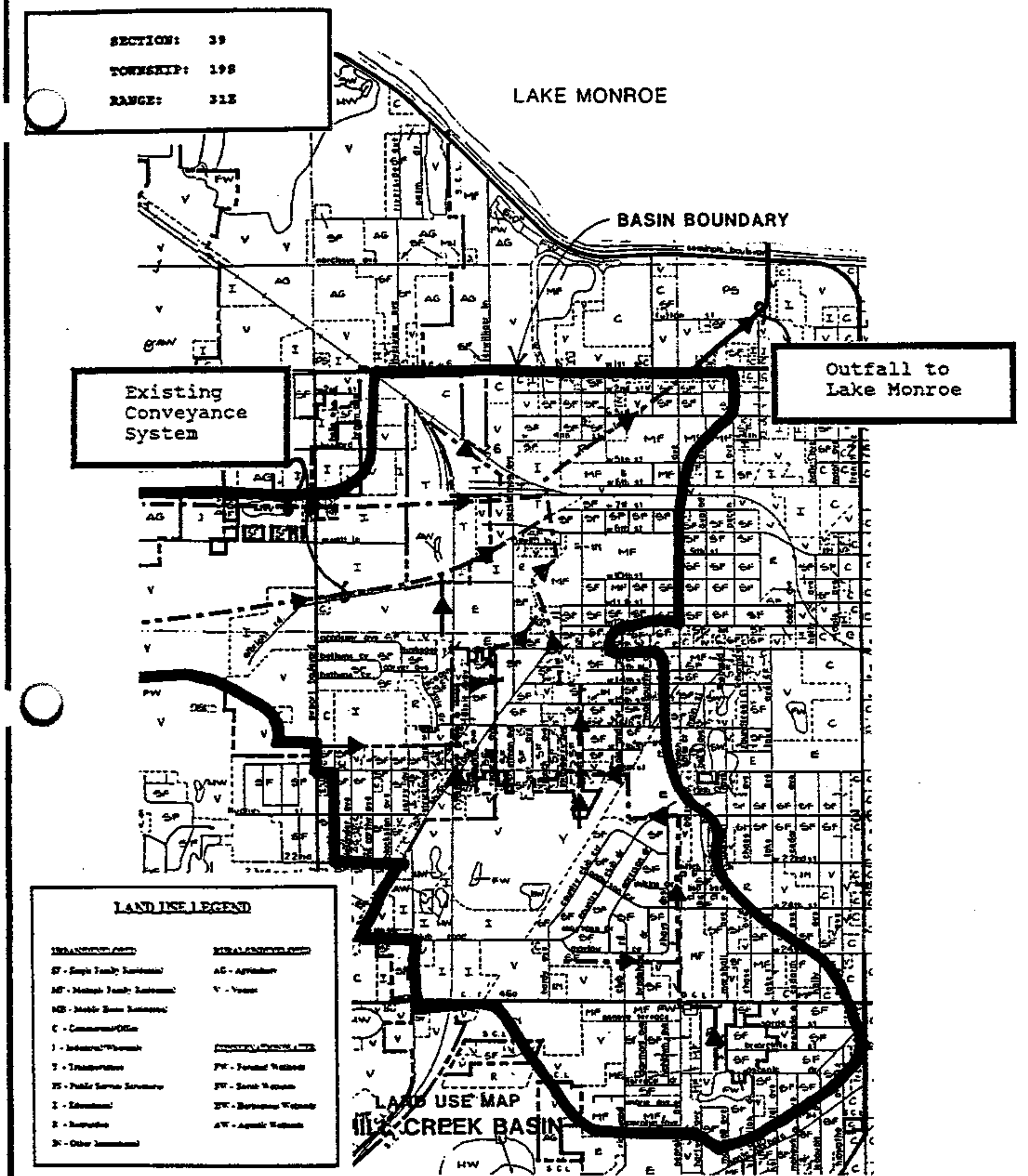
Conklin Porter and Holmes
ENGINEERS, INC.



CLOUD BRANCH DRAINAGE BASIN: S.C.S. SOILS MAP (1966)

MAP No. 8

Conklin Porter and Holmes ENGINEERS, INC.

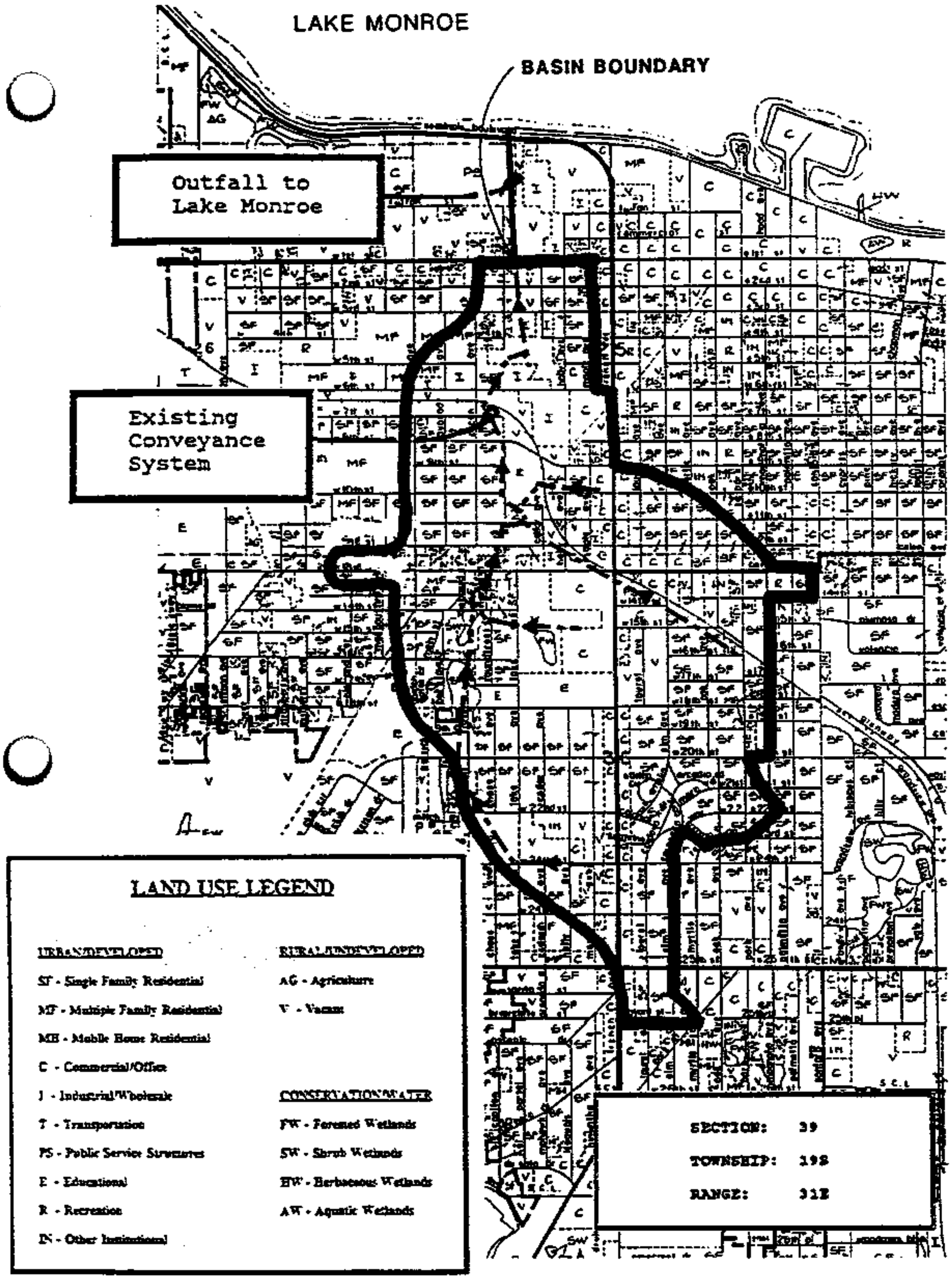


SCALE: 1" = 2000'

MILL CREEK DRAINAGE BASIN: LAND USE MAP WITH WETLANDS

MAP No. 9

Conklin Porter and Holmes ENGINEERS, INC.



SCALE: 1" = 2000'

CLOUD BRANCH DRAINAGE BASIN: LAND USE MAP WITH WETLANDS

MAP No. 10

Conklin Porter and Holmes
ENGINEERS, INC.

Conklin, Porter and Holmes
ENGINEERS, INC.
500 W. FULTON STREET
POST OFFICE BOX 2808
SANFORD, FLORIDA 32772-2808
TEL 407-322-6841 TEL 407-831-5717
FAX #407-330-0639

December 16, 1991

Mr. David Dewey
St. Johns River Water Mgmt. Dist.
618 E. South Street, Suite 200
Orlando, FL 32801

Dear Mr. Dewey:

Enclosed is an application for a conceptual permit for the Sanford Mill Creek/Cloud Branch major drainage program that we have been discussing with you, Hal Wilkening, Joan Budzinski, and Rod Pakzadian.

The submittal package includes the following items:

1. Notice of Receipt of Application form and attachments.

2. Management and Storage of Surface Waters Conceptual Approval form and attachments, included in the loose-leaf notebook with narrative and backup information supporting the application.

We, City Staff, and Officials will be pleased to meet with you or St. Johns River Water Mgmt. Dist. Staff and/or Board to pursue the matter further and supply any additional information or explanations as may be required. We appreciate your assistance in meeting with us on this matter and look forward to your review and approval of this conceptual permit and the subsequent construction permits for this very needed system improvement.

Sincerely,

CONKLIN, PORTER AND HOLMES ENGINEERS, INC.

Bristol C. Conklin

Bristol C. Conklin, P.E.
Executive Vice President

BCC/tlb

Enclosures

1024ltr5.tlb

MILL CREEK/CLOUD BRANCH STORMWATER MANAGEMENT SYSTEM IMPROVEMENTS

CONCEPTUAL PERMIT APPLICATION TO
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

CONKLIN, PORTER & HOLMES - ENGINEERS, INC.
P.O. Box 2808
Sanford, FL 32772-2808

DECEMBER 1991

Bristol C Conklin
12/6/91

CPH Project No. S0607.02

MILL CREEK/CLOUD BRANCH STORMWATER MANAGEMENT SYSTEM IMPROVEMENTS

CONCEPTUAL PERMIT APPLICATION

TABLE OF CONTENTS

5. **Maps**

Map No. 1	Mill Creek Drainage Basin: Project Location & Topo Map
Map No. 2	Cloud Branch Drainage Basin: Project Location & Topo Map
Map No. 3	Mill Creek Drainage Basin: Proposed Improvements
Map No. 4	Cloud Branch Drainage Basin: Proposed Improvements
Map No. 5	Mill Creek Drainage Basin: Flood Prone Map
Map No. 6	Cloud Branch Drainage Basin: Flood Prone Map
Map No. 7	Mill Creek Drainage Basin: S.C.S. Soils Map (1966)
Map No. 8	Cloud Branch Drainage Basin: S.C.S. Soils Map (1966)
Map No. 9	Mill Creek Drainage Basin: Land Use Map With Wetlands
Map No. 10	Cloud Branch Drainage Basin: Land Use Map With Wetlands

6. **Map Pockets**

Map Pocket A:	Mill Creek Drainage Basin: Topographic Map With System Boundaries and Proposed Stormwater Management System Improvements
Map Pocket B:	Cloud Branch Drainage Basin: Topographic Map With System Boundaries and Proposed Stormwater Management System Improvements
Map Pocket C:	Overall System Aerial/Wetlands Map
Map Pocket D:	Mill Creek Drainage Basin (Pre-Condition): Nodal Diagram With Water Surface Elevations and Associated Flows - 25-Year/6-Hour Storm Event
Map Pocket E:	Cloud Branch Drainage Basin (Pre-Condition): Nodal Diagram With Water Surface Elevations and Associated Flows - 25-Year/6-Hour Storm Event

Effective Date ________ MANAGEMENT AND STORAGE OF SURFACE WATERS
CONCEPTUAL APPROVAL
CHAPTER 40C-4, CHAPTER 40C-40, CHAPTER 40C-41, F.A.C.

ST. JOHNS RIVER WATER MANAGMENT DISTRICT
DEPARTMENT OF RESOURCE MANAGEMENT
DIVISION OF RECORDS
P.O. BOX 1429
PALATKA, FLORIDA 32178-1429

NUMBER ________
FEE RECEIVED ________
ASSIGNED REVIEWERS ________
PROJECTED DATE OF ISSUANCE ________

Please type of print with BLACK ball point pen. Read ALL instructions on the back of this sheet before completing application. Complete necessary data sheets attached.

APPLICATION IS FOR: X CONCEPTUAL APPROVAL ___ RE-ISSUANCE ___ MODIFICATION

OWNER
Name of Owner: City of Sanford
Address: P.O. Box 1788
City: Sanford County: Seminole
State: Florida Zip Code: 32772-1788 Telephone No.: (407) 330-5600

APPLICANT/ENTITY TO RECEIVE PERMIT
Name of Applicant: City of Sanford
Address: Same as Above
City: ________ County: ________
State: ________ Zip Code: ________ Telephone No.: ________

CONSULTANT OR ENGINEER OR SCS DISTRICT CONSERVATIONIST
Name of Firm: Conklin, Porter and Holmes-Engineers, Inc.
Name of Firm Contact: Bristol C. Conklin, P.E.
Address: P.O. Box 2808
City: Sanford County: Seminole
State: Florida Zip Code: 32772-2808 Telephone No.: (407) 322-6841

ATTORNEY OF RECORD
Name of Firm: Stenstrom, McIntosh, Colbert, Whigham
Name of Firm Contact: Bill Colbert
Address: P.O. Box 1330
City: Sanford County: Seminole
State: Florida Zip Code: 32771 Telephone No.: (407) 322-2171

PROJECT INFORMATION
Name of Project: Mill Creek and Cloud Branch Drainage Improvements
U.S.G.S. Topo Quad Map: Sanford 1392 Mill Creek
County: Seminole Project Acreage: 664 Cld Br Total Acreage Owned: N/A
Section: 39 Township: 19S Range: 31E
Description of Project: Make drainage and detention improvements on existing Cloud Branch and Mill Creek to alleviate flooding, eliminate property damage and protect the health safety and welfare of the existing inhabitants, businesses, and industry. Please see attached booklet for further description.
Description of Proposed Surface Water Works: Channel maintenance, cleaning and excavation; erosion protection; closing drainage courses in close proximity to residences and buildings; providing drainage detention and control facilities; all in an already developed low income minority area. See attached booklet for descript.
Water Course/Water Body Most Affected: Mill Creek, Cloud Branch, and Lake Monroe.
Date Construction is Proposed to Commence/End: 1992/1997 to 2000.
If Application is for Alteration of Existing Permit,
Give Permit Number: N/A
(Include Information Required on Attached Sheets)

OTHER
Name and Address of Proposed Operation/Maintenance Entity: City of Sanford
Have You Had A Pre-Application Conference With District Staff?
Yes X No ___ Date: 08 / 21 / 91 With Whom? Hal Wilkening, Joan Budzinski, Rod Pakzadian
Has a Conservation Plan Been Approved by the Local SWCD? No

Has Stormwater Permit or Exemption Been Granted? No If So, Give No.: ____
Have any Wetland Resource/Dredge and Fill Permits, Authorizations, or Exemptions Been Granted? No If so, Give Nos. and Agencies: ____

** Issuance of Permit Does Not Preclude Responsibility of Applicant to Obtain All Necessary Federal, State, Local Permits **

In compliance with the provisions of Chpater 373, Florida Statutes, 1973, and applicable rules and regulations of St. Johns River Water Management District, application is hereby made for a permit as identified above, and in accordance with support data and incidental information filed with this application and made a part thereof.

CITY OF SANFORD
W. A. Simmons, City Manager

Applicant's Name (please print)	Applicant's Signature	Date
CITY OF SANFORD W. A. Simmons, City Manager	[signature]	12/9/91

If person other than applicant has completed this form, that person certifies by his signature below that he is acting as an authorized agent of the applicant and his signature will be certification that he is in fact the authorized agent.

Agent's Name (please print)	Agent's Signature	Date

Effective Date ____________

MANAGEMENT AND STORAGE OF SURFACE WATERS
CONCEPTUAL APPROVAL

REQUIRED SITE AND SYSTEM DESIGN INFORMATION

A. Maps

1. A general location map.

2. A recent aerial map(s), legible for photo interpretation with a scale no smaller then 1" = 800', of the site with project boundaries and any on-site wetlands delineated.

3. A topographic map with project boundaries shown. Delineate 100-year flood prone areas (including hurricane flood zones) and indicate major land surface features.

4. A current land use map.

5. A soils map of the site.

6. A master drainage plan for the site showing: the location of water bodies and proposed size, side slopes and depths; the location of receiving water bodies; the location of proposed control structures; and the drainage basin boundaries for the site.

7. A master stormwater management system plan for the site.

8. A master development plan for the site.

B. Environment and Natural Resources: Land

1. Where the degree of limitations are very severe or moderate for a particular soil, discuss how each of these limitations will be overcome, and what site alterations will be overcome, and what site alterations will be necessary.

2. What steps will be taken during construction and operation and maintenance at full development to prevent or control damage from wind and water soil erosion and sedimentation? Include a description of proposed plans for clearing and grading as related to erosion control.

3. Describe any unique geologic features of the site, and discuss what aspects of the site plan will be used to compensate for or take advantage of these.

C. Environment and Natural Resources: Water

1. Describe the existing hydrologic conditions (surface water) on and abutting the site, including identification and discussion of any potential aquifer recharge areas.

2. Describe in terms of appropriate water quality parameters the existing ground and surface water quality conditions on and abutting the site which will be affected by this development.

D. Environment and Natural Resources: Wetlands

1. How many acres of wetlands, as defined in section 16.0, Applicant's Handbook, are found on the site?

2. What alterations or disturbances, including clearing, draining, excavating, or filling will occur to the wetlands?

OTHER Provide the name, address, and documentation of the entity which will operate and maintain the system. This applies o all projects including subdivision projects.

SIGNATURE The bottom of the application is for the applicant's and/or the agent's printed name, original signature and date.

3. What wetlands will be preserved in their natural or existing state?

4. What, if any, mitigation is proposed to compensate for encroachment into wetlands?

E. Environment and Natural Resources: Floodplains

1. Is any development proposed within the 100-year flood prone area as identified by the National Flood Insurance Program?

2. Quantify the encroachment volume within the 10 year floodplain. Describe any compensating storage to be provided.

3. Describe all traversing works and other encroachment within floodways.

F. Public Facilities: Drainage

1. Describe the various elements of the proposed drainage system shown on the master drainage plan and discuss the design capacity criteria to be used for the various elements. Include information as to what design (e.g. 10 year - 24-hour, 25 - year 24 hour, etc.) will be used for what portions of the system.

2. From the master drainage plan, indicate the total number of acres in each drainage area, and specify the acreage of any portions of drainage areas outside the site boundaries. Indicate the total acreage and storage capacity of proposed retention areas, and the total acres of impervious surfaces proposed.

3. Specify and compare the volume and quality of runoff from the site in its existing condition to the anticipated runoff at the end of each phase of development. Indicate what provisions will be incorporated in the design of the drainage system to minimize any degradation of water quality in the ultimate receiving body from that occurring in its pre-development state. Indicate the major points of discharge for storm water.

4. Specify who will operate and maintain the drainage system after completion of the development.

G. Design Analysis including:

1. Pre-development and post-development drainage calculations as follows:

a. Runoff characteristics, including area, runoff curve number or runoff coefficient and time of concentration for each hydrologic basin
b. Water table elevations (normal and average wet season) including aerial extent and magnitude of water table drawdown
c. Receiving water elevations (normal, wet season, design storm)
d. Design storms used including duration, frequency, and time distribution
e. Runoff hydrograph(s) for each basin (for all required design storm event(s))
f. Stage-storage computations for any storage area such as a reservoir, detention area or channel storage, used in storage routing
g. Stage-discharge computations for any storage areas at a selected control point, such as structure control or natural restriction
h. Flood routings through on-site conveyance and storage areas
i. Water surface profiles in the primary drainage system for each required design storm event(s)

j. Runoff peak rates and volumes discharged from the system for each required design storm event(s)

2. A description of the methodology, assumptions and references for the parameters listed in 3 above and a copy of all such computations, engineering plans and specifications used to analyze the system. If a computer program is used for the analysis, provide the name and description of the program.

3. Provide a description of the proposed stormwater treatment methodology including type of treatment, pollution abatement volumes and analysis of recovery.

4. Provide a discussion of the proposed construction schedule, including the sequence of any phases.

H. Water Use

1. Will the surface water system be used for water supply, including landscape irrigation, recreation, etc.?

2. Are there proposed groundwater withdrawals which will discharge into surface waters? If so, from what hydrogeologic zone?

MILL CREEK/CLOUD BRANCH STORMWATER MANAGEMENT SYSTEM IMPROVEMENTS

CONCEPTUAL PERMIT APPLICATION TO
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

INTRODUCTION
AND
REQUIRED SITE AND SYSTEM DESIGN INFORMATION

DECEMBER 1991

CPH Project No. S0607.02

MILL CREEK/CLOUD BRANCH STORMWATER MANAGEMENT SYSTEM IMPROVEMENTS

CONCEPTUAL PERMIT APPLICATION: INTRODUCTION AND REQUIRED SITE AND SYSTEM DESIGN INFORMATION

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES

TABLE2.CON

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
CONCEPTUAL PERMIT

INTRODUCTION

Description of project area. The areas surrounding the Mill Creek / Cloud Branch water courses are currently thoroughly developed, economically depressed, and are mostly comprised of black and lower income housing, neighborhood commercial, railroad, and industrial land use (see Map Numbers 9 and 10). Repeated, hazardous flooding problems exist in these areas because of the very inadequate drainage system. In many cases, homes and other structures are built right on the streams and ditches, and public health and safety has always been a major problem as has been regular flooding damage.

The following statements describe the Mill Creek / Cloud Branch Drainage areas and pertinent factors affecting the project:

- The area is an old, developed area with relatively little undeveloped or vacant land
- The area has severe drainage and flooding problems. It has a generally high water table, and poor soils conditions
- Right-of-ways and land required for most of the existing and proposed improvements are not in public ownership and will have to be obtained.
- The project is a maintenance and upgrading (retrofitting) of a highly deficient, existing public system. This is an entirely different circumstance than an all new, private enterprise land development. This case should not be subject to strict enforcement of the same rules and criteria as a new private land development project
- The people of the area were seriously flooded on July 13, 1991 and many previous times. They have called for improvements by means of committees, petitions, appearances before City Commission and in the newspapers
- Any solution of the problem involves extremely high cost
- Very limited fund availability for this and other City drainage projects

- The City has just implemented a stormwater utility with a charge of $3/ERU, but drainage improvements are needed throughout the City. The $3 charge will provide very little funding for the needed Mill Creek / Cloud Branch improvements, let alone those needed throughout the City. However, it is a start at a new funding source.

Description of proposed project. The project consists of providing maintenance and improvements to the existing, open drainage conveyances of Mill Creek and Cloud Branch through a developed, urban area consisting of approximately 2,056 acres. The purpose is to alleviate flooding, eliminate property damage and protect the health, safety and welfare of the existing inhabitants and businesses. The proposed improvements include work on the existing systems, consisting of channel maintenance, cleaning and excavation; erosion protection; closing some open water courses that are in very close proximity to residences and buildings; providing drainage detention and control facilities; all in an already developed, low income, minority area. No new residential, commercial, industrial or governmental land development of any kind is included in this project. It is purely a governmental drainage and water management project to improve deplorable, existing conditions.

Wetlands areas. The existing water courses of Mill Creek and Cloud Branch traverse very few wetlands areas as shown in Map Numbers 9 and 10, taken from SJRWMD Wetlands Maps. Some maintenance, cleaning, channel enlargement and modifications in some of the areas will be required for hydraulic conveyance purposes. Most of the wetlands that now exist along these streams and ditches have been so drastically altered and disturbed that they are not effective wetlands any longer and are not so classified.

One of the main existing wetland areas is on Cloud Branch from north of 19th Street to about 14th Street. The intent is to use this wetlands in its natural state as much as reasonably possible without major modifications, as it naturally provides a considerable water storage volume and serves other natural wetland purposes.

Wetlands will be studied further and addressed in more detail as to jurisdiction, effectiveness, etc., in connection with individual permits which will follow this conceptual permit.

REQUIRED SITE AND SYSTEM DESIGN INFORMATION

A. Maps

1. General Location Map - See Map Numbers 1 and 2.

2. Recent Aerial Map with Project Boundaries and On-site Wetlands - See Map Pocket C.

3. Topographic Map With Project Boundaries Shown and Flood Prone Areas - See Map Numbers 1, 2, 5, 6 and Map Pockets A & B.

4. Current Land Use Map - See Maps Numbers 9 and 10.

5. Seminole County S.C.S. Soils Map (1966) - See Map Numbers 7 and 8.

6. A Master Drainage Plan - See Map Numbers 3 and 4 and Map Pockets A and B.

7. A Master Stormwater Management System Plan - See Map Pockets A, B, H, and I (Nodal Diagrams with structures shown for 25-year/6-hour storm) and booklet enclosed.

8. Master Development Plan for the Site - No residential, commercial, industrial, or governmental developments are involved in the plan. Drainage improvements of an existing main City drainage system is all that is involved.

B. Environment and Natural Resources: Land

1. Degree of limitations of the soil. Referring to Map Numbers 7 and 8 and Tables G-5 and G-6 taken from USDA, S.C.S. Soil Survey for Seminole County (1966), it can be seen that the soil types are generally :

   - Leon Fine Sand (LfA)
   - Blanton Fine Sand (BnB)
   - St. Johns Fine Sand (Sa)
   - Delray Fine Sand (DF)
   - Immokalee Fine Sand (Im)

   The drainage areas are generally moderately poor soils with high water table and moderate to severe limitations.

   The soils limitations will be overcome by various means. The program of improving the drainage by the systems described in the maps and elsewhere in the booklet will in themselves convey local runoff away from the peoples' homes, residences, streets, and buildings. This will alleviate standing water in those areas and provide better surface drainage. Water storage will be in planned detention areas rather than in yards, streets, and buildings. The detention will attenuate peak flows and reduce erosion. Erodibility limitation of the soils are discussed in the following Item 2.

High groundwater is another soil limitation which will be mitigated and lowered by the project.

The improved drainage system will in itself lower the high groundwater table locally around these main conveyances and allow improved lateral drainage systems along the streets (not a part of this project) to be connected in order to manage the surface water runoff and control the high groundwater better through much of the basins.

2. Erosion control. See Map Numbers 3 and 4 and Map Pockets A and B. During construction, silt screens will be used in the streams downstream of the maintenance cleaning and excavation work or other construction. Detention sites will be constructed off-line with staked hay bales and silt fences being utilized. Seeding, grassing, and sodding will be extensively used both as temporary construction and permanent erosion control measures. Detention sites will be completed as side channels basins and completely stabilized sodded and grassed before water is directed onto them. The detention basins will reduce the peak rates of discharge and reduce erosion by producing lesser velocities. The design throughout will be accomplished to control velocities and reduce erosion. Special erosion protection will be provided around all structures. Grades and side slopes will be flattened wherever possible to minimize erosion and facilitate maintenance. Most of the existing system does not have easements or right-of-ways and a major part of this program involves obtaining land right-of-ways and easements which will facilitate future maintenance and thereby, reduce erosion.

3. Unique geologic features. There are no known unique geologic features of the site. Some few of the stream reaches are still natural and very attractive. These reaches will be preserved, stabilized, and enhanced.

C. Environment and Natural Resources: Water

1. Existing hydrologic conditions. See Map Numbers 1 and 2, and Map Pockets A and B. The streams are old, relic channels in some reaches that still follow their original course though the area has been urbanized. In some areas, the streams or creeks have been modified and relocated as ditches around projects and to follow rectangular street patterns. This results in their paths being tortuous, convoluted, and unnatural. Some of the side channels or branches are agricultural or other drainage ditches that follow in from the outskirts along roads or along railroads. There is a base flow at all times caused by the lateral discharge of a high groundwater table into the streams and ditches. The base flow undoubtedly contains some minor amounts of man induced surface water runoff from various sources. The groundwater is high in all areas and the soils rather poor. The area adjacent to Lake Monroe (St. Johns River) essentially is a discharge area rather than a recharge area. There is a hardpan layer at 28" to 32" in much of the area which causes the surface rainfall entering the soil to move laterally along the impervious layer to a point of discharge at the creeks, streams, and ditches. The hardpan and fine silty and organic nature of the sands creates a high perched water table unless it is drained laterally. Essentially there are no good retention (percolation recharge to groundwater) sites in the basins because of previous urbanization and the high water table and rather poor soils. Detention basins are planned rather than retention facilities.

2. Water Quality Parameters. Refer to Section F.3 of this Design Information Package.

D. Environment and Natural Resources: Wetlands

1.-4. Wetland areas affected. A long, narrow, unnamed wetlands north of 19th Street and south of 14th Street on Cloud Branch is essentially to be left as is, but may be impacted to a small degree. Also, an unnamed wetlands on Mill Creek, west and south of Goldsboro School and south of 18th Street, may be slightly impacted by the proposed detention facility planned just north of the wetland. Jurisdiction, wetlands, and mitigation will be addressed in more detail in individual permits to follow when more detailed stormwater management system improvement plans and wetland information is available. Wetlands within the

Mill Creek/Cloud Branch Drainage Basins are presented in Table D-1. They are classified as follows:

1. Forested Wetlands (FW)

2. Shrub Wetlands (SW)

3. Herbaceous Wetlands (HW)

4. Aquatic Wetlands (AW)

5. Disturbed Wetlands Within the Channel

In addition, the table identifies the total area of wetlands which will be altered and/or impacted (via clearing and excavation) as a result of the proposed stormwater management system for the Mill Creek and Cloud Branch Drainage Basins.

E. Environment and Natural Resources: Floodplains

1. Proposed development in floodplains area. No development is proposed as a part of this project and therefore, no development is proposed in the 100-year flood prone area as identified by National Flood Insurance Program as shown in Map Numbers 5 and 6.

2. Encroachment volume in floodplains and compensating storage. Obviously there are existing encroachments in areas that currently flood or are flood prone but no new encroachments will be made. The purpose of this program is to provide better drainage and to remove the flooding of buildings and alleviate flooding in the yards and streets. Therefore, no compensating storage is proposed or appropriate.

3. Proposed traversing works or other encroachments. No new traversing works or other encroachments within floodways are contemplated.

F. Public Facilities: Drainage

See Map Numbers 3 and 4, and Map Pockets A and B for the proposed system.

1. Description of drainage system elements. The various elements of the drainage system are shown on the above

referenced Maps and Map Pockets and described in this booklet and the Supplementary Informational Booklet. The system is generally intended at this time to be designed for a 25-year/6-hour storm event (6-inches in 6 hours) for all internal improvements and meets the SJRWM District's pre/post discharge criteria at the point of discharge for the 25-year/24-hour storm event (agreed upon at pre-application meetings with local District Personnel and Hal Wilkening as a "measuring point" on each stream, immediately upstream of the confluence of Mill Creek and Cloud Branch.

2. Drainage area size. The Mill Creek and Cloud Branch Drainage Basins encompass approximately 1,392 acres and 664 acres, respectively (2,056 acres total). Approximately 40 acres are proposed for storage (detention) providing approximately 96.1 acre-feet of storage (25-year/6-hour storm event) in the Mill Creek Drainage Basin.

   The Cloud Branch Drainage Basin consists of areas of natural storage as well as proposed detention facilities. The proposed detention facilities and natural storage areas account for approximately 9.4 acres and 4.0 acres, respectively. The two systems provide a combined 39.6 acre-feet of storage (25-year/6-hour storm event) within the Cloud Branch Basin.

   There is no significant amount of impervious area being created as the whole project is a drainage project and no land development is involved.

3. Amount and quality of runoff (pre/post). The amount of runoff (peak rate) following implementation of these improvements (post-condition) will not exceed the pre-development rate for either stream prior to the confluence of the two streams ("point of discharge") and their outfall to Lake Monroe. The analyses are based on routing a 25-year/24-hour storm through both the pre-developed and post-developed designed improvements for both basins.

   The Nodal Diagrams and accompanying hydrologic/hydraulic results are presented in Map Pockets F, G, J, and K.

The summarized results at the point of discharge are as follows:

	25-Year / 24-Hour Storm Event: Hydrologic/Hydraulic Results:	
	Mill Creek	Cloud Branch
Parameter		
Pre-development condition flow (cfs):	2014	829
Post-development condition flow (cfs):	1136	512

The quality of the runoff during base flow conditions (primarily lateral groundwater seepage) into the open streams and ditches is relatively clear (non turbid) in many stream reaches and has a pleasant appearance. The quality and turbidity will be slightly improved by the various improvements in the systems contemplated.

The quality of the runoff during rainfall events will be improved significantly for several reasons. R.O.W.'s will be obtained allowing the City to provide routine maintenance throughout the system. The primary source of pollution in the system is soil particle erosion.

With the banks of the streams flattened and grassed and other erosion protection in place throughout the system, as described in B.2 and a regular preventive maintenance program in place, soil erosion will be significantly reduced. Also, the water detention basins will provide some settling and pollution abatement. At selected locations, such as Coast Line Park and Pinehurst Park, the detention basins will be designed as wet detention facilities. They are proposed as unfenced, recreational, surface water amenities, as well as pollution abatement and peak attenuation facilities. In addition, "non-structural" measures will be expanded, such as increased street cleaning, trash, and debris pick-up and removal, thereby improving water quality by decreasing the pollutant load reaching the streams.

Oil and trash skimmers will be provided on all basin outlets. Where systems are piped and junction structures provided at cross streets, the junction structures will have dual compartments thereby providing a pollution abatement function. Also, in the residential areas, tributary to the main through drainage systems, depressed grassed swales will be utilized with raised inlets connecting to the Mill Creek/Cloud Branch main system. These measures will provide additional pollution abatement in connection with the lateral drainage facilities not directly included in this main system program. At the present time, much of this lateral drainage is directly connected, piped, or flows over land as sheet flow, or by ditches to the system.

<u>There will be no degradation of existing water quality</u>. An improvement in water quality is expected.

The discharge point for both streams is Lake Monroe.

4. <u>Owner/operator</u>. The City of Sanford will operate and maintain the systems under their new (existing) stormwater utility organization and funding.

G. Design Analysis:

1. <u>Pre-development and Post-development drainage calculations.</u>

   a. <u>Runoff Characteristics.</u> Runoff characteristics, including hydrologic basin number, basin area, S.C.S. runoff curve numbers and basin time of concentrations are presented in the following Tables:

<u>Table No.</u>	<u>Description</u>
G-1	Mill Creek Drainage Basin - Summary of Pertinent Basin Data: Pre-Condition
G-2	Mill Creek Drainage Basin - Summary of Pertinent Basin Data: Post-Condition
G-3	Cloud Branch Drainage Basin - Summary of Pertinent Basin Data: Pre-Condition
G-4	Cloud Branch Drainage Basin - Summary of Pertinent Basin Data: Post-Condition

   Runoff curve numbers and times of concentration for all basins within the study area were generated utilizing the methodologies outlined in <u>Urban Hydrology for Small Watershed,</u> S.C.S. Technical Release 55.

   b. <u>Water Table Elevations.</u> Estimated Physical Soil Properties for the Mill Creek and Cloud Branch Drainage Basins are presented in Tables G-5 and G-

6, respectively. This information was extracted from the S.C.S. Soil Survey of Seminole County (1966) and includes soil type, description of soil, depth to seasonally high water table, permeability, and available moisture capacity.

c. <u>Receiving Water Elevations</u>. The Mill Creek and Cloud Branch streams converge at the City of Sanford Water Reclamation Facility and outfall into Lake Monroe. Seasonal water surface elevations for Lake Monroe are presented in Table G-7 for calendar years 1982 through 1990. The data was supplied by the U.S. Department of the Interior-Geologic Survey.

d. <u>Design Storms.</u> Stormwater facilities required for the adequate conveyance of rainfall induced runoff varies greatly, dependent upon the size of the area, site topography, soil types, antecedent moisture conditions, depressional storage, and level of protection desired. Protection against a storm of reasonable magnitude is essential when considering the effects of flooding on both residential and commercial properties. In addition, the selection of design rainfall criteria results from an evaluation of the economic balance between the cost of the stormwater management system and the benefit derived from the level of protection it provides. An economic evaluation of the two design storm events (25-year/6-hour and 25-year/24-hour) is presented in the supplemental information booklet (Section VI). Therefore, based on previous studies, the "incremental" difference in the level of protection provided by the design storm events an economic evaluation, and a rigorous evaluation of the storm events, internal improvements to both the Mill Creek and Cloud Branch Drainage Basins have been designed based on a 25-year frequency/6-hour duration storm event (Seminole County). In addition, in order to meet the SJRWMD's pre/post discharge criteria, a 25-year frequency/24-hour duration storm event was routed through the proposed 25-year / 6-hour post condition improvements. Distributions for both storm event are presented in Tables G-8 and G-9.

e. <u>Runoff Hydrographs.</u> Runoff hydrographs for the proposed design storms (25-year/6-hour, 25-year/24-hour) applied to the Mill Creek and Cloud Branch

Drainage Basins, pre and post conditions, are presented in the following Appendices:

Appendix 1:	Mill Creek Drainage Basin: 25-Year/6-Hour Storm Event Runoff Hydrographs (Pre and Post Condition)
Appendix 2:	Mill Creek Drainage Basin: 25-Year/24-Hour Storm Event Runoff Hydrographs (Pre and Post Condition)
Appendix 3:	Cloud Branch Drainage Basin: 25-Year/24-Hour Storm Event Runoff Hydrographs (Pre and Post Condition)
Appendix 4:	Cloud Branch Drainage Basin: 25-Year/24-Hour Storm Event Runoff Hydrographs (Pre and Post Condition)

f. Stage-Area Computations. Stage-area computations for storage areas, either natural storage or proposed detention facilities are presented for both the pre and post conditions in Tables G-10 and G-11, respectively.

g.-j. Hydraulic Analyses and Results of Flood Routings. The design storms (25-year/24-hour and 25-year/6-hour) have been routed through the Mill Creek and Cloud Branch Drainage Basins for both the pre and post conditions. The following tables present all pertinent data relative to the hydraulic analyses, for the referenced storm events including: (1) stage-discharge relationships; (2) flood routings through on-site conveyance and storage areas; (3) water surface profiles in the drainage system(s); and (4) peak runoff rates and volumes discharged from the stormwater managements systems.

Table	Title
G-12	Mill Creek Drainage Basin 25-Year/6-Hour Storm Event Analytical Results: Pre-Condition
G-13	Mill Creek Drainage Basin 25-Year/24-Hour Storm Event Analytical Results: Pre-Condition

G-14 Mill Creek Drainage Basin
25-Year/6-Hour Storm Event Analytical Results: Post-Condition

G-15 Mill Creek Drainage Basin
25-Year/24-Hour Storm Event Analytical Results: Post-Condition

G-16 Cloud Branch Drainage Basin
25-Year/6-Hour Storm Event Analytical Results: Pre-Condition

G-17 Cloud Branch Drainage Basin
25-Year/24-Hour Storm Event Analytical Results: Pre-Condition

G-18 Cloud Branch Drainage Basin
25-Year/6-Hour Storm Event Analytical Results: Post-Condition

G-19 Cloud Branch Drainage Basin
25-Year/24-Hour Storm Event Analytical Results: Post-Condition

2. Engineering Design Methodology. In order to compute design storm hydrographs, the Mill Creek and Cloud Branch Drainage Basins were subdivided into contributing sub-basins as shown in Map Pockets A and B. Each basin was analyzed topographically for drainage patterns utilizing the U.S.G.S. Topographic Survey (Sanford Quadrangle, Photo Revised 1988) and digitally planimetered to determine sub-basin acreage. The Mill Creek and Cloud Branch Drainage Basins encompass approximately 1,392 and 664 acres, respectively (a total study area of 2056 acres).

Use of a sophisticated analytical model to determine basin hydrographs, overall system operation, water surface profiles (HGL) and conveyance for both the pre and post conditions is essential. The data and results must also be easily retrievable and understandable; therefore, the advanced interconnected pond routing (AdICPR) computer model was selected to evaluate the stormwater management systems.

A. S.C.S. Unit Hydrograph Method. The Soil Conservation Service Unit Hydrograph Method was selected to compute design storm runoff hydrographs from the various sub-basins within both the Mill Creek and Cloud Branch Drainage Basins. It provides a widely accepted basis for converting rainfall excess from a watershed to a runoff hydrograph. A synthetic "unit hydrograph" produces one inch of rainfall excess distributed uniformly over a watershed and occurring at uniform rate during the specified time period. The runoff hydrograph is generated through evaluation of the following basin parameters:

- Design Storm Rainfall (inches)
- Design Storm Duration (hours)
- Design Storm Rainfall Distribution
- Basin Area (Acres)
- Basin Curve Number (SCS CN)
- Directly Connected Impervious Area (% DCIA)
- Time of Concentration (Tc)
- S.C.S. Unit Hydrograph Shape/Peaking Factor

B. <u>Time of Concentration (Tc).</u> Travel time (Tt) is the time it takes water to travel from one location to another in a watershed. Travel time is a component of the Time of Concentration (Tc), which is the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. Time of concentration is computed by summing all the travel times for consecutive components of the drainage conveyance system. Factors affecting the time of concentration and travel time are:

- Surface Roughness
- Channel Shape and Flow Patterns
- Slope

The methodology outlined in the USDA <u>Soil Conservation Service Technical Release No. 55</u> (Chapter 3) was utilized for the determination of sub-basin Travel Times (Tt) and Time of Concentration (Tc).

C. <u>Lag Time.</u> The lag time is merely a hydrograph delay or additional travel time (Tt) for the hydrograph. The hydrograph will be offset in time by the amount specified. It can be used to account for the time a hydrograph may take to flow through another drainage basin. This parameter should not be confused with the "Lag Method" that has been developed by the Soil Conversation Service (SCS). The peak rate of runoff will not be altered nor will any other flow rates. The lag time has been set to zero for analyses performed on the Mill Creek and Cloud Branch Drainage Basins.

D. <u>Directly Connected Impervious Area (% DCIA)</u>. The directly connected impervious area (DCIA) is the impervious area that is connected to the basin outlet point without flowing over pervious areas. The DCIA has been set to zero for analyses within the Mill Creek and Cloud Branch Drainage Basins and is accounted for in a "weighted" composite SCS Curve Number (CN).

E. <u>SCS Unit Hydrograph Shape/Peaking Factor</u>. The Unit Hydrograph shape/peaking factor is generally considered to be constant for a given watershed, with the standard SCS dimensionless Unit Hydrograph based on a shape factor of 484. In preliminary analyses within the drainage basins, the use of the 484 shape factor appeared to produce results "inconsistent" with previous work done in the Study area and actual conditions witnessed during various "large" storm events within the last two years; however, the Soil Conversation Service states that adjustments to the unit hydrograph shape may be warranted on a site specific basis. SCS recognizes that the shape factor can be expected to range from 600 in steep terrain to 256 in flat swampy areas; therefore, based on a review of similar studies made in the past for similar value land with similar physiographic conditions, and calibration of the model to existing flow data within the basins, a design shape factor of 342 was selected for purposes of computing stormwater runoff hydrographs.

F. <u>SCS Curve Number Determination</u>. Soil Conservation Service Runoff Curve Numbers (SCS CN) were determined for each sub-basin based on Hydrologic Soil Group, antecedent moisture conditions, and land use cover present. The methodology outlined in the USDA <u>Soil Conversation Service Technical Release No. 55</u> (Chapter 2) was utilized for the determination of sub-basin curve numbers (CN).

In the determination of the SCS runoff curve number for each sub-basin, a "weighting" procedure based on the percentage of a particular land use cover (residential, commercial, multi-family, school, open space, and industrial) was used. This provided a "pre-condition" composite or weighted runoff curve number. In evaluating the drainage basins for future development (post-conditions), the SCS curve numbers were adjusted upward in order to produce a ten to fifteen percent increase in rainfall excess over existing developed conditions.

G. Hydraulic Analyses of the Mill Creek and Cloud Branch Drainage Basins - Advanced Interconnected Pond Routing Model (AdICPR). The method selected to perform the hydraulic analyses on the Mill Creek and Cloud Branch Drainage Systems is Streamline Technologies "Advanced Interconnected Pond Routing Model (AdICPR)".

AdICPR is a user friendly interactive software package designed to route flood hydrographs through single pond systems, as well as multiple interconnected ponds, lakes or reservoirs. Factors such as stochastic tailwater conditions, submergence, flow reversal and multiple boundary conditions are integrated into the algorithm. Connections between ponds can be modeled using sharp/broad crested weirs; circular, elliptical, arch and box culverts; gates and orifices; trapezoidal and parabolic channels; drop structures; bridges; and, rating curves.

AdICPR requires four basic data groups to describe a control section or node. These are as follows:

- Control and Initialization Data
- Stage/Area/Time Data
- Reach Data
- Inflow Hydrographs

Hydraulic input data for the Mill Creek and Cloud Branch stormwater routing, pre and post condition (25-year/6-hour storm event) are presented in Appendices 5 and 6, respectively.

3. Stormwater treatment methodology. The quality of the runoff will be improved significantly for several reasons. R.O.W.'s will be obtained allowing the City to provide routine maintenance throughout the system. The primary source of pollution in the system is soil particle erosion. With the banks of the streams flattened and grassed and other erosion protection in place throughout the system, as described in B.2, and a regular preventive maintenance program in place, soil erosion will be significantly reduced.

Oil and trash skimmers will be provided on all basin outlets. Where systems are piped and junction structures provided at cross streets. The structures will have dual compartments thereby providing a pollution abatement function. Also, in the residential areas, tributary to the main through drainage systems, depressed grassed swales will be utilized with raised inlets connecting to the Mill Creek/Cloud Branch main system. Also, wherever reasonably practical, sheet flow or direct overflow to the streams or ditches will be gathered together in grassed, depressed areas with raised inlets behind the banks of the stream prior to discharge to the streams. This will provide additional pollution abatement in connection with the lateral drainage facilities not directly included in this main system program. In addition, "non-structural" measures will be expanded, such as increased street cleaning and trash and debris pick up and removal, thereby improving water quality by decreasing the pollutant load reaching the streams.

At the present time, much of the lateral drainage is directly connected, piped, or flows over land as sheet flow or by ditches to the system. In addition, pollution abatement facilities will be required to St. Johns River Water Management District standards on any new development facilities constructed anywhere in the basins.

Also, the stormwater management system detention facilities will provide some settling and pollution abatement. At selected locations, such as in the Coast Line Park and Pinehurst Park, the detention basins will be designed and constructed to wet detention standards and be unfenced, recreational, surface water amenities, as well as pollution abatement and peak attenuating facilities.

4. Proposed construction schedule. It is contemplated that this program will be implemented incrementally according to priorities over the next five to ten years as funding is arranged.

H. Water Use

1. Use of surface water. There will be minor recreational benefits by having the detention basins located in two parks be constructed to wet detention standards, unfenced and utilized to some degree as visual recreational amenities.

   There may be some incidental water use for irrigation by residents, but it is certainly very small and completely insignificant.

2. Groundwater withdrawals. There are no known direct groundwater withdrawals that are discharged to surface waters. As previously described, there is a lateral seepage discharge to the streams and ditches of shallow groundwater because of the soil and high groundwater conditions.

TABLE D-1

MILL CREEK AND CLOUD BRANCH DRAINAGE BASINS MASTER STORMWATER MANAGEMENT SYSTEM ON-SITE WETLANDS

DRAINAGE BASIN	WETLAND TYPE	WETLAND ACREAGE (AC)	WETLANDS TO REMAIN (AC)	WETLANDS TO BE FILLED (AC)	WETLANDS TO BE EXCAVATED (AC)	TOTAL WETLAND AREA TO BE IMPACTED (AC)
MILL CREEK	Forested Wetlands (FW)	6.51	6.51	0.00	0.00	0.00
	Herbaceous Wetlands (HW)	7.80	5.38	0.00	2.42	2.42
	Aquatic Wetlands (AW)	1.94	1.94	0.00	0.00	0.00
	Disturbed Wetlands Within the Channel*	0.57	0.00	0.00	0.57	0.57
	Total Wetland Acreage (AC)	**16.82**	**13.83**	**0.00**	**2.99**	**2.99**
CLOUD BRANCH	Forested Wetlands (FW)	3.07	3.07	0.00	0.00	0.00
	Shrub Wetlands (SW)	5.64	5.64	0.00	0.00	0.00
	Disturbed Wetlands Within the Channel*	0.19	0.00	0.00	0.19	0.19
	Total Wetland Acreage (AC)	**8.90**	**8.71**	**0.00**	**0.19**	**0.19**

* Disturbed wetlands within channel estimated based on aerial photography, limited field reconnaissance, and City documentation.

NOTE: Refer to Map No. 9 (Mill Creek) and Map No. 10 (Cloud Branch) which identify land uses and wetlands within the project boundaries.

TABLE G-1

MILL CREEK DRAINAGE BASIN
SUMMARY OF PERTINENT BASIN DATA: PRE-CONDITION

HYDROLOGIC BASIN NO.	TO NODE NO.	BASIN AREA (AC)	SCS WEIGHTED CN	TIME OF CONCENTRATION (MIN)	UNIT HYDRO SHAPE FACTOR
100	200	30.5	62	65	342
105	200	24.5	67	55	342
200	220	53.1	71	46	342
210	200	46.9	70	46	342
220	200	92.4	69	43	342
300	201	21.9	75	17	342
400	301	97.2	71	20	342
410	400	35.0	65	32	342
420	400	31.0	65	25	342
500	400	18.3	67	24	342
610	550	23.5	67	27	342
620	600	55.8	71	40	342
625	550	11.7	67	25	342
640	550	78.9	78	54	342
650	550	38.3	65	45	342

TABLE G-1 (Cont'd)

MILL CREEK DRAINAGE BASIN
SUMMARY OF PERTINENT BASIN DATA: PRE-CONDITION

HYDROLOGIC BASIN NO.	TO NODE NO.	BASIN AREA (AC)	SCS WEIGHTED CN	TIME OF CONCENTRATION (MIN)	UNIT HYDRO SHAPE FACTOR
700	602	16.0	65	26	342
710	602	37.0	65	28	342
810	800	29.6	70	29	342
820	800	74.5	70	55	342
830	800	27.3	70	29	342
840	800	30.8	64	32	342
910	1000	31.6	70	33	342
920	1000	58.4	69	53	342
921	1000	24.4	82	18	342
930	603	10.3	89	8	342
940	1000	48.0	63	39	342
950	1000	56.8	62	45	342
960	1000	62.2	59	48	342
1000	1100	69.5	65	38	342
1100	1200	23.0	65	26	342
1200	1300	54.0	78	56	342
CLDBRNCH	1400	663.8	62	111	342

1108tab3.tlb

TABLE G-2

MILL CREEK DRAINAGE BASIN
SUMMARY OF PERTINENT BASIN DATA: POST CONDITION

HYDROLOGIC BASIN NO.	TO NODE NO.	BASIN AREA (AC)	SCS WEIGHTED CN	TIME OF CONCENTRATION (MIN)	UNIT HYDRO SHAPE FACTOR
100	100	30.5	64	65	342
105	100	24.5	69	55	342
200	220	53.1	73	46	342
210	210	46.9	72	46	342
220	108	92.4	71	43	342
300	201	21.9	77	17	342
400	300	108.0	73	90	342
410	301	35.0	67	32	342
420	301	31.0	67	25	342
500	302	18.3	69	24	342
610	401	23.5	69	27	342
620	403	55.8	73	40	342
625	410	11.7	69	25	342
640	619	78.9	79	54	342
650	410	38.3	67	45	342
700	610	16.0	67	26	342

TABLE G-2 (Cont'd)

MILL CREEK DRAINAGE BASIN
SUMMARY OF PERTINENT BASIN DATA: POST CONDITION

HYDROLOGIC BASIN NO.	TO NODE NO.	BASIN AREA (AC)	SCS WEIGHTED CN	TIME OF CONCENTRATION (MIN)	UNIT HYDRO SHAPE FACTOR
710	610	37.0	67	28	342
810	614	29.6	72	29	342
820	614	74.5	72	55	342
830	615	27.3	72	29	342
840	616	30.8	66	32	342
910	622	31.6	72	33	342
920	624	58.4	71	53	342
921	622	24.4	84	18	342
930	620	10.3	90	8	342
940	625	48.0	65	39	342
950	627	56.8	64	45	342
960	628	62.2	61	48	342
1000	700	69.5	67	38	342
1100	800	23.0	67	26	342
1200	900	54.0	80	56	342
CLDBRNCH	1400	663.8	62	111	342

1108tab2.tlb

TABLE G-3

CLOUD BRANCH DRAINAGE BASIN
SUMMARY OF PERTINENT BASIN DATA: PRE-CONDITION

HYDROLOGIC BASIN NO.	TO NODE NO.	BASIN AREA (AC)	SCS WEIGHTED CN	TIME OF CONCENTRATION (MIN)	UNIT HYDRO SHAPE FACTOR
100	10	90.0	69	33	342
200	20	12.0	53	20	342
300	40	5.0	54	15	342
310	40	32.0	54	25	342
400	STORAGE 1	12.0	59	28	342
500	STORAGE 1	44.0	57	38	342
600	STORAGE 2	27.0	56	52	342
700	STORAGE 3	23.0	78	25	342
800	STORAGE 3	26.0	65	36	342
900	STORAGE 3	6.4	54	28	342
1000	STORAGE 3	25.0	65	41	342
1100	100	13.3	83	24	342
1200	115	9.8	55	22	342
1300	1301	95.0	57	49	342
1400	1401	105.0	64	86	342
1500	130	26.3	56	21	342
1600	150	42.0	69	43	342
1700	170	47.0	65	27	342
1800	190	23.0	61	19	342
MILLCRK	210	1392.0	66	104	342

1108tab8.tlb

TABLE G-4

CLOUD BRANCH DRAINAGE BASIN
SUMMARY OF PERTINENT BASIN DATA: POST CONDITION

HYDROLOGIC BASIN NO.	TO NODE NO.	BASIN AREA (AC)	SCS WEIGHTED CN	TIME OF CONCENTRATION (MIN)	UNIT HYDRO SHAPE FACTOR
100	10	90.0	71	33	342
200	10	12.0	55	20	342
300	40	5.0	56	15	342
310	40	32.0	56	25	342
400	STORAGE 1	12.0	61	28	342
500	STORAGE 1	44.0	59	38	342
600	STORAGE 2	27.0	58	52	342
700	STORAGE 3	23.0	79	25	342
800	STORAGE 3	26.0	67	36	342
900	STORAGE 3	6.4	56	28	342
1000	100	25.0	67	41	342
1100	100	13.3	84	24	342
1200	110	9.8	57	22	342
1300	1301	95.0	59	49	342
1400	1401	105.0	66	86	342
1500	120	26.3	58	21	342
1600	150	42.0	71	43	342
1700	170	47.0	67	27	342
1800	190	23.0	63	19	342
MILLCRK	210	1392.0	66	104	342

1108tabl.tlb

TABLE G-5

MILL CREEK DRAINAGE BASIN
ESTIMATED PHYSICAL SOIL PROPERTIES:
S.C.S. SOIL SURVEY OF SEMINOLE COUNTY (1966)

MAP SYMBOL	SOIL	APPROX. % OF BASIN AREA	DESCRIPTION OF SOIL	DEPTH TO SEASONAL HIGH WATER TABLE*	PERMEABILITY (IN/HR)	AVAILABLE MOISTURE CAPACITY
Bt	Brighton, Istokpoga, and Okeechobee	3	This undifferentiated soil consists of organic soils that are too wet or have too dense a cover of vegetation to be studied separately.			
Df	Delray fine sand, high	8	Poorly drained or very poorly drained, slightly acid to neutral soils that have a thick surface layer that contains a large amount of organic matter.	0 to 15 inches 6 to 12 months	5 to 10	0.00-0.15
Im	Immokalee fine sand	7	Poorly drained, strongly acid, nearly level fine sand and sand; a pan stained with organic matter is at a depth of 30 to 48 inches.	0 to 15 inches 1 to 2 months of the year	0.8 to 50	0.00-0.15
LfA	Leon fine sand, 0 to 2 percent slopes	55	Poorly drained, strongly acid sand and fine sand underlain by sandy material; a pan stained with organic matter is at a depth of less than 30 inches.	0 to 15 inches 1 to 2 months of the year	0.8 to 50	0.00-0.15
Ma		4	Consists of clayey or sandy material, or both, that was either brought in by truck or was dredged in. Material is too variable to estimate soil properties.			

* Level expected during the normal wet season.

TABLE G-5 (Cont'd)

MILL CREEK DRAINAGE BASIN
ESTIMATED PHYSICAL SOIL PROPERTIES:
S.C.S. SOIL SURVEY OF SEMINOLE COUNTY (1966)

MAP SYMBOL	SOIL	APPROX. % OF BASIN AREA	DESCRIPTION OF SOIL	DEPTH TO SEASONAL HIGH WATER TABLE*	PERMEABILITY (IN/HR)	AVAILABLE MOISTURE CAPACITY
PmB	Pomello fine sand, 0 to 5 percent slopes	2	Thick beds of loose, moderately well-drained, strongly acid fine sand underlain by sandy material; a pan stained with organic matter is at a depth of 30 to 48 inches.	15 to 30 inches 1 to 2 months of the year	10 to 50	0.00-0.10
Pn	Pompano fine sand	1	Poorly drained or very poorly drained, slightly acid to neutral fine sand that is more than 30 inches thick.	0 to 15 inches 2 to 6 months of the year	2.5 to 10	0.00-0.15
Rm	Rutlege mucky fine sand	1	Very poorly drained, strongly acid fine sand that is more than 42 inches thick.	0 to 15 inches 6 to 12 months of the year	5 to 10	0.00-0.15
Sa	St. Johns fine sand	15	Poorly drained, strongly acid fine sand that has a highly organic surface layer.	0 to 15 inches 2 to 6 months of the year	2.5 to 10	0.00-0.15
SfB	St. Lucie fine sand, 0 to 5 percent slopes	1	Beds of loose, excessively drained sand, generally more than 72 inches thick.	30 to more than 60 inches for less than 1 month of the year	50+	0.00-0.05

* Level expected during the normal wet season.

scs2.tlb

TABLE G-6

CLOUD BRANCH DRAINAGE BASIN
ESTIMATED PHYSICAL SOIL PROPERTIES:
S.C.S. SOIL SURVEY OF SEMINOLE COUNTY (1966)

MAP SYMBOL	SOIL	APPROX. % OF BASIN AREA	DESCRIPTION OF SOIL	DEPTH TO SEASONAL HIGH WATER TABLE*	PERMEABILITY (IN/HR)	AVAILABLE MOISTURE CAPACITY
BnB	Blanton Fine Sand, 0 to 5 percent slopes	30	42 inches or more of moderately well drained, loose fine sand over stratified fine sandy loam or fine sandy clay loam	15 to 30 inches for 1 to 2 months of the year	2.5 to 50	0.00 to 0.15
Bp	Brighton peat	2	Strongly acid peat over acid sand. The thickness of the organic material ranges from 12 to 60 inches or more	0 to 15 inches continuously	5 to 50	0.00 to 0.20
LfA	Leon Fine Sand, 0 to 2 percent slopes	60	Poorly drained, strongly acid sand and fine sand underlain by sandy material; a pan stained with organic material is at a depth of less than 30 inches	0 to 15 inches continuously	10 to 50	0.00 to 0.15
Ma		4	Consists of clayey or sandy material or both that was either brought in by truck or was dredged in.	This undifferentiated soil consists of organic soils that are too wet or have too dense a cover of vegetation to be studied or separated.		
PmB	Pomello Fine Sand, 0 to 5 percent slopes	4	Thick beds of loose, moderately well drained, strongly acid fine sand underlain by sandy material; a pan stained with organic material is at a depth of 30 to 48 inches	15 to 30 inches 1 to 2 months of the year	10 to 50	0.00 to 0.10

*Level expected during the normal wet season

TABLE G-7
LAKE MONROE SEASONAL WATER SURFACE ELEVATIONS*

CALENDAR YEAR	LAKE MONROE WATER SURFACE ELEVATIONS (FMSL) MAX	MEAN	MIN
1982	4.39	2.40	0.25
1983	4.32	2.33	1.26
1984	3.20	1.91	0.62
1985	4.79	1.86	0.26
1986	3.87	1.54	0.39
1987	3.76	1.83	0.31
1988	2.88	1.68	0.30
1989	2.52	1.16	-0.18
1990	1.73	1.02	0.25
1982-1990 AVERAGE:	3.50	1.75	0.38

NOTE: Lake Monroe (receiving water) assumed to be at elevation 3.00 FMSL for design storm events (hydraulic analysis).

*Data supplied by the U.S. Department of the Interior - Geologic Survey:

- Station Number 02234499
- Location: Lake Monroe, near Sanford, FL
- Latitude: 285013
- Longitude: 0811928
- State: 12
- County: 117

bmf.tlb

TABLE G-8

SEMINOLE COUNTY
25-YEAR FREQUENCY / 6-HOUR DURATION
RAINFALL DISTRIBUTION

TIME (MIN)	TIME (HR)	CUMUL PREC (IN)	DELTA PREC (IN)
0	0.00	0.00	0.00
15	0.25	0.10	0.10
30	0.50	0.21	0.11
45	0.75	0.33	0.12
60	1.00	0.48	0.15
75	1.25	0.64	0.16
90	1.50	0.81	0.17
105	1.75	1.08	0.27
120	2.00	1.38	0.30
135	2.25	2.46	1.08
150	2.50	3.60	1.14
165	2.75	3.90	0.30
180	3.00	4.20	0.30
195	3.25	4.44	0.24
210	3.50	4.68	0.24
225	3.75	4.86	0.18
240	4.00	5.01	0.15
255	4.25	5.16	0.15
270	4.50	5.28	0.12
285	4.75	5.40	0.12
300	5.00	5.52	0.12
315	5.25	5.64	0.12
330	5.50	5.76	0.12
345	5.75	5.88	0.12
360	6.00	6.00	0.12

NOTE: Rainfall distribution taken from Seminole County Land Development Code.

bmftabl.tlb

TABLE G-9

SOIL CONSERVATION SERVICE (S.C.S.) 25-YEAR FREQUENCY/24-HOUR DURATION TYPE III RAINFALL DISTRIBUTION

TIME (MIN.)	TIME (HR.)	CUMUL. PREC. (IN.)	DELTA PREC. (IN.)
0	0.00	0.00	0.000
30	0.50	0.04	0.043
60	1.00	0.09	0.043
90	1.50	0.13	0.043
120	2.00	0.17	0.043
150	2.50	0.22	0.052
180	3.00	0.27	0.043
210	3.50	0.32	0.052
240	4.00	0.37	0.052
270	4.50	0.43	0.060
300	5.00	0.49	0.060
330	5.50	0.55	0.060
360	6.00	0.62	0.069
390	6.50	0.69	0.069
420	7.00	0.77	0.077
450	7.50	0.86	0.095
480	8.00	0.99	0.129
510	8.50	1.12	0.129
540	9.00	1.27	0.155
570	9.50	1.44	0.163
600	10.00	1.63	0.189
630	10.50	1.86	0.232
660	11.00	2.15	0.292
690	11.50	2.56	0.413
705	11.75	2.92	0.353
720	12.00	4.30	1.385
735	12.25	5.69	1.393
750	12.50	6.04	0.344
780	13.00	6.46	0.421
810	13.50	6.75	0.292
840	14.00	6.97	0.224
870	14.50	7.17	0.198
900	15.00	7.34	0.163

TABLE G-9 (Cont'd)

SOIL CONSERVATION SERVICE (S.C.S.) 25-YEAR FREQUENCY/24-HOUR DURATION TYPE III RAINFALL DISTRIBUTION

TIME (MIN.)	TIME (HR.)	CUMUL. PREC. (IN.)	DELTA PREC. (IN.)
930	15.50	7.48	0.146
960	16.00	7.62	0.138
990	16.50	7.74	0.120
1020	17.00	7.83	0.095
1050	17.50	7.91	0.077
1080	18.00	7.99	0.077
1110	18.50	8.05	0.060
1140	19.00	8.12	0.069
1170	19.50	8.18	0.060
1200	20.00	8.23	0.052
1230	20.50	8.28	0.052
1260	21.00	8.33	0.052
1290	21.50	8.39	0.052
1320	22.00	8.44	0.052
1350	22.50	8.48	0.043
1380	23.00	8.52	0.043
1410	23.50	8.57	0.043
1440	24.00	8.60	0.034

1119tab4.tlb

TABLE G-10

MILL CREEK AND CLOUD BRANCH DRAINAGE BASINS
STAGE - AREA RELATIONSHIPS: PRE-CONDITION

DRAINAGE BASIN	NODE NO.	STAGE (FMSL)	AREA (AC)
MILL CREEK			
	200	25.13	0.48
		31.75	2.05
		32.00	2.51
	300	24.17	0.32
		31.10	1.19
		31.50	1.50
	400	20.04	0.29
		30.00	0.91
		30.50	1.14
	800	18.32	0.75
		26.08	2.94
		26.50	3.28
	1000	12.00	1.01
		19.00	3.66
CLOUD BRANCH			
	STORAGE 1	23.97	0.18
		27.98	2.30
		30.00	2.75
	STORAGE 2	23.07	0.09
		27.08	1.20
		29.00	1.45
	STORAGE 3	21.95	0.07
		26.96	0.42
		28.70	0.47

1114TAB1.TLB

S0607.02

TABLE G-11

MILL CREEK AND CLOUD BRANCH DRAINAGE BASINS STAGE - AREA RELATIONSHIPS: POST CONDITION

DRAINAGE BASIN	NODE NO.	STORAGE AREA CLASS.	STAGE (FMSL)	AREA (AC)
<u>MILL CREEK</u>				
	100	NSA	32.00	0.50
			36.00	1.00
			40.00	1.50
	300	PDF	23.80	21.43
			35.00	26.67
	614	PDF	20.74	3.75
			28.00	5.90
	620	NSA	10.18	0.10
			18.00	1.00
	624B	PDF	22.00	1.90
			29.00	2.80
<u>CLOUD BRANCH</u>				
	10	PDF	27.65	2.70
			31.65	3.87
			32.65	4.19
	STORAGE 1	NSA	23.97	0.18
			27.98	2.30
			30.00	2.75
	STORAGE 2	NSA	23.07	0.09
			27.08	1.20
			29.00	1.45
	STORAGE 3	PDF	21.95	0.67
			25.95	1.06
			26.95	1.25
	120	PDF	17.50	2.00
			23.50	3.10
	150	PDF	15.67	0.25
			17.67	0.45
			21.67	0.90

<u>NOTE</u>: NSA - Natural Storage Area
PDF - Proposed Detention Facility

1114tab2.tlb

TABLE G-12

MILL CREEK DRAINAGE BASIN
25-YEAR/6-HOUR STORM EVENT
ANALYTICAL RESULTS: PRE-CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
220	200	35.72	8.84	16	6.00
200	100,105 210,220	32.03	9.03	194	3.13
201	300	31.43	2.93	189	3.50
300	---	31.30	8.24	185	3.57
301	400	29.29	2.53	247	3.67
400	410,420 500	25.85	5.43	276	3.87
401	---	24.04	0.68	276	3.87
550	610,625 640,650	22.97	4.56	399	3.80
600	620	22.22	10.78	446	3.10
601	---	17.46	0.33	444	3.13
800	810,820 830,840	22.97	8.60	139	3.47
801	---	21.13	0.64	139	3.47
602	700,710	17.37	3.28	603	3.77
1000	910,920 921,940 950,960	17.92	13.86	186	2.83

TABLE G-12 (Cont'd)

MILL CREEK DRAINAGE BASIN
25-YEAR/6-HOUR STORM EVENT
ANALYTICAL RESULTS: PRE-CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE	
				FLOW (CFS)	TIME (HR)
1001	---	17.14	1.25	181	3.63
603	930	17.05	9.54	788	3.83
1100	1000	13.50	10.00	830	3.83
1101	---	13.18	1.60	830	3.83
1200	1100	12.56	4.36	841	3.83
1201	---	12.33	2.10	840	3.87
1300	1200	11.79	7.22	890	3.90
1301	---	10.70	6.25	890	3.93
1400	CLDBRNCH	3.62	8.73	1247	3.90
1401	---	3.11	2.10	1247	3.87
LK MONROE	---	3.00	263.65	--	---

* AdICPR Filename: C:\MC\PRE256.*

1108tab7.tlb

TABLE G-13

MILL CREEK DRAINAGE BASIN
25-YEAR/24-HOUR STORM EVENT
ANALYTICAL RESULTS: PRE-CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE	
				FLOW (CFS)	TIME (HR)
220	200	39.29	12.93	22	14.57
200	100,105 210,220	32.61	10.35	390	12.77
201	300	32.56	3.41	420	12.73
300	---	32.17	9.94	444	12.80
301	400	32.14	3.73	580	12.67
400	410,420 500	27.16	6.65	754	12.53
401	---	26.82	1.09	753	12.53
550	610,625 640,650	25.73	6.54	1091	12.57
600	620	22.79	11.77	1221	12.57
601	---	21.62	0.52	1218	12.57
800	810,820 830,840	25.57	13.39	279	12.80
801	---	22.60	0.87	279	12.83
602	700,710	21.47	5.11	1556	12.60
1000	910,920 921,940 950,960	23.81	27.65	372	13.30

TABLE G-13 (Cont'd)

MILL CREEK DRAINAGE BASIN
25-YEAR/24-HOUR STORM EVENT
ANALYTICAL RESULTS: PRE-CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE	
				FLOW (CFS)	TIME (HR)
1001	---	21.12	2.07	382	13.30
603	930	21.09	14.55	1788	12.77
1100	1000	17.14	14.28	1892	12.80
1101	---	17.06	2.32	1890	12.80
1200	1100	16.05	6.25	1914	12.80
1201	---	15.97	3.06	1912	12.83
1300	1200	15.17	10.00	2019	12.83
1301	---	14.93	9.44	2014	12.87
1400	CLDBRNCH	9.78	21.01	2510	13.00
1401	---	3.43	2.26	2510	13.00
LK MONROE	---	3.00	618.07	--	---

* AdICPR Filename: C:\MC\PRE2524.*

1108tab6.tlb

TABLE G-14

MILL CREEK DRAINAGE BASIN
25-YEAR/6-HOUR STORM EVENT
ANALYTICAL RESULTS: POST CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE	
				FLOW (CFS)	TIME (HR)
100	100,105	32.43	0.74	46	3.43
105	---	30.88	0.24	45	3.50
220	200	37.13	12.48	2	6.00
106	---	30.57	0.46	45	3.50
210	210	31.05	3.20	41	3.93
107	---	30.44	1.14	86	3.77
108	220	29.94	2.06	170	3.40
200	---	29.39	1.20	169	3.50
201	300	28.27	0.92	187	3.50
202	---	27.50	0.78	187	3.53
300	400	26.23	58.42	81	6.00
301	410,420	21.50	0.06	104	6.00
302	500	20.42	0.19	121	2.67
400	---	16.76	0.33	119	2.67
401	610	16.59	0.65	150	2.67
410	625,650	16.82	0.52	54	2.90
402	---	16.42	2.15	182	2.87
403	620	16.09	2.47	256	2.93
600	---	15.94	1.05	255	2.97
610	700,710	15.31	0.07	570	4.30
616	840	27.23	0.00	38	2.70
615	830	26.81	0.89	82	2.73
619	640	26.57	0.01	119	2.90
618	---	26.04	1.54	117	3.03
617	---	25.83	1.00	125	3.93

TABLE G-14 (Cont'd)

MILL CREEK DRAINAGE BASIN
25-YEAR/6-HOUR STORM EVENT
ANALYTICAL RESULTS: POST CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
614	810,820	25.83	25.84	191	3.90
613	---	23.78	1.34	190	3.97
612	---	22.52	1.11	189	4.03
611	---	20.32	0.76	189	4.03
620	930	15.01	4.71	483	4.23
620A	---	14.51	1.02	484	4.23
620B	---	14.14	1.14	484	4.30
628	960	30.55	0.12	46	3.10
627	950	30.25	0.72	97	3.07
626	---	29.86	0.69	96	3.10
625	940	28.92	2.17	140	3.17
624B	---	26.28	11.90	95	4.20
624A	---	24.33	0.49	95	4.23
624	920	24.04	0.74	155	4.43
623	---	19.82	1.91	134	4.23
622	910,921	15.65	2.13	164	2.63
621	---	15.06	1.21	168	4.33
650	---	12.46	3.63	484	4.37
700	1000	10.38	3.44	518	3.17
750	---	9.94	1.74	517	3.23
800	1100	9.69	1.65	534	3.23
850	---	9.22	1.62	533	3.27
900	1200	8.55	1.84	608	3.27
950	---	7.65	6.31	604	3.40
1000	CLDBRNCH	3.38	2.63	994	3.47
1050	---	3.06	1.62	994	3.47
LK MONROE	---	3.00	232.58	---	--

* AdICPR Filename: C:\MC\REVISED2.* 118tab10.tlb

TABLE G-15

MILL CREEK DRAINAGE BASIN
25-YEAR/24-HOUR STORM EVENT
ANALYTICAL RESULTS: POST CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE	
				FLOW (CFS)	TIME (HR)
100	100,105	33.73	1.56	83	12.93
105	---	32.59	0.45	82	13.00
220	200	38.41	14.71	24	15.20
106	---	32.50	0.85	95	13.33
210	210	32.62	6.41	74	13.13
107	---	32.45	1.98	166	13.33
108	220	32.27	3.29	300	12.90
200	---	32.02	1.85	300	12.93
201	300	30.11	1.32	317	12.93
202	---	29.68	1.26	316	12.97
300	400	27.29	84.05	138	18.67
301	410,420	26.24	0.13	146	12.20
302	500	24.26	0.36	200	12.33
400	---	20.92	0.97	188	12.30
401	610	20.92	1.78	234	12.33
410	625,650	20.92	1.62	90	12.50
402	---	20.91	5.47	251	12.40
403	620	20.90	5.29	350	12.53
600	---	20.88	2.10	316	12.40
610	700,710	20.74	0.16	316	13.13
616	840	28.12	0.00	76	12.37
615	830	27.68	1.20	158	12.40
619	640	29.96	0.01	190	12.60
618	---	28.77	2.74	163	12.73
617	---	28.68	1.59	158	12.97
614	810,820	26.67	30.10	392	12.90
613	---	26.02	2.25	389	13.00

TABLE G-15 (Cont'd)

MILL CREEK DRAINAGE BASIN
25-YEAR/24-HOUR STORM EVENT
ANALYTICAL RESULTS: POST CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
612	---	25.48	1.89	388	13.03
611	---	21.42	1.01	388	13.07
620	930	19.63	9.07	942	13.17
620A	---	17.72	1.66	947	13.20
620B	---	17.45	1.81	946	13.20
628	960	31.25	0.17	102	12.57
627	950	31.22	0.95	208	12.60
626	---	30.33	0.80	208	12.60
625	940	30.27	3.09	304	12.60
624B	---	27.93	16.50	188	13.57
624A	---	27.89	1.19	188	13.63
624	920	27.84	1.49	258	13.27
623	---	21.72	3.34	258	13.50
622	910,921	21.54	5.56	299	13.50
621	---	19.67	2.51	486	13.23
650	---	14.70	5.45	947	13.23
700	1000	13.43	5.38	1022	13.10
750	---	12.72	2.64	1022	13.10
800	1100	12.47	2.54	1041	13.07
850	---	11.79	2.47	1040	13.10
900	1200	11.21	2.73	1140	13.07
950	---	9.71	8.86	1136	13.13
1000	CLDBRNCH	7.27	8.77	1669	13.17
1050	---	3.16	1.68	1669	13.17
LK MONROE	---	3.00	611.30	--	--

* AdICPR Filename: C:\MC\2524256A.*

1119tab2.tlb

TABLE G-16

CLOUD BRANCH DRAINAGE BASIN
25-YEAR/6-HOUR STORM EVENT
ANALYTICAL RESULTS: PRE-CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE	
				FLOW (CFS)	TIME (HR)
10	100	33.32	0.71	123	2.77
20	200	32.56	1.08	130	2.80
40	300,310	31.84	0.54	154	2.77
50	---	30.82	0.39	154	2.80
STORAGE 1	400,500	30.53	8.03	122	3.57
STORAGE 2	600	30.51	5.19	137	3.67
STORAGE 3	700,800 900,1000	30.50	2.18	194	3.57
90	---	30.47	0.40	194	3.57
100	1100	30.00	0.35	206	3.57
110	---	28.80	0.50	206	3.57
115	---	27.96	0.97	257	3.60
1301**	1300	30.57	1.11	48	3.80
118	---	27.58	0.51	312	3.70
1401**	1400	32.04	2.24	63	4.23
120	---	26.62	1.72	312	3.70
130	1500	26.45	1.70	358	4.40
140	---	26.38	1.03	323	3.70

** Artificial Basin utilized to simulate upstream storage in various areas (roadway, parking area and lot storage).

TABLE G-16 (Cont'd)

CLOUD BRANCH DRAINAGE BASIN
25-YEAR/6-HOUR STORM EVENT
ANALYTICAL RESULTS: PRE-CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
150	1600	26.20	1.14	356	3.67
160	---	20.49	2.11	356	3.73
170	1700	16.48	1.61	384	3.70
180	---	13.24	0.86	384	3.70
190	1800	9.82	0.81	395	3.73
200	---	7.48	2.12	394	3.77
210	MILLCRK	6.57	4.73	1278	3.83
1000	---	3.65	1.83	1278	3.83
1050	---	3.11	1.91	1278	3.83
LK MONROE	---	3.00	294.22	--	--

* AdICPR Filename: C:\CB\256PRE3.*

1108tab4.tlb

TABLE G-17

CLOUD BRANCH DRAINAGE BASIN
25-YEAR/24-HOUR STORM EVENT
ANALYTICAL RESULTS: PRE-CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
10	100	34.99	0.94	236	12.40
20	200	34.01	1.40	255	12.43
40	300,310	32.95	0.66	336	12.60
50	---	32.92	0.58	317	12.40
STORAGE 1	400,500	32.49	13.14	228	12.63
STORAGE 2	600	32.47	7.79	202	12.83
STORAGE 3	700,800 900,1000	32.37	3.01	176	14.07
90	---	32.76	0.51	549	12.83
100	1100	30.95	0.41	385	12.53
110	---	30.88	0.71	462	12.80
115	---	29.40	1.20	563	12.83
1301**	1300	40.70	3.60	100	13.10
118	---	28.19	0.55	718	12.80
1401**	1400	40.95	4.69	107	13.60
120	---	28.03	2.03	651	12.90
130	1500	27.57	1.92	674	13.33

** Artificial Basin utilized to simulate upstream storage in various areas (roadway, parking area and lot storage).

TABLE G-17 (Cont'd)

CLOUD BRANCH DRAINAGE BASIN
25-YEAR/24-HOUR STORM EVENT
ANALYTICAL RESULTS: PRE-CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
140	---	27.49	1.16	672	12.87
150	1600	26.91	1.22	743	12.80
160	---	22.94	2.94	743	12.83
170	1700	17.35	1.78	812	12.73
180	---	16.04	1.27	811	12.77
190	1800	14.27	1.28	834	12.73
200	---	11.99	3.81	829	12.77
210	MILLCRK	11.66	8.43	2829	12.87
1000	---	10.65	4.73	2829	12.90
1050	---	3.54	2.10	2829	12.90
LK MONROE	---	3.00	765.75	--	--

* AdICPR Filename: C:\CB\2524PRE.*

1108tab5.tlb

TABLE G-18

CLOUD BRANCH DRAINAGE BASIN
25-YEAR/6-HOUR STORM EVENT
ANALYTICAL RESULTS: POST CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE	
				FLOW (CFS)	TIME (HR)
10	100,200	32.03	14.68	46	4.47
15	---	29.72	0.90	42	4.70
40	300,310	29.60	1.00	52	4.93
50	---	28.19	0.27	52	5.17
STORAGE 1	400,500	27.46	1.25	72	4.93
STORAGE 2	600	27.31	1.00	83	4.93
STORAGE 3	700,800,900	27.06	4.76	114	4.23
100	1000,1100	26.00	0.09	141	3.33
110	1200	24.20	0.14	145	3.27
1301**	1300	27.62	0.39	61	3.27
1401**	1400	28.29	1.20	69	4.20
120	1500	22.92	14.02	273	3.93
150	1600	22.09	3.80	305	3.80
160	---	19.67	1.81	305	3.87
170	---	15.78	1.47	332	3.80
180	---	12.76	0.79	332	3.80
190	---	8.97	0.72	343	3.77
200	---	6.60	1.79	343	3.80
210	MILLCRK	5.89	4.24	1231	3.93
1000	---	3.59	1.80	1231	3.93
1050	---	3.09	1.90	1232	3.93
LK MONROE	---	3.00	288.87	--	--

* AdICPR Filename: C:\CB\256POST5.*

** Artificial Basin utilized to simulate upstream storage in various areas (roadway, parking areas and lot storage).

TABLE G-19

CLOUD BRANCH DRAINAGE BASIN
25-YEAR/24-HOUR STORM EVENT
ANALYTICAL RESULTS: POST CONDITION*

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
10	100,200	32.50	16.57	163	12.70
15	---	32.07	1.90	162	12.83
40	300,310	31.97	1.86	196	12.83
50	---	31.62	0.80	190	12.83
STORAGE 1	400,500	31.60	11.12	131	13.00
STORAGE 2	600	31.59	6.66	132	16.37
STORAGE 3	700,800,900	31.57	9.98	192	15.13
100	1000,1100	29.06	0.13	183	13.03
110	1200	26.60	0.19	195	12.40
1301**	1300	38.04	2.95	108	13.00
1401**	1400	39.03	4.16	111	13.63
120	1500	25.10	19.63	389	13.83
150	1600	23.44	4.88	423	13.37
160	---	20.55	2.10	423	13.40
170	---	16.72	1.66	476	12.57
180	---	13.78	0.94	476	12.57
190	---	11.51	0.99	518	12.53
200	---	8.27	2.42	512	12.53
210	MILLCRK	7.89	5.69	1605	13.17
1000	---	7.06	3.24	1605	13.17
1050	---	3.15	1.93	1605	13.17
LK MONROE	---	3.00	581.41	--	--

* AdICPR Filename: C:\CB\2524PST1.*

** Artificial Basin utilized to simulate upstream storage in various areas (roadway, parking areas and lot storage).

1119tabl.tlb

MILL CREEK/CLOUD BRANCH STORMWATER MANAGEMENT SYSTEM IMPROVEMENTS

CONCEPTUAL PERMIT APPLICATION TO
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

SUPPLEMENTARY INFORMATION BOOKLET

DECEMBER 1991

TABLE OF CONTENTS

LIST OF TABLES

I. Site Specific Description and History:

The north central and northwestern portions of the City of Sanford contain stormwater drainage systems generally tributary to two existing, natural drainage ways. These two streams are Mill Creek and Cloud Branch.

The Mill Creek system drains the northwestern portion of the City of Sanford roughly bounded by Lake Monroe on the north, 25th Street on the south, Airport Boulevard and Bevier Road on the west and Olive Avenue on the east. The Cloud Branch system is generally bounded by Lake Monroe on the north, 25th Street on the south, Park Avenue and Sanford Avenue on the east and Olive Avenue on the west.

Both of these basins drain from south to north and are natural, relic, drainage channels which have been substantially modified for agricultural use and later for development purposes by the inclusion of road crossing culverts, regrading, basin diversions, channel relocations, rechannelization, and other activities. In most cases, rights-of-way for the creeks and the associated structures do not presently exist, except through prescriptive rights or where the channels follow or cross street rights-of-way. There is no retention or detention provided in the system except that occurring in the channels themselves or in some smaller, lower floodplain areas through which channels pass.

Most of the buildings, streets and improvements in the Mill Creek basin came about without any appreciable governmental regulation. Because of the natural streams which ran through the area, it was ideal for agricultural purposes. The community of Goldsboro sprang up around the various railroad lines. It became populated and grew into the incorporated community of Goldsboro, and was incorporated as the Village of Goldsboro in 1891. It was not brought into the City of Sanford until 1911, and had approximately 5,000 people in the Village at the time it was incorporated in 1891.

The areas surrounding these two channels are currently thoroughly developed, economically depressed, and are mostly comprised of black and lower income housing, neighborhood commercial, railroad, and industrial land use. Repeated hazardous flooding problems exist in these areas because of the very inadequate drainage system. In many cases, homes and other structures are built right on the streams and ditches, and public health and safety has always been a major problem as well as the flooding damage.

On July 13, 1991, the Mill Creek/Cloud Branch area, as well as the rest of Sanford, was hit by an extreme rainfall event. At the Water Reclamation Facility located at the confluence of Cloud Branch and Mill Creek streams (at Lake Monroe), 0.2" of rainfall fell from midnight until 8:00 a.m.. From 8:00 a.m. until 1:00 p.m., an additional 5.8" of rainfall was measured. The storm was preceded by an extended wet period of regular, heavy rainfalls and the ground was completely saturated and the runoff very high. Flooding of streets, homes, and buildings was very widespread and a great amount of property damage, misery and hazard was experienced by the area population. The public has been highly disturbed by this occurrence and the newspaper and residents have been exerting great pressure to obtain some relief. Unfortunately, over the years, there have been a number of reported drownings in the streams which run through these two basins which are located so close to homes and areas where children play. Luckily, no drownings occurred in the recent flooding of July 13, 1991.

There has never been a revenue source sufficient to even partly remedy the existing drainage problems. For example, some of the streets in the areas surrounding the channels have not been paved because it would take a drainage solution immediately preceding or coincidental with any pavement improvements to take care of the major ditches in the area and the water courses that run in the street rights-of-way. As a result, streets that badly need paving have been left unpaved and the drainage has not been fixed as the costs involved are extremely high and there has been no revenue source available. The City has recently adopted a Stormwater Utility Ordinance and will be implementing the system in the near future. A portion of the funds from this new source will be directed to the upgrading of the Mill Creek and Cloud Branch Stormwater Management Systems.

II. Statement of Intent:

It is the intent of the Consultants, City Officials, and Residents to get the main drainage system in the Goldsboro and Cloud Branch areas upgraded; to eliminate major flooding and the attendant property damage and public health hazards; and to reasonably comply with environmental and regulatory concerns.

With every increased level of protection provided by an increasing scope of drainage facilities, there is an attendant increase in cost. It is absolutely imperative to examine the level of protection and criteria to be applied to make absolutely certain that the optimum level of protection in relation to the cost is being provided for the following reasons:

- The area is a an old, existing, minority, completely developed area with relatively little undeveloped or vacant land
- It has severe drainage problems and generally high water table and poor soils conditions

- Right-of-Ways and land required for most of the existing and proposed improvements are not in public ownership
- Any solution of the problem involves extremely high cost
- Very limited fund availability.

The intent is to accomplish the program to a satisfactory level consistent with the needs, intent of the regulatory requirements, and fund availability that may be generated through the City's Stormwater Utility and other, already strained, revenue sources.

The SJRWMD Regulations contain Objectives and Standards from which criteria are established which presume that if these criteria are met, the standards and objectives will be met. It is the position of the Consultants, City Officials, and residents that certain of the standard SJRWMD Detailed Design Criteria are not appropriate for the subject case in order to substantially meet the Objectives and Standards of the Rules. Furthermore, it is the City's opinion that applying the same design criteria to a "retrofit" situation as to new development is neither necessary, appropriate, nor financially feasible in this particular case. If the SJRWMD presumptive criteria are applied in an inflexible manner, it will simply mean that these kinds of problems and the attendant property damage, human misery, and threat to the public health and safety, will tend to continue without being addressed because no substantial progress will be attainable.

We believe that we will show in the attached material that the Objectives and Standards of the District can be substantially met without meeting all of the detailed design criteria included in the SJRWMD Rules and their implementation.

III. Previous Studies:

1968 Study:

The City's Consulting Engineer studied these basins in 1968 and prepared a Drainage Study which proposed solutions to the drainage problems which were never implemented because of cost and unavailability of funds. However, a considerable amount of base information is available from this Study as the basins have not changed very much since that time. The 1968 Study was prior to the existence of current regulatory requirements of the SJRWMD and others for retention/detention and other current criteria and regulations.

1988 Study:

A follow-up Study, including strategically located detention facilities utilizing computer modeling was performed in 1988 for a 25 year / 16 hour storm event (6-inch rainfall).

Current Study:

The present Study is a Preliminary Engineering Study to refine designs, needs and costs and prepare Preliminary Engineering Plans for a staged implementation of drainage improvements including land and right-of-way acquisition and construction of needed improvements including some detention facilities.

IV. Proposed Criteria and Performance Standards:

We propose to generally use a 25 Year / 6 Hour storm analysis for the main facilities in these basins where it is economically feasible to do so. The 25 Year / 6 Hour storm is 6" of rainfall in 6 hours, while the 25 year / 24 Hour SJRWMD storm is 8.6" of rainfall in 24 hours. We propose to provide some strategically located detention facilities in the system, sized basically to attenuate or reduce peak flows. The basins will have bleed down devices to reestablish the basin storage capacity in 14 days or less. It is also generally proposed that post development runoff to the lake from the 25 Year / 24 Hour storm will not exceed the predevelopment runoff for the 25 Year / 24 Hour storm at the point of discharge.

The soils in the study area are poor percolating soils with high groundwater table and retention is not a practical alternative. Filtration is not proposed to be provided as is allowable in the South Florida Water Management and Southwest Florida Water Management Districts, but pollution abatement by settling and oil and trash skimming, as well as peak flow mitigation, will be accomplished in the detention basins and system. The detention facilities in Coast Line Park and Pinehurst Park will be designed as wet detention facilities, providing pollution abatement, peak attenuation and recreational and aesthetic benefits as lakes or ponds. In addition for erosion control and pollution abatement, erosion protective measures including seeding and sodding will be extensively utilized. Also, junction structures at side streets will be dual compartment structures providing some pollution abatement function. Also, lateral drainage wherever feasible will be conveyed in swales on side streets. Direct discharge of lateral ditches, swales, sheet flow and pipes into the main system will be minimized. Raised inlets in grassed depressed areas or other similar measures will be utilized where practical to convey lateral drainage into the main system. The lateral drainage is not a part of this project, but can be separately accomplished where practically feasible over a period of years.

Some strategically located channels in close proximity to people and buildings are proposed to be closed, and where possible in less congested areas, channels or streams are left open. Many road crossings and culverts would have to be increased in size and/or replaced with bigger pipes or box culverts provided or lengthened, etc. Fencing will be utilized in selected, strategic locations at detention basins and open channels to reduce any hazard to children or others who live in close proximity to the facility.

Right-of-Way acquisition by establishment of prescriptive rights and acquisition of additional right-of-way width by donation, is contemplated. Land acquisition by purchase or condemnation will be required for most detention facilities and at some conveyance locations. Having dedicated rights-of-way will drastically improve maintenance and will result in better flow capability and pollution abatement.

Analysis of the enclosed Nodal Diagrams (Map Pockets D, E, F, G, H, I, J, and K), and the basin physical culture and topography shows the general hydraulic performance and effect of the proposed criteria. The proposed general project criteria when implemented will essentially eliminate the vast majority of building and street flooding with construction or improvement of suitable lateral drainage under separate projects.

V. Performance of 25 Year / 6 Hour Designed Facilities Under 25 Year / 24 Hour Storm and Other Performance Evaluation

Nodal diagrams for the Mill Creek and Cloud Branch Drainage Basins, showing the results of applying the 25 Year / 24 Hour Storm to the system preliminarily designed for the 25 Year / 6 Hour storm are presented in Map Pockets J and K. Examination of the flows, and Water Surface elevations shows that, in general, the 25 Year / 6 Hour designed facilities handle the heavier 25 Year / 24 Hour design storm without severe flooding problems. There would be some temporary street and yard flooding and inconvenience. However, increases in property damage over the 25 Year / 6 Hour storm due to building flooding or in public health or safety hazards would be so small as to not be significant or measurable.

Comparison of the pre and post condition peak runoff at the point of discharge, indicates that the post development peak runoff for the 25 Year / 24 Hour storm does not exceed the pre development runoff. The detention facilities as now preliminarily sized, have significantly decreased the peak rate of flow. This has been done primarily to minimize the size of proposed new downstream drainage facilities and/or to minimize the increase in size needed to existing facilities. The final design may vary from that shown, but no increase in peak flow rate at this measuring point is proposed for the 25 Year / 24 Hour storm.

VI. Mill Creek Cost Comparison - 25 Year / 6 Hour Storm Versus 25 Year / 24 Hour Storm

An Opinion of Probable Construction Cost to upgrade the Mill Creek Stormwater Management System is presented in Table 1. Table 2 presents a similar estimate for upgrading the facilities for the 25 Year / 24 Hour Storm. Table 3 is a summary table showing the increase in costs involved. The construction program utilizing the 25 Year / 6 Hour Storm has a total preliminary cost estimated at $7,619,846, while the 25 Year / 24 Hour Storm design, has a total preliminary cost estimated at $10,088,874, and the difference in cost is $2,469,028. There is a major difference in physical facilities and costs involved in providing the additional protection and there is no big difference in the protection provided. (See discussion in Section V). The analysis and cost comparison has been performed based on a hydraulic analysis only. Other SJRWMD pollution abatement criteria such as providing filtration and detention of the first one-inch of runoff throughout the basin have not been utilized. If applied, they simply would serve to dramatically increase the cost of the SJRWMD 25 Year / 24 Hour presumptive criteria alternative and greatly increase the cost difference with the proposed design criteria.

These opinions of probable construction cost include only the Mill Creek basin as representative and do not include the adjacent, similar Cloud Branch Basin or any other basins also experiencing serious drainage problems in the City. Obviously, the cost differential would increase very significantly if the Cloud Branch Basin were also included in the comparison.

TABLE 1

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST: MILL CREEK DRAINAGE BASIN

25-YEAR/6-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
A. CHANNEL CLEANING AND REGRADING			
1. Mill Creek Channel & Tributaries	25,000 LF	$ 4.00	$ 100,000
2. Stripping and Sodding	15,000 SY	2.00	30,000
3. Seeding and Mulching	73,300 SY	0.35	25,655
4. Channel Section Fencing	5,000 LF	10.00	50,000
5. Channel Section Sodding	1 LS	25,000	25,000
6. Erosion Control (Fabriform, Etc.)	1 LS	100,000	100,000
		SUBTOTAL:	**$ 330,655**
B. DETENTION POND SYSTEMS			
1. <u>18th Street Detention System</u>			
A. Land Cost	33 AC	$ 26,136	$ 862,488
B. Excavation & Disposal (On-Site) (9.0' Avg. Cut)	479,160 CY	1.50	718,740
C. Seeding and Mulching	50,000 SY	0.35	17,500
D. System Control Structures	1 LS	50,000	50,000
E. Fencing of Site (5300 LF @ $10/LF + 2 Gates)	1 LS	55,000	55,000
F. Sodding of Side Slopes	1 LS	10,000	10,000
G. Erosion Control (Fabriform)	1 LS	30,000	30,000
H. Construction of Maint. Roadway and Pond Berm	1 LS	62,500	62,500
		SUBTOTAL:	**$1,806,228**

TABLE 1 (Cont'd)

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST:
MILL CREEK DRAINAGE BASIN

25-YEAR/6-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
2. McCracken Road/RR Detention System (South Side Channel)			
A. Land Cost	6.50 AC	$ 30,000	$195,000
B. Excavation & Disposal (On-Site) (9.0' Avg. Cut)	94,380 CY	1.50	141,570
C. Seeding and Mulching	9,800 SY	0.35	3,430
D. System Control Structure	1 LS	40,000	40,000
E. Fencing of Site (2200 LF @ $10/LF + 2 Gates)	1 LS	24,000	24,000
F. Sodding of Side Slopes	1 LS	10,000	10,000
G. Erosion Control (Fabriform)	1 LS	25,000	25,000
H. Construction of Maint. Roadway and Pond Berm	1 LS	45,000	45,000
I. Dual 48" RCP	60 LF	200.00	12,000
J. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
K. Culvert System Headwalls	2 EA	10,000	20,000
L. Asphalt Road Restoration	1 LS	5,000	5,000
M. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$527,000**
3. North Side Channel Detention System			
A. Land Cost	3.30 AC	$ 30,000	$ 99,000
B. Excavation & Disposal (On-Site) (6.5' Avg. Cut)	31,460 CY	1.50	47,190
C. Seeding and Mulching	3,800 SY	0.35	1,330
D. System Control Structure	1 LS	40,000	40,000
E. Fencing of Site (1400 LF @ $10/LF + 2 Gates)	1 LS	16,000	16,000
F. Sodding of Side Slopes	1 LS	10,000	10,000
G. Erosion Control (Fabriform)	1 LS	25,000	25,000
H. Construction of Maint. Roadway and Pond Berm	1 LS	45,000	45,000
		SUBTOTAL:	**$283,520**

TABLE 1 (Cont'd)

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST: MILL CREEK DRAINAGE BASIN

25-YEAR/6-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
C. UPGRADING OF CULVERT AT 20TH STREET & GOLDSBORO (MAIN CHANNEL)			
1. 4.0' x 8.0' Box Culvert	320 LF	$ 250	$ 80,000
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert System Headwalls	2 EA	10,000	20,000
4. Sodding	1,000 SY	2.00	2,000
5. Storm Inlets & Junction Boxes	4 EA	5,000	20,000
6. Asphalt Road Restoration	3 EA	5,000	15,000
7. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$143,000**
D. UPGRADING OF STORMWATER SYSTEM AT 18TH STREET (MAIN CHANNEL)			
1. Storm Inlets & Junction Boxes	2 EA	$ 5,000	$ 10,000
2. Miscellaneous (Grading, Grouting)	1 LS	1,500	1,500
3. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 15,000**
E. BACKFILLING OF DITCH FROM 20TH TO 18TH ST. (MAIN CHANNEL)			
1. Backfill and Compaction	1 LS	$ 10,000	$ 10,000
2. Sodding	3,900 SY	2.00	7,800
3. Miscellaneous (Grading, Etc.)	1 LS	2,200	2,200
		SUBTOTAL:	**$ 20,000**

TABLE 1 (Cont'd)

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST:
MILL CREEK DRAINAGE BASIN

25-YEAR/6-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
F. CULVERT CROSSING-EXISTING COUNTY DITCH TO 18TH ST. DETENTION POND (MAIN CHANNEL)			
1. 4.0' x 9.0' Box Culvert	375 LF	$ 275	$103,125
2. Culvert System Headwalls	2 EA	10,000	20,000
3. Sodding	500 SY	2.00	1,000
4. Storm Inlets & Junction Boxes	2 EA	5,000	10,000
5. Road Restoration	1 LS	7,500	7,500
6. Easement Acquisition	1 LS	20,000	20,000
7. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$165,125**
G. PIPING OF MILL CREEK FROM 18TH ST. TO NORTH OF 13TH ST. (MAIN CHANNEL)			
1. Dual 48-inch RCP Culverts	2,700 LF	$ 200	$540,000
2. Storm Inlets and Junction Boxes	15 EA	5,000	75,000
3. Culvert System Headwalls	2 EA	10,000	20,000
4. Sodding	3,200 SY	2.00	6,400
5. Easement Acquisition	1.00 AC	30,000	30,000
6. Asphalt Road Restoration	4 EA	5,000	20,000
7. Dirt Road Restoration	2 EA	2,000	4,000
8. Sheeting/Shoring/Traffic Control	1 LS	150,000	150,000
9. Realignment of Existing Water and Sewer Utilities	1 LS	50,000	50,000
10. Flow Control Boxes	3 EA	10,000	30,000
11. Miscellaneous Restoration	1 LS	20,000	20,000
12. Erosion Protection	1 LS	2,000	2,000
		SUBTOTAL:	**$947,400**

TABLE 1 (Cont'd)

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST:
MILL CREEK DRAINAGE BASIN

25-YEAR/6-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
H. UPGRADING OF CULVERT AT 8TH STREET (MAIN CHANNEL)			
1. 5.0' x 8.0' Box Culvert	60 LF	$ 300	$ 18,000
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert System Headwalls	2 EA	10,000	20,000
4. Sodding	100 SY	2.00	200
5. Asphalt Road Restoration	1 EA	5,000	5,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 49,200**
I. UPGRADING OF CULVERT AT MEISCH ROAD (NORTH SIDE CHANNEL)			
1. 1.5' x 10.0' Box Culvert	60 LF	$ 200	$ 12,000
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert Headwalls	2 EA	5,000	10,000
4. Sodding	100 SY	2.00	200
5. Asphalt Road Restoration	1 EA	5,000	5,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 33,200**
J. UPGRADING OF CULVERT OF BEVIER ROAD (NORTH SIDE CHANNEL)			
1. 1.5' x 10.0' Box Culvert	60 LF	$ 200	$ 12,000
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert Headwalls	2 EA	5,000	10,000
4. Sodding	100 SY	2.00	200
5. Asphalt Road Restoration	1 EA	5,000	5,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 33,200**

TABLE 1 (Cont'd)

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST: MILL CREEK DRAINAGE BASIN

25-YEAR/6-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
K. UPGRADING OF CULVERT AT AIRPORT BLVD. (SOUTH SIDE CHANNEL)			
1. Dual 42-inch RCP Culverts	50 LF	$ 150	$ 7,500
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert Headwalls	2 EA	5,000	10,000
4. Sodding	100 SY	2.00	200
5. Asphalt Road Restoration	1 EA	5,000	5,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 28,700**
L. UPGRADING OF CULVERT AT PERSIMMON AVENUE (SOUTH SIDE CHANNEL)			
1. 5.0' x 8.0' Box Culvert	60 LF	$ 300	$ 18,000
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert Headwalls	2 EA	7,500	15,000
4. Sodding	100 SY	2.00	200
5. Asphalt Road Restoration	1 EA	5,000	5,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 44,200**
M. UPGRADING OF CULVERT AT 8TH ST. (SOUTH SIDE CHANNEL)			
1. 5.0' x 8.0' Box Culvert	75 LF	$ 300	$ 22,500
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert Headwalls	2 EA	7,500	15,000
4. Sodding	100 SY	2.00	200
5. Asphalt Road Restoration	1 EA	5,000	5,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 48,700**

TABLE 1 (Cont'd)

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST:
MILL CREEK DRAINAGE BASIN

25-YEAR/6-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
N. REGRADING/REDIRECTION/CULVERT CROSSING OF CHANNEL @ RR/MCKEE AREA			
1. Ditch Filling/Grading/Sodding, Etc.	1 LS	$ 10,000	$ 10,000
2. Bore & Jack: Railroad	1 LS	7,500	7,500
3. Dual 48" RCP Culverts	50 LF	200	10,000
4. Culvert System Headwalls	2 EA	7,500	15,000
5. Sodding	250 SY	2.00	500
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 46,500**

O. MILL CREEK OPINION OF PROBABLE CONSTRUCTION COST

1. ITEMIZED COST BREAKDOWN (SEE ABOVE)	**$4,521,628**
2. RIGHT-OF-WAY ACQUISITION FOR MILL CREEK	**1,000,000**
3. CONSTRUCTION CONTINGENCY (15%)	**828,244**
4. PROJECT COSTS (SURVEYING, SOILS, ENGINEERING, LEGAL, CONSTRUCTION ADMIN., RPR, MAPPING, ETC.) (20%)	**1,269,974**
MILL CREEK OPINION OF PROBABLE CONSTRUCTION COST:	**$7,619,846**

TABLE 2

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST: MILL CREEK DRAINAGE BASIN

25-YEAR/24-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
A. CHANNEL CLEANING AND REGRADING			
1. Mill Creek Channel & Tributaries	25,000 LF	$ 4.00	$ 100,000
2. Stripping and Sodding	15,000 SY	2.00	30,000
3. Seeding and Mulching	73,300 SY	0.35	25,655
4. Channel Section Fencing	5,000 LF	10.00	50,000
5. Channel Section Sodding	1 LS	40,000	40,000
6. Erosion Control (Fabriform, Etc.)	1 LS	200,000	200,000
		SUBTOTAL:	**$ 445,655**
B. DETENTION POND SYSTEMS			
1. <u>18th Street Detention System</u>			
A. Land Cost	48 AC	$ 26,136	$1,254,528
B. Excavation & Disposal (On-Site) (9.0' Avg. Cut)	696,960 CY	1.50	1,045,440
C. Seeding and Mulching	78,000 SY	0.35	27,300
D. System Control Structures	1 LS	75,000	75,000
E. Fencing of Site (5300 LF @ $10/LF + 2 Gates)	1 LS	72,000	72,000
F. Sodding of Side Slopes	1 LS	20,000	20,000
G. Erosion Control (Fabriform)	1 LS	50,000	50,000
H. Construction of Maint. Roadway and Pond Berm	1 LS	100,000	100,000
		SUBTOTAL:	**$2,644,268**

TABLE 2 (Cont'd)

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST: MILL CREEK DRAINAGE BASIN

25-YEAR/24-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
2. McCracken Road/RR Detention System (South Side Channel)			
A. Land Cost	8.0 AC	$ 30,000	$240,000
B. Excavation & Disposal (On-Site) (9.0' Avg. Cut)	116,160 CY	1.50	174,240
C. Seeding and Mulching	12,016 SY	0.35	4,206
D. System Control Structure	1 LS	50,000	50,000
E. Fencing of Site (2200 LF @ $10/LF + 2 Gates)	1 LS	30,000	30,000
F. Sodding of Side Slopes	1 LS	15,000	15,000
G. Erosion Control (Fabriform)	1 LS	30,000	30,000
H. Construction of Maint. Roadway and Pond Berm	1 LS	62,500	62,500
I. Dual 48" RCP	60 LF	200.00	12,000
J. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
K. Culvert System Headwalls	2 EA	10,000	20,000
L. Asphalt Road Restoration	1 LS	5,000	5,000
M. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$648,946**
3. North Side Channel Detention System			
A. Land Cost	4.00 AC	$ 30,000	$120,000
B. Excavation & Disposal (On-Site) (6.5' Avg. Cut)	41,947 CY	1.50	62,921
C. Seeding and Mulching	4,750 SY	0.35	1,663
D. System Control Structure	1 LS	50,000	50,000
E. Fencing of Site (1400 LF @ $10/LF + 2 Gates)	1 LS	22,000	22,000
F. Sodding of Side Slopes	1 LS	15,000	15,000
G. Erosion Control (Fabriform)	1 LS	30,000	30,000
H. Construction of Maint. Roadway and Pond Berm	1 LS	62,500	62,500
		SUBTOTAL:	**$364,084**

TABLE 2 (Cont'd)

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST:
MILL CREEK DRAINAGE BASIN

25-YEAR/24-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
C. UPGRADING OF CULVERT AT 20TH STREET & GOLDSBORO (MAIN CHANNEL)			
1. 4.0' x 9.0' Box Culvert	320 LF	$ 275	$ 88,000
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert System Headwalls	2 EA	10,000	20,000
4. Sodding	1,000 SY	2.00	2,000
5. Storm Inlets & Junction Boxes	4 EA	5,000	20,000
6. Asphalt Road Restoration	3 EA	5,000	15,000
7. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$151,000**
D. UPGRADING OF STORMWATER SYSTEM AT 18TH STREET (MAIN CHANNEL)			
1. Storm Inlets & Junction Boxes	2 EA	$ 5,000	$ 10,000
2. Miscellaneous (Grading, Grouting)	1 LS	1,500	1,500
3. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 15,000**
E. BACKFILLING OF DITCH FROM 20TH TO 18TH ST. (MAIN CHANNEL)			
1. Backfill and Compaction	1 LS	$ 10,000	$ 10,000
2. Sodding	3,900 SY	2.00	7,800
3. Miscellaneous (Grading, Etc.)	1 LS	2,200	2,200
		SUBTOTAL:	**$ 20,000**

TABLE 2 (Cont'd)

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST:
MILL CREEK DRAINAGE BASIN

25-YEAR/24-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
F. CULVERT CROSSING-EXISTING COUNTY DITCH TO 18TH ST. DETENTION POND (MAIN CHANNEL)			
1. 4.0' x 9.0' Box Culvert	375 LF	$ 275	$103,125
2. Culvert System Headwalls	2 EA	10,000	20,000
3. Sodding	500 SY	2.00	1,000
4. Storm Inlets & Junction Boxes	2 EA	5,000	10,000
5. Road Restoration	1 LS	7,500	7,500
6. Easement Acquisition	1 LS	20,000	20,000
7. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$165,125**
G. PIPING OF MILL CREEK FROM 18TH ST. TO NORTH OF 13TH ST. (MAIN CHANNEL)			
1. Dual 48-inch RCP Culverts	2,700 LF	$ 200	$540,000
2. Storm Inlets and Junction Boxes	15 EA	5,000	75,000
3. Culvert System Headwalls	2 EA	10,000	20,000
4. Sodding	3,200 SY	2.00	6,400
5. Easement Acquisition	1.00 AC	30,000	30,000
6. Asphalt Road Restoration	4 EA	5,000	20,000
7. Dirt Road Restoration	2 EA	2,000	4,000
8. Sheeting/Shoring/Traffic Control	1 LS	150,000	150,000
9. Realignment of Existing Water and Sewer Utilities	1 LS	50,000	50,000
10. Flow Control Boxes	3 EA	10,000	30,000
11. Miscellaneous Restoration	1 LS	20,000	20,000
12. Erosion Protection	1 LS	2,000	2,000
		SUBTOTAL:	**$947,400**

TABLE 2 (Cont'd)

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST:
MILL CREEK DRAINAGE BASIN

25-YEAR/24-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
H. UPGRADING OF CULVERT AT 8TH STREET (MAIN CHANNEL)			
1. 5.0' x 8.0' Box Culvert	60 LF	$ 300	$ 18,000
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert System Headwalls	2 EA	10,000	20,000
4. Sodding	100 SY	2.00	200
5. Asphalt Road Restoration	1 EA	5,000	5,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 49,200**
I. UPGRADING OF CULVERT AT MEISCH ROAD (NORTH SIDE CHANNEL)			
1. 1.5' x 10.0' Box Culvert	60 LF	$ 200	$ 12,000
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert Headwalls	2 EA	5,000	10,000
4. Sodding	100 SY	2.00	200
5. Asphalt Road Restoration	1 EA	5,000	5,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 33,200**
J. UPGRADING OF CULVERT OF BEVIER ROAD (NORTH SIDE CHANNEL)			
1. 1.5' x 10.0' Box Culvert	60 LF	$ 200	$ 12,000
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert Headwalls	2 EA	5,000	10,000
4. Sodding	100 SY	2.00	200
5. Asphalt Road Restoration	1 EA	5,000	5,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 33,200**

TABLE 2 (Cont'd)

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST:
MILL CREEK DRAINAGE BASIN

25-YEAR/24-HOUR STORM EVENT

ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
K. UPGRADING OF CULVERT AT AIRPORT BLVD. (SOUTH SIDE CHANNEL)			
1. Dual 42-inch RCP Culverts	50 LF	$ 150	$ 7,500
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert Headwalls	2 EA	5,000	10,000
4. Sodding	100 SY	2.00	200
5. Asphalt Road Restoration	1 EA	5,000	5,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 28,700**
L. UPGRADING OF CULVERT AT PERSIMMON AVENUE (SOUTH SIDE CHANNEL)			
1. 5.0' x 8.0' Box Culvert	60 LF	$ 300	$ 18,000
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert Headwalls	2 EA	7,500	15,000
4. Sodding	100 SY	2.00	200
5. Asphalt Road Restoration	1 EA	5,000	5,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 44,200**
M. UPGRADING OF CULVERT AT 8TH ST. (SOUTH SIDE CHANNEL)			
1. 5.0' x 8.0' Box Culvert	75 LF	$ 300	$ 22,500
2. Demolition/Removal of Existing Culvert	1 LS	2,500	2,500
3. Culvert Headwalls	2 EA	7,500	15,000
4. Sodding	100 SY	2.00	200
5. Asphalt Road Restoration	1 EA	5,000	5,000
6. Erosion Protection	1 LS	3,500	3,500
		SUBTOTAL:	**$ 48,700**

TABLE 2 (Cont'd)

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST:
MILL CREEK DRAINAGE BASIN

25-YEAR/24-HOUR STORM EVENT

	ITEM DESCRIPTION	QUANTITY	UNIT COST	ITEM COST
N.	**REGRADING/REDIRECTION/CULVERT CROSSING OF CHANNEL @ RR/MCKEE AREA**			
1.	Ditch Filling/Grading/Sodding, Etc.	1 LS	$ 10,000	$ 10,000
2.	Bore & Jack: Railroad	1 LS	7,500	7,500
3.	Dual 48" RCP Culverts	50 LF	200	10,000
4.	Culvert System Headwalls	2 EA	7,500	15,000
5.	Sodding	250 SY	2.00	500
6.	Erosion Protection	1 LS	3,500	3,500
			SUBTOTAL:	**$ 46,500**
O.	**UPGRADING OF CULVERT AT 3RD STREET (MAIN CHANNEL)**			
1.	5.0' x 8.0' Box Culvert	80 LF	$ 300	$ 24,000
2.	Ditch Widening	1 LS	5,000	5,000
3.	Culvert System Headwalls	2 EA	10,000	20,000
4.	Sodding	400 SY	2.00	800
5.	Road Elev. Change and Restoration	1 EA	12,500	12,500
6.	Erosion Protection	1 LS	3,500	3,500
			SUBTOTAL:	**$ 65,800**
P.	**UPGRADING OF CULVERT AT 2ND STREET (MAIN CHANNEL)**			
1.	5.0' x 8.0' Box Culvert	60 LF	$ 300	$ 18,000
2.	Ditch Widening	1 LS	5,000	5,000
3.	Culvert System Headwalls	2 EA	10,000	20,000
4.	Sodding	400 SY	2.00	800
5.	Road Elev. Change and Restoration	1 EA	12,500	12,500
6.	Erosion Protection	1 LS	3,500	3,500
			SUBTOTAL:	**$ 59,800**

TABLE 2 (Cont'd)

CITY OF SANFORD

OPINION OF PROBABLE CONSTRUCTION COST:
MILL CREEK DRAINAGE BASIN

25-YEAR/24-HOUR STORM EVENT

Q. MILL CREEK OPINION OF PROBABLE CONSTRUCTION COST

1.	ITEMIZED COST BREAKDOWN (SEE ABOVE)	$5,810,778
2.	RIGHT-OF-WAY ACQUISITION FOR MILL CREEK	1,500,000
3.	CONSTRUCTION CONTINGENCY (15%)	1,096,617
4.	PROJECT COSTS (SURVEYING, SOILS, ENGINEERING, LEGAL, CONSTRUCTION ADMIN., RPR, MAPPING, ETC.) (20%)	1,681,479
	MILL CREEK OPINION OF PROBABLE CONSTRUCTION COST:	$10,088,874

TABLE 3

CITY OF SANFORD
MILL CREEK HYDROLOGIC/HYDRAULIC ANALYSIS
OPINION OF PROBABLE CONSTRUCTION COST SUMMARY

	ITEM DESCRIPTION	25YR/24HR COST	25YR/6HR COST	COST DIFFERENTIAL
A.	CHANNEL CLEANING AND REGRADING	$ 445,655	$ 330,655	$115,000
B.	DETENTION POND SYSTEMS			
	1. 18th STREET DETENTION SYSTEM	2,644,268	1,806,228	838,040
	2. McCRACKEN ROAD/RR DETENTION SYSTEM (SOUTH SIDE CHANNEL)	648,946	527,000	121,946
	3. NORTH SIDE CHANNEL DETENTION SYSTEM	364,084	283,520	80,564
C.	UPGRADING OF CULVERT AT 20th STREET & GOLDSBORO (MAIN CHANNEL)	151,000	143,000	8,000
D.	UPGRADING OF STORMWATER SYSTEM AT 18th STREET (MAIN CHANNEL)	15,000	15,000	0
E.	BACKFILLING OF DITCH FROM 20th TO 18th STREET (MAIN CHANNEL)	20,000	20,000	0
F.	CULVERT CROSSING-EXISTING CO DITCH TO 18th ST. DET. POND (MAIN CHANNEL)	165,125	165,125	0
G.	PIPING OF MILL CREEK FROM 18th ST. TO NORTH OF 13TH ST. (MAIN CHANNEL)	947,400	947,400	0
H.	UPGRADING OF CULVERT AT 8th STREET (MAIN CHANNEL)	49,200	49,200	0
I.	UPGRADING OF CULVERT AT 3rd STREET (MAIN CHANNEL)	65,800	0	65,800
J.	UPGRADING OF CULVERT AT 2nd STREET (MAIN CHANNEL)	59,800	0	59,800
K.	UPGRADING OF CULVERT AT MEISCH RD. (NORTH SIDE CHANNEL)	33,200	33,200	0
L.	UPGRADING OF CULVERT AT BEVIER RD. (NORTH SIDE CHANNEL)	33,200	33,200	0
M.	UPGRADING OF CULVERT AT AIRPORT BLVD. (SOUTH SIDE CHANNEL)	28,700	28,700	0
N.	UPGRADING OF CULVERT AT PERSIMMON AVE. (SOUTH SIDE CHANNEL)	44,200	44,200	0

TABLE 3 (Continued)

CITY OF SANFORD
MILL CREEK HYDROLOGIC/HYDRAULIC ANALYSIS
OPINION OF PROBABLE CONSTRUCTION COST SUMMARY

ITEM DESCRIPTION	25YR/24HR COST	25YR/6HR COST	COST DIFFERENTIAL
O. UPGRADING OF CULVERT AT 8th ST. (SOUTH SIDE CHANNEL)	48,700	48,700	0
P. REGRADING/REDIRECTION/CULVERT CROSSING OF CHANNEL AT RR/McKEE AREA	$ 46,500	46,500	0
Q. RIGHT-OF-WAY ACQUISITION FOR MILL CREEK	1,500,000	1,000,000	500,000
R. CONSTRUCTION CONTINGENCY (15%)	1,096,617	828,244	268,373
S. PROJECT COSTS (SURVEYING, SOILS, ENGINEERING, LEGAL CONSTRUCTION ADMIN., RPR, MAPPING, ETC.) (205)	1,681,479	1,269,974	411,505
MILL CREEK OPINION OF PROBABLE CONSTRUCTION COST	$10,088,874	$7,619,846	$2,469,028

VII. Accomplishment of SJRWMD Objectives and Standards Utilizing Proposed Criteria

Following is a listing of St. Johns River Water Management District Objectives and Standards. The "Objectives" are listed first, and the "Standards", follow. We have answered each point directly for our proposed storm and criteria and then followed that response with comparison remarks with the existing conditions in the basin and 25 Year / 24 Hour SJRWMD criteria, etc., as may be appropriate.

Objectives:

SJRWMD: To obtain a permit for operation, maintenance, removal or abandonment of a system, each applicant must give reasonable assurance that such activity will not:

No.O-1
SJRWMD: Adversely affect navigability of rivers and harbors;

CITY: No affect or difference in affect between the existing basin conditions or SJRWMD presumptive criteria.

No.O-2
SJRWMD: Adversely affect recreational development or public lands;

CITY: No adverse affect or difference in affect.

No.O-3
SJRWMD: Endanger life, health, or property;

CITY: There will remain some minimal risk to life, health and property. The proposed project would vastly reduce existing public health, safety and property damage and risks, but not all risks would be eliminated. In comparison with the SJRWMD 25 Year / 24 Hour presumptive criteria, there would be no significant, additional, adverse impact as there would only be some slight increase in street and yard flooding and inconvenience, but no additional risk to life, health, or property as no additional buildings would be flooded. Also see Map Pockets D through K for additional, detailed back-up data.

No.O-4
SJRWMD: Be inconsistent with the maintenance of minimum flows and levels established pursuant to Section 373.042, F.S.;

CITY: No adverse affect.

No.O-5
SJRWMD: Adversely affect the availability of water for reasonable beneficial purposes;

CITY: *No adverse affect or difference in affect.*

No.O-6
SJRWMD: Be incapable of being effectively operated;

CITY: *No adverse affect. Proposed system would be greatly improved operationally over existing facilities and it would meet SJRWMD criteria and requirements on operability.*

No.O-7
SJRWMD: Adversely affect the operation of a Work of the District established pursuant to Section 373.086, F.S., and Chapter 40C-6,F.A.C.;

CITY: *No adverse affect.*

No.O-8
SJRWMD: Adversely affect existing agricultural, commercial, industrial, or residential developments;

CITY: *No adverse affect. The existing conditions would be greatly improved. In comparison with the SJRWMD standard storm and criteria, the proposed system would cause very minor additional inconvenience, but no measurable difference in impact. See detail data in Map Pockets A, B, and D through K.*

No.O-9
SJRWMD Cause adverse impacts to the quality of receiving waters;

CITY: *No adverse impacts. Existing water quality will be significantly improved by the proposed project criteria. The water quality might be very slightly better under implementation of the complete SJRWMD criteria, but it is believed that it would not be significantly better.*

No.O-10
SJRWMD: Adversely affect natural resources, fish or wildlife;

CITY: *No difference in affect of the proposed design in comparison with SJRWMD criteria.*

No.O-11
SJRWMD: Induce saltwater or pollution intrusion;

CITY: *No adverse affect.*

No.O-12
SJRWMD: **Increase the potential for damages to off-site property or the public caused by:**

1. **floodplain development, encroachment or other alteration; or**
2. **retardance, acceleration, displacement, or diversion of surface water; or**
3. **reduction of natural water storage areas; or**
4. **facility failure;**

CITY: *No adverse impact.*

1. *Will help reduce risk to existing development in the floodplain and encroachments See Map Pocket data.*

2. *By providing detention areas downstream, runoff will be stored and flows mitigated. In areas proposed to be piped or closed, it will be accelerated, but the overall affect is not significantly changed.*

3. *Water currently is stored in the natural low areas, in the floodway and floodplain, in the streets, on the lots and private property and in the buildings. Under the proposed system, the street, lot and building water storage will be transferred to the planned detention areas and away from the people.*

4. *Detention facilities are the only facility proposed different from the existing system having a potential for failure, and they will be conservatively designed and emergency flow paths examined.*

Also see Map Pockets A, B, H, I, J, and K for additional, detailed information on Items 1-4 above, and response to Items O-1, O-2 and O-3 above.

No.O-13
SJRWMD: **Increase the potential for flood damages to residences, public buildings, or proposed and existing streets and roadways;**

CITY: *No adverse impact. The potential for flood damage to residences, buildings and streets will be vastly reduced under the proposed criteria. See response to Items No. O-3, O-12, O-15, O-16 and O-17.*

No.O-14
SJRWMD: **Otherwise be inconsistent with the overall objectives of the District.**

CITY: *Consistent with overall objectives of the District.*

No.O-15

SJRWMD: In evaluating the potential for flood damages to residences, public buildings, or public streets and roadways, the following <u>criteria</u> will be utilized:

Any proposed streets and roadways must be flood-free as required by local government criteria;

CITY: No adverse affect. Proposal will greatly help conditions. Please refer to Items No. O-3 - O-13, where subject was previously discussed and compared. City requires new development to be flood-free, etc., under development regulations. See also O-16, below.

No.O-16

SJRWMD: The first floor of any proposed building used for residence or as a public facility, must be set at or above an elevation adopted by local ordinance or where a local ordinance has not been adopted, at the 100 year flood elevation calculated by the District or approved by the District based upon the determination of the applicant.

CITY: No adverse impact. The City has adopted FIRM maps and requires all new buildings and residences to be above 100 Year Flood Elevation. Some existing buildings in subject basin are below 100 Year Flood Elevation and relief will be provided by the proposed improvements. This item is further discussed and compared with SJRWMD criteria under Items No. O-3, 0-12 and O-13.

<u>Standards:</u>

SJRWMD: To obtain a permit for the construction, alternation, operation or maintenance of a system, each applicant must give reasonable assurance that such activity meets the following standards:

No.S-1

SJRWMD: Adverse water quantity impacts will not be caused to receiving water and adjacent lands.

CITY: No adverse impact. See Map Pockets H and I, and also previous responses to Item Nos. O-3, O-8, O-12, O-15 and O-16.

No.S-2

SJRWMD: Surface and ground water levels and surface water flows will not be adversely affected.

CITY: No adverse impacts. See previous responses to Item Nos. O-3 and O-12.

No.S-3
SJRWMD: Existing surface water storage and conveyance capabilities will not be adversely affected.

CITY: No adverse impact. See also response to Item No. O-12.

No.S-4
SJRWMD: The system must be capable of being effectively operated.

CITY: The system can be effectively operated. Please refer to previous response Item No. O-6.

No.S-5
SJRWMD: The activity must not result in adverse impacts to the operation of Works of the District established pursuant to Section 373.086, F.S.

CITY: No adverse impacts.

No.S-6
SJRWMD: Hydrologically related environmental functions will not be adversely affected.

CITY: No adverse affect. Please refer to Items No. O-10 and O-11. Some open channels or conveyances through environmentally sensitive areas will have to be cleaned and increased in capacity. Also some detention sites may partially be in environmentally sensitive areas. This work will be done in conformance with SJRWMD and other applicable agency rules.

No.S-7
SJRWMD: The activity is not otherwise harmful to the water resources of the District.

CITY: No adverse impacts. See responses to Items No. O-1, O-4, O-5, O-7, O-9, O-11 and O-14.

No.S-8
SJRWMD: It is presumed that a system meets the standards listed above if the system meets the following *criteria*:

The post-development peak rate of discharge must not exceed the pre-development peak rate of discharge for the storm event as prescribed in Section 10.3.

CITY: The post-development peak rate of discharge will not exceed the pre-development peak rate of discharge to Lake Monroe for the 25 Year / 24 Hour design storm.

No.S-9
SJRWMD **The post-development volume of direct runoff must not exceed the pre-development volume of direct runoff for systems as prescribed in Subsections 10.4.2 and 10.4.3.**

CITY: *Not applicable. The system is not discharging to a land-locked lake as described in Section 10.4.2, nor does Section 10.4.3 requiring special volume requirements for specific basins apply.*

No.S-10
SJRWMD: **Floodways and floodplains, and levels of flood flows or velocities of adjacent streams, impoundments or other watercourses must not be altered so as to adversely impact the off-site storage and conveyance capabilities of the water resource.**

CITY: *No adverse impact. Existing off-site storage and conveyance capabilities will be greatly enhanced by proposed project and is the real reason for the project improvements. Velocities and erosion will be adequately satisfied by normal criteria.*

No.S-11
SJRWMD: **Flows of adjacent streams, impoundments or other watercourses must not be decreased so as to cause adverse impacts.**

CITY: *There will be no decrease in adjacent streams, impoundments or other watercourses.*

No.S-12
SJRWMD: **Hydrologically related environmental functions and water quality must not be adversely impacted.**

CITY: See previous response to Items No. S-6 and O-9.

APPENDICES

APPENDIX 1

MILL CREEK DRAINAGE BASIN:

25-YEAR/6-HOUR STORM EVENT

RUNOFF HYDROGRAPHS

MILL CREEK DRAINAGE BASIN:

25-YEAR/6-HOUR STORM EVENT

RUNOFF HYDROGRAPH

PRE-CONDITION

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

BASIN NAME	100	105	200	210	220
NODE NAME	200	200	220	200	200
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	30.50	24.50	53.10	46.90	92.40
CURVE NUMBER	62.00	67.00	71.00	70.00	69.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	65.00	55.00	46.00	46.00	43.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
100	20.65	3.32	2.07	BASIN SOUTH OF 25TH, EAST OF DITCH
105	23.01	3.06	2.53	BASIN SOUTH OF 25TH, WEST OF DITCH
200	65.77	2.66	2.87	BASIN NORTH OF 25TH, WEST OF DITCH
210	55.66	2.86	2.78	BASIN NORTH OF 25TH, EAST OF DITCH
220	109.38	2.87	2.68	COUNTRY CLUB MANOR BASIN

BASIN NAME	300	400	410	420	500
NODE NAME	201	301	400	400	400
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	21.90	97.20	35.00	31.00	18.30
CURVE NUMBER	75.00	71.00	65.00	65.00	67.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	17.00	20.00	32.00	25.00	24.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
300	54.58	2.53	3.27	GOLDSBORO SCHOOL AREA BASIN
400	194.10	2.58	2.90	BASIN ALONG 18TH ST. SOUTH SIDE
410	40.93	2.70	2.34	BASIN BETWEEN 16TH AND 18TH STREETS
420	42.04	2.61	2.35	BASIN BETWEEN 16TH AND 14TH STREETS
500	28.01	2.61	2.52	BASIN BETWEEN 14TH AND 13TH STREETS

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

BASIN NAME	610	625	650	620	700
NODE NAME	550	550	550	600	602
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	23.50	11.70	38.30	55.80	16.00
CURVE NUMBER	67.00	67.00	65.00	71.00	65.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	27.00	25.00	45.00	40.00	26.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
610	33.57	2.64	2.53	BASIN BETWEEN 11TH AND 13TH STREETS
625	17.52	2.61	2.53	BASIN NORTH OF CROOMS SCH OF CHOICE
650	36.61	2.90	2.35	BASIN SOUTH OF CROOMS SCH OF CHOICE
620	75.09	2.76	2.88	BASIN BETWEEN 11TH AND 8TH STREETS
700	21.14	2.66	2.33	BASIN BETWEEN 9TH AND 7TH STREETS

BASIN NAME	710	810	820	830	840
NODE NAME	602	800	800	800	800
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	37.00	29.60	74.50	27.30	30.80
CURVE NUMBER	65.00	70.00	70.00	70.00	64.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	28.00	29.00	55.00	29.00	32.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
710	46.87	2.68	2.34	BASIN BETWEEN MCCRACKEN AND 9TH ST
810	46.48	2.64	2.90	BASIN ON EAST SIDE OF LOCKHART AREA
820	79.70	3.05	2.80	WEST SIDE OF LOCKHART & W OF AIRPR
830	42.87	2.64	2.80	BASIN WEST OF AIRPRT BOULEVARD
840	34.17	2.70	2.25	BASIN JUST NORTH OF SMITH CANAL

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

BASIN NAME	640	930	910	921	920
NODE NAME	550	603	1000	1000	1000
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	78.90	10.30	31.60	24.40	58.40
CURVE NUMBER	78.00	89.00	70.00	82.00	69.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	54.00	8.00	33.00	18.00	53.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
640	115.36	3.00	3.58	BASIN @ SW ROAD AND 18TH STREET
930	42.44	2.49	4.73	BASIN @ 9TH ST & RR NEAR MILL CREEK
910	45.91	2.71	2.78	BASIN @ RR YARD AREA, WEST OF CREEK
921	73.74	2.52	3.99	BASIN @ RR YARD, W OF PERSIMMON AVE
920	61.07	3.06	2.67	BASIN NORTH OF MCCRACKEN ROAD AREA

BASIN NAME	940	950	960	1000	1100
NODE NAME	1000	1000	1000	1100	1200
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	48.00	56.80	62.20	69.50	23.00
CURVE NUMBER	63.00	62.00	59.00	65.00	65.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	39.00	45.00	48.00	38.00	26.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
940	44.87	2.86	2.17	BASIN BETWEEN AIRPORT BLVD & BEVIER
950	46.36	3.00	2.09	BASIN BETWEEN MEISCH AND BEVIER RDS
960	41.50	3.09	1.83	BASIN WEST OF MEISCH ROAD
1000	73.25	2.79	2.35	BASIN BETWEEN RR AND 3RD STREET
1100	30.39	2.66	2.33	BASIN BETWEEN 3RD AND 2ND STREETS

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

BASIN NAME	1200	CLDBRNCH
NODE NAME	1300	1400
UNIT HYDROGRAPH	GAMMA	GAMMA
PEAKING FACTOR	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00
STORM DURATION (hrs)	6.00	6.00
AREA (ac)	54.00	306.50
CURVE NUMBER	78.00	84.00
DCIA (%)	.00	.00
TC (mins)	56.00	100.00
LAG TIME (hrs)	.00	.00
BASIN STATUS	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
1200	77.50	2.99	3.57	BASIN JUST SOUTH OF 1ST STREET
CLDBRNCH	372.37	3.56	4.20	ARTIFICAL BASIN REPRES CLOUD BRANCH

MILL CREEK DRAINAGE BASIN:

25-YEAR/6-HOUR STORM EVENT

RUNOFF HYDROGRAPH

POST-CONDITION

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

BASIN NAME	100	105	200	210	220
NODE NAME	100	100	220	210	108
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	30.50	24.50	53.10	46.90	92.40
CURVE NUMBER	64.00	69.00	73.00	72.00	71.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	65.00	55.00	46.00	46.00	43.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
100	22.77	3.32	2.24	BASIN SOUTH OF 25TH, EAST OF DITCH
105	25.13	3.06	2.71	BASIN SOUTH OF 25TH, WEST OF DITCH
200	71.35	2.86	3.06	BASIN NORTH OF 25TH, WEST OF DITCH
210	60.54	2.86	2.97	BASIN NORTH OF 25TH, WEST OF DITCH
220	119.08	2.87	2.87	COUNTRY CLUB MANOR

BASIN NAME	300	400	410	420	500
NODE NAME	201	300	301	301	302
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	21.90	108.00	35.00	31.00	18.30
CURVE NUMBER	77.00	73.00	67.00	67.00	69.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	17.00	90.00	32.00	25.00	24.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
300	58.35	2.53	3.47	GOLDSBORO SCHOOL AREA
400	98.34	3.60	3.09	LARGE RETENTION TRACT SOUTH OF 18TH
410	45.20	2.70	2.52	BASIN BETWEEN 16TH & 18TH STREETS
420	46.42	2.61	2.53	BASIN BETWEEN 14TH & 16TH STREETS
500	30.66	2.61	2.70	BASIN BETWEEN 13TH & 14TH STREETS

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

BASIN NAME	610	625	650	620	700
NODE NAME	401	410	410	403	610
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	23.50	11.70	38.30	55.80	16.00
CURVE NUMBER	69.00	69.00	67.00	73.00	67.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	27.00	25.00	45.00	40.00	26.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
610	36.80	2.64	2.71	BASIN BETWEEN 11TH & 13TH STREETS
625	19.20	2.61	2.71	BASIN NORTH OF CROOMS SCH OF CHOICE
650	40.34	2.90	2.53	BASIN SOUTH OF CROOMS SCH OF CHOICE
620	81.60	2.76	3.07	BASIN BETWEEN 11TH & 8TH STREETS
700	23.28	2.66	2.51	BASIN BETWEEN 9TH & 7TH STREETS

BASIN NAME	710	810	820	830	840
NODE NAME	610	614	614	615	616
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	37.00	29.60	74.50	27.30	30.80
CURVE NUMBER	67.00	72.00	72.00	72.00	66.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	28.00	29.00	55.00	29.00	32.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
710	51.66	2.68	2.52	BASIN BETWEEN MCCRACKEN & 9TH ST
810	50.56	2.64	2.99	EAST SIDE OF LOCKHART AREA
820	86.37	3.06	2.99	WEST SIDE OF LOCKHART & W OF AIRPRT
830	46.63	2.64	2.99	BASIN WEST OF AIRPORT BLVD
840	37.89	2.70	2.43	BASIN JUST NORTH OF SMITH CANAL

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

BASIN NAME	640	930	910	921	920
NODE NAME	619	620	622	622	624
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	78.90	10.30	31.60	24.40	58.40
CURVE NUMBER	79.00	90.00	72.00	84.00	71.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	54.00	8.00	33.00	18.00	53.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
640	119.30	2.88	3.68	BASIN @ SW ROAD AND 18TH STREET
930	43.13	2.49	4.84	BASIN @ 9TH ST & RR NEAR MILL CREEK
910	49.90	2.71	2.97	BASIN @ RR YARD AREA WEST OF CREEK
921	77.88	2.52	4.20	BASIN @ RR YARD, W OF PERSIMMON AVE
920	66.47	2.94	2.86	BASIN NORTH OF MCCRACKEN ROAD AREA

BASIN NAME	940	950	960	1000	1100
NODE NAME	625	627	628	700	800
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	48.00	56.80	62.20	69.50	23.00
CURVE NUMBER	65.00	64.00	61.00	67.00	67.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	39.00	45.00	48.00	38.00	26.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
940	49.71	2.86	2.34	BASIN BETWEEN AIRPORT BLVD & BEVIER
950	51.59	2.90	2.26	BASIN BETWEEN MEISCH AND BEVIER RDS
960	46.51	2.99	2.00	BASIN WEST OF MEISCH ROAD
1000	80.85	2.79	2.53	BASIN BETWEEN RR AND 3RD STREET
1100	33.46	2.66	2.51	BASIN BETWEEN 3RD AND 2ND STREETS

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

BASIN NAME	1200	CLDBRNCH
NODE NAME	900	1000
UNIT HYDROGRAPH	GAMMA	GAMMA
PEAKING FACTOR	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00
STORM DURATION (hrs)	6.00	6.00
AREA (ac)	54.00	306.50
CURVE NUMBER	80.00	86.00
DCIA (%)	.00	.00
TC (mins)	56.00	100.00
LAG TIME (hrs)	.00	.00
BASIN STATUS	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
1200	82.80	2.99	3.77	BASIN JUST SOUTH OF 1ST STREET
CLDBRNCH	393.38	3.56	4.41	ARTIFICIAL BASIN REP. CLOUD BRANCH

APPENDIX 2

MILL CREEK DRAINAGE BASIN:

25-YEAR/24-HOUR STORM EVENT

RUNOFF HYDROGRAPHS

MILL CREEK DRAINAGE BASIN:

25-YEAR/24-HOUR STORM EVENT

RUNOFF HYDROGRAPH

PRE-CONDITION

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/24HR STORM EVENT - PRE COND (PRE2524)
10/24/1991

BASIN NAME	100	105	200	210	220
NODE NAME	200	200	220	200	200
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	30.50	24.50	53.10	46.90	92.40
CURVE NUMBER	62.00	67.00	71.00	70.00	69.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	65.00	55.00	46.00	46.00	43.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
100	42.35	12.71	4.03	BASIN SOUTH OF 25TH, EAST OF DITCH
105	44.33	12.59	4.62	BASIN SOUTH OF 25TH, WEST OF DITCH
200	119.63	12.47	5.10	BASIN NORTH OF 25TH, WEST OF DITCH
210	103.09	12.47	4.98	BASIN NORTH OF 25TH, EAST OF DITCH
220	206.94	12.52	4.86	COUNTRY CLUB MANOR BASIN

BASIN NAME	300	400	410	420	500
NODE NAME	201	301	400	400	400
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	21.90	97.20	35.00	31.00	18.30
CURVE NUMBER	75.00	71.00	65.00	65.00	67.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	17.00	20.00	32.00	25.00	24.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
300	90.70	12.24	5.59	GOLDSBORO SCHOOL AREA BASIN
400	348.30	12.27	5.11	BASIN ALONG 18TH ST, SOUTH SIDE
410	84.66	12.37	4.38	BASIN BETWEEN 16TH AND 18TH STREETS
420	85.94	12.33	4.39	BASIN BETWEEN 16TH AND 14TH STREETS
500	54.71	12.32	4.62	BASIN BETWEEN 14TH AND 13TH STREETS

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/24HR STORM EVENT - PRE COND (PRE2524)
10/24/1991

BASIN NAME	610	625	650	620	700
NODE NAME	550	550	550	600	602
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	23.50	11.70	38.30	55.80	16.00
CURVE NUMBER	67.00	67.00	65.00	71.00	65.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	27.00	25.00	45.00	40.00	26.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
610	66.10	12.36	4.62	BASIN BETWEEN 11TH AND 13TH STREETS
625	34.24	12.33	4.62	BASIN NORTH OF CROOMS SCH OF CHOICE
650	74.76	12.50	4.39	BASIN SOUTH OF CROOMS SCH OF CHOICE
620	137.61	12.44	5.11	BASIN BETWEEN 11TH AND 9TH STREETS
700	43.45	12.31	4.38	BASIN BETWEEN 9TH AND 7TH STREETS

BASIN NAME	710	810	820	830	840
NODE NAME	602	800	800	800	800
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	37.00	29.60	74.50	27.30	30.80
CURVE NUMBER	65.00	70.00	70.00	70.00	64.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	28.00	29.00	55.00	29.00	32.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
710	96.37	12.32	4.38	BASIN BETWEEN MCCRACKEN AND 9TH ST
810	86.21	12.37	4.98	BASIN ON EAST SIDE OF LOCKHART AREA
820	145.86	12.59	4.98	WEST SIDE OF LOCKHART & W OF AIRPR
830	79.51	12.37	4.98	BASIN WEST OF AIRPRT BOULEVARD
840	72.35	12.37	4.26	BASIN JUST NORTH OF SMITH CANAL

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK - 25YR/24HR STORM EVENT - PRE COND (PRE2524)
10/24/1991

BASIN NAME	640	930	910	921	920
NODE NAME	550	603	1000	1000	1000
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	78.90	10.30	31.60	24.40	58.40
CURVE NUMBER	78.00	89.00	70.00	82.00	69.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	54.00	8.00	33.00	18.00	53.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
640	186.31	12.60	5.95	BASIN @ SW ROAD AND 18TH STREET
930	57.42	12.21	7.28	BASIN @ 9TH ST & RR NEAR MILL CREEK
910	85.68	12.39	4.98	BASIN @ RR YARD AREA, WEST OF CREEK
921	111.51	12.24	6.43	BASIN @ RR YARD, W OF PERSIMMON AVE
920	114.37	12.60	4.86	BASIN NORTH OF MCCRACKEN ROAD AREA

BASIN NAME	940	950	960	1000	1100
NODE NAME	1000	1000	1000	1100	1200
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	48.00	56.80	62.20	69.50	23.00
CURVE NUMBER	63.00	62.00	59.00	65.00	65.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	39.00	45.00	48.00	38.00	26.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
940	96.60	12.48	4.14	BASIN BETWEEN AIRPORT BLVD & BEVIER
950	101.04	12.50	4.03	BASIN BETWEEN MEISCH AND BEVIER RDS
960	95.66	12.59	3.67	BASIN WEST OF MEISCH ROAD
1000	151.32	12.41	4.38	BASIN BETWEEN RR AND 3RD STREET
1100	62.46	12.31	4.38	BASIN BETWEEN 3RD AND 2ND STREETS

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/24HR STORM EVENT - PRE COND (PRE2524)
10/24/1991

BASIN NAME	1200	CLDBRNCH
NODE NAME	1300	1400
UNIT HYDROGRAPH	GAMMA	GAMMA
PEAKING FACTOR	342.	342.
RAINFALL FILE	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60
STORM DURATION (hrs)	24.00	24.00
AREA (ac)	54.00	306.50
CURVE NUMBER	78.00	84.00
DCIA (%)	.00	.00
TC (mins)	56.00	100.00
LAG TIME (hrs)	.00	.00
BASIN STATUS	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
1200	124.02	12.57	5.94	BASIN JUST SOUTH OF 1ST STREET
CLDBRNCH	524.33	13.11	6.67	ARTIFICAL BASIN REPRES CLOUD BRANCH

MILL CREEK DRAINAGE BASIN:

25-YEAR/24-HOUR STORM EVENT

RUNOFF HYDROGRAPH

POST-CONDITION

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/24HR ON 25/6 IMPROVS-POST-MED POND-(2524256A)
10/24/1991

BASIN NAME	100	105	200	210	220
NODE NAME	100	100	220	210	108
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	30.50	24.50	53.10	46.90	92.40
CURVE NUMBER	64.00	69.00	73.00	72.00	71.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	65.00	55.00	46.00	46.00	43.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
100	45.14	12.71	4.26	BASIN SOUTH OF 25TH, EAST OF DITCH
105	46.77	12.59	4.86	BASIN SOUTH OF 25TH, WEST OF DITCH
200	125.35	12.47	5.34	BASIN NORTH OF 25TH, WEST OF DITCH
210	108.20	12.47	5.22	BASIN NORTH OF 25TH, WEST OF DITCH
220	217.19	12.52	5.10	COUNTRY CLUB MANOR

BASIN NAME	300	400	410	420	500
NODE NAME	201	300	301	301	302
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	21.90	108.00	35.00	31.00	18.30
CURVE NUMBER	77.00	73.00	67.00	67.00	69.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	17.00	90.00	32.00	25.00	24.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
300	94.13	12.24	5.83	GOLDSBORO SCHOOL AREA
400	161.49	13.00	5.35	LARGE RETENTION TRACT SOUTH OF 18TH
410	89.51	12.37	4.62	BASIN BETWEEN 16TH & 18TH STREETS
420	90.71	12.33	4.62	BASIN BETWEEN 14TH & 16TH STREETS
500	57.53	12.32	4.86	BASIN BETWEEN 13TH & 14TH STREETS

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/24HR ON 25/6 IMPROVS-POST-MED POND-(2524256A)
10/24/1991

BASIN NAME	610	625	650	620	700
NODE NAME	401	410	410	403	610
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	23.50	11.70	38.30	55.80	16.00
CURVE NUMBER	69.00	69.00	67.00	73.00	67.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	27.00	25.00	45.00	40.00	26.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
610	69.53	12.30	4.86	BASIN BETWEEN 11TH & 13TH STREETS
625	36.00	12.33	4.86	BASIN NORTH OF CROOMS SCH OF CHOICE
650	79.11	12.50	4.62	BASIN SOUTH OF CROOMS SCH OF CHOICE
620	144.05	12.44	5.35	BASIN BETWEEN 11TH & 8TH STREETS
700	45.92	12.31	4.62	BASIN BETWEEN 9TH & 7TH STREETS

BASIN NAME	710	810	820	830	840
NODE NAME	610	614	614	615	616
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	37.00	29.60	74.50	27.30	30.80
CURVE NUMBER	67.00	72.00	72.00	72.00	66.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	28.00	29.00	55.00	29.00	32.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
710	101.91	12.32	4.62	BASIN BETWEEN MCCRACKEN & 9TH ST
810	90.23	12.37	5.22	EAST SIDE OF LOCKHART AREA
820	153.05	12.59	5.22	WEST SIDE OF LOCKHART & W OF AIRPRT
830	83.22	12.37	5.22	BASIN WEST OF AIRPORT BLVD
840	76.64	12.37	4.50	BASIN JUST NORTH OF SMITH CANAL

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK-25YR/24HR ON 25/6 IMPROVS-POST-MED POND-(2524256A)
10/24/1991

BASIN NAME	640	930	910	921	920
NODE NAME	619	620	622	622	624
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	78.90	10.30	31.60	24.40	58.40
CURVE NUMBER	79.00	90.00	72.00	84.00	71.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	54.00	8.00	33.00	18.00	53.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
640	189.75	12.60	6.07	BASIN @ SW ROAD AND 18TH STREET
930	57.87	12.21	7.40	BASIN @ 9TH ST & RR NEAR MILL CREEK
910	89.75	12.39	5.22	BASIN @ RR YARD AREA WEST OF CREEK
921	114.68	12.24	6.67	BASIN @ RR YARD, W OF PERSIMMON AVE
920	120.13	12.60	5.10	BASIN NORTH OF MCCRACKEN ROAD AREA

BASIN NAME	940	950	960	1000	1100
NODE NAME	625	627	628	700	600
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	48.00	56.80	62.20	69.50	23.00
CURVE NUMBER	65.00	64.00	61.00	67.00	67.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	39.00	45.00	48.00	38.00	26.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
940	102.50	12.48	4.38	BASIN BETWEEN AIRPORT BLVD & BEVIER
950	107.62	12.50	4.27	BASIN BETWEEN MEISCH AND BEVIER RDS
960	102.53	12.59	3.91	BASIN WEST OF MEISCH ROAD
1000	160.12	12.41	4.62	BASIN BETWEEN RR AND 3RD STREET
1100	66.02	12.31	4.62	BASIN BETWEEN 3RD AND 2ND STREETS

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/24HR ON 25/6 IMPROVS-POST-MED POND-(2524256A)
10/24/1991

BASIN NAME	1200	CLDBRNCH
NODE NAME	900	1000
UNIT HYDROGRAPH	GAMMA	GAMMA
PEAKING FACTOR	342.	342.
RAINFALL FILE	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60
STORM DURATION (hrs)	24.00	24.00
AREA (ac)	54.00	306.50
CURVE NUMBER	80.00	86.00
DCIA (%)	.00	.00
TC (mins)	56.00	100.00
LAG TIME (hrs)	.00	.00
BASIN STATUS	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
1200	128.65	12.57	6.18	BASIN JUST SOUTH OF 1ST STREET
CLDBRNCH	539.78	13.11	6.92	ARTIFICIAL BASIN REP. CLOUD BRANCH

APPENDIX 3

CLOUD BRANCH DRAINAGE BASIN:

25-YEAR/6-HOUR STORM EVENT

RUNOFF HYDROGRAPHS

CLOUD BRANCH DRAINAGE BASIN:

25-YEAR/6-HOUR STORM EVENT

RUNOFF HYDROGRAPH

PRE-CONDITION

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/24/1991

BASIN NAME	100	200	300	310	400
NODE NAME	10	20	40	40	STORAGE1
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	90.00	12.00	5.00	32.00	12.00
CURVE NUMBER	69.00	53.00	54.00	54.00	59.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	33.00	20.00	15.00	25.00	28.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
100	125.16	2.71	2.69	BASIN BTWN 18TH & 20TH, ELM & MAPLE
200	8.41	2.62	1.36	BASIN BETWEEN 24TH ST & 22ND STREET
300	4.49	2.57	1.44	BASIN BETWEEN 22ND ST AND 20TH ST
310	21.38	2.67	1.44	BASIN BETWEEN 22ND & 24TH ST'S-WEST
400	10.76	2.68	1.83	BASIN BETWEEN 20TH AND 19TH STREETS

BASIN NAME	500	600	700	800	900
NODE NAME	STORAGE1	STORAGE2	STORAGE3	STORAGE3	STORAGE3
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	44.00	27.00	23.00	26.00	6.40
CURVE NUMBER	57.00	56.00	78.00	65.00	54.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	38.00	52.00	25.00	36.00	28.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
500	29.08	2.87	1.67	BASIN BETWEEN 19TH AND 16TH STREETS
600	14.43	3.24	1.57	BASIN BETWEEN 16TH AND 14TH STREETS
700	53.17	2.61	3.58	BASIN AROUND SANFORD MIDDL SCH AREA
800	28.27	2.60	2.35	BASIN WEST OF SANF MIDDLE SCH AREA
900	4.01	2.74	1.43	BASIN BETWEEN 14TH AND 15TH STREETS

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/24/1991

BASIN NAME	1000	1100	1200	1300	1400
NODE NAME	STORAGE3	100	115	1301	1401
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	25.00	13.30	9.80	95.00	105.00
CURVE NUMBER	65.00	83.00	55.00	57.00	64.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	41.00	24.00	22.00	49.00	86.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
1000	25.18	2.82	2.32	BASIN BETWEEN 14TH AND 13TH STREETS
1100	36.64	2.56	4.08	BASIN BETWEEN 13TH AND 12TH STREETS
1200	7.66	2.64	1.51	BASIN BETWEEN 12TH AND 11TH STREETS
1300	55.39	3.16	1.67	BASIN E OF FRENCH, S OF RR-TO PARK
1400	68.01	3.63	2.24	BASIN E OF FRENCH, N OF RR, TO PARK

BASIN NAME	1500	1600	1700	1800	MILLCRK
NODE NAME	130	150	170	190	210
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	26.30	42.00	47.00	23.00	1392.00
CURVE NUMBER	56.00	69.00	65.00	61.00	66.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	21.00	43.00	27.00	19.00	104.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
1500	22.75	2.61	1.59	BASIN BETWEEN 10TH AND 8TH STREETS
1600	49.72	2.87	2.68	BASIN BETWEEN 8TH ST AND SCL RR
1700	60.82	2.64	2.35	BASIN BETWEEN SCL RR AND 3RD STREET
1800	29.21	2.58	2.00	BASIN BETWEEN 3RD AND 1ST STREETS
MILLCRK	889.79	3.93	2.36	ARTIFICAL HYD REPRESENTING MILL CRK

CLOUD BRANCH DRAINAGE BASIN:

25-YEAR/6-HOUR STORM EVENT

RUNOFF HYDROGRAPH

POST-CONDITION

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POST5
11/07/1991

BASIN NAME	100	200	300	310	400
NODE NAME	10	10	40	40	STORAGE1
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	90.00	12.00	5.00	32.00	12.00
CURVE NUMBER	71.00	55.00	56.00	56.00	61.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	33.00	20.00	15.00	25.00	28.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
100	136.41	2.71	2.88	BASIN BTWN 18TH & 20TH, ELM & MAPLE
200	9.90	2.62	1.52	BASIN BETWEEN 24TH & 22ND STREET
300	5.22	2.57	1.60	BASIN BETWEEN 22ND & 20TH STREET
310	25.02	2.67	1.60	BASIN BETWEEN 22ND & 24TH ST'S-WEST
400	12.20	2.68	2.00	BASIN BETWEEN 20TH & 19TH STREETS

BASIN NAME	500	600	700	800	900
NODE NAME	STORAGE1	STORAGE2	STORAGE3	STORAGE3	STORAGE3
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	44.00	27.00	23.00	26.00	6.40
CURVE NUMBER	59.00	58.00	79.00	67.00	56.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	38.00	52.00	25.00	36.00	28.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
500	33.12	2.87	1.84	BASIN BETWEEN 19TH AND 16TH STREETS
600	16.32	3.12	1.73	BASIN BETWEEN 16TH AND 14TH STREETS
700	54.91	2.61	3.68	BASIN AROUND SANFORD MIDDL SCH AREA
800	31.14	2.72	2.53	BASIN WEST OF SANF MIDDLE SCH AREA
900	4.67	2.74	1.59	BASIN BETWEEN 14TH AND 15TH STREETS

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POSTS
11/07/1991

BASIN NAME	1000	1100	1200	1300	1400
NODE NAME	100	100	110	1301	1401
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	25.00	13.30	9.80	95.00	105.00
CURVE NUMBER	67.00	84.00	57.00	59.00	66.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	41.00	24.00	22.00	49.00	86.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
1000	27.79	2.82	2.50	BASIN BETWEEN 14TH AND 13TH STREETS
1100	37.69	2.56	4.19	BASIN BETWEEN 13TH AND 12TH STREETS
1200	8.87	2.64	1.67	BASIN BETWEEN 12TH AND 11TH STREETS
1300	62.62	3.05	1.84	BASIN E OF FRENCH, S OF RR-TO PARK
1400	74.27	3.63	2.41	BASIN E OF FRENCH, N OF RR, TO PARK

BASIN NAME	1500	1600	1700	1800	MILLCRK
NODE NAME	120	150	170	190	210
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6	RAIN25-6
RAIN AMOUNT (in)	6.00	6.00	6.00	6.00	6.00
STORM DURATION (hrs)	6.00	6.00	6.00	6.00	6.00
AREA (ac)	26.30	42.00	47.00	23.00	1392.00
CURVE NUMBER	58.00	71.00	67.00	63.00	66.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	21.00	43.00	27.00	19.00	104.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
1500	26.20	2.61	1.75	BASIN BETWEEN 10TH AND 8TH STREETS
1600	54.13	2.87	2.87	BASIN BETWEEN 8TH ST AND SCL RR
1700	67.15	2.64	2.53	BASIN BETWEEN SCL RR AND 3RD STREET
1800	32.65	2.58	2.18	BASIN BETWEEN 3RD AND 1ST STREETS
MILLCRK	889.79	3.93	2.36	ARTIFICAL HYD REPRESENTING MILL CRK

APPENDIX 4

CLOUD BRANCH DRAINAGE BASIN:

25-YEAR/24-HOUR STORM EVENT

RUNOFF HYDROGRAPHS

CLOUD BRANCH DRAINAGE BASIN:

25-YEAR/24-HOUR STORM EVENT

RUNOFF HYDROGRAPH

PRE-CONDITION

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

CLOUD BRANCH- 25YR/24HR STORM EVENT - PRE COND (2524PRE)
10/24/1991

BASIN NAME	100	200	300	310	400
NODE NAME	10	20	40	40	STORAGE1
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	90.00	12.00	5.00	32.00	12.00
CURVE NUMBER	69.00	53.00	54.00	54.00	59.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	33.00	20.00	15.00	25.00	28.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
100	238.12	12.39	4.86	BASIN BTWN 18TH & 20TH, ELM & MAPLE
200	24.33	12.31	2.97	BASIN BETWEEN 24TH ST & 22ND STREET
300	11.97	12.27	3.09	BASIN BETWEEN 22ND ST AND 20TH ST
310	60.45	12.33	3.09	BASIN BETWEEN 22ND & 24TH ST'S-WEST
400	25.81	12.38	3.67	BASIN BETWEEN 20TH AND 19TH STREETS

BASIN NAME	500	600	700	800	900
NODE NAME	STORAGE1	STORAGE2	STORAGE3	STORAGE3	STORAGE3
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	44.00	27.00	23.00	26.00	6.40
CURVE NUMBER	57.00	56.00	78.00	65.00	54.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	38.00	52.00	25.00	36.00	28.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
500	72.98	12.50	3.44	BASIN BETWEEN 19TH AND 16TH STREETS
600	35.09	12.60	3.32	BASIN BETWEEN 16TH AND 14TH STREETS
700	85.27	12.33	5.95	BASIN AROUND SANFORD MIDDL SCH AREA
800	58.68	12.40	4.39	BASIN WEST OF SANF MIDDLE SCH AREA
900	11.33	12.38	3.08	BASIN BETWEEN 14TH AND 15TH STREETS

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

CLOUD BRANCH- 25YR/24HR STORM EVENT - PRE COND (2524PRE)
10/24/1991

BASIN NAME	1000	1100	1200	1300	1400
NODE NAME	STORAGE3	100	115	1301	1401
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	25.00	13.30	9.80	95.00	105.00
CURVE NUMBER	65.00	83.00	55.00	57.00	64.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	41.00	24.00	22.00	49.00	86.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
1000	51.85	12.48	4.38	BASIN BETWEEN 14TH AND 13TH STREETS
1100	54.49	12.32	6.55	BASIN BETWEEN 13TH AND 12TH STREETS
1200	20.66	12.32	3.20	BASIN BETWEEN 12TH AND 11TH STREETS
1300	133.18	12.63	3.43	BASIN E OF FRENCH, S OF RR-TO PARK
1400	127.52	13.00	4.26	BASIN E OF FRENCH, N OF RR, TO PARK

BASIN NAME	1500	1600	1700	1800	MILLCRK
NODE NAME	130	150	170	190	210
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	26.30	42.00	47.00	23.00	1392.00
CURVE NUMBER	56.00	69.00	65.00	61.00	68.50
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	21.00	43.00	27.00	19.00	80.50
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
1500	58.98	12.32	3.32	BASIN BETWEEN 10TH AND 8TH STREETS
1600	94.07	12.52	4.86	BASIN BETWEEN 8TH ST AND SCL RR
1700	125.24	12.36	4.39	BASIN BETWEEN SCL RR AND 3RD STREET
1800	64.70	12.29	3.91	BASIN BETWEEN 3RD AND 1ST STREETS
MILLCRK	2017.22	12.88	4.80	ARTIFICAL HYD REPRESENTING MILL CRK

CLOUD BRANCH DRAINAGE BASIN:

25-YEAR/24-HOUR STORM EVENT

RUNOFF HYDROGRAPH

POST-CONDITION

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH-25YR/24HR STORM ON 25/6 IMPROVS-POST-2524PST1
11/15/1991

BASIN NAME	1000	1100	1200	1300	1400
NODE NAME	100	100	110	1301	1401
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	25.00	13.30	9.80	95.00	105.00
CURVE NUMBER	67.00	84.00	57.00	59.00	66.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	41.00	24.00	22.00	49.00	86.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
1000	54.83	12.48	4.62	BASIN BETWEEN 14TH AND 13TH STREETS
1100	55.25	12.27	6.67	BASIN BETWEEN 13TH AND 12TH STREETS
1200	22.34	12.32	3.43	BASIN BETWEEN 12TH AND 11TH STREETS
1300	143.65	12.52	3.67	BASIN E OF FRENCH, S OF RR-TO PARK
1400	135.27	13.00	4.50	BASIN E OF FRENCH, N OF RR, TO PARK

BASIN NAME	1500	1600	1700	1800	MILLCRK
NODE NAME	120	150	170	190	210
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	26.30	42.00	47.00	23.00	1392.00
CURVE NUMBER	58.00	71.00	67.00	63.00	56.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	21.00	43.00	27.00	19.00	100.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
1500	63.51	12.32	3.55	BASIN BETWEEN 10TH AND 8TH STREETS
1600	98.72	12.52	5.10	BASIN BETWEEN 8TH ST AND SCL RR
1700	132.19	12.36	4.62	BASIN BETWEEN SCL RR AND 3RD STREET
1800	68.76	12.29	4.15	BASIN BETWEEN 3RD AND 1ST STREETS
MILLCRK	1139.19	13.11	3.32	ARTIFICAL HYD REPRESENTING MILL CRK

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH-25YR/24HR STORM ON 25/6 IMPROVS-POST-2524PST1
11/15/1991

BASIN NAME	100	200	300	310	400
NODE NAME	10	10	40	40	STORAGE1
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	90.00	12.00	5.00	32.00	12.00
CURVE NUMBER	71.00	55.00	56.00	56.00	61.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	33.00	20.00	15.00	25.00	28.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
100	249.85	12.39	3.10	BASIN BTWN 18TH & 20TH, ELM & MAPLE
200	26.47	12.31	3.20	BASIN BETWEEN 24TH & 22ND STREET
300	12.95	12.27	3.32	BASIN BETWEEN 22ND & 20TH STREET
310	65.71	12.33	3.32	BASIN BETWEEN 22ND & 24TH ST'S-WEST
400	27.61	12.38	3.91	BASIN BETWEEN 20TH & 19TH STREETS

BASIN NAME	500	600	700	800	900
NODE NAME	STORAGE1	STORAGE2	STORAGE3	STORAGE3	STORAGE3
UNIT HYDROGRAPH	GAMMA	GAMMA	GAMMA	GAMMA	GAMMA
PEAKING FACTOR	342.	342.	342.	342.	342.
RAINFALL FILE	SCSIII	SCSIII	SCSIII	SCSIII	SCSIII
RAIN AMOUNT (in)	8.60	8.60	8.60	8.60	8.60
STORM DURATION (hrs)	24.00	24.00	24.00	24.00	24.00
AREA (ac)	44.00	27.00	23.00	26.00	6.40
CURVE NUMBER	59.00	58.00	79.00	67.00	56.00
DCIA (%)	.00	.00	.00	.00	.00
TC (mins)	38.00	52.00	25.00	36.00	28.00
LAG TIME (hrs)	.00	.00	.00	.00	.00
BASIN STATUS	ONSITE	ONSITE	ONSITE	ONSITE	ONSITE

BASIN	QMX (cfs)	TMX (hrs)	VOL (in)	NOTES
500	78.67	12.41	3.67	BASIN BETWEEN 19TH AND 16TH STREETS
600	37.99	12.60	3.55	BASIN BETWEEN 16TH AND 14TH STREETS
700	86.81	12.28	6.07	BASIN AROUND SANFORD MIDDL SCH AREA
800	62.08	12.40	4.62	BASIN WEST OF SANF MIDDLE SCH AREA
900	12.31	12.38	3.32	BASIN BETWEEN 14TH AND 15TH STREETS

APPENDIX 5

HYDRAULIC INPUT DATA

MILL CREEK DRAINAGE BASIN:

25-YEAR/6-HOUR STORM EVENT

MILL CREEK DRAINAGE BASIN:

25-YEAR/6-HOUR STORM EVENT

HYDRAULIC INPUT DATA

PRE-CONDITION

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

CONTROL PARAMETERS

START TIME: .00
END TIME: 6.00

TO TIME (hours)	SIMULATION INC (secs)	PRINT INC (mins)
6.00	.50	2.00

RUNOFF HYDROGRAPH FILE: DEFAULT
OFFSITE HYDROGRAPH FILE: DEFAULT
BOUNDARY DATABASE FILE: NONE

NOTE: MILL CREEK-25YR/6HR ROUTING (PRE256)

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

NODE NAME	NODE TYPE	INI STAGE (ft)	X-COOR (ft)	Y-COOR (ft)	LENGTH (ft)	STAGE (ft)	AREA/TIME (ac)/(hr)
200	AREA	25.130	.000	.000	.000	25.130	.480
						31.750	2.050
						32.000	2.510
201	AREA	24.690	.000	.000	.000	24.690	.000
						33.000	.000
300	AREA	24.170	.000	.000	.000	24.170	.320
						31.100	1.190
						31.500	1.500
301	AREA	23.720	.000	.000	.000	23.720	.000
						33.000	.000
400	AREA	20.040	.000	.000	.000	20.040	.290
						30.000	.910
						30.500	1.140
401	AREA	19.760	.000	.000	.000	19.760	.000
						28.000	.000
550	AREA	17.000	.000	.000	.000	17.000	.070
						27.000	.440
600	AREA	10.990	.000	.000	.000	10.990	.290
						21.950	1.100
						22.500	1.530
601	AREA	10.300	.000	.000	.000	10.300	.000
						22.000	.000
602	AREA	10.000	.000	.000	.000	10.000	.050
						20.000	.200
603	AREA	9.650	.000	.000	.000	9.650	.160
						19.650	.720
800	AREA	18.320	.000	.000	.000	18.320	.750
						26.080	2.940
						26.500	3.280

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

NODE NAME	NODE TYPE	INI STAGE (ft)	X-COOR (ft)	Y-COOR (ft)	LENGTH (ft)	STAGE (ft)	AREA/TIME (ac)/(hr)
801	AREA	18.290	.000	.000	.000	18.290 27.000	.000 .000
1000	AREA	12.000	.000	.000	.000	12.000 19.000	1.010 3.660
1001	AREA	11.130	.000	.000	.000	11.130 26.000	.000 .000
1100	AREA	4.980	.000	.000	.000	4.980 12.960	.500 1.170
1101	AREA	4.520	.000	.000	.000	4.520 14.000	.000 .000
1200	AREA	4.500	.000	.000	.000	4.500 11.970	.230 .510
1201	AREA	4.500	.000	.000	.000	4.500 13.000	.000 .000
1300	AREA	3.020	.000	.000	.000	3.020 13.800	.290 .810
1301	AREA	3.000	.000	.000	.000	2.990 14.000	.000 .000
1400	AREA	3.000	.000	.000	.000	-.750 9.250	.800 2.000
1401	AREA	3.000	.000	.000	.000	-1.000 15.000	.000 .000
LKMONROE	TIME	3.000	.000	.000	.000	3.000 3.000 3.000	.000 3.000 6.000
220	AREA	28.000	.000	.000	.000	28.000 32.000	1.040 1.250

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

```
>>REACH NAME       : B
  FROM NODE        : 200
  TO NODE          : 201
  REACH TYPE       : CULVERT, ELLIPTICAL w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):   43.000       RISE (in):   24.000    LENGTH (ft): 320.000
   U/S INVERT (ft):   25.130 D/S INVERT (ft):   24.690      MANNING N:    .015
       ENTRNC LOSS:     .750   # OF CULVERTS:    1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):   31.750  CREST LN. (ft): 200.000     WEIR COEF.:   2.800
          RESERVED:********         RESERVED:********       RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********         RESERVED:********       RESERVED:********

            NOTE: EXISTING CULVERT @ 20TH ST-MAIN CH

>>REACH NAME       : D
  FROM NODE        : 300
  TO NODE          : 301
  REACH TYPE       : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):   48.000       RISE (in):   48.000    LENGTH (ft): 600.000
   U/S INVERT (ft):   24.170 D/S INVERT (ft):   23.720      MANNING N:    .015
       ENTRNC LOSS:     .500   # OF CULVERTS:    1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):   31.100  CREST LN. (ft): 250.000     WEIR COEF.:   2.800
          RESERVED:********         RESERVED:********       RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********         RESERVED:********       RESERVED:********

            NOTE: CULVERT ALONG 18TH ST-GOLDS TO MULB
```

```
Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

>>REACH NAME       : F
  FROM NODE        : 400
  TO NODE          : 401
  REACH TYPE       : CULVERT, ARCH w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):  60.000        RISE (in):  54.000     LENGTH (ft): 100.000
   U/S INVERT (ft):  20.040 D/S INVERT (ft):  19.760       MANNING N:     .015
       ENTRNC LOSS:    .500   # OF CULVERTS:   2.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  26.470  CREST LN. (ft): 200.000      WEIR COEF.:   2.800
          RESERVED:********         RESERVED:********       RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********       RESERVED:********

              NOTE: CULVERTS @ 13TH STREET - MAIN CH

>>REACH NAME       : K
  FROM NODE        : 600
  TO NODE          : 601
  REACH TYPE       : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):  60.000        RISE (in):  60.000     LENGTH (ft):  60.000
   U/S INVERT (ft):  10.990 D/S INVERT (ft):  10.300       MANNING N:     .015
       ENTRNC LOSS:    .750   # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  21.950  CREST LN. (ft): 250.000      WEIR COEF.:   2.800
          RESERVED:********         RESERVED:********       RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********       RESERVED:********

              NOTE: CULVERT @ 8TH STREET - MAIN CH
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

>>REACH NAME : P
FROM NODE : 800
TO NODE : 801
REACH TYPE : CULVERT, CIRCULAR w/ ROADWAY
FLOW DIRECTION : POSITIVE AND NEGATIVE FLOWS ALLOWED
TURBO SWITCH : ON

CULVERT DATA :
SPAN (in): 78.000 RISE (in): 78.000 LENGTH (ft): 60.000
U/S INVERT (ft): 18.320 D/S INVERT (ft): 18.290 MANNING N: .015
ENTRNC LOSS: .500 # OF CULVERTS: 1.000

POSITION A : RECTANGULAR ROADWAY/BERM WEIR
CREST EL. (ft): 26.080 CREST LN. (ft): 150.000 WEIR COEF.: 2.800
RESERVED:******** RESERVED:******** RESERVED:********

POSITION B : RECTANGULAR ROADWAY/BERM WEIR
CREST EL. (ft):******** CREST LN. (ft):******** WEIR COEF.:********
RESERVED:******** RESERVED:******** RESERVED:********

NOTE: CULVERT @ PERSIMMON - SOUTH CHAN

>>REACH NAME : T
FROM NODE : 1000
TO NODE : 1001
REACH TYPE : CULVERT, ARCH w/ ROADWAY
FLOW DIRECTION : POSITIVE AND NEGATIVE FLOWS ALLOWED
TURBO SWITCH : ON

CULVERT DATA :
SPAN (in): 56.000 RISE (in): 57.500 LENGTH (ft): 100.000
U/S INVERT (ft): 12.000 D/S INVERT (ft): 11.130 MANNING N: .015
ENTRNC LOSS: .500 # OF CULVERTS: 2.000

POSITION A : RECTANGULAR ROADWAY/BERM WEIR
CREST EL. (ft): 26.600 CREST LN. (ft): 150.000 WEIR COEF.: 2.800
RESERVED:******** RESERVED:******** RESERVED:********

POSITION B : RECTANGULAR ROADWAY/BERM WEIR
CREST EL. (ft):******** CREST LN. (ft):******** WEIR COEF.:********
RESERVED:******** RESERVED:******** RESERVED:********

NOTE: CULVERT @ PERSIMMON - NORTH CHAN

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

```
>>REACH NAME       : W
  FROM NODE        : 1100
  TO NODE          : 1101
  REACH TYPE       : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in): 300.000        RISE (in):  54.000     LENGTH (ft):  80.000
   U/S INVERT (ft):   4.980 D/S INVERT (ft):   4.520      MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  12.960  CREST LN. (ft): 200.000     WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********       RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********         RESERVED:********       RESERVED:********

            NOTE: CULVERT @ 3RD STREET - MAIN CHAN

>>REACH NAME       : Y
  FROM NODE        : 1200
  TO NODE          : 1201
  REACH TYPE       : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in): 300.000        RISE (in):  54.000     LENGTH (ft):  60.000
   U/S INVERT (ft):   4.500 D/S INVERT (ft):   4.500      MANNING N:     .015
       ENTRNC LOSS:    .500   # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  11.970  CREST LN. (ft): 200.000     WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********       RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********         RESERVED:********       RESERVED:********

            NOTE: CULVERT @ 2ND STREET - MAIN CH
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

```
>>REACH NAME       : AA
  FROM NODE        : 1300
  TO NODE          : 1301
  REACH TYPE       : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):   84.000       RISE (in):   84.000     LENGTH (ft): 100.000
   U/S INVERT (ft):    3.020 D/S INVERT (ft):    2.990      MANNING N:     .015
       ENTRNC LOSS:     .600   # OF CULVERTS:    3.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):   13.800  CREST LN. (ft): 200.000      WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********        RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********   CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********        RESERVED:********

              NOTE: CULVERTS @ 1ST STREET - MAIN CHAN

>>REACH NAME       : AC
  FROM NODE        : 1400
  TO NODE          : 1401
  REACH TYPE       : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):  360.000       RISE (in):  108.000     LENGTH (ft):  45.000
   U/S INVERT (ft):    -.750 D/S INVERT (ft):   -1.000      MANNING N:     .015
       ENTRNC LOSS:     .500   # OF CULVERTS:    1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):   16.500  CREST LN. (ft): 200.000      WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********        RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********   CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********        RESERVED:********

              NOTE: CULVERT UNDER HWY 17-92 - MAIN CH
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

```
>>REACH NAME       : BEN
  FROM NODE        : 220
  TO NODE          : 200
  REACH TYPE       : DROP STRUCTURE w/ CIRC. CULVERT
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):  24.000       RISE (in):  24.000    LENGTH (ft): 600.000
   U/S INVERT (ft):  29.520 D/S INVERT (ft):  28.320      MANNING N:    .013
      ENTRNC LOSS:     .500  # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR RISER SLOT
    CREST EL. (ft):  29.000  CREST LN. (ft):  10.000   OPENING (ft): 999.000
        WEIR COEF.:   3.000      GATE COEF.:    .600 NUMBER OF ELEM.:   1.000

  POSITION B       : RECTANGULAR RISER SLOT
    CREST EL. (ft):  30.000  CREST LN. (ft): 100.000   OPENING (ft): 999.000
        WEIR COEF.:   3.000      GATE COEF.:    .600 NUMBER OF ELEM.:   1.000

             NOTE: S/W INLET IN ALLEYWAY S OF C CLUB
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

```
>>REACH NAME       : C
  FROM NODE        : 201
  TO NODE          : 300
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   10.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
       LENGTH (ft):1375.000 U/S INVERT (ft):   24.690 D/S INVERT (ft):   24.170
         MANNING N:     .030   ENTRNC COEF.:      .100 MAX. DEPTH (ft):   99.000

                NOTE: CHAN BETW 20TH & 18TH ST - MAIN CH

>>REACH NAME       : E
  FROM NODE        : 301
  TO NODE          : 400
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):    6.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):    1.000
       LENGTH (ft):2100.000 U/S INVERT (ft):   23.720 D/S INVERT (ft):   20.040
         MANNING N:     .030   ENTRNC COEF.:      .100 MAX. DEPTH (ft):   99.000

                NOTE: CHAN BTWN 18TH & 13TH ST - MAIN CH

>>REACH NAME       : G
  FROM NODE        : 401
  TO NODE          : 550
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):    6.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
       LENGTH (ft): 500.000 U/S INVERT (ft):   19.760 D/S INVERT (ft):   17.000
         MANNING N:     .030   ENTRNC COEF.:      .100 MAX. DEPTH (ft):   99.000

                NOTE: CHAN BTWN 13TH & 11TH ST - MAIN CH

>>REACH NAME       : J
  FROM NODE        : 550
  TO NODE          : 600
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   10.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):    1.000
       LENGTH (ft):1250.000 U/S INVERT (ft):   17.000 D/S INVERT (ft):   10.990
         MANNING N:     .030   ENTRNC COEF.:      .100 MAX. DEPTH (ft):   99.000

                NOTE: CHAN BTWN 11TH & 8TH ST - MAIN CH
```

```
Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
        Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

>>REACH NAME       : L
  FROM NODE        : 601
  TO NODE          : 602
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):  15.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
       LENGTH (ft): 100.000 U/S INVERT (ft):  10.300 D/S INVERT (ft):  10.000
         MANNING N:    .030    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

            NOTE: CHAN BTWN 8TH ST & S CHAN-MAIN CH

>>REACH NAME       : M
  FROM NODE        : 602
  TO NODE          : 603
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):  15.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
       LENGTH (ft): 450.000 U/S INVERT (ft):  10.000 D/S INVERT (ft):   9.650
         MANNING N:    .030    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

            NOTE: CHAN BTWN RR MAIN & RR SPUR-MAIN CH

>>REACH NAME       : Q
  FROM NODE        : 801
  TO NODE          : 602
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   8.000   LEFT SS (h/v):   1.000   RGHT SS (h/v):   1.000
       LENGTH (ft): 650.000 U/S INVERT (ft):  18.290 D/S INVERT (ft):  10.000
         MANNING N:    .035    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

            NOTE: CHAN BTWN PERSIM & MC -SOUTH CHAN

>>REACH NAME       : U
  FROM NODE        : 1001
  TO NODE          : 603
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   8.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
       LENGTH (ft): 450.000 U/S INVERT (ft):  11.130 D/S INVERT (ft):   9.650
         MANNING N:    .035    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

            NOTE: CHAN BTWN PERSIM & MC - NORTH CHAN
```

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

```
>>REACH NAME       : V
  FROM NODE        : 603
  TO NODE          : 1100
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):  12.000   LEFT SS (h/v):   1.000   RGHT SS (h/v):   1.000
       LENGTH (ft):1750.000 U/S INVERT (ft):   9.650 D/S INVERT (ft):   4.980
         MANNING N:    .030   ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

             NOTE: CHAN BTWN RR MAIN & 3RD ST-MAINCH

>>REACH NAME       : X
  FROM NODE        : 1101
  TO NODE          : 1200
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):  18.000   LEFT SS (h/v):   1.000   RGHT SS (h/v):   1.000
       LENGTH (ft): 550.000 U/S INVERT (ft):   4.520 D/S INVERT (ft):   4.500
         MANNING N:    .030   ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

             NOTE: CHAN BTWN 3RD & 2ND ST - MAIN CHAN

>>REACH NAME       : Z
  FROM NODE        : 1201
  TO NODE          : 1300
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):  18.000   LEFT SS (h/v):   1.500   RGHT SS (h/v):   1.500
       LENGTH (ft): 690.000 U/S INVERT (ft):   4.500 D/S INVERT (ft):   3.020
         MANNING N:    .030   ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

             NOTE: CHAN BTWN 2ND & 1ST ST - MAIN CHAN

>>REACH NAME       : AB
  FROM NODE        : 1301
  TO NODE          : 1400
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):  15.000   LEFT SS (h/v):   1.000   RGHT SS (h/v):   1.000
       LENGTH (ft):2313.000 U/S INVERT (ft):   2.990 D/S INVERT (ft):   -.750
         MANNING N:    .030   ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

             NOTE: CHAN BTWN 1ST ST & 17-92 -MAINCH
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

```
>>REACH NAME       : AD
  FROM NODE        : 1401
  TO NODE          : LKMONROE
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft): 125.000   LEFT SS (h/v):    4.000   RGHT SS (h/v):    4.000
       LENGTH (ft): 220.000 U/S INVERT (ft):   -1.000 D/S INVERT (ft):   -2.000
         MANNING N:    .030    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

            NOTE: OUTFALL TO LAKE MONROE
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK - 25YR/6HR STORM EVENT - PRE COND (PRE256)
10/24/1991

REACH SUMMARY
=============

INDEX	RCHNAME	FRMNODE	TONODE	REACH TYPE
1	B	200	201	CULVERT, ELLIPTICAL w/ ROADWAY
2	D	300	301	CULVERT, CIRCULAR w/ ROADWAY
3	F	400	401	CULVERT, ARCH w/ ROADWAY
4	K	600	601	CULVERT, CIRCULAR w/ ROADWAY
5	P	800	801	CULVERT, CIRCULAR w/ ROADWAY
6	T	1000	1001	CULVERT, ARCH w/ ROADWAY
7	W	1100	1101	CULVERT, RECTANGULAR w/ ROADWAY
8	Y	1200	1201	CULVERT, RECTANGULAR w/ ROADWAY
9	AA	1300	1301	CULVERT, RECTANGULAR w/ ROADWAY
10	AC	1400	1401	CULVERT, RECTANGULAR w/ ROADWAY
11	BEN	220	200	DROP STRUCTURE w/ CIRC. CULVERT
12	C	201	300	TRAPEZOIDAL CHANNEL, ENERGY EQ.
13	E	301	400	TRAPEZOIDAL CHANNEL, ENERGY EQ.
14	G	401	550	TRAPEZOIDAL CHANNEL, ENERGY EQ.
15	J	550	600	TRAPEZOIDAL CHANNEL, ENERGY EQ.
16	L	601	602	TRAPEZOIDAL CHANNEL, ENERGY EQ.
17	M	602	603	TRAPEZOIDAL CHANNEL, ENERGY EQ.
18	Q	801	602	TRAPEZOIDAL CHANNEL, ENERGY EQ.
19	U	1001	603	TRAPEZOIDAL CHANNEL, ENERGY EQ.
20	V	603	1100	TRAPEZOIDAL CHANNEL, ENERGY EQ.
21	X	1101	1200	TRAPEZOIDAL CHANNEL, ENERGY EQ.
22	Z	1201	1300	TRAPEZOIDAL CHANNEL, ENERGY EQ.
23	AB	1301	1400	TRAPEZOIDAL CHANNEL, ENERGY EQ.
24	AD	1401	LKMONROE	TRAPEZOIDAL CHANNEL, ENERGY EQ.

MILL CREEK DRAINAGE BASIN:

25-YEAR/6-HOUR STORM EVENT

HYDRAULIC INPUT DATA

POST-CONDITION

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

CONTROL PARAMETERS

START TIME: .00
END TIME: 6.00

TO TIME (hours)	SIMULATION INC (secs)	PRINT INC (mins)
6.00	.50	2.00

RUNOFF HYDROGRAPH FILE: DEFAULT
OFFSITE HYDROGRAPH FILE: DEFAULT
BOUNDARY DATABASE FILE: NONE

NOTE: 25YR/6HR STORM REVISED-FILE:MC\REVISED2

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

NODE NAME	NODE TYPE	INI STAGE (ft)	X-COOR (ft)	Y-COOR (ft)	LENGTH (ft)	STAGE (ft)	AREA/TIME (ac)/(hr)
610	AREA	10.300	.000	.000	.000	10.300	.000
						22.000	.000
600	AREA	10.990	.000	.000	.000	10.990	.000
						22.000	.000
403	AREA	11.940	.000	.000	.000	11.940	.000
						23.000	.000
402	AREA	13.620	.000	.000	.000	13.620	.000
						24.000	.000
410	AREA	15.000	.000	.000	.000	15.000	.000
						26.000	.000
401	AREA	14.140	.000	.000	.000	14.140	.000
						27.000	.000
400	AREA	14.670	.000	.000	.000	14.670	.000
						27.000	.000
302	AREA	16.890	.000	.000	.000	16.890	.000
						27.000	.000
301	AREA	18.230	.000	.000	.000	18.230	.000
						30.000	.000
300	AREA	23.800	.000	.000	.000	23.800	21.430
						35.000	26.670
202	AREA	24.000	.000	.000	.000	24.000	.000
						32.000	.000
201	AREA	24.000	.000	.000	.000	24.000	.000
						32.000	.000
200	AREA	24.500	.000	.000	.000	24.500	.000
						32.000	.000
108	AREA	26.110	.000	.000	.000	26.110	.000
						34.000	.000

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

NODE NAME	NODE TYPE	INI STAGE (ft)	X-COOR (ft)	Y-COOR (ft)	LENGTH (ft)	STAGE (ft)	AREA/TIME (ac)/(hr)
107	AREA	27.810	.000	.000	.000	27.810	.000
						34.000	.000
210	AREA	28.410	.000	.000	.000	28.410	.000
						30.000	1.500
						32.000	2.000
						34.000	2.500
						36.000	3.000
106	AREA	28.320	.000	.000	.000	28.320	.000
						37.000	.000
220	AREA	28.000	.000	.000	.000	28.000	.000
						29.000	.500
						30.000	1.000
						32.000	1.500
						34.000	2.000
105	AREA	29.000	.000	.000	.000	29.000	.000
						38.000	.000
100	AREA	30.150	.000	.000	.000	30.150	.000
						32.000	.500
						34.000	.750
						36.000	1.000
						38.000	1.250
						40.000	1.500
611	AREA	18.290	.000	.000	.000	18.290	.000
						26.000	.000
612	AREA	18.320	.000	.000	.000	18.320	.000
						26.000	.000
613	AREA	20.740	.000	.000	.000	20.740	.000
						32.000	.000
614	AREA	20.740	.000	.000	.000	20.740	3.750
						28.000	5.900
615	AREA	24.880	.000	.000	.000	24.880	.000
						32.000	.000

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

NODE NAME	NODE TYPE	INI STAGE (ft)	X-COOR (ft)	Y-COOR (ft)	LENGTH (ft)	STAGE (ft)	AREA/TIME (ac)/(hr)
616	AREA	25.320	.000	.000	.000	25.320	.000
						32.000	.000
617	AREA	21.000	.000	.000	.000	21.000	.000
						26.000	.000
618	AREA	22.600	.000	.000	.000	22.600	.000
						32.000	.000
619	AREA	22.800	.000	.000	.000	22.800	.000
						32.000	.000
620	AREA	10.180	.000	.000	.000	10.180	.100
						18.000	1.000
620A	AREA	9.650	.000	.000	.000	9.650	.000
						18.000	.000
620B	AREA	8.510	.000	.000	.000	8.510	.000
						18.000	.000
621	AREA	11.130	.000	.000	.000	11.130	.000
						22.000	.000
622	AREA	12.000	.000	.000	.000	12.000	.000
						24.000	.000
623	AREA	18.140	.000	.000	.000	18.140	.000
						28.000	.000
624	AREA	20.350	.000	.000	.000	20.350	.000
						30.000	.000
624A	AREA	22.000	.000	.000	.000	22.000	.000
						31.000	.000
624B	AREA	22.000	.000	.000	.000	22.000	1.900
						29.000	2.800
625	AREA	26.250	.000	.000	.000	26.250	.000
						34.000	.000

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

NODE NAME	NODE TYPE	INI STAGE (ft)	X-COOR (ft)	Y-COOR (ft)	LENGTH (ft)	STAGE (ft)	AREA/TIME (ac)/(hr)
626	AREA	26.970	.000	.000	.000	26.970	.000
						38.000	.000
627	AREA	27.270	.000	.000	.000	27.270	.000
						38.000	.000
628	AREA	27.360	.000	.000	.000	27.360	.000
						30.000	.050
						32.000	.100
						38.000	.400
650	AREA	8.490	.000	.000	.000	8.490	.000
						18.000	.000
700	AREA	4.980	.000	.000	.000	4.980	.000
						14.000	.000
750	AREA	4.520	.000	.000	.000	4.520	.000
						14.000	.000
800	AREA	4.500	.000	.000	.000	4.500	.000
						14.000	.000
850	AREA	4.500	.000	.000	.000	4.500	.000
						14.000	.000
900	AREA	3.020	.000	.000	.000	3.020	.000
						14.000	.000
950	AREA	3.090	.000	.000	.000	3.090	.000
						14.000	.000
1000	AREA	3.000	.000	.000	.000	3.000	.000
						17.000	.000
1050	AREA	3.000	.000	.000	.000	3.000	.000
						17.000	.000
LKMONROE	TIME	3.000	.000	.000	.000	3.000	.000
						3.000	3.000
						3.000	6.000

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

NODE NAME	NODE TYPE	INI STAGE (ft)	X-COOR (ft)	Y-COOR (ft)	LENGTH (ft)	STAGE (ft)	AREA/TIME (ac)/(hr)

```
Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
       Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

>>REACH NAME        : X
  FROM NODE         : 614
  TO NODE           : 613
  REACH TYPE        : RECTANGULAR WEIR/GATE/ORIFICE, VILLEMONTE EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
    CREST EL. (ft):  25.000  CREST LN. (ft):  75.000    OPENING (ft): 999.000
        WEIR COEF.:   3.000       GATE COEF.:     .600 NUMBER OF ELEM.:   1.000
              NOTE: WEIR @ RR POND-MCCRACK RD (S CHAN)

>>REACH NAME        : AI-2
  FROM NODE         : 624B
  TO NODE           : 624A
  REACH TYPE        : RECTANGULAR WEIR/GATE/ORIFICE, VILLEMONTE EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
    CREST EL. (ft):  25.800  CREST LN. (ft):  75.000    OPENING (ft): 999.000
        WEIR COEF.:   3.000       GATE COEF.:     .600 NUMBER OF ELEM.:   1.000
              NOTE: N SIDE CHAN POND BTWN RR & ARPT BLV
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

```
>>REACH NAME        : A
  FROM NODE         : 100
  TO NODE           : 105
  REACH TYPE        : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in):   36.000      RISE (in):   36.000     LENGTH (ft):   75.000
   U/S INVERT (ft):   30.150 D/S INVERT (ft):  30.000      MANNING N:      .013
       ENTRNC LOSS:     .500   # OF CULVERTS:   2.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):   34.000  CREST LN. (ft): 200.000      WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********        RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):9999.000  CREST LN. (ft):     .000      WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********        RESERVED:********

              NOTE: CULVERT UNDER 25TH STREET

>>REACH NAME        : H
  FROM NODE         : 200
  TO NODE           : 201
  REACH TYPE        : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in):   96.000      RISE (in):   48.000     LENGTH (ft): 320.000
   U/S INVERT (ft):   24.500 D/S INVERT (ft):  24.000      MANNING N:      .013
       ENTRNC LOSS:     .500   # OF CULVERTS:   1.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):   31.750  CREST LN. (ft): 200.000      WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********        RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):9999.000  CREST LN. (ft):     .000      WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********        RESERVED:********

              NOTE: CULVERT @ COUNTRY CLUB RD (20TH ST)
```

```
        Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
              Copyright 1989-1990, Streamline Technologies, Inc.

        MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
        10/24/1991

>>REACH NAME        : J
  FROM NODE         : 202
  TO NODE           : 300
  REACH TYPE        : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in): 108.000       RISE (in):  48.000     LENGTH (ft): 375.000
   U/S INVERT (ft):  24.000 D/S INVERT (ft):  23.000      MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   1.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  30.000  CREST LN. (ft): 125.000      WEIR COEF.:   2.800
         RESERVED:********        RESERVED:********        RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):9999.000  CREST LN. (ft):    .000      WEIR COEF.:   2.800
         RESERVED:********        RESERVED:********        RESERVED:********

              NOTE: CULVERT UNDER SCL RR @ PROP POND

>>REACH NAME        : L
  FROM NODE         : 301
  TO NODE           : 302
  REACH TYPE        : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in):  48.000       RISE (in):  48.000     LENGTH (ft): 600.000
   U/S INVERT (ft):  18.230 D/S INVERT (ft):  16.890      MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   2.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  30.250  CREST LN. (ft): 100.000      WEIR COEF.:   2.800
         RESERVED:********        RESERVED:********        RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********      WEIR COEF.:********
         RESERVED:********        RESERVED:********        RESERVED:********

              NOTE: PIPED SECTION BTWN 16TH & 14THST'S
```

```
Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
        Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

>>REACH NAME        : M
  FROM NODE         : 302
  TO NODE           : 400
  REACH TYPE        : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in):  48.000        RISE (in):  48.000     LENGTH (ft):1000.000
   U/S INVERT (ft):  16.890 D/S INVERT (ft):  14.670       MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   2.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  26.470  CREST LN. (ft): 125.000      WEIR COEF.:   2.800
          RESERVED:********         RESERVED:********        RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********        RESERVED:********

            NOTE: PIPED SECTION BTWN 14TH & 13TH ST'S

>>REACH NAME        : S
  FROM NODE         : 600
  TO NODE           : 610
  REACH TYPE        : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in):  96.000        RISE (in):  60.000     LENGTH (ft):  60.000
   U/S INVERT (ft):  10.990 D/S INVERT (ft):  10.300       MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   1.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  21.950  CREST LN. (ft): 250.000      WEIR COEF.:   2.800
          RESERVED:********         RESERVED:********        RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********        RESERVED:********

            NOTE: CULVERT @ 8TH STREET
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

```
>>REACH NAME       : AM-1
  FROM NODE        : 620
  TO NODE          : 620A
  REACH TYPE       : CULVERT, ARCH w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in): 180.000       RISE (in): 108.000     LENGTH (ft):  50.000
   U/S INVERT (ft):  10.180 D/S INVERT (ft):   9.650       MANNING N:    .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  24.510  CREST LN. (ft): 100.000      WEIR COEF.:   2.800
          RESERVED:********        RESERVED:********        RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********        RESERVED:********        RESERVED:********

            NOTE: CULVERT UNDER RR SPUR - MAIN CHAN

>>REACH NAME       : AM-2
  FROM NODE        : 620B
  TO NODE          : 650
  REACH TYPE       : CULVERT, ARCH w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in): 180.000       RISE (in): 108.000     LENGTH (ft):  75.000
   U/S INVERT (ft):   8.510 D/S INVERT (ft):   8.510       MANNING N:    .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  26.360  CREST LN. (ft): 100.000      WEIR COEF.:   2.800
          RESERVED:********        RESERVED:********        RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********        RESERVED:********        RESERVED:********

            NOTE: CULVERT UNDER RR MAINLINE - MAIN CH
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

```
>>REACH NAME       : U
  FROM NODE        : 612
  TO NODE          : 611
  REACH TYPE       : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):   96.000        RISE (in):   60.000     LENGTH (ft):   60.000
   U/S INVERT (ft):   18.320 D/S INVERT (ft):   18.290      MANNING N:      .013
       ENTRNC LOSS:     .500   # OF CULVERTS:    1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):   26.080  CREST LN. (ft): 125.000      WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********       RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********   CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********       RESERVED:********

            NOTE: CULVERT UNDER PERSIMMON, SOUTH CHAN

>>REACH NAME       : X-1
  FROM NODE        : 614
  TO NODE          : 613
  REACH TYPE       : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):   12.000        RISE (in):   12.000     LENGTH (ft):    5.000
   U/S INVERT (ft):   20.740 D/S INVERT (ft):   20.740      MANNING N:      .013
       ENTRNC LOSS:     .500   # OF CULVERTS:    3.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):9999.000   CREST LN. (ft):      .000     WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********       RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********   CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********       RESERVED:********

            NOTE: CIRC ORIF'S @ RR POND FOR BLEEDDOWN
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

```
>>REACH NAME        : Z
  FROM NODE         : 616
  TO NODE           : 615
  REACH TYPE        : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in):  42.000       RISE (in):  42.000    LENGTH (ft):  50.000
   U/S INVERT (ft):  25.320 D/S INVERT (ft):  24.880     MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   2.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  31.370  CREST LN. (ft): 125.000     WEIR COEF.:   2.800
          RESERVED:********        RESERVED:********       RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********        RESERVED:********       RESERVED:********

              NOTE: CULVERT @ AIRPORT BLVD-S SIDE CHAN

>>REACH NAME        : AA
  FROM NODE         : 617
  TO NODE           : 614
  REACH TYPE        : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in):  48.000       RISE (in):  48.000    LENGTH (ft):  60.000
   U/S INVERT (ft):  21.000 D/S INVERT (ft):  20.700     MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   2.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  30.500  CREST LN. (ft):  75.000     WEIR COEF.:   2.800
          RESERVED:********        RESERVED:********       RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********        RESERVED:********       RESERVED:********

              NOTE: CULVERT NEAR SCHOOL BOARD PROPERTY
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

CONTROL PARAMETERS

START TIME: .00
END TIME: 6.00

TO TIME (hours)	SIMULATION INC (secs)	PRINT INC (mins)
6.00	.50	2.00

RUNOFF HYDROGRAPH FILE: DEFAULT
OFFSITE HYDROGRAPH FILE: DEFAULT
BOUNDARY DATABASE FILE: NONE

NOTE: CLOUD BRANCH - 25YR/6HR - PRE COND

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

```
>>REACH NAME        : AC
  FROM NODE         : 619
  TO NODE           : 618
  REACH TYPE        : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in):   48.000       RISE (in):   48.000      LENGTH (ft):   60.000
   U/S INVERT (ft):   22.800 D/S INVERT (ft):   22.600       MANNING N:      .013
       ENTRNC LOSS:     .500    # OF CULVERTS:   2.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):   30.500  CREST LN. (ft):   75.000      WEIR COEF.:     2.800
          RESERVED:********         RESERVED:********         RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********   CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********         RESERVED:********

                NOTE: CULVERT UNDER RR NEAR MCKEE PROP

>>REACH NAME        : AF
  FROM NODE         : 622
  TO NODE           : 621
  REACH TYPE        : CULVERT, ARCH w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in):   57.500       RISE (in):   56.000      LENGTH (ft):   80.000
   U/S INVERT (ft):   12.000 D/S INVERT (ft):   11.130       MANNING N:      .013
       ENTRNC LOSS:     .500    # OF CULVERTS:   2.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):   26.600  CREST LN. (ft):  125.000      WEIR COEF.:     2.800
          RESERVED:********         RESERVED:********         RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********   CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********         RESERVED:********

                NOTE: CULVERT @ PERSIMMON ON N SIDE CHAN
```

```
Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
       Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

>>REACH NAME        : AH
  FROM NODE         : 624
  TO NODE           : 623
  REACH TYPE        : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in):  48.000       RISE (in):  48.000    LENGTH (ft): 525.000
   U/S INVERT (ft):  20.350 D/S INVERT (ft):  18.140     MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   2.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  27.800  CREST LN. (ft): 100.000    WEIR COEF.:    2.800
         RESERVED:********         RESERVED:********      RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********    WEIR COEF.:********
         RESERVED:********         RESERVED:********      RESERVED:********

              NOTE: CULVERT UNDER RR - N SIDE CHAN

>>REACH NAME        : AI-3
  FROM NODE         : 624B
  TO NODE           : 624A
  REACH TYPE        : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in):  12.000       RISE (in):  12.000    LENGTH (ft):   5.000
   U/S INVERT (ft):  22.020 D/S INVERT (ft):  22.000     MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   3.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):9999.000  CREST LN. (ft):     .000    WEIR COEF.:    2.800
         RESERVED:********         RESERVED:********      RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********    WEIR COEF.:********
         RESERVED:********         RESERVED:********      RESERVED:********

              NOTE: CONTROL STRUCT ORIFICES - POND 624B
```

```
        Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
              Copyright 1989-1990, Streamline Technologies, Inc.

        MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
        10/24/1991

>>REACH NAME        : AJ
  FROM NODE         : 626
  TO NODE           : 625
  REACH TYPE        : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in): 120.000       RISE (in):  18.000     LENGTH (ft):  60.000
   U/S INVERT (ft):  26.970 D/S INVERT (ft):  26.250      MANNING N:     .013
       ENTRNC LOSS:     .500   # OF CULVERTS:   1.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  29.790  CREST LN. (ft): 125.000      WEIR COEF.:   2.800
          RESERVED:********         RESERVED:********       RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********       RESERVED:********

                NOTE: CULVERT UNDER BEVIER - N SIDE CHAN

>>REACH NAME        : AL
  FROM NODE         : 628
  TO NODE           : 627
  REACH TYPE        : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in): 120.000       RISE (in):  18.000     LENGTH (ft):  60.000
   U/S INVERT (ft):  27.360 D/S INVERT (ft):  27.270      MANNING N:     .013
       ENTRNC LOSS:     .500   # OF CULVERTS:   1.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  30.680  CREST LN. (ft): 125.000      WEIR COEF.:   2.800
          RESERVED:********         RESERVED:********       RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********       RESERVED:********

                NOTE: CULVERT UNDER MEISCH - N SIDE CHAN
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)


```
MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

>>REACH NAME       : A0
  FROM NODE        : 700
  TO NODE          : 750
  REACH TYPE       : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
       SPAN (in): 300.000       RISE (in):  60.000     LENGTH (ft):  80.000
   U/S INVERT (ft):   4.980 D/S INVERT (ft):   4.520     MANNING N:     .013
      ENTRNC LOSS:     .500   # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  12.960  CREST LN. (ft): 200.000    WEIR COEF.:   2.800
         RESERVED:********         RESERVED:********      RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********    WEIR COEF.:********
         RESERVED:********         RESERVED:********      RESERVED:********

             NOTE: CULVERT UNDER 3RD ST - MAIN CHAN

>>REACH NAME       : A0
  FROM NODE        : 800
  TO NODE          : 850
  REACH TYPE       : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
       SPAN (in): 300.000       RISE (in):  60.000     LENGTH (ft):  60.000
   U/S INVERT (ft):   4.500 D/S INVERT (ft):   4.500     MANNING N:     .013
      ENTRNC LOSS:     .500   # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  11.970  CREST LN. (ft): 200.000    WEIR COEF.:   2.800
         RESERVED:********         RESERVED:********      RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********    WEIR COEF.:********
         RESERVED:********         RESERVED:********      RESERVED:********

             NOTE: CULVERT UNDER 2ND ST - MAIN CHAN
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

```
>>REACH NAME        : AS
  FROM NODE         : 900
  TO NODE           : 950
  REACH TYPE        : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
       SPAN (in):   84.000      RISE (in):   96.000     LENGTH (ft): 100.000
   U/S INVERT (ft):   3.020 D/S INVERT (ft):  2.990      MANNING N:     .013
     ENTRNC LOSS:      .500  # OF CULVERTS:   3.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  13.800  CREST LN. (ft): 200.000     WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********      RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********         RESERVED:********      RESERVED:********

             NOTE: CULVERTS @ 1ST STREET - MAIN CHAN

>>REACH NAME        : AU
  FROM NODE         : 1000
  TO NODE           : 1050
  REACH TYPE        : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
       SPAN (in): 360.000      RISE (in): 108.000      LENGTH (ft):   45.000
   U/S INVERT (ft):   -.750 D/S INVERT (ft):  -1.000     MANNING N:     .013
     ENTRNC LOSS:      .500  # OF CULVERTS:   1.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  16.500  CREST LN. (ft): 200.000     WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********      RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********         RESERVED:********      RESERVED:********

             NOTE: CULVERT UNDER U.S. HWY 17-92
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

```
>>REACH NAME       : C
  FROM NODE        : 220
  TO NODE          : 106
  REACH TYPE       : DROP STRUCTURE w/ CIRC. CULVERT
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):  24.000         RISE (in):  24.000     LENGTH (ft): 600.000
   U/S INVERT (ft):  29.520 D/S INVERT (ft):  28.320        MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR RISER SLOT
    CREST EL. (ft):  37.000  CREST LN. (ft):  16.000    OPENING (ft): 999.000
        WEIR COEF.:   3.000      GATE COEF.:    .600 NUMBER OF ELEM.:   1.000

  POSITION B       : NOT USED

           NOTE: NEW CULV IN SOUTH PORTION OF C CLUB

>>REACH NAME       : K
  FROM NODE        : 300
  TO NODE          : 301
  REACH TYPE       : DROP STRUCTURE w/ CIRC. CULVERT
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):  48.000         RISE (in):  48.000     LENGTH (ft):1100.000
   U/S INVERT (ft):  20.670 D/S INVERT (ft):  18.230        MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   2.000

  POSITION A       : RECTANGULAR RISER SLOT
    CREST EL. (ft):  25.750  CREST LN. (ft):  75.000    OPENING (ft): 999.000
        WEIR COEF.:   3.000      GATE COEF.:    .600 NUMBER OF ELEM.:   1.000

  POSITION B       : CIRCULAR RISER SLOT
   INVERT EL. (ft):  24.000       SPAN (in):   8.000        RISE (in):   8.000
        WEIR COEF.:   3.000      GATE COEF.:    .600 NUMBER OF ELEM.:   3.000

           NOTE: CULV FROM 18TH ST POND TO 16TH ST
```

```
Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
     Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

>>REACH NAME        : B
  FROM NODE         : 105
  TO NODE           : 106
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):    8.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
      LENGTH (ft): 400.000 U/S INVERT (ft):   29.000 D/S INVERT (ft):   28.320
        MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

           NOTE: CHAN NORTH OF 25TH ST-TO W SIDE CH

>>REACH NAME        : D
  FROM NODE         : 106
  TO NODE           : 107
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):    8.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
      LENGTH (ft): 300.000 U/S INVERT (ft):   28.320 D/S INVERT (ft):   27.810
        MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

           NOTE: CHAN BETWEEN W SIDE CHAN & 24TH ST

>>REACH NAME        : E
  FROM NODE         : 210
  TO NODE           : 107
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):    2.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
      LENGTH (ft): 600.000 U/S INVERT (ft):   28.410 D/S INVERT (ft):   27.810
        MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

           NOTE: SIDE CHANNEL - SOUTH OF 24TH STREET

>>REACH NAME        : F
  FROM NODE         : 107
  TO NODE           : 108
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):    8.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
      LENGTH (ft):1000.000 U/S INVERT (ft):   27.810 D/S INVERT (ft):   26.110
        MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

           NOTE: CHAN BTWN 24TH & 23RD ST - MAIN CH
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

```
>>REACH NAME       : G
  FROM NODE        : 108
  TO NODE          : 200
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   8.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
       LENGTH (ft): 950.000 U/S INVERT (ft):  26.110 D/S INVERT (ft):  24.500
         MANNING N:    .025    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

            NOTE: CHAN BTWN 23RD & 20TH ST - MAIN CH

>>REACH NAME       : I
  FROM NODE        : 201
  TO NODE          : 202
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):  10.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
       LENGTH (ft): 675.000 U/S INVERT (ft):  24.000 D/S INVERT (ft):  24.000
         MANNING N:    .030    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

            NOTE: CHAN ALONG 20TH - WEST OF GOLDSBORO

>>REACH NAME       : N
  FROM NODE        : 400
  TO NODE          : 401
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):  20.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
       LENGTH (ft): 250.000 U/S INVERT (ft):  14.670 D/S INVERT (ft):  14.140
         MANNING N:    .025    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

            NOTE: CHAN BTWN 13TH & 12TH ST'S-MAIN CH

>>REACH NAME       : O
  FROM NODE        : 401
  TO NODE          : 402
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):  20.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
       LENGTH (ft): 250.000 U/S INVERT (ft):  14.140 D/S INVERT (ft):  13.620
         MANNING N:    .025    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

            NOTE: CHAN BTWN 12TH & 11TH ST - MAIN CH
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

```
>>REACH NAME        : P
  FROM NODE         : 410
  TO NODE           : 402
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):  10.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
       LENGTH (ft): 700.000 U/S INVERT (ft):  15.000 D/S INVERT (ft):  13.620
         MANNING N:    .025    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

             NOTE: SIDE CHANNEL FROM CROOMS AREA

>>REACH NAME        : Q
  FROM NODE         : 402
  TO NODE           : 403
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):  20.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
       LENGTH (ft): 800.000 U/S INVERT (ft):  13.620 D/S INVERT (ft):  11.940
         MANNING N:    .025    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

             NOTE: CHAN BTWN 11TH & 9TH ST - MAIN CH

>>REACH NAME        : R
  FROM NODE         : 403
  TO NODE           : 600
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):  20.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
       LENGTH (ft): 450.000 U/S INVERT (ft):  11.940 D/S INVERT (ft):  10.990
         MANNING N:    .025    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

             NOTE: CHAN BTWN 9TH & 8TH ST - MAIN CH

>>REACH NAME        : T
  FROM NODE         : 611
  TO NODE           : 620
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):  20.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
       LENGTH (ft): 450.000 U/S INVERT (ft):  18.320 D/S INVERT (ft):  10.180
         MANNING N:    .025    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

             NOTE: CHAN BTWN PERSIM & 8TH ST-S SIDE CH
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

```
>>REACH NAME        : AM
  FROM NODE         : 620A
  TO NODE           : 620B
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):   20.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
       LENGTH (ft): 450.000 U/S INVERT (ft):    9.650 D/S INVERT (ft):    8.510
         MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

               NOTE: CHAN BTWN RR SPUR & RR MAIN-MAIN CH

>>REACH NAME        : V
  FROM NODE         : 613
  TO NODE           : 612
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):   10.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
       LENGTH (ft):1000.000 U/S INVERT (ft):   20.580 D/S INVERT (ft):   18.290
         MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

               NOTE: CHAN BTWN RR & PERSIM - S SIDE CHAN

>>REACH NAME        : Y
  FROM NODE         : 615
  TO NODE           : 614
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):   10.000   LEFT SS (h/v):    1.500   RGHT SS (h/v):    1.500
       LENGTH (ft):1300.000 U/S INVERT (ft):   24.880 D/S INVERT (ft):   20.780
         MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

               NOTE: CHAN BTWN AIRPT BL & R POND-S SICH

>>REACH NAME        : AB
  FROM NODE         : 616
  TO NODE           : 617
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):   10.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
       LENGTH (ft):1300.000 U/S INVERT (ft):   22.600 D/S INVERT (ft):   22.000
         MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

               NOTE: SOUTH SIDE CHANNEL - SOUTHERN TRIB
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

```
>>REACH NAME        : AD
  FROM NODE         : 610
  TO NODE           : 620
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):  20.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
      LENGTH (ft):  25.000 U/S INVERT (ft):  10.300 D/S INVERT (ft):  10.180
       MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

             NOTE: CHAN BTWN 8TH ST & RR SPUR-MAIN CH

>>REACH NAME        : AE
  FROM NODE         : 621
  TO NODE           : 620
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):  20.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
      LENGTH (ft): 550.000 U/S INVERT (ft):  11.130 D/S INVERT (ft):   8.510
       MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

             NOTE: CHAN BTWN PERS & POND 620-N SIDE CH

>>REACH NAME        : AG
  FROM NODE         : 623
  TO NODE           : 622
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):  20.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
      LENGTH (ft):1400.000 U/S INVERT (ft):  18.140 D/S INVERT (ft):  12.000
       MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

             NOTE: CHAN BTWN RR & PERSIM - N SIDE CHAN

>>REACH NAME        : AI-1
  FROM NODE         : 624A
  TO NODE           : 624
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):  10.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
      LENGTH (ft): 580.000 U/S INVERT (ft):  22.000 D/S INVERT (ft):  20.350
       MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

             NOTE: CHAN BTWN N SIDE CHAN POND & RR
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

```
>>REACH NAME       : AI
  FROM NODE        : 625
  TO NODE          : 624B
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   10.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
       LENGTH (ft):1995.000 U/S INVERT (ft):   26.250 D/S INVERT (ft):   22.000
         MANNING N:     .025    ENTRNC COEF.:      .100 MAX. DEPTH (ft):   99.000

            NOTE: CHAN BTWN BEVIER & N SIDE CHANPOND

>>REACH NAME       : AK
  FROM NODE        : 627
  TO NODE          : 626
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   10.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
       LENGTH (ft): 655.000 U/S INVERT (ft):   27.270 D/S INVERT (ft):   26.970
         MANNING N:     .025    ENTRNC COEF.:      .100 MAX. DEPTH (ft):   99.000

            NOTE: CHAN BTWN MEISCH & BEVIER-N SIDE CH

>>REACH NAME       : AN
  FROM NODE        : 650
  TO NODE          : 700
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   20.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
       LENGTH (ft):1650.000 U/S INVERT (ft):    6.490 D/S INVERT (ft):    4.980
         MANNING N:     .025    ENTRNC COEF.:      .100 MAX. DEPTH (ft):   99.000

            NOTE: CHAN BTWN RR & 3RD ST - MAIN CHAN

>>REACH NAME       : AP
  FROM NODE        : 750
  TO NODE          : 800
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   30.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
       LENGTH (ft): 550.000 U/S INVERT (ft):    4.520 D/S INVERT (ft):    4.500
         MANNING N:     .025    ENTRNC COEF.:      .100 MAX. DEPTH (ft):   99.000

            NOTE: CHAN BTWN 3RD & 2ND ST - MAIN CHAN
```

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

```
>>REACH NAME        : AR
  FROM NODE         : 850
  TO NODE           : 900
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):  20.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
       LENGTH (ft): 690.000 U/S INVERT (ft):   4.500 D/S INVERT (ft):   3.020
         MANNING N:    .025    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

             NOTE: CHAN BTWN 2ND & 1ST ST - MAIN CHAN

>>REACH NAME        : AT
  FROM NODE         : 950
  TO NODE           : 1000
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):  20.000   LEFT SS (h/v):   2.000   RGHT SS (h/v):   2.000
       LENGTH (ft):2313.000 U/S INVERT (ft):   2.990 D/S INVERT (ft):   -.750
         MANNING N:    .025    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

             NOTE: CHAN BTWN 1ST ST & 17-92 - MAIN CH

>>REACH NAME        : AV
  FROM NODE         : 1050
  TO NODE           : LKMONROE
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft): 125.000   LEFT SS (h/v):   4.000   RGHT SS (h/v):   4.000
       LENGTH (ft): 220.000 U/S INVERT (ft):  -1.000 D/S INVERT (ft):  -2.000
         MANNING N:    .025    ENTRNC COEF.:    .100 MAX. DEPTH (ft):  99.000

             NOTE: OUTFALL TO LAKE MONROE
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

REACH SUMMARY
=============

INDEX	RCHNAME	FRMNODE	TONODE	REACH TYPE
1	X	614	613	RECTANGULAR WEIR/GATE/ORIFICE, VILLEMONTE EQ
2	AI-2	624B	624A	RECTANGULAR WEIR/GATE/ORIFICE, VILLEMONTE EQ
3	A	100	105	CULVERT, CIRCULAR w/ ROADWAY
4	H	200	201	CULVERT, RECTANGULAR w/ ROADWAY
5	J	202	300	CULVERT, RECTANGULAR w/ ROADWAY
6	L	301	302	CULVERT, CIRCULAR w/ ROADWAY
7	M	302	400	CULVERT, CIRCULAR w/ ROADWAY
8	S	600	610	CULVERT, RECTANGULAR w/ ROADWAY
9	AM-1	620	620A	CULVERT, ARCH w/ ROADWAY
10	AM-2	620B	650	CULVERT, ARCH w/ ROADWAY
11	U	612	611	CULVERT, RECTANGULAR w/ ROADWAY
12	X-1	614	613	CULVERT, CIRCULAR w/ ROADWAY
13	Z	616	615	CULVERT, CIRCULAR w/ ROADWAY
14	AA	617	616	CULVERT, CIRCULAR w/ ROADWAY
15	AC	619	618	CULVERT, CIRCULAR w/ ROADWAY
16	AF	622	621	CULVERT, ARCH w/ ROADWAY
17	AH	624	623	CULVERT, CIRCULAR w/ ROADWAY
18	AI-3	624B	624A	CULVERT, CIRCULAR w/ ROADWAY
19	AJ	626	625	CULVERT, RECTANGULAR w/ ROADWAY
20	AL	628	627	CULVERT, RECTANGULAR w/ ROADWAY
21	AO	700	750	CULVERT, RECTANGULAR w/ ROADWAY
22	AQ	800	850	CULVERT, RECTANGULAR w/ ROADWAY
23	AS	900	950	CULVERT, RECTANGULAR w/ ROADWAY
24	AU	1000	1050	CULVERT, RECTANGULAR w/ ROADWAY
25	C	220	106	DROP STRUCTURE w/ CIRC. CULVERT
26	K	300	301	DROP STRUCTURE w/ CIRC. CULVERT
27	B	105	106	TRAPEZOIDAL CHANNEL, ENERGY EQ.
28	D	106	107	TRAPEZOIDAL CHANNEL, ENERGY EQ.
29	E	210	107	TRAPEZOIDAL CHANNEL, ENERGY EQ.
30	F	107	108	TRAPEZOIDAL CHANNEL, ENERGY EQ.
31	G	108	200	TRAPEZOIDAL CHANNEL, ENERGY EQ.
32	I	201	202	TRAPEZOIDAL CHANNEL, ENERGY EQ.
33	N	400	401	TRAPEZOIDAL CHANNEL, ENERGY EQ.
34	O	401	402	TRAPEZOIDAL CHANNEL, ENERGY EQ.
35	P	410	402	TRAPEZOIDAL CHANNEL, ENERGY EQ.
36	Q	402	403	TRAPEZOIDAL CHANNEL, ENERGY EQ.
37	R	403	600	TRAPEZOIDAL CHANNEL, ENERGY EQ.
38	T	611	620	TRAPEZOIDAL CHANNEL, ENERGY EQ.
39	AM	620A	620B	TRAPEZOIDAL CHANNEL, ENERGY EQ.
40	V	613	612	TRAPEZOIDAL CHANNEL, ENERGY EQ.
41	Y	615	614	TRAPEZOIDAL CHANNEL, ENERGY EQ.
42	AB	618	617	TRAPEZOIDAL CHANNEL, ENERGY EQ.
43	AD	610	620	TRAPEZOIDAL CHANNEL, ENERGY EQ.
44	AE	621	620	TRAPEZOIDAL CHANNEL, ENERGY EQ.
45	AG	623	622	TRAPEZOIDAL CHANNEL, ENERGY EQ.
46	AI-1	624A	624	TRAPEZOIDAL CHANNEL, ENERGY EQ.
47	AI	625	624B	TRAPEZOIDAL CHANNEL, ENERGY EQ.
48	AK	627	626	TRAPEZOIDAL CHANNEL, ENERGY EQ.
49	AN	650	700	TRAPEZOIDAL CHANNEL, ENERGY EQ.
50	AP	750	800	TRAPEZOIDAL CHANNEL, ENERGY EQ.

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

MILL CREEK-25YR/6HR STORM EVENT-POST COND-MED POND-(REVISED2)
10/24/1991

REACH SUMMARY
=============

INDEX	RCHNAME	FRMNODE	TONODE	REACH TYPE
51	AR	850	900	TRAPEZOIDAL CHANNEL, ENERGY EQ.
52	AT	950	1000	TRAPEZOIDAL CHANNEL, ENERGY EQ.
53	AV	1050	LKMONROE	TRAPEZOIDAL CHANNEL, ENERGY EQ.

APPENDIX 6

HYDRAULIC INPUT DATA

CLOUD BRANCH DRAINAGE BASIN:

25-YEAR/6-HOUR STORM EVENT

CLOUD BRANCH DRAINAGE BASIN:

25-YEAR/6-HOUR STORM EVENT

HYDRAULIC INPUT DATA

PRE-CONDITION

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

NODE NAME	NODE TYPE	INI STAGE (ft)	X-COOR (ft)	Y-COOR (ft)	LENGTH (ft)	STAGE (ft)	AREA/TIME (ac)/(hr)
10	AREA	28.220	.000	.000	.000	28.220	.000
						35.220	.000
20	AREA	27.640	.000	.000	.000	27.640	.000
						33.640	.000
40	AREA	26.880	.000	.000	.000	26.880	.000
						35.000	.000
50	AREA	26.650	.000	.000	.000	26.650	.000
						35.000	.000
STORAGE1	AREA	24.230	.000	.000	.000	23.970	.180
						25.970	.310
						27.970	.430
						27.980	2.300
						30.000	2.750
STORAGE2	AREA	24.230	.000	.000	.000	23.070	.090
						25.070	.160
						27.070	.220
						27.080	1.200
						29.000	1.450
STORAGE3	AREA	24.230	.000	.000	.000	21.950	.070
						23.950	.110
						26.950	.150
						26.960	.420
						28.700	.470
90	AREA	24.230	.000	.000	.000	22.450	.000
						32.000	.000
100	AREA	24.230	.000	.000	.000	24.230	.000
						35.000	.000
110	AREA	24.080	.000	.000	.000	24.080	.000
						35.000	.000
115	AREA	21.940	.000	.000	.000	21.940	.000
						32.000	.000

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

NODE NAME	NODE TYPE	INI STAGE (ft)	X-COOR (ft)	Y-COOR (ft)	LENGTH (ft)	STAGE (ft)	AREA/TIME (ac)/(hr)
1301	AREA	22.940	.000	.000	.000	22.940	.010
						26.940	.090
						27.940	.400
118	AREA	19.810	.000	.000	.000	19.810	.000
						28.000	.000
1401	AREA	20.810	.000	.000	.000	20.810	.010
						24.810	.100
						25.810	.450
120	AREA	19.000	.000	.000	.000	19.000	.000
						28.000	.000
130	AREA	17.560	.000	.000	.000	17.560	.000
						26.000	.000
140	AREA	17.360	.000	.000	.000	17.360	.000
						26.000	.000
150	AREA	15.670	.000	.000	.000	15.670	.000
						25.000	.000
160	AREA	15.160	.000	.000	.000	15.160	.000
						25.000	.000
170	AREA	8.250	.000	.000	.000	8.250	.000
						17.000	.000
180	AREA	8.100	.000	.000	.000	8.100	.000
						17.000	.000
190	AREA	3.000	.000	.000	.000	2.260	.000
						12.000	.000
200	AREA	3.000	.000	.000	.000	2.000	.000
						12.000	.000
210	AREA	3.000	.000	.000	.000	.140	.000
						10.000	.000

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

NODE NAME	NODE TYPE	INI STAGE (ft)	X-COOR (ft)	Y-COOR (ft)	LENGTH (ft)	STAGE (ft)	AREA/TIME (ac)/(hr)
1000	AREA	3.000	.000	.000	.000	-.750	.000
						10.000	.000
1050	AREA	3.000	.000	.000	.000	-1.000	.000
						10.000	.000
LKMONROE	TIME	3.000	.000	.000	.000	3.000	.000
						3.000	3.000
						3.000	6.000

```
   Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
           Copyright 1989-1990, Streamline Technologies, Inc.

   CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
   10/15/1991

>>REACH NAME       : C
  FROM NODE        : 40
  TO NODE          : 50
  REACH TYPE       : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):  36.000       RISE (in):  36.000     LENGTH (ft):  60.000
   U/S INVERT (ft):  26.880 D/S INVERT (ft):  26.650       MANNING N:    .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   2.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  31.600  CREST LN. (ft): 100.000     WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********      RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********         RESERVED:********      RESERVED:********

             NOTE: CULVERT SYSTEM AT 20TH ST

>>REACH NAME       : E
  FROM NODE        : STORAGE1
  TO NODE          : STORAGE2
  REACH TYPE       : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):  36.000       RISE (in):  36.000     LENGTH (ft):  80.000
   U/S INVERT (ft):  23.970 D/S INVERT (ft):  23.070       MANNING N:    .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  28.700  CREST LN. (ft): 100.000     WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********      RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********         RESERVED:********      RESERVED:********

             NOTE: CULVERT AT 16TH ST BTWN LOW AREAS
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

```
>>REACH NAME      : F
  FROM NODE       : STORAGE2
  TO NODE         : STORAGE3
  REACH TYPE      : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION  : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH    : ON

  CULVERT DATA    :
         SPAN (in):  30.000       RISE (in):  30.000     LENGTH (ft): 100.000
   U/S INVERT (ft):  23.070 D/S INVERT (ft):  21.950       MANNING N:    .013
      ENTRNC LOSS:     .500   # OF CULVERTS:   1.000

  POSITION A      : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  28.000  CREST LN. (ft): 150.000      WEIR COEF.:   2.800
          RESERVED:********        RESERVED:********        RESERVED:********

  POSITION B      : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********        RESERVED:********        RESERVED:********

            NOTE: CULVERT SYSTEM AT 14TH ST

>>REACH NAME      : G
  FROM NODE       : STORAGE3
  TO NODE         : 90
  REACH TYPE      : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION  : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH    : ON

  CULVERT DATA    :
         SPAN (in):  48.000       RISE (in):  48.000     LENGTH (ft): 150.000
   U/S INVERT (ft):  21.950 D/S INVERT (ft):  22.450       MANNING N:    .013
      ENTRNC LOSS:     .500   # OF CULVERTS:   1.000

  POSITION A      : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  29.300  CREST LN. (ft): 150.000      WEIR COEF.:   2.800
          RESERVED:********        RESERVED:********        RESERVED:********

  POSITION B      : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********        RESERVED:********        RESERVED:********

            NOTE: CULVERT SYSTEM AT 13TH STREET
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

```
>>REACH NAME     : I
  FROM NODE      : 100
  TO NODE        : 110
  REACH TYPE     : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH   : ON

  CULVERT DATA   :
         SPAN (in):  42.000        RISE (in):  42.000     LENGTH (ft):  50.000
   U/S INVERT (ft):  24.230 D/S INVERT (ft):  24.080      MANNING N:     .013
       ENTRNC LOSS:     .500   # OF CULVERTS:   1.000

  POSITION A     : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  29.600  CREST LN. (ft): 100.000      WEIR COEF.:   2.800
          RESERVED:********        RESERVED:********       RESERVED:********

  POSITION B     : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********        RESERVED:********       RESERVED:********

            NOTE: CULVERT SYSTEM AT 12TH STREET

>>REACH NAME     : J-1
  FROM NODE      : 1301
  TO NODE        : 115
  REACH TYPE     : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH   : ON

  CULVERT DATA   :
         SPAN (in):  36.000        RISE (in):  36.000     LENGTH (ft): 300.000
   U/S INVERT (ft):  22.940 D/S INVERT (ft):  21.940      MANNING N:     .013
       ENTRNC LOSS:     .500   # OF CULVERTS:   1.000

  POSITION A     : NOT USED

  POSITION B     : NOT USED

            NOTE: CULVERT SYSTEM FROM NODE 1300 TO CB
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

```
>>REACH NAME       : K-1
  FROM NODE        : 1401
  TO NODE          : 118
  REACH TYPE       : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
        SPAN (in):  36.000       RISE (in):  36.000    LENGTH (ft): 300.000
   U/S INVERT (ft):  20.810 D/S INVERT (ft):  19.810     MANNING N:    .013
       ENTRNC LOSS:    .500  # OF CULVERTS:   1.000

  POSITION A       : NOT USED

  POSITION B       : NOT USED

             NOTE: CULVERT SYSTEM FROM NODE 1400 TO CB

>>REACH NAME       : L
  FROM NODE        : 118
  TO NODE          : 120
  REACH TYPE       : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
        SPAN (in):  48.000       RISE (in):  48.000    LENGTH (ft): 200.000
   U/S INVERT (ft):  19.810 D/S INVERT (ft):  19.000     MANNING N:    .013
       ENTRNC LOSS:    .500  # OF CULVERTS:   2.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  27.100  CREST LN. (ft): 100.000     WEIR COEF.:   2.600
          RESERVED:********       RESERVED:********      RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********       RESERVED:********      RESERVED:********

             NOTE: CULV SYST @ S END OF COASTLINE PARK
```

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

```
>>REACH NAME       : N
  FROM NODE        : 130
  TO NODE          : 140
  REACH TYPE       : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):   54.000       RISE (in):   54.000     LENGTH (ft):   60.000
   U/S INVERT (ft):   17.560 D/S INVERT (ft):   17.360      MANNING N:     .013
       ENTRNC LOSS:     .500   # OF CULVERTS:    1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):   25.230  CREST LN. (ft): 100.000      WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********        RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********   CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********        RESERVED:********

              NOTE: CULVERT SYSTEM AT 8TH STREET

>>REACH NAME       : P
  FROM NODE        : 150
  TO NODE          : 160
  REACH TYPE       : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):   48.000       RISE (in):   48.000     LENGTH (ft):  200.000
   U/S INVERT (ft):   15.670 D/S INVERT (ft):   15.160      MANNING N:     .013
       ENTRNC LOSS:     .500   # OF CULVERTS:    2.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):   26.000  CREST LN. (ft): 100.000      WEIR COEF.:    2.800
          RESERVED:********         RESERVED:********        RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********   CREST LN. (ft):********      WEIR COEF.:********
          RESERVED:********         RESERVED:********        RESERVED:********

              NOTE: CULVERT SYSTEM UNDER SCL RR
```

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

```
>>REACH NAME       : R
  FROM NODE        : 170
  TO NODE          : 180
  REACH TYPE       : CULVERT, ARCH w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
        SPAN (in): 100.000       RISE (in):   56.000     LENGTH (ft):   50.000
   U/S INVERT (ft):   8.250 D/S INVERT (ft):   8.100      MANNING N:      .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   1.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  16.310  CREST LN. (ft): 100.000     WEIR COEF.:    2.800
          RESERVED:********        RESERVED:********       RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********        RESERVED:********       RESERVED:********

             NOTE: CULVERT SYSTEM AT 3RD STREET

>>REACH NAME       : T
  FROM NODE        : 190
  TO NODE          : 200
  REACH TYPE       : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
        SPAN (in):  84.000       RISE (in):   84.000     LENGTH (ft):   90.000
   U/S INVERT (ft):   2.260 D/S INVERT (ft):   2.000      MANNING N:      .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   1.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  13.500  CREST LN. (ft): 100.000     WEIR COEF.:    2.800
          RESERVED:********        RESERVED:********       RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********        RESERVED:********       RESERVED:********

             NOTE: CULVERT SYSTEM AT 1ST STREET
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

```
>>REACH NAME      : W
  FROM NODE       : 1000
  TO NODE         : 1050
  REACH TYPE      : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION  : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH    : ON

  CULVERT DATA    :
         SPAN (in): 360.000      RISE (in): 108.000     LENGTH (ft):  45.000
   U/S INVERT (ft):   -.750 D/S INVERT (ft):  -1.000     MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  16.500  CREST LN. (ft): 200.000     WEIR COEF.:   2.800
          RESERVED:********         RESERVED:********      RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********         RESERVED:********      RESERVED:********

              NOTE: CULVERT UNDER U.S. HWY 17-92
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

```
>>REACH NAME       : A
  FROM NODE        : 10
  TO NODE          : 20
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   6.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):    1.000
       LENGTH (ft): 900.000 U/S INVERT (ft):   28.220 D/S INVERT (ft):   27.640
         MANNING N:    .035    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

              NOTE: CHANNEL BETWEEN 24TH ST & 22ND ST

>>REACH NAME       : B
  FROM NODE        : 20
  TO NODE          : 40
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   6.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):    1.000
       LENGTH (ft): 690.000 U/S INVERT (ft):   27.640 D/S INVERT (ft):   26.880
         MANNING N:    .035    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

              NOTE: CHANNEL BETWEEN 22ND ST & 20TH ST

>>REACH NAME       : D
  FROM NODE        : 50
  TO NODE          : STORAGE1
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   6.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):    1.000
       LENGTH (ft): 500.000 U/S INVERT (ft):   26.650 D/S INVERT (ft):   24.570
         MANNING N:    .035    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

              NOTE: CHAN BTWN 20TH AND 16TH ST - PART 1

>>REACH NAME       : H
  FROM NODE        : 90
  TO NODE          : 100
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   4.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):    1.000
       LENGTH (ft): 330.000 U/S INVERT (ft):   22.450 D/S INVERT (ft):   24.230
         MANNING N:    .035    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

              NOTE: CHANNEL BETWEEN 13TH AND 12TH ST
```

```
Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

>>REACH NAME       : J
  FROM NODE        : 110
  TO NODE          : 115
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   7.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):   1.000
       LENGTH (ft): 460.000 U/S INVERT (ft):   24.080 D/S INVERT (ft):  21.940
         MANNING N:    .035    ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

               NOTE: CHANNEL BETWEEN 12TH AND 11TH ST

>>REACH NAME       : K
  FROM NODE        : 115
  TO NODE          : 118
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   7.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):   1.000
       LENGTH (ft): 350.000 U/S INVERT (ft):   21.940 D/S INVERT (ft):  19.810
         MANNING N:    .035    ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

               NOTE: CHAN BTWN 11TH AND COASTLINE PARK

>>REACH NAME       : M
  FROM NODE        : 120
  TO NODE          : 130
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):  15.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):   1.000
       LENGTH (ft): 750.000 U/S INVERT (ft):   19.000 D/S INVERT (ft):  17.560
         MANNING N:    .035    ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

               NOTE: CHAN BTWN 10TH & 8TH-COASTLINE PARK

>>REACH NAME       : O
  FROM NODE        : 140
  TO NODE          : 150
  REACH TYPE       : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : OFF
   BOT. WIDTH (ft):   8.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):   1.000
       LENGTH (ft): 550.000 U/S INVERT (ft):   17.360 D/S INVERT (ft):  15.670
         MANNING N:    .035    ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

               NOTE: CHAN BTWN 8TH ST AND THE SCL RR
```

```
Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
      Copyright 1989-1990, Streamline Technologies, Inc.

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

>>REACH NAME        : Q
  FROM NODE         : 160
  TO NODE           : 170
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):    8.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):    1.000
       LENGTH (ft):1360.000 U/S INVERT (ft):   15.160 D/S INVERT (ft):    8.250
         MANNING N:     .035    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

              NOTE: CHANNEL BETWEEN SCL RR AND 3RD ST

>>REACH NAME        : S
  FROM NODE         : 180
  TO NODE           : 190
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):    8.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):    1.000
       LENGTH (ft): 630.000 U/S INVERT (ft):    8.100 D/S INVERT (ft):    2.260
         MANNING N:     .035    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

              NOTE: CHANNEL BETWEEN 3RD ST AND 1ST ST

>>REACH NAME        : U
  FROM NODE         : 200
  TO NODE           : 210
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):   12.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
       LENGTH (ft): 950.000 U/S INVERT (ft):    2.000 D/S INVERT (ft):     .140
         MANNING N:     .035    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

              NOTE: CHAN BTWN 1ST ST AND MC CONFLUENCE

>>REACH NAME        : V
  FROM NODE         : 210
  TO NODE           : 1000
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):   30.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
       LENGTH (ft): 700.000 U/S INVERT (ft):     .140 D/S INVERT (ft):    -.750
         MANNING N:     .035    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

              NOTE: CHAN BTWN MC/CB CONFL & HWY 17-92
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

```
>>REACH NAME        : X
  FROM NODE         : 1050
  TO NODE           : LKMONROE
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft): 125.000   LEFT SS (h/v):    4.000   RGHT SS (h/v):    4.000
       LENGTH (ft): 220.000 U/S INVERT (ft):   -1.000 D/S INVERT (ft):   -2.000
         MANNING N:    .030    ENTRNC COEF.:     .100 MAX. DEPTH (ft):   99.000

             NOTE: OUTFALL TO LAKE MONROE
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - PRE CONDITION (256PRE3)
10/15/1991

REACH SUMMARY

INDEX	RCHNAME	FRMNODE	TONODE	REACH TYPE
1	C	40	50	CULVERT, CIRCULAR w/ ROADWAY
2	E	STORAGE1	STORAGE2	CULVERT, CIRCULAR w/ ROADWAY
3	F	STORAGE2	STORAGE3	CULVERT, CIRCULAR w/ ROADWAY
4	G	STORAGE3	90	CULVERT, CIRCULAR w/ ROADWAY
5	I	100	110	CULVERT, CIRCULAR w/ ROADWAY
6	J-1	1301	115	CULVERT, CIRCULAR w/ ROADWAY
7	K-1	1401	118	CULVERT, CIRCULAR w/ ROADWAY
8	L	118	120	CULVERT, CIRCULAR w/ ROADWAY
9	N	130	140	CULVERT, CIRCULAR w/ ROADWAY
10	P	150	160	CULVERT, CIRCULAR w/ ROADWAY
11	R	170	180	CULVERT, ARCH w/ ROADWAY
12	T	190	200	CULVERT, RECTANGULAR w/ ROADWAY
13	W	1000	1050	CULVERT, RECTANGULAR w/ ROADWAY
14	A	10	20	TRAPEZOIDAL CHANNEL, ENERGY EQ.
15	B	20	40	TRAPEZOIDAL CHANNEL, ENERGY EQ.
16	D	50	STORAGE1	TRAPEZOIDAL CHANNEL, ENERGY EQ.
17	H	90	100	TRAPEZOIDAL CHANNEL, ENERGY EQ.
18	J	110	115	TRAPEZOIDAL CHANNEL, ENERGY EQ.
19	K	115	118	TRAPEZOIDAL CHANNEL, ENERGY EQ.
20	M	120	130	TRAPEZOIDAL CHANNEL, ENERGY EQ.
21	O	140	150	TRAPEZOIDAL CHANNEL, ENERGY EQ.
22	Q	160	170	TRAPEZOIDAL CHANNEL, ENERGY EQ.
23	S	180	190	TRAPEZOIDAL CHANNEL, ENERGY EQ.
24	U	200	210	TRAPEZOIDAL CHANNEL, ENERGY EQ.
25	V	210	1000	TRAPEZOIDAL CHANNEL, ENERGY EQ.
26	X	1050	LKMONROE	TRAPEZOIDAL CHANNEL, ENERGY EQ.

CLOUD BRANCH DRAINAGE BASIN:

25-YEAR/6-HOUR STORM EVENT

HYDRAULIC INPUT DATA

POST-CONDITION

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POST5
11/07/1991

CONTROL PARAMETERS
==================

START TIME: .00
END TIME: 6.00

TO TIME (hours)	SIMULATION INC (secs)	PRINT INC (mins)
6.00	.50	2.00

RUNOFF HYDROGRAPH FILE: DEFAULT
OFFSITE HYDROGRAPH FILE: DEFAULT
BOUNDARY DATABASE FILE: NONE

NOTE: CLOUD BRANCH-25YR/6HR STRM-POST-256POST5

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POSTS
11/07/1991

NODE NAME	NODE TYPE	INI STAGE (ft)	X-COOR (ft)	Y-COOR (ft)	LENGTH (ft)	STAGE (ft)	AREA/TIME (ac)/(hr)
10	AREA	27.650	.000	.000	.000	27.650	2.700
						29.650	3.280
						31.650	3.870
						32.650	4.190
15	AREA	27.640	.000	.000	.000	27.640	.000
						36.640	.000
40	AREA	26.880	.000	.000	.000	26.880	.000
						35.000	.000
50	AREA	26.650	.000	.000	.000	26.650	.000
						35.000	.000
STORAGE1	AREA	23.970	.000	.000	.000	23.970	.180
						25.970	.310
						27.970	.430
						27.980	2.300
						30.000	2.750
STORAGE2	AREA	23.070	.000	.000	.000	23.070	.090
						25.070	.160
						27.070	.220
						27.080	1.200
						29.000	1.450
STORAGE3	AREA	21.950	.000	.000	.000	21.950	.670
						23.950	.860
						25.950	1.060
						26.950	1.250
100	AREA	19.920	.000	.000	.000	19.920	.000
						26.000	.000
110	AREA	18.530	.000	.000	.000	18.530	.000
						25.000	.000
1301	AREA	22.940	.000	.000	.000	22.940	.010
						26.940	.090
						27.940	.400

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POSTS
11/07/1991

NODE NAME	NODE TYPE	INI STAGE (ft)	X-COOR (ft)	Y-COOR (ft)	LENGTH (ft)	STAGE (ft)	AREA/TIME (ac)/(hr)
1401	AREA	20.810	.000	.000	.000	20.810	.010
						24.810	.100
						25.810	.450
120	AREA	17.500	.000	.000	.000	17.500	2.000
						23.500	3.100
150	AREA	17.500	.000	.000	.000	15.670	.250
						17.670	.450
						19.670	.670
						21.670	.900
160	AREA	15.160	.000	.000	.000	15.160	.000
						25.000	.000
170	AREA	8.250	.000	.000	.000	8.250	.000
						17.000	.000
180	AREA	8.100	.000	.000	.000	8.100	.000
						17.000	.000
190	AREA	3.000	.000	.000	.000	2.260	.000
						12.000	.000
200	AREA	3.000	.000	.000	.000	2.000	.000
						12.000	.000
210	AREA	3.000	.000	.000	.000	.140	.000
						10.000	.000
1000	AREA	3.000	.000	.000	.000	-.750	.000
						10.000	.000
1050	AREA	3.000	.000	.000	.000	-1.000	.000
						10.000	.000
LKMONROE	TIME	3.000	.000	.000	.000	3.000	.000
						3.000	3.000
						3.000	6.000

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POSTS
11/07/1991

```
>>REACH NAME       : A
  FROM NODE        : 10
  TO NODE          : 15
  REACH TYPE       : RECTANGULAR WEIR/GATE/ORIFICE, VILLEMONTE EQ.
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
    CREST EL. (ft):  31.750  CREST LN. (ft):  90.000    OPENING (ft): 999.000
        WEIR COEF.:   3.100       GATE COEF.:    .600 NUMBER OF ELEM.:   1.000
              NOTE: CONTROL STRUCTURE @ PINEHURST PARK
```

```
        Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
                Copyright 1989-1990, Streamline Technologies, Inc.

        CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POST5
        11/07/1991

  >>REACH NAME        : C
    FROM NODE         : 40
    TO NODE           : 50
    REACH TYPE        : CULVERT, CIRCULAR w/ ROADWAY
    FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
    TURBO SWITCH      : ON

    CULVERT DATA      :
           SPAN (in):  30.000       RISE (in):  30.000     LENGTH (ft):  60.000
     U/S INVERT (ft):  26.880 D/S INVERT (ft):  26.650       MANNING N:    .013
         ENTRNC LOSS:     .500   # OF CULVERTS:   2.000

    POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
      CREST EL. (ft):  31.600  CREST LN. (ft): 100.000     WEIR COEF.:   2.800
            RESERVED:********        RESERVED:********        RESERVED:********

    POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
      CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
            RESERVED:********        RESERVED:********        RESERVED:********

              NOTE: CULVERT SYSTEM AT 20TH STREET

  >>REACH NAME        : E
    FROM NODE         : STORAGE1
    TO NODE           : STORAGE2
    REACH TYPE        : CULVERT, RECTANGULAR w/ ROADWAY
    FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
    TURBO SWITCH      : ON

    CULVERT DATA      :
           SPAN (in):  48.000       RISE (in):  36.000     LENGTH (ft):  80.000
     U/S INVERT (ft):  23.970 D/S INVERT (ft):  23.070       MANNING N:    .013
         ENTRNC LOSS:     .500   # OF CULVERTS:   2.000

    POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
      CREST EL. (ft):  28.700  CREST LN. (ft): 100.000     WEIR COEF.:   2.800
            RESERVED:********        RESERVED:********        RESERVED:********

    POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
      CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
            RESERVED:********        RESERVED:********        RESERVED:********

              NOTE: CULVERT SYSTEM AT 16TH STREET
```

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POST5
11/07/1991

```
>>REACH NAME       : F
  FROM NODE        : STORAGE2
  TO NODE          : STORAGE3
  REACH TYPE       : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):  48.000        RISE (in):  36.000    LENGTH (ft): 100.000
   U/S INVERT (ft):  23.070 D/S INVERT (ft):  21.950      MANNING N:    .013
       ENTRNC LOSS:    .500    # OF CULVERTS:  2.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  28.000  CREST LN. (ft): 150.000     WEIR COEF.:   2.800
          RESERVED:********         RESERVED:********      RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):9999.000  CREST LN. (ft):    .000     WEIR COEF.:   2.800
          RESERVED:********         RESERVED:********      RESERVED:********

              NOTE: CULVERT SYSTEM AT 14TH ST & RNDTREE

>>REACH NAME       : I
  FROM NODE        : 100
  TO NODE          : 110
  REACH TYPE       : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):  48.000        RISE (in):  48.000    LENGTH (ft): 300.000
   U/S INVERT (ft):  19.920 D/S INVERT (ft):  18.530      MANNING N:    .013
       ENTRNC LOSS:    .500    # OF CULVERTS:  2.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  29.600  CREST LN. (ft): 100.000     WEIR COEF.:   2.800
          RESERVED:********         RESERVED:********      RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********         RESERVED:********      RESERVED:********

              NOTE: CULVERT SYSTEM BTWN 12TH & 11TH ST
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POST5
11/07/1991

```
>>REACH NAME       : J
  FROM NODE        : 110
  TO NODE          : 120
  REACH TYPE       : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):  48.000       RISE (in):  48.000     LENGTH (ft): 210.000
   U/S INVERT (ft):  18.530 D/S INVERT (ft):  16.500      MANNING N:     .013
      ENTRNC LOSS:     .500   # OF CULVERTS:   2.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  26.500  CREST LN. (ft): 100.000     WEIR COEF.:   2.800
          RESERVED:********        RESERVED:********       RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********        RESERVED:********       RESERVED:********

              NOTE: CULV SYST BTWN 11TH & COASTLINE PK

>>REACH NAME       : N
  FROM NODE        : 120
  TO NODE          : 150
  REACH TYPE       : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in): 120.000       RISE (in):  60.000     LENGTH (ft): 120.000
   U/S INVERT (ft):  16.500 D/S INVERT (ft):  16.500      MANNING N:     .013
      ENTRNC LOSS:     .500   # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  25.230  CREST LN. (ft): 100.000     WEIR COEF.:   2.800
          RESERVED:********        RESERVED:********       RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********        RESERVED:********       RESERVED:********

              NOTE: CULVERT EQUAL SYST AT COASTLINE PK
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POST5
11/07/1991

```
>>REACH NAME       : R
  FROM NODE        : 170
  TO NODE          : 180
  REACH TYPE       : CULVERT, ARCH w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in): 100.000       RISE (in):  56.000    LENGTH (ft):  50.000
   U/S INVERT (ft):   8.250 D/S INVERT (ft):   8.100     MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  16.310  CREST LN. (ft): 100.000    WEIR COEF.:   2.800
          RESERVED:********        RESERVED:********      RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********    WEIR COEF.:********
          RESERVED:********        RESERVED:********      RESERVED:********

            NOTE: CULVERT SYSTEM AT 3RD STREET

>>REACH NAME       : T
  FROM NODE        : 190
  TO NODE          : 200
  REACH TYPE       : CULVERT, RECTANGULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):  84.000       RISE (in):  84.000    LENGTH (ft):  90.000
   U/S INVERT (ft):   2.260 D/S INVERT (ft):   2.000     MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   1.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  13.500  CREST LN. (ft): 100.000    WEIR COEF.:   2.800
          RESERVED:********        RESERVED:********      RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********    WEIR COEF.:********
          RESERVED:********        RESERVED:********      RESERVED:********

            NOTE: CULVERT SYSTEM AT 1ST STREET
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POST5
11/07/1991

```
>>REACH NAME        : W
  FROM NODE         : 1000
  TO NODE           : 1050
  REACH TYPE        : CULVERT, RECTANGULAR W/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
        SPAN (in): 360.000       RISE (in): 108.000     LENGTH (ft):  45.000
   U/S INVERT (ft):    -.750 D/S INVERT (ft):  -1.000     MANNING N:     .013
        ENTRNC LOSS:     .500   # OF CULVERTS:   1.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):  16.500  CREST LN. (ft): 200.000     WEIR COEF.:   2.800
          RESERVED:********          RESERVED:********     RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********          RESERVED:********     RESERVED:********

              NOTE: CULVERT SYSTEM AT U.S. HWY 17-92

>>REACH NAME        : A-1
  FROM NODE         : 10
  TO NODE           : 15
  REACH TYPE        : CULVERT, CIRCULAR W/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
        SPAN (in):    6.000      RISE (in):    6.000     LENGTH (ft):   2.000
   U/S INVERT (ft):   27.650 D/S INVERT (ft):  27.640     MANNING N:     .013
        ENTRNC LOSS:     .500   # OF CULVERTS:   2.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):9999.000  CREST LN. (ft):     .000     WEIR COEF.:   2.800
          RESERVED:********          RESERVED:********     RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********          RESERVED:********     RESERVED:********

              NOTE: BLEEDDOWN CTRL STRUCT'S @ PINEHURST
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POST5
11/07/1991

```
>>REACH NAME        : J-1
  FROM NODE         : 1301
  TO NODE           : 120
  REACH TYPE        : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in):   36.000        RISE (in):   36.000     LENGTH (ft): 300.000
   U/S INVERT (ft):   22.940 D/S INVERT (ft):   18.670       MANNING N:     .013
       ENTRNC LOSS:     .500   # OF CULVERTS:    1.000

  POSITION A        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):9999.000  CREST LN. (ft):     .000     WEIR COEF.:    2.800
         RESERVED:********         RESERVED:********        RESERVED:********

  POSITION B        : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********      WEIR COEF.:********
         RESERVED:********         RESERVED:********        RESERVED:********

              NOTE: CULVERT SYST FROM NODE 1300 TO 120

>>REACH NAME        : K-1
  FROM NODE         : 1401
  TO NODE           : 120
  REACH TYPE        : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : ON

  CULVERT DATA      :
         SPAN (in):   36.000        RISE (in):   36.000     LENGTH (ft): 200.000
   U/S INVERT (ft):   20.810 D/S INVERT (ft):   18.670       MANNING N:     .013
       ENTRNC LOSS:     .500   # OF CULVERTS:    1.000

  POSITION A        : NOT USED

  POSITION B        : NOT USED

              NOTE: CULVERT SYST FROM NODE 1400 TO 120
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POSTS
11/07/1991

```
>>REACH NAME       : H-1
  FROM NODE        : STORAGE3
  TO NODE          : 100
  REACH TYPE       : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):   6.000       RISE (in):   6.000     LENGTH (ft):   2.000
   U/S INVERT (ft):  21.950 D/S INVERT (ft):  21.940      MANNING N:    .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   3.000

  POSITION A       : NOT USED

  POSITION B       : NOT USED

            NOTE: BLEEDDOWN CONTROL STRUCT'S AT 14TH

>>REACH NAME       : P-1
  FROM NODE        : 150
  TO NODE          : 160
  REACH TYPE       : CULVERT, CIRCULAR w/ ROADWAY
  FLOW DIRECTION   : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH     : ON

  CULVERT DATA     :
         SPAN (in):   6.000       RISE (in):   6.000     LENGTH (ft):   2.000
   U/S INVERT (ft):  17.500 D/S INVERT (ft):  17.490      MANNING N:    .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   3.000

  POSITION A       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):9999.000  CREST LN. (ft):    .000     WEIR COEF.:   2.800
          RESERVED:********        RESERVED:********       RESERVED:********

  POSITION B       : RECTANGULAR ROADWAY/BERM WEIR
    CREST EL. (ft):********  CREST LN. (ft):********     WEIR COEF.:********
          RESERVED:********        RESERVED:********       RESERVED:********

            NOTE: BLEEDDOWN CNTRL STRUCTS @ SCL RR
```

```
Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
      Copyright 1989-1990, Streamline Technologies, Inc.

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POST5
11/07/1991

>>REACH NAME         : H
  FROM NODE          : STORAGE3
  TO NODE            : 100
  REACH TYPE         : DROP STRUCTURE w/ CIRC. CULVERT
  FLOW DIRECTION     : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH       : ON

  CULVERT DATA       :
         SPAN (in):  48.000        RISE (in):  48.000     LENGTH (ft): 440.000
   U/S INVERT (ft):  21.950 D/S INVERT (ft):  19.920       MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   2.000

  POSITION A         : RECTANGULAR RISER SLOT
    CREST EL. (ft):  25.000  CREST LN. (ft):  75.000    OPENING (ft): 999.000
        WEIR COEF.:   3.000       GATE COEF.:    .600 NUMBER OF ELEM.:   1.000

  POSITION B         : RECTANGULAR RISER SLOT
    CREST EL. (ft):9999.000  CREST LN. (ft):    .000    OPENING (ft): 999.000
        WEIR COEF.:   3.000       GATE COEF.:    .600 NUMBER OF ELEM.:   1.000

             NOTE: WEIR./CULV SYST BTWN 13TH & 12TH ST

>>REACH NAME         : P
  FROM NODE          : 150
  TO NODE            : 160
  REACH TYPE         : DROP STRUCTURE w/ CIRC. CULVERT
  FLOW DIRECTION     : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH       : ON

  CULVERT DATA       :
         SPAN (in):  48.000        RISE (in):  48.000     LENGTH (ft): 200.000
   U/S INVERT (ft):  15.670 D/S INVERT (ft):  15.160       MANNING N:     .013
       ENTRNC LOSS:    .500   # OF CULVERTS:   4.000

  POSITION A         : RECTANGULAR RISER SLOT
    CREST EL. (ft):  21.000  CREST LN. (ft):  85.000    OPENING (ft): 999.000
        WEIR COEF.:   3.100       GATE COEF.:    .600 NUMBER OF ELEM.:   1.000

  POSITION B         : NOT USED

             NOTE: WEIR/CULV SYSTEM AT SCL RR MAINLINE
```

```
Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
Copyright 1989-1990, Streamline Technologies, Inc.

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POSTS
11/07/1991

>>REACH NAME        : B
  FROM NODE         : 15
  TO NODE           : 40
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):  10.000   LEFT SS (h/v):    4.000   RGHT SS (h/v):   4.000
       LENGTH (ft): 780.000 U/S INVERT (ft):  27.640 D/S INVERT (ft):  26.880
         MANNING N:    .025   ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

              NOTE: CHANNEL BETWEEN 22ND & 20TH STREET

>>REACH NAME        : D
  FROM NODE         : 50
  TO NODE           : STORAGE1
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):   8.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):   2.000
       LENGTH (ft): 500.000 U/S INVERT (ft):  26.650 D/S INVERT (ft):  24.570
         MANNING N:    .025   ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

              NOTE: CHAN BTWN 20TH & 16TH STREET

>>REACH NAME        : Q
  FROM NODE         : 160
  TO NODE           : 170
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):   8.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):   1.000
       LENGTH (ft):1360.000 U/S INVERT (ft):  15.160 D/S INVERT (ft):   8.250
         MANNING N:    .025   ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

              NOTE: CHANNEL BTWN SCL RR AND 3RD STREET

>>REACH NAME        : S
  FROM NODE         : 180
  TO NODE           : 190
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):   8.000   LEFT SS (h/v):    1.000   RGHT SS (h/v):   1.000
       LENGTH (ft): 630.000 U/S INVERT (ft):   8.100 D/S INVERT (ft):   2.260
         MANNING N:    .025   ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

              NOTE: CHANNEL BTWN 3RD AND 1ST STREET
```

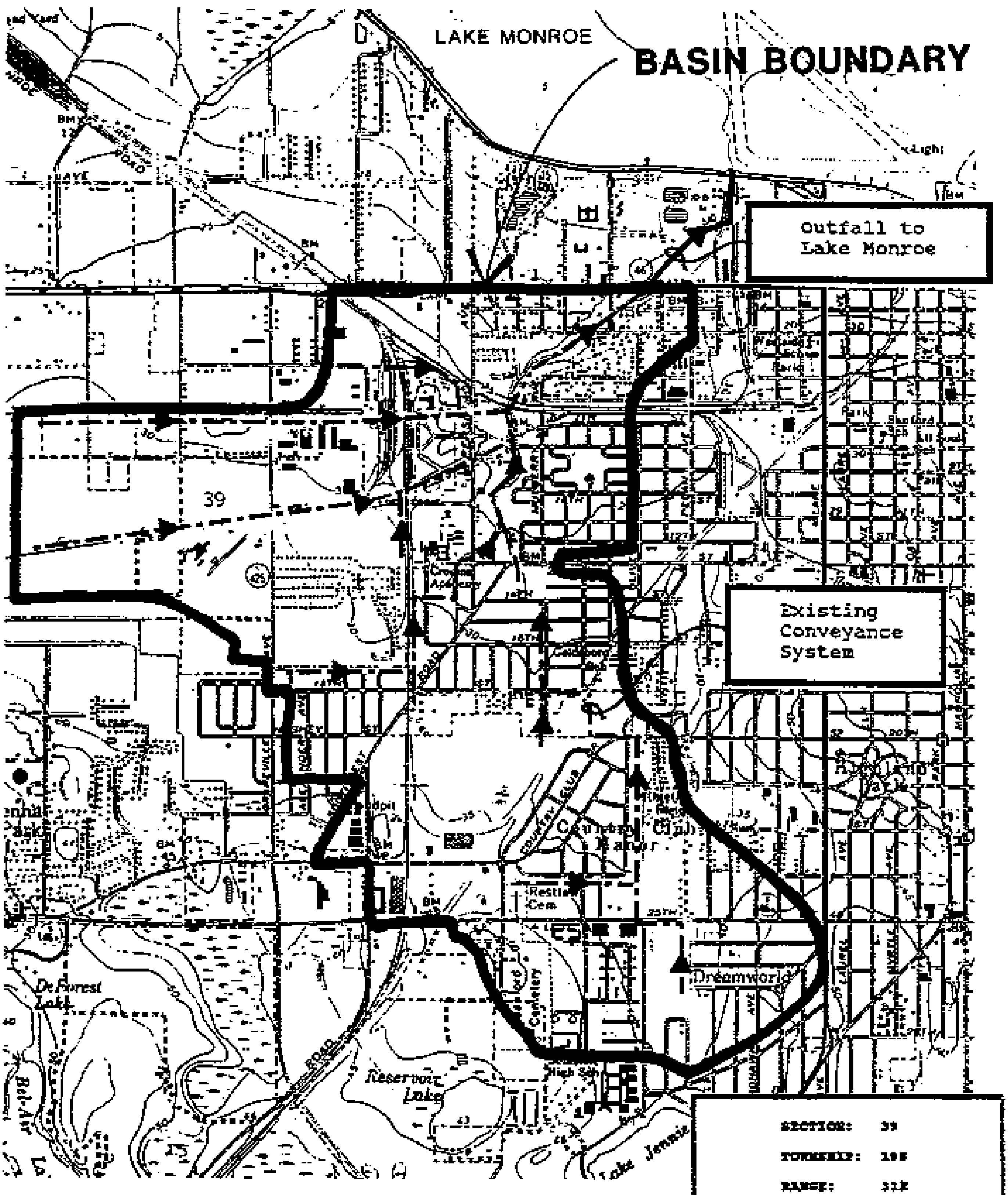
```
Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)
      Copyright 1989-1990, Streamline Technologies, Inc.

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POST5
11/07/1991

>>REACH NAME        : U
  FROM NODE         : 200
  TO NODE           : 210
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):  12.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
       LENGTH (ft): 950.000 U/S INVERT (ft):    2.000 D/S INVERT (ft):     .140
         MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

              NOTE: CHANNEL BTWN 1ST ST & CHAN CONFLUEN

>>REACH NAME        : V
  FROM NODE         : 210
  TO NODE           : 1000
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft):  30.000   LEFT SS (h/v):    2.000   RGHT SS (h/v):    2.000
       LENGTH (ft): 700.000 U/S INVERT (ft):     .140 D/S INVERT (ft):    -.750
         MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

              NOTE: CHAN BTWN CONFLUENCE & US HWY 17-92

>>REACH NAME        : X
  FROM NODE         : 1050
  TO NODE           : LKMONROE
  REACH TYPE        : TRAPEZOIDAL CHANNEL, ENERGY EQ.
  FLOW DIRECTION    : POSITIVE AND NEGATIVE FLOWS ALLOWED
  TURBO SWITCH      : OFF
   BOT. WIDTH (ft): 125.000   LEFT SS (h/v):    4.000   RGHT SS (h/v):    4.000
       LENGTH (ft): 220.000 U/S INVERT (ft):   -1.000 D/S INVERT (ft):   -2.000
         MANNING N:     .025    ENTRNC COEF.:     .100 MAX. DEPTH (ft):  99.000

              NOTE: OUTFALL CHANNEL TO LAKE MONROE
```

Advanced Interconnected Channel & Pond Routing (adICPR Ver 1.31)

CLOUD BRANCH - 25YR/6HR STORM EVENT - POST COND - 256POST5
11/07/1991

REACH SUMMARY
=============

INDEX	RCHNAME	FRMNODE	TONODE	REACH TYPE
1	A	10	15	RECTANGULAR WEIR/GATE/ORIFICE, VILLEMONTE EQ
2	C	40	50	CULVERT, CIRCULAR w/ ROADWAY
3	E	STORAGE1	STORAGE2	CULVERT, RECTANGULAR w/ ROADWAY
4	F	STORAGE2	STORAGE3	CULVERT, RECTANGULAR w/ ROADWAY
5	I	100	110	CULVERT, CIRCULAR w/ ROADWAY
6	J	110	120	CULVERT, CIRCULAR w/ ROADWAY
7	N	120	150	CULVERT, RECTANGULAR w/ ROADWAY
8	R	170	180	CULVERT, ARCH w/ ROADWAY
9	T	190	200	CULVERT, RECTANGULAR w/ ROADWAY
10	W	1000	1050	CULVERT, RECTANGULAR w/ ROADWAY
11	A-1	10	15	CULVERT, CIRCULAR w/ ROADWAY
12	J-1	1301	120	CULVERT, CIRCULAR w/ ROADWAY
13	K-1	1401	120	CULVERT, CIRCULAR w/ ROADWAY
14	H-1	STORAGE3	100	CULVERT, CIRCULAR w/ ROADWAY
15	P-1	150	160	CULVERT, CIRCULAR w/ ROADWAY
16	H	STORAGE3	100	DROP STRUCTURE w/ CIRC. CULVERT
17	P	150	160	DROP STRUCTURE w/ CIRC. CULVERT
18	B	15	40	TRAPEZOIDAL CHANNEL, ENERGY EQ.
19	D	50	STORAGE1	TRAPEZOIDAL CHANNEL, ENERGY EQ.
20	Q	160	170	TRAPEZOIDAL CHANNEL, ENERGY EQ.
21	S	180	190	TRAPEZOIDAL CHANNEL, ENERGY EQ.
22	U	200	210	TRAPEZOIDAL CHANNEL, ENERGY EQ.
23	V	210	1000	TRAPEZOIDAL CHANNEL, ENERGY EQ.
24	X	1050	LKMONROE	TRAPEZOIDAL CHANNEL, ENERGY EQ.

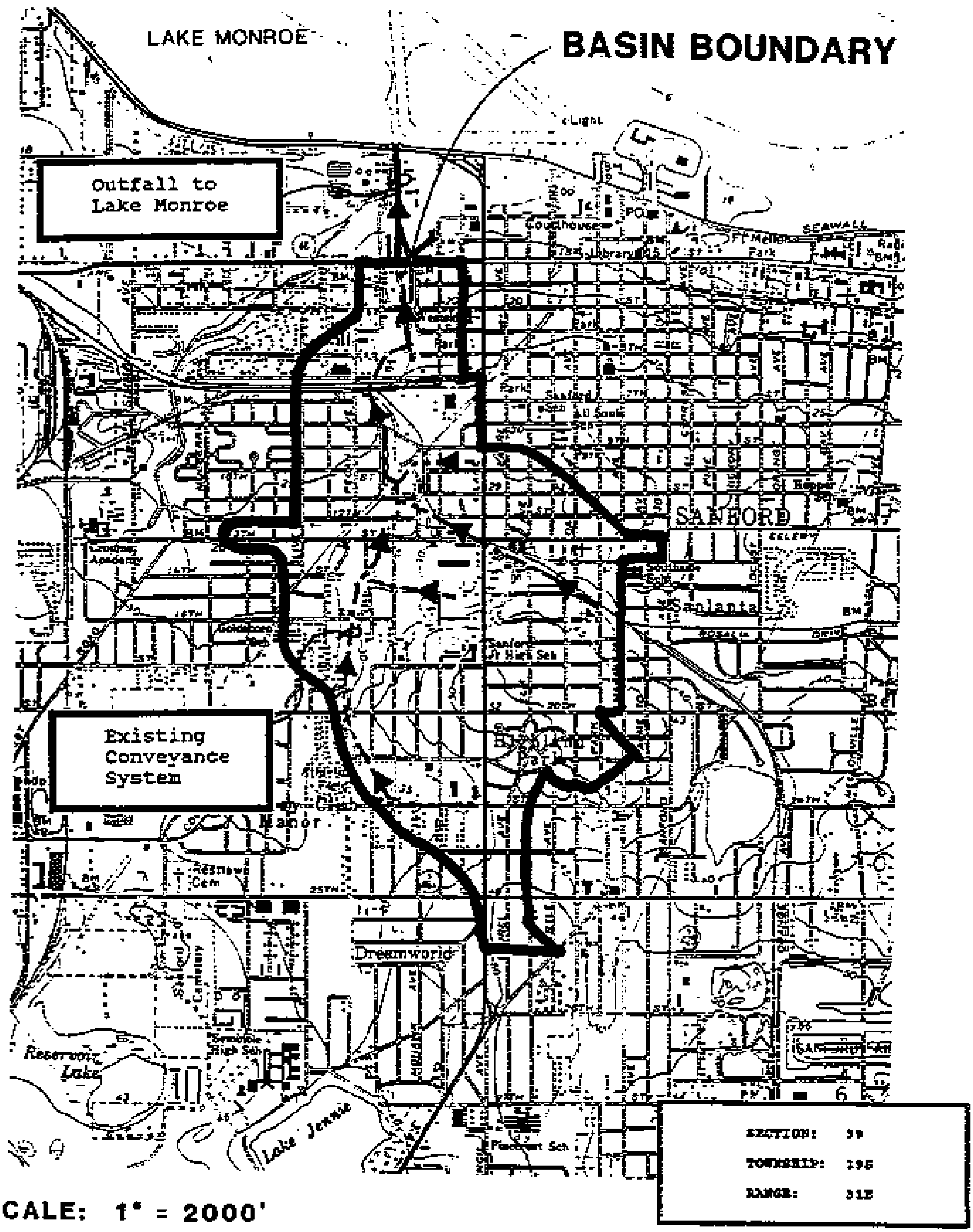


SCALE: 1" = 2000'

MILL CREEK DRAINAGE BASIN: PROJECT LOCATION & TOPO MAP

MAP No. 1

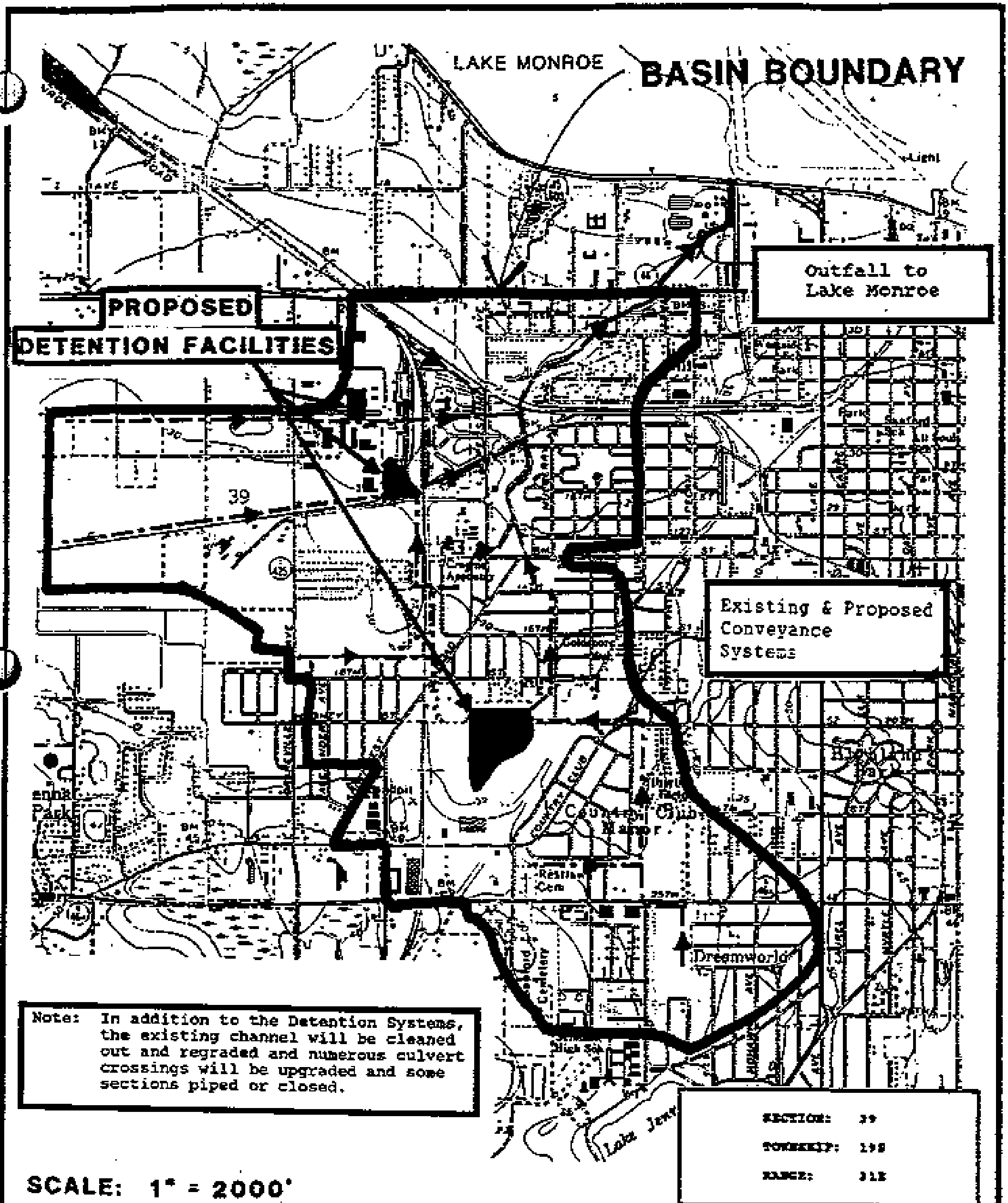
Conklin Porter and Holmes
ENGINEERS, INC.
cph



CLOUD BRANCH DRAINAGE BASIN: PROJECT LOCATION & TOPO MAP

MAP No. 2

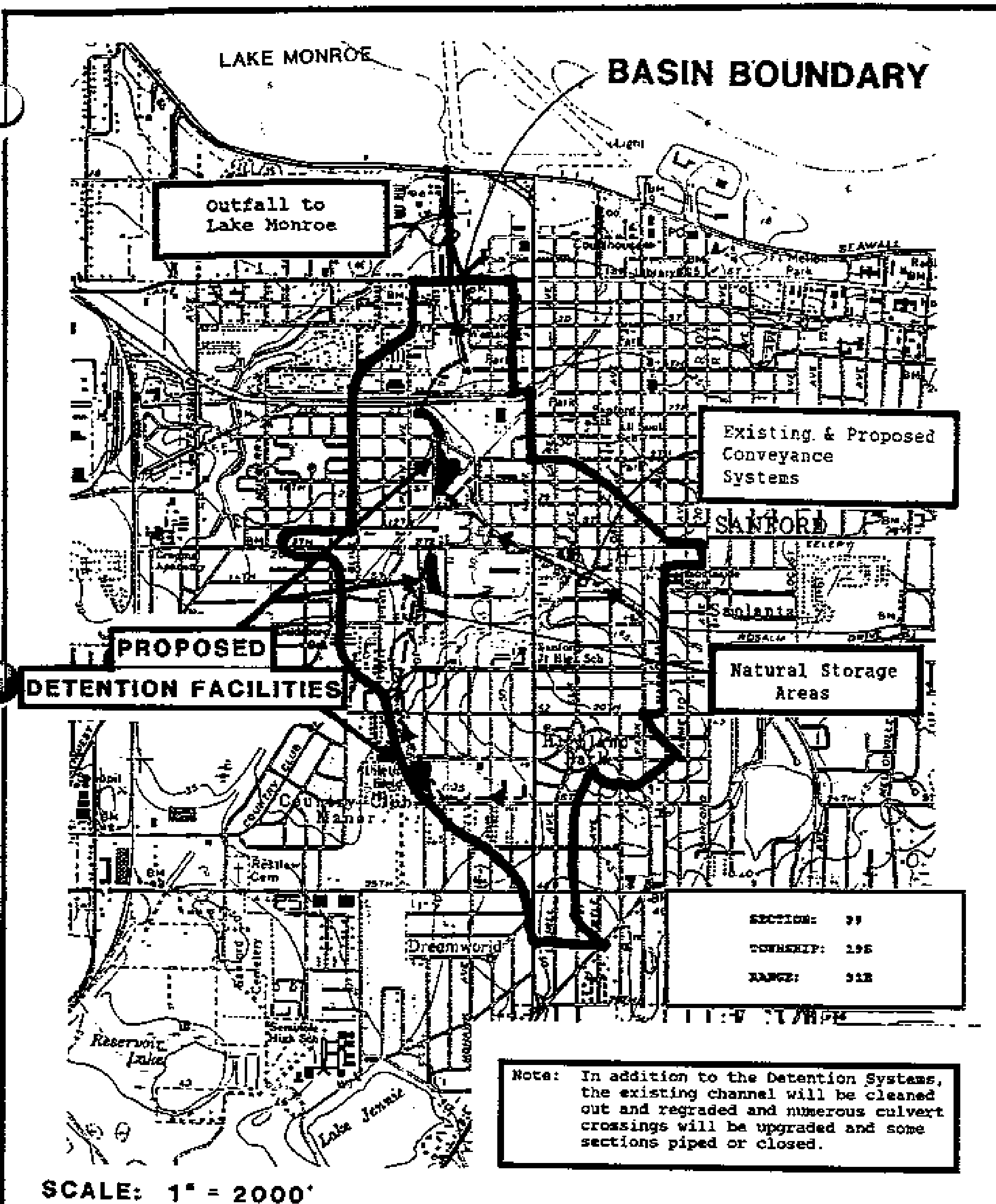
Conklin Porter and Holmes ENGINEERS, INC.



MILL CREEK DRAINAGE BASIN: PROPOSED IMPROVEMENTS

MAP No. 3

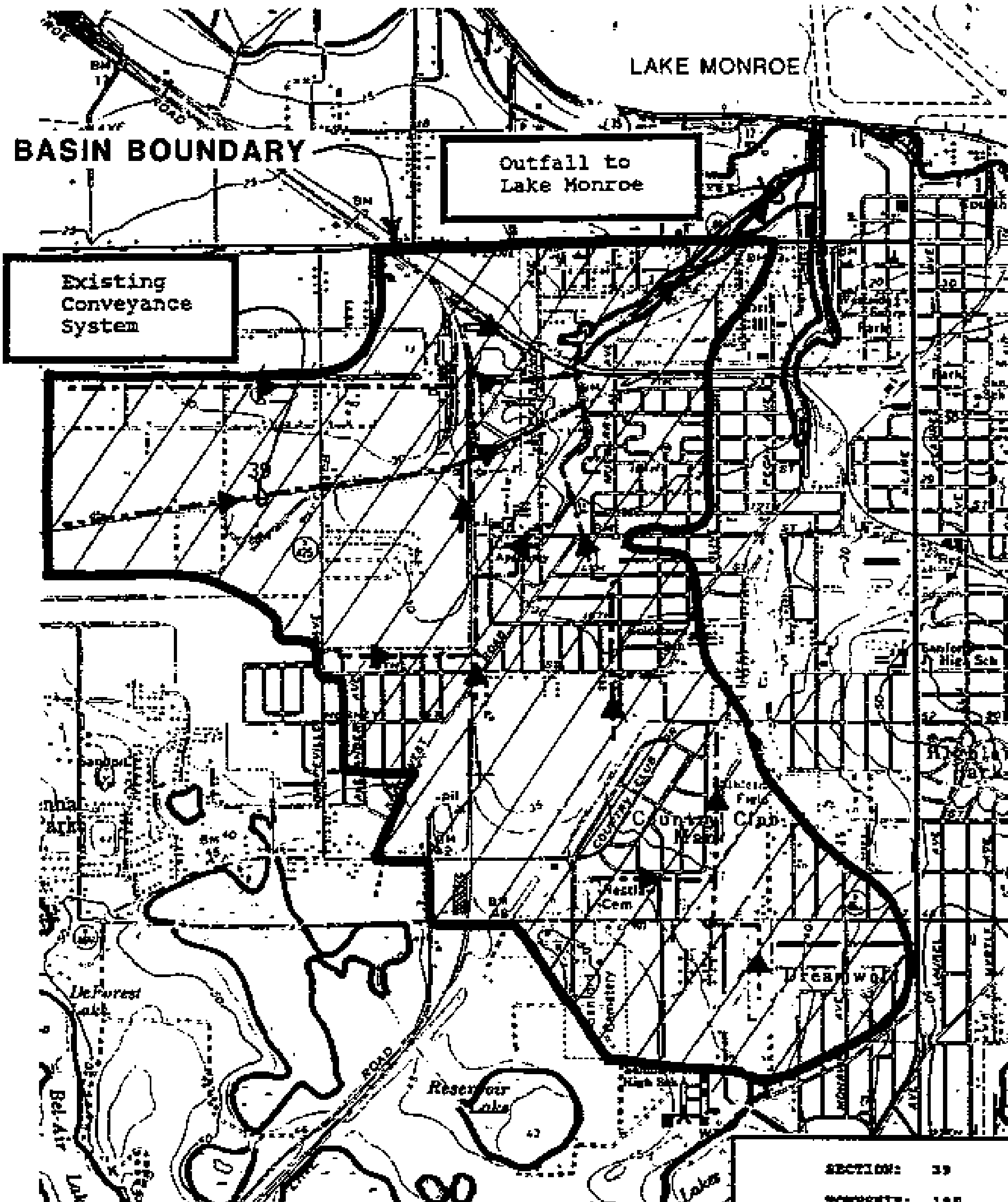
Conklin Porter and Holmes ENGINEERS, INC.



CLOUD BRANCH DRAINAGE BASIN: PROPOSED IMPROVEMENTS

MAP No. 4

Conklin Porter and Holmes ENGINEERS, INC.



SECTION: 35

TOWNSHIP: 19S

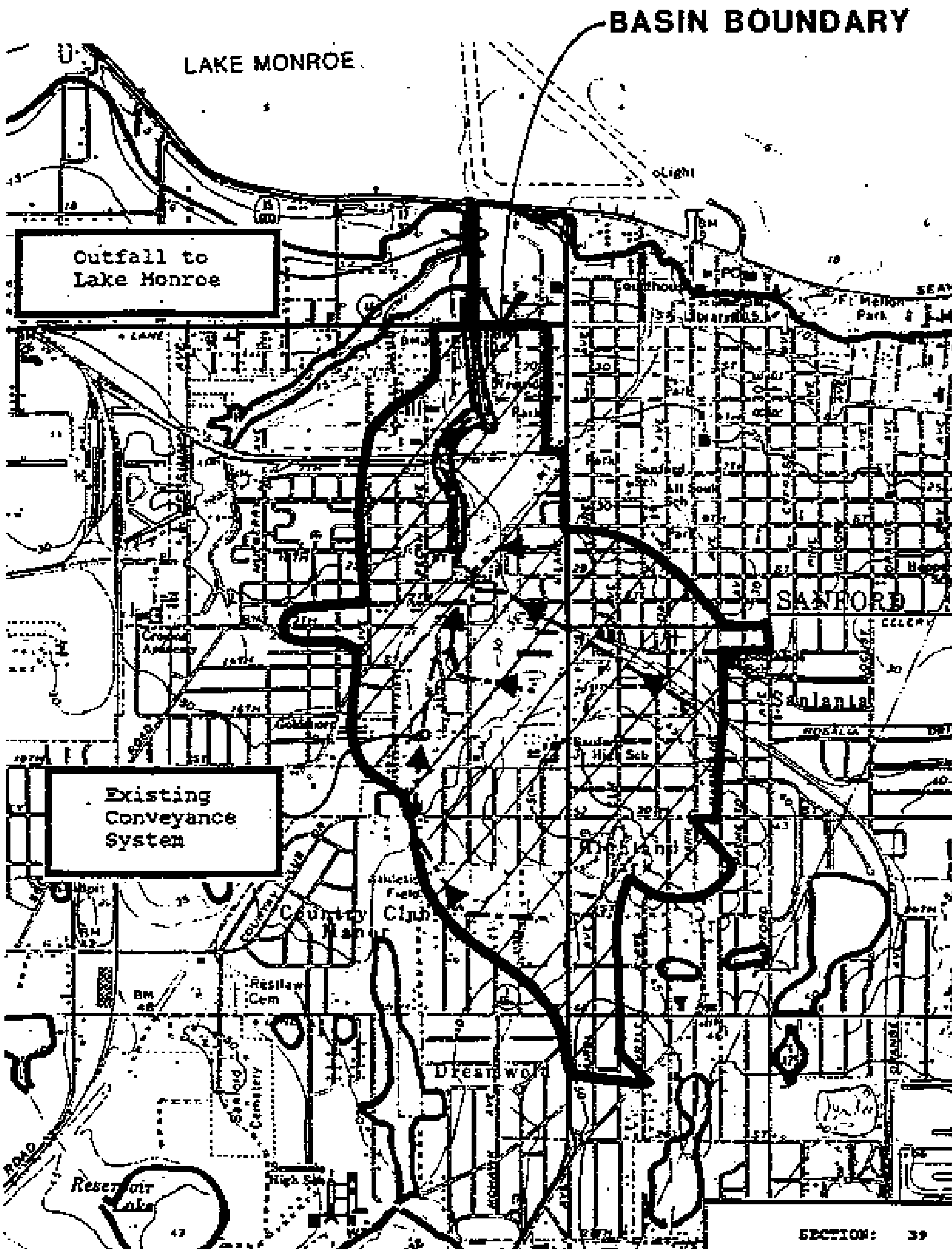
RANGE: 31E

SCALE: 1" = 2000' (100 YR. FLOOD)

MILL CREEK DRAINAGE BASIN: FLOOD PRONE MAP (FEMA)

MAP No. 5

Conklin Porter and Holmes ENGINEERS, INC.



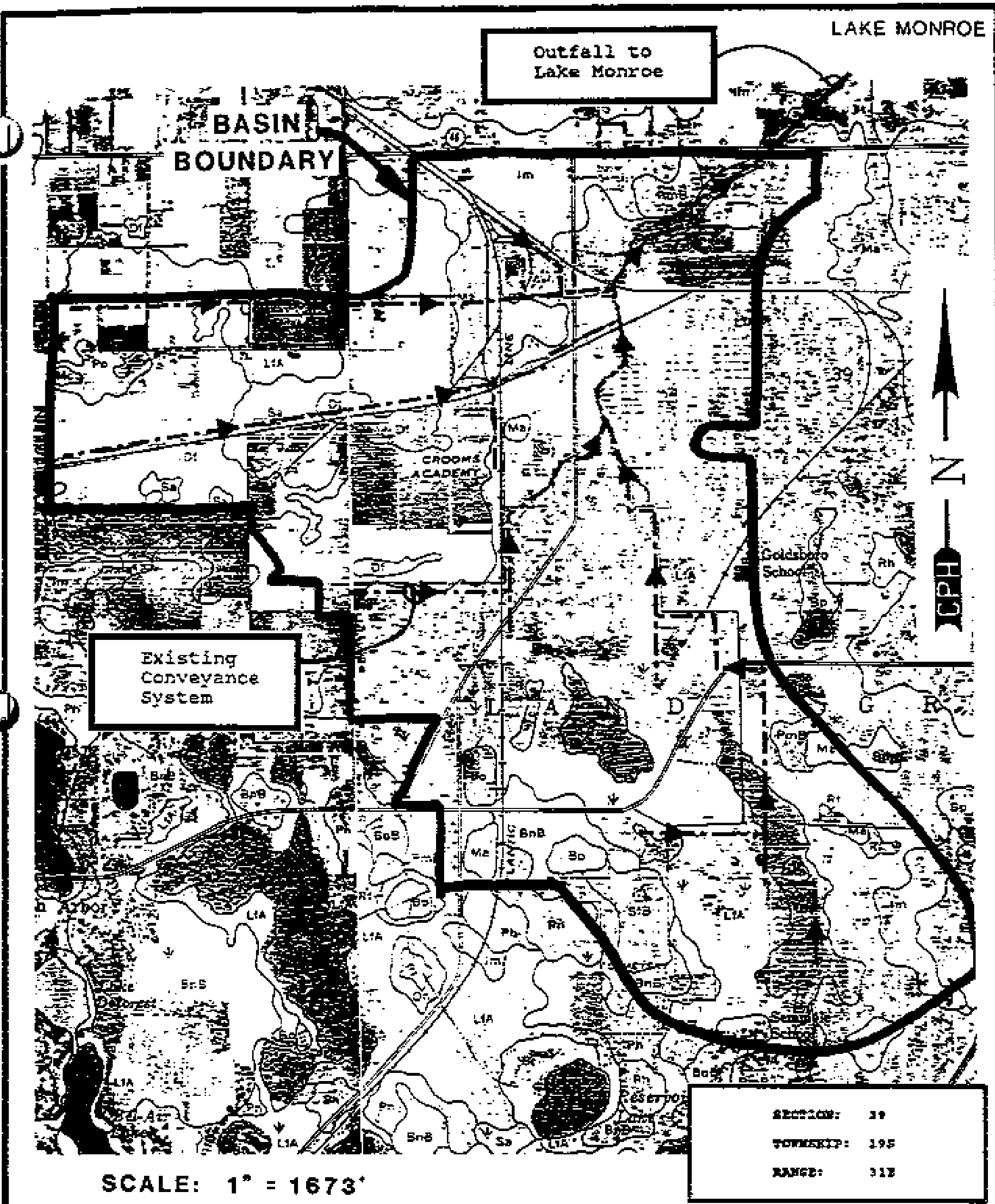
SECTION: 39
TOWNSHIP: 19S
RANGE: 31E

SCALE: 1" = 2000' (100 YR. FLOOD)

CLOUD BRANCH DRAINAGE BASIN: FLOOD PRONE MAP (FEMA)

MAP No. 6

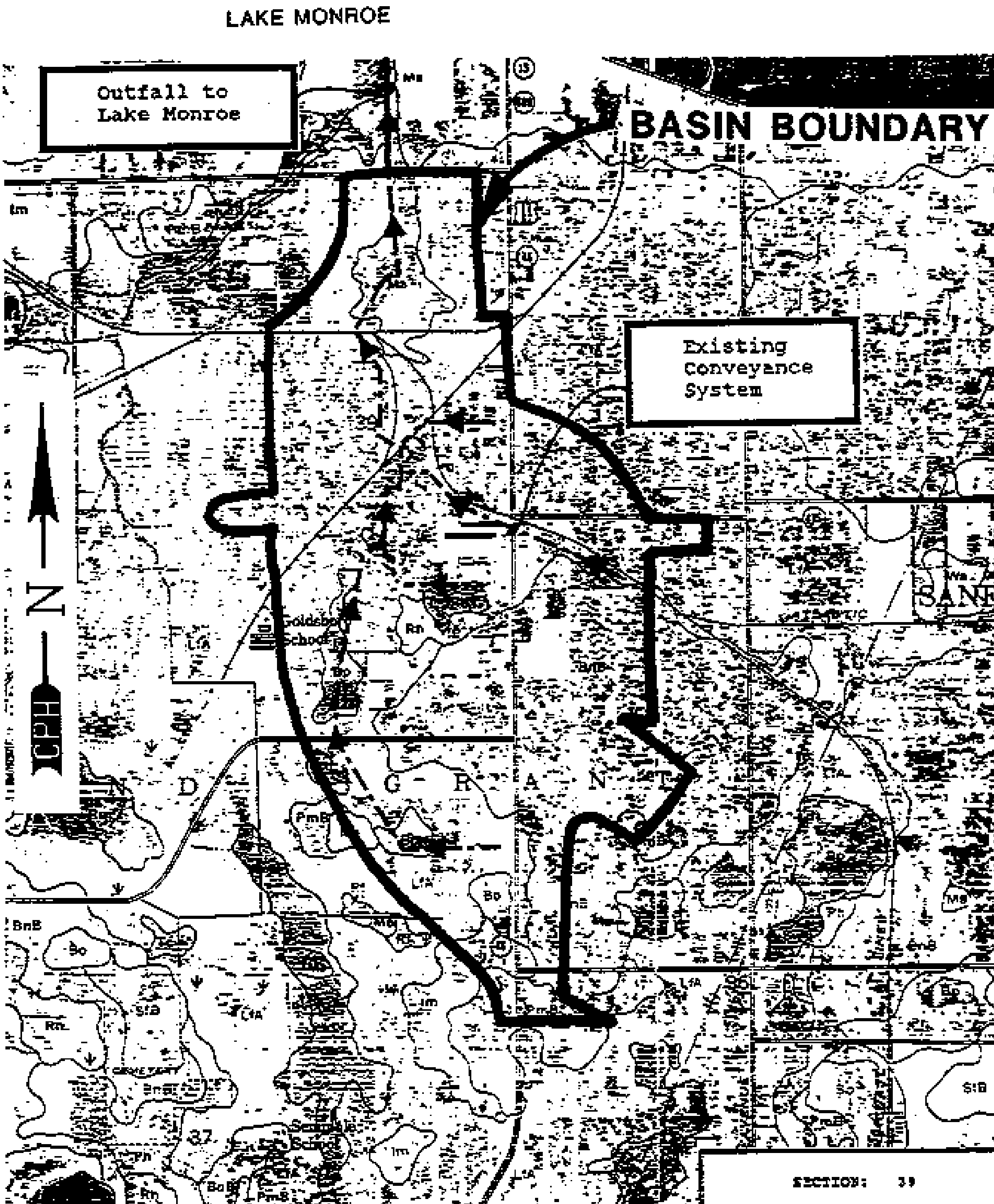
Conklin Porter and Holmes ENGINEERS, INC.



MILL CREEK DRAINAGE BASIN: S.C.S. SOILS MAP (1966)

MAP No. 7

Conklin Porter and Holmes ENGINEERS, INC.



SECTION: 39

TOWNSHIP: 19S

RANGE: 31E

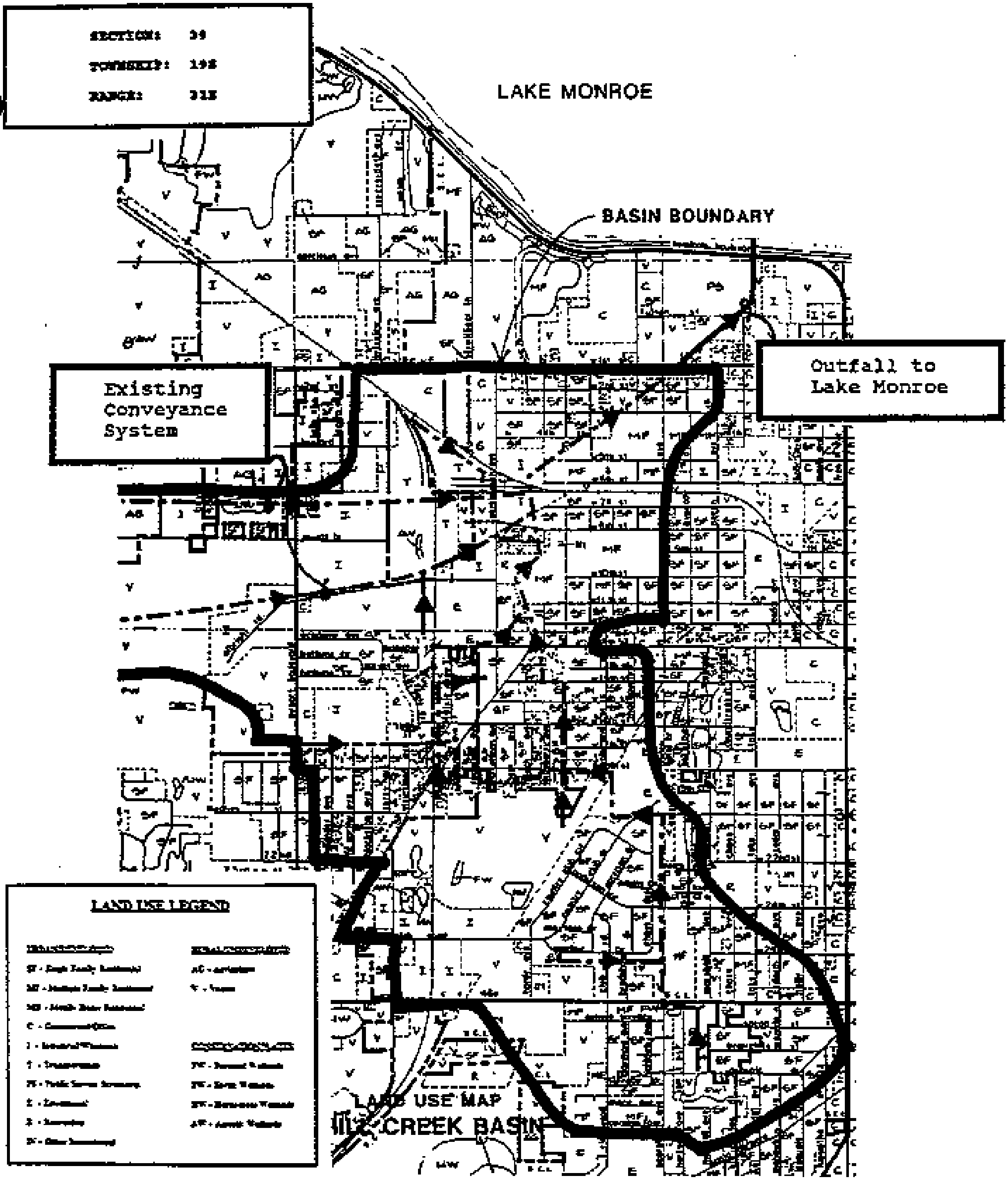
SCALE: 1" = 1673'

CLOUD BRANCH DRAINAGE BASIN: S.C.S. SOILS MAP (1966)

MAP No. 8

Conklin Porter and Holmes ENGINEERS, INC.

cph

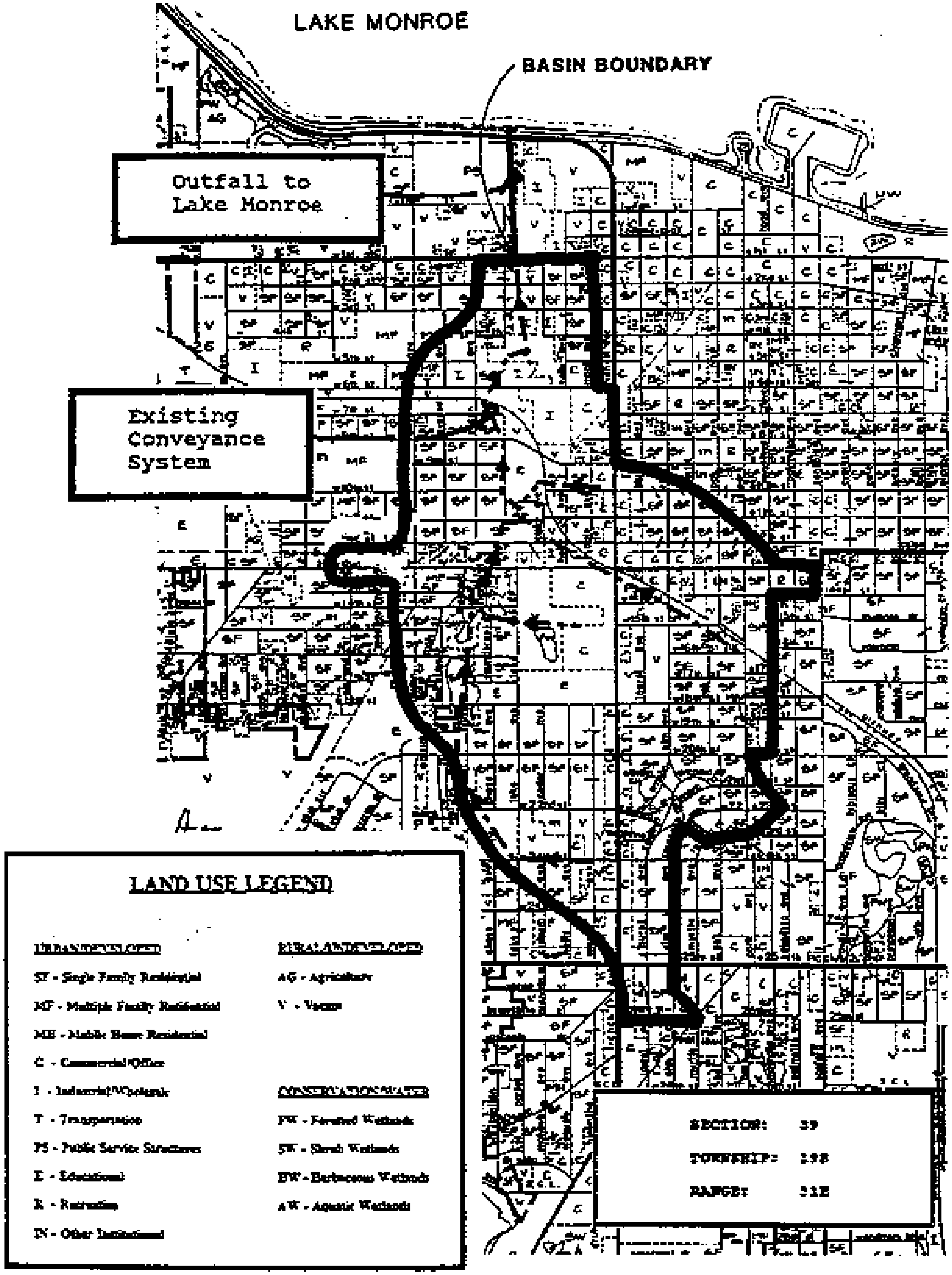


SCALE: 1" = 2000'

MILL CREEK DRAINAGE BASIN: LAND USE MAP WITH WETLANDS

MAP No. 9

Conklin Porter and Holmes ENGINEERS, INC.



SCALE: 1" = 2000'

CLOUD BRANCH DRAINAGE BASIN: LAND USE MAP WITH WETLANDS

MAP No. 10

Conklin Porter and Holmes ENGINEERS, INC.

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

Henry Dean, Executive Director
John R. Wehle, Assistant Executive Director

POST OFFICE BOX 1429 PALATKA, FLORIDA 32178-1429
TELEPHONE 904/329-4500 SUNCOM 904/860-4500
FAX (EXECUTIVE/LEGAL) 329-4125 (PERMITTING) 329-4315 (ADMINISTRATION/FINANCE) 329-4508

FIELD STATIONS

618 E. South Street Orlando, Florida 32801 407/894-5423

7775 Baymeadows Way Suite 102 Jacksonville, Florida 32256 904/730-6270

PERMITTING: 305 East Drive Melbourne, Florida 32904 407/984-4940

OPERATIONS: 2133 N. Wickham Road Melbourne, Florida 32935-8109 407/254-1762

CERTIFIED MAIL 647 214 959

FEBRUARY 21, 1992

CITY OF SANFORD
POST OFFICE BOX 1738
SANFORD, FL 32772-1738

RE: NOTICE OF BOARD CONSIDERATION OF PERMIT APPLICATION
NUMBER 4-117-0326ACG IN SEMINOLE COUNTY

THE STAFF OF THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT HAS COMPLETED ITS REVIEW OF THE ABOVE-REFERENCED APPLICATION. ENCLOSED IS A COPY OF THE TECHNICAL STAFF REPORT (TSR) WHICH STATES THAT STAFF WILL RECOMMEND APPROVAL OF THE APPLICATION WITH THOSE CONDITIONS CONTAINED IN THE TSR. THIS TSR CONSTITUTES A NOTICE OF DISTRICT INTENT TO GRANT THE PERMIT APPLICATION. IF YOU DISAGREE WITH ANY PART OF THE TSR, YOU SHOULD IMMEDIATELY CONTACT THE DISTRICT STAFF TO DISCUSS YOUR CONCERNS. PLEASE REFER TO THE ENCLOSED NOTICE OF RIGHTS WHICH DESCRIBES ANY RIGHTS YOU MAY HAVE AND IMPORTANT TIME FRAMES REGARDING THE PROPOSED AGENCY ACTION.

YOU ARE ENTITLED TO ADDRESS THE GOVERNING BOARD CONCERNING THE APPLICATION. HOWEVER, WHETHER YOU DO SO OR NOT IS SOLELY YOUR DECISION. OBJECTIONS WHICH THE DISTRICT HAS RECEIVED CONCERNING THE ABOVE-REFERENCED APPLICATION ARE PROVIDED TO ASSIST YOU IN PREPARING ANY PRESENTATION TO THE GOVERNING BOARD. THE STAFF RECOMMENDATION, ANY PRESENTATION BY YOU OR OTHERS, AND ANY OBJECTIONS WILL BE CONSIDERED IN THE BOARD'S FINAL PERMIT DECISION.

THE GOVERNING BOARD WILL CONSIDER YOUR APPLICATION AT 1:00 P.M. MARCH 10, 1992, OR AS SOON THEREAFTER AS IT MAY COME ONTO BE HEARD AT: ST. JOHNS RIVER WATER MANAGEMENT DISTRICT HEADQUARTERS, HIGHWAY 100 WEST, PALATKA, FLORIDA 32178.

SINCERELY,

Shannon Banican

SHANNON BANICAN, SR. RECORDS TECHNICIAN
DIVISION OF RECORDS

CC: DISTRICT FILE
VICKI CURTIS, DATA MANAGEMENT SUPERVISOR
AGENT: CONKLIN, PORTER AND HOLMES-ENGINEERS, INC.

NOTICE OF RIGHTS

1. A party whose substantial interests are determined has the right to request an administrative hearing by filing a written petition with the St. Johns River Water Management District (District) within 14 days of receipt of notice of the District's intent to grant or deny a permit application as provided in Section 40C-1.511, Florida Administrative Code, at the office of the District Clerk located at District headquarters, Highway 100 West, Palatka, Florida.

2. A party whose substantial interests are determined has the right to request an administrative hearing by filing a written petition in the office of the District Clerk within 14 days of receipt of notice of final District action on a permit application, as provided in Section 40C-1.511, Florida Administrative Code, if the Governing Board took action which substantially differs from the notice of intent to grant or deny the permit application, or if a substantially interested party did not receive notice of the District's intent to grant or deny the permit application.

3. A substantially interested party has the right to a formal administrative hearing pursuant to Section 120.57(1), Florida Statutes, where there is a dispute between the District and the party regarding an issue of material fact. A petition for a formal hearing must comply with the requirements set forth in Section 40C-1.521(2), Florida Administrative Code.

4. A substantially interested party has the right to an informal hearing pursuant to Section 120.57(2), Florida Statutes, where no material facts are in dispute. A petition for an informal hearing must comply with the requirements set forth in Section 40C-1.521(2), Florida Administrative Code.

5. Filing of a petition for an administrative hearing occurs upon delivery to the District Clerk at the District headquarters in Palatka, Florida.

6. Failure to file a petition for an administrative hearing within the requisite time frame shall constitute a waiver of the right to an administrative hearing.

7. The right to an administrative hearing and the relevant procedures to be followed are governed by Chapter 120, Florida Statutes, and Chapter 40C-1, Florida Administrative Code.

8. Any substantially affected person who claims that final action of the District constitutes an unconstitutional taking of property without just compensation may seek review of the action in circuit court pursuant to Section 373.617, Florida Statutes, and the Florida Rules of Civil Procedures, by filing an action within 90 days of the rendering of the final District action.

9. Pursuant to Section 120.68, Florida Statutes, a party who is adversely affected by final District action may seek review of the action in the district court of appeal by filing a notice of appeal pursuant to Fla.R.App.P. 9.110 within 30 days of the rendering of the final District action.

10. A party to the proceeding who claims that a District order is inconsistent with the provisions and purposes of Chapter 373, Florida S
Statutes, by the Land and Water
Commission and serving a cop
order within 20 days of the r
by the Commission within
cance, the Commission

11. A Distric
Board on behalf

12. F
paragraph
right to

Management And Storage of Surface Waters Technical Staff Report
February 17, 1992

Applicant: City of Sanford
Post Office Box 1788
Sanford, Fl 32772-1788

Agent: Conklin, Porter, and Holmes Engineers, Inc.
Post Office Box 2808
Sanford, Fl 32772-2808

County: Seminole
Section(s): 39
Acres Owned: N/A

Project Name: Mill Creek and Cloud Branch
Township(s): 19S Range(s):31E
Project Acreage: 1392 Mill Creek and
664 Cloud Branch

Authority: Chapters 40C-4.041(1),(2)(b) , F.A.C.

General Description of Application No. 4-117-0326ACG:
This application is for the conceptual authorization to make drainage improvements to regions of the Mills Creek and Cloud Branch drainage basin located within the City of Sanford.

Receiving Water Body(ies): Mill Creek, Cloud Branch,and Lake Monroe (Class III)

Existing Land Use: Urban residential, forested wetlands, herbaceous wetlands, ditches, Mill Creek, and Cloud Branch.

Operation and Maintenance Entity: City of Sanford

Staff Comments:
The north central and northwestern portions of the City of Sanford contain surface water drainage system generally tributary to two existing natural drainage ways. These two streams are Mill Creek and Cloud Branch.

The Mill Creek system drains the northwestern portion of the city of Sanford, roughly bounded by Lake Monroe on the north, 25th Street on the south, Airport Boulevard and Bevier Road on the west, and Olive Avenue on the east. The Cloud Branch system is generally bounded by Lake Monroe on the north, 25th Street on the south, Park Avenue and Sanford Avenue on the east and Olive Avenue on the west in Seminole County.

This application is for the conceptual approval of drainage improvements to regions of Mills Creek and Cloud Branch located within the City of Sanford. The areas surrounding these two channels are thoroughly developed, economically depressed areas, mostly comprised of lower income housing, commercial, railroad, and industrial land use. Repeated hazardous flooding problems exist in these areas, because of the very inadequate drainage system. In many cases, homes and other structures are built right on the streams and ditches. Public health and safety has always been a major problem, as well as flooding damage.

The proposed conceptual surface water management system will consist of two man-made detention ponds within Mill Creek drainage basin, and two wet detention ponds. Two detention ponds within the Cloud Branch drainage basin. The actual design will be submitted in the construction application.

Mill Creek and Cloud Branch are Class III waters of the state that flow into Lake Monroe. Both water bodies have been channelized along their courses in the region of the proposed drainage improvements. The creeks are steeply sloped, grassed banked, eroding, conveyances through the residential neighborhoods. There are two areas of mixed forested wetlands, bisected by Cloud Branch, within the area of the conceptually proposed project. No encroachments are proposed into the wetlands; however, the conceptual plan indicates they will be used for detention or attenuation.

The residential regions of the City of Sanford served by these creeks experienced severe flooding and property damage during the storm events in spring/summer 1991.

On July 13, 1991, the Mill Creek and Cloud Branch area, as well as the rest of Sanford, was hit by an extreme rainfall event. At the Water Reclamation Facility located at the confluence of Cloud Branch and Mill Creek (at Lake Monroe), from 8:00 a.m. until 1:00 p.m., 5.8 inches of rainfall was measured.

The area has a long history of drainage related problems. The city's consulting engineer studied these two basins in 1968 and prepared a drainage study which proposed solutions to the drainage problems. The study was never implemented because of cost and unavailability of funds. The 1968 study was prior to the existence of current requirements of the District and other agencies for retention/detention and other criteria and regulations.

In the post-development condition (no new development has been proposed) Mill Creek and Cloud Branch, as well as run-off from the Mill Creek and Cloud Branch drainage basins, will be routed through two man-made detention ponds within Mill Creek, two man-made wet detention ponds and two detention ponds within Cloud Branch. A number of channel modifications and other improvements also are proposed to alleviate flooding, and increase public safety.

The applicant proposed to use a 25-year, 6-hour storm analysis for the main facilities in these basins, where it is economically feasible to do so. Also, the applicant propose to provide some strategically located detention facilities in the system, sized basically to attenuate or reduce peak flows. The basins will have bleed-down devices to re-establish the basin storage capacity in 14 days or less. The wet-detention ponds are designed to attenuate the peak rate of discharge for the 25-year, 6-hour storm event. It is also generally proposed that post-development peak rate of discharge to the Lake Monroe from the 25-year, 24-hour storm event will not exceed the pre-development peak rate of discharge for the 25-year 24-hour storm event at the point of discharge.

The applicant provided a cost analysis showing that the construction program utilizing the 25-year 6-hour storm event has a total preliminary cost estimated at $7,619,846, while the 25-year 24-hour storm event design has a total preliminary cost estimated at $10,088,874; a difference in cost of $2,469,028. There is a major difference in physical facilities and costs involved in providing the additional protection and there is no big difference in the protection provided.

The proposed project will not meet the design and performance criteria delineated in Section 40C-42.025 F.A.C, however the applicant has shown that the proposed Mill Creek and Cloud Branch drainage improvements will meet the overall objectives of the District pursuant to section 9 of the Applicant's Handbook (A.H).

Erosion-protection measures, including seeding and sodding, will be extensively utilized. Also, junction structures at side streets will be dual compartment structures providing some pollution abatement functions.

In lieu of meeting the District criteria as delineated in Chapter 40C-4, 40C-42, F.A.C. and section 10.2.1, A.H., the applicant proposals will meet the overall objectives and standards pursuant to section 9.0 and 10.1.2, A.H.

Therefore, staff believes that this project, as conceptually proposed is consistent with the objectives and standards of the District set forth in chapter 40C-4, and 40C-42, F.A.C.

Recommendation: Approval

Conditions For Application Number #4-117-0326ACG

General (See Condition Sheet): 6, 7

Other Conditions:

1. Pursuant to Section 3.4.2(s) of the MSSW Applicant's Handbook, this permit does not authorize any construction, operation, or alteration of the proposed system.

2. This Conceptual Approval permit is valid for twenty years from the date of issuance, provided that construction of the initial phase of the system is permitted and construction undertaken within two years of the issuance of this conceptual

approval permit, and provided that all phases of the system are designed and built in accordance with the terms of the conceptual approval permit and that all required permits for subsequent phases are obtained.

3. The permittee must obtain a General or Individual permit from the District prior to beginning construction of subsequent phases or any other work not specifically authorized by this permit.

4. The proposed conceptual surface water management system is approved as shown on plans received by the District on December 17, 1991.

Pakzadian/Thomas

PLEASE REFER TO YOUR TSR FOR THOSE CONDITIONS
WHICH APPLY TO YOUR PERMIT

GENERAL CONDITIONS

Management and Storage of Surface Waters

RULE IMPLEMENTED OCTOBER 19, 1989

1. Prior to lot or unit sales, or upon completion of construction of the system, whichever occurs first, the District must receive the final operation and maintenance document(s) approved by the District and recorded, if the latter is appropriate. For those systems which are proposed to be maintained by county or municipal entities, final operation and maintenance documents must be received by the District when maintenance and operation of the system is accepted by the local government entity. Failure to submit the appropriate final document will result in the permittee remaining personally liable for carrying out maintenance and operation of the permitted system.

2. All construction, operation and maintenance shall be as set forth in the plans, specifications and performance criteria as approved by this permit.

3. District authorized staff, upon proper identification, will have permission to enter, inspect and observe the system to insure conformity with the plans and specifications approved by the permit.

4. Turbidity barriers must be installed at all locations where the possibility of transferring suspended solids into the receiving waterbody exists due to the proposed work. Turbidity barriers must remain in place at all locations until construction is completed and soils are stabilized and vegetation has been established. Thereafter the permittee will be responsible for the removal of the barriers.

5. The operation phase of the permit shall not become effective until a Florida Registered Professional Engineer certifies that all facilities have been constructed in accordance with the design approved by the District. Within 30 days after completion of construction of the surface water management system, the permittee shall submit the following: completion certification report signed and sealed by the P.E.; and when the completed system substantially differs from permitted plans, two sets of record (as built) plans which reflect the surface water management system as actually constructed. This submittal will serve to notify the District staff that the facilities are ready for inspection and approval. The permit

cannot be transferred to the responsible operation and maintenance entity approved by the District until construction of the completed surface water management system is approved by the District.

6. If any other regulatory agency should require revisions or modification to the permitted project, the District is to be notified of the revisions so that a determination can be made whether a permit modification is required.

7. The District must be notified, in writing, within 30 days of any sale, conveyance, or other transfer of a permitted system or facility or within 30 days of any transfer of ownership or control of the real property at which the permitted system or facility is located. All transfers of ownership or transfers of a permit are subject to the requirements of chapter 40C-1.

8. The permittee must require the contractor to review and maintain a copy of this permit, complete with all conditions, attachments, exhibits, and permit modifications in good condition and posted at the same location as other agency permits on the construction site. The complete permit copy shall be available for review upon request by District representatives.

PLEASE REFER TO YOUR TSR FOR THOSE CONDITIONS
WHICH APPLY TO YOUR PERMIT

GENERAL CONDITIONS

Management and Storage of Surface Waters

RULE IMPLEMENTED OCTOBER 19, 1989

1. Prior to lot or unit sales, or upon completion of construction of the system, whichever occurs first, the District must receive the final operation and maintenance document(s) approved by the District and recorded, if the latter is appropriate. For those systems which are proposed to be maintained by county or municipal entities, final operation and maintenance documents must be received by the District when maintenance and operation of the system is accepted by the local government entity. Failure to submit the appropriate final document will result in the permittee remaining personally liable for carrying out maintenance and operation of the permitted system.

2. All construction, operation and maintenance shall be as set forth in the plans, specifications and performance criteria as approved by this permit.

3. District authorized staff, upon proper identification, will have permission to enter, inspect and observe the system to insure conformity with the plans and specifications approved by the permit.

4. Turbidity barriers must be installed at all locations where the possibility of transferring suspended solids into the receiving waterbody exists due to the proposed work. Turbidity barriers must remain in place at all locations until construction is completed and soils are stabilized and vegetation has been established. Thereafter the permittee will be responsible for the removal of the barriers.

5. The operation phase of the permit shall not become effective until a Florida Registered Professional Engineer certifies that all facilities have been constructed in accordance with the design approved by the District. Within 30 days after completion of construction of the surface water management system, the permittee shall submit the following: completion certification report signed and sealed by the P.E.; and when the completed system substantially differs from permitted plans, two sets of record (as built) plans which reflect the surface water management system as actually constructed. This submittal will serve to notify the District staff that the facilities are ready for inspection and approval. The permit

cannot be transferred to the responsible operation and maintenance entity approved by the District until construction of the completed surface water management system is approved by the District.

6. If any other regulatory agency should require revisions or modification to the permitted project, the District is to be notified of the revisions so that a determination can be made whether a permit modification is required.

7. The District must be notified, in writing, within 30 days of any sale, conveyance, or other transfer of a permitted system or facility or within 30 days of any transfer of ownership or control of the real property at which the permitted system or facility is located. All transfers of ownership or transfers of a permit are subject to the requirements of chapter 40C-1.

8. The permittee must require the contractor to review and maintain a copy of this permit, complete with all conditions, attachments, exhibits, and permit modifications in good condition and posted at the same location as other agency permits on the construction site. The complete permit copy shall be available for review upon request by District representatives.

MANAGEMENT AND STORAGE OF SURFACE WATERS/STORMWATER

SPECIAL CONDITIONS

OCTOBER 19, 1989

Duration and Completion

1. This permit for construction will expire five years from the data of issuance.

2. Construction or alteration of the surface water management system must be completed and all disturbed areas must be stabilized in accordance with permitted plans and permit conditions prior to any of the following events (whichever occurs first): issuance of a certificate of occupancy; use of the infra-structure for its intended use; or transfer of responsibility for operation and maintenance to a local government or other responsible entity.

Conceptual

3. Pursuant to section 3.4.2(s) of the MSSW Applicant's Handbook, this permit does not authorize any construction, operation, or alteration of the proposed system.

4. This Conceptual Approval permit is valid for twenty years from the date of issuance, provided that construction of the initial phase of the system is permitted and construction undertaken within two years of the issuance of this conceptual approval permit, and provided that all phases of the system are designed and built in accordance with the terms of the conceptual approval permit and that all required permits for subsequent phases are obtained.

5. The permittee must obtain a General or Individual permit from the District prior to beginning construction of subsequent phases or any other work not specifically authorized by this permit.

High Maintenance Systems

6. At a minimum, all retention and detention storage areas must be excavated to rough grade prior to building construction or placement of impervious surface within the area to be served by those facilities. To prevent reduction in storage volume and percolation rates, all accumulated sediment must be removed fro the storage area prior to final grading and stabilization.

7. A registered Professional Engineer (P.E.) or his or her designee must be on-site to verify that the filtration system is constructed according to the permitted plans. This P.E. must submit a signed and sealed inspection report to the District using form number EN-42 within 30 days of completion of the filter system. An annual inspection of the filter system must be made by a P.E. or his or her designee in the month of May. A signed and sealed inspection report must be submitted to the District by the inspecting P.E. within 30 days of the inspection date. If the filtration system is not functioning as designed and permitted, maintenance must be performed immediately and reported in the annual inspection report. If maintenance measures are insufficient to enable the system to meet the design and performance standards in chapter 40C-42, the permittee must obtain District approval of an alternate design.

8. A P.E. or his or her designee must inspect the pump system (including pumps and appurtenant works) in May of each year. The inspecting P.E. must submit a signed and sealed report to the District using form number EN-35) within 30 days of the inspection certifying that the pump system is operating as designed and permitted. If the pump system is not operating as designed and permitted, maintenance must be performed immediately to restore the system to permitted operating specifications. All necessary maintenance must be described by the P.E. as part of the annual report. If maintenance measures prove insufficient to restore the system to permitted operation specifications, the permittee must obtain District approval of an alternative design.

9. A Registered Professional Engineer or his or her designee must be onsite to ensure that the exfiltration system is constructed according to the permitted plans. Within 30 days of installation, the Professional Engineer must submit a signed and sealed report (EN-42) to the District certifying that the exfiltration system is installed in accordance with the permitted plans.

Inlets to exfiltration systems must be inspected and cleaned of debris and sediment on a quarterly basis in February, May, August, and November of each year. If the system becomes clogged, maintenance measures must be taken to ensure the system will function as designed. If maintenance measures prove insufficient to restore the system to permitting operating specifications, the permittee must obtain District approval of an alternate design that will perform the same function.

Wet Detention

10. The littoral zone of the wet detention system, as shown on the approved plans, must be vegetated with a mixture of native herbaceous vegetation, achieving an 80% cover within 18 months of completion of the system. At least an 80% cover must be maintained in perpetuity.

11. Monitoring reports (2 copies) evaluating the establishment of littoral zone vegetation must be submitted to the District within 30 days following completion of the system and 18 months after completion. The initial report must verify that the littoral zone has been constructed and describe the methods used to initiate establishment of a vegetative cover. The 18 month report must contain the following: an assessment of viability of the littoral zone vegetation; percent coverage by species; percent survival since original planting (if applicable); and a description of all maintenance measures taken to date.

12. All activities necessary to establish the vegetated littoral zone as required by permitted plans and other conditions of this permit, must be completed prior to any of the following events (whichever occurs first): issuance of the first certificate of occupancy; the use of infrastructure for its intended use; or, transfer of responsibility for operation and maintenance of the system to a local government or other responsible entity.

Karst Sensitive Areas

13. If limestone bedrock is encountered during construction of the retention basins or a sinkhole or solution cavity forms during construction, construction of the basin must be halted immediately and the District must be notified. At that time, a modification of this permit may be required.

14. The permittee must visually inspect all permitted surface water management basins monthly for the occurrence of sinkholes and document these inspections on District Condition Compliance Form Number EN33 . Two copies of the completed forms must be sent to the District annually by May 31st of each year.

15. The permittee must repair any sinkhole that develops within the surface water management system. Permittee must notify the District of any sinkhole development in the surface water management system within 48 hours of its discovery and must submit a detailed sinkhole repair plan within 30 days of such discovery for written approval by the District staff.

Wetland Preservation/Creation

16. All wetland areas or water bodies that are outside of the specific limits of construction authorized by this permit must be protected from erosion, siltation, scouring or excess turbidity, and dewatering.

17. The permittee must submit two copies of an as-built survey of the wetland creation areas certified by a registered surveyor or professional engineer showing dimensions, grades, ground elevations, and water surface elevations. The as-built must be submitted with the first monitoring report.

18. Within the wetland creation areas, non-native vegetation, cattails (Typha spp.) and primrose willow (Ludwiga peruvianna), must be controlled by hand clearing or other methods approved by the District so that they constitute no more than 10% of the areal cover in each stratum.

19. Prior to construction, the permittee must clearly designate the limits of construction on-site. The permittee must advise the contractor that any work outside the limits of construction, including clearing, is a violation of this permit.

20. The wetland creation areas must be planted prior to any of the following events (whichever occurs first): issuance of the first certificate of occupancy; use of the infrastructure for its intended use; or transfer of responsibility for operation and maintenance of the system to a local government or other responsible entity.

21. Within 30 days of completion of initial planting, the permittee must submit to the District for review and approval a plan detailing the site-specific methods to be used for monitoring the wetland creation areas so that achievement of success criteria can be clearly demonstrated. The plan must include such information as the size, location and number of monitoring quadrants, the location and number of photographic stations, and other pertinent factors to demonstrate achievement of success criteria.

22. The permittee must furnish the District with monitoring reports for the wetland creation area(s) describing:

   A. Percent survival and diversity of planted species within each stratum;

   B. Recruitment density and composition within each stratum;

   C. Recorded growth via established parameters for planted trees and shrubs;

   D. Percent cover of herbaceous species;

   E. Surface water elevation referenced to N.G.V.D., or if surface water is not present, groundwater elevation referenced to N.G.V.D.; and

   F. Wildlife utilization.

The data must be collected and submitted semi-annually, once during the wet season (August-September) and once during the dry season (March-April) for a total period of 3 years following initial planting. Reports to the District must also include photographs, descriptions of problems encountered, and solutions undertaken.

23. Successful establishment of the wetland creation area will have occurred when:

A. At least 80 percent of the planted individuals in each stratum have survived and are showing signs of normal annual growth, based upon standard growth parameters such as height and base diameter, or canopy circumference;

B. At least 80 percent cover by appropriate wetland herbaceous species has been obtained; and

C. The above criteria has been achieved by the end of a 3 year period following initial planting.

24. If successful establishment has not occurred as stated above, the permittee must apply to the District for a permit modification no later than 30 days following the termination of the 3 year monitoring period. The application must include a narrative describing the type and causes of failure and contain a complete set of plans for the redesign and/or replacement planting of the wetland creation area so that the success criteria will be achieved. Within 30 days of District approval and issuance of the permit modification, the permittee must implement the redesign and/or replacement planting. Following completion of such work, success criteria as stated above or modified by subsequent permit must again be achieved. In addition, the monitoring required by these conditions must be conducted.

25. Within 30 days of any monitoring event that indicates 50% or greater mortality of planted wetland species in any stratum within the mitigation area, the applicant must submit a remediation program for District staff review and approval.

26. Prior to initiating any construction, the permittee must record a conservation easement on the real property pursuant to section 704.06, F.S., prohibiting all construction including clearing, dredging, or filling, except that which is specifically authorized by this permit within the wetland creation, wetland enhancement, and upland conservation areas as delineated on the final plans as approved by the District. The easement must contain provisions as set forth in paragraphs 1(a)-(h) of section 704.06, F.S., as well as provisions indicating that they may be enforced by the District and may not be amended without District approval. Within 30 days of the date of issuance of this permit and prior to recording, said easement must be submitted to the District for review and approval.

Within 30 days of receipt of District approval, the permittee must provide the District with a certified copy of the recorded easement showing the date it was recorded and the official records book and page number.

27. Prior to initiating any construction, the permittee must record a deed restrictions on the real property pursuant to section 704.06, F.S., prohibiting all construction including clearing, dredging, or filling, except that which is specifically authorized by this permit within the wetland creation, wetland enhancement, and upland conservation areas as delineated on the final plans as approved by the District. The restrictions must contain provisions as set forth in paragraphs 1(a)-(h) of section 704.06, F.S., as well as provisions indicating that they may be enforced by the District and may not be amended without District approval. Within 30 days of the date of issuance of this permit and prior to recording, said restrictions must be submitted to the District for review and approval.

Within 30 days of receipt of District approval, the permittee must provide the District with a certified copy of the recorded restrictions showing the date it was recorded and the official records book and page number.

Erosion and Sediment Control

28. The permittee must submit two copies of an erosion and sediment control plan detailing measures to be taken during construction to prevent the discharge of turbid water or eroded soil to adjacent properties, wetlands, or water bodies outside of the specific limits of construction approved by this permit. Said plan must be submitted to the District for staff review and written approval at least 14 days prior to the initiation of construction. The approved plan must be provided to and discussed with the construction contractor prior to the initiation of construction.

29. Permittee must select, implement, and operate all erosion and sediment control measures required to retain sediment on-site and to prevent violations of water quality standards as specified in chapters 17-301, 17-302, and 17-4, F.A.C. The permittee is encouraged to use appropriate Best Management Practices for erosion and sediment control as described in the Florida Land Development Manual: A guide to Sound Land and Water Management (DER, 1988).

30. The permittee must construct and maintain a permanent protective vegetative and/or artificial cover for erosion and sediment control on all land surfaces exposed or disturbed by construction or alteration of the permitted project. Unless modified by another condition of this permit or specified otherwise on a District-approved erosion and sediment control plan, this protective cover must be installed within fourteen (14) days after final grading of the affected land surfaces. A permanent vegetative cover must be established within 60 days after planting or installation. The permittee must maintain cover on adjacent ground surfaces which may be impacted by construction activities until the District receives the P.E. certification that the project is constructed according to the permitted plans.

Integrated Pest Management Plan/Golf Course

31. Within 90 days of the beginning of construction or prior to application of any pesticides to the project area, whichever occurs first, the permittee must obtain District approval of a site specific, integrated Pesticide Management Plan. The management plan must specify the usage of non-chemical or cultural means as the primary defense against nuisance and/or destructive pests. These non-chemical measures should include practices such as: the planting and maintenance of native vegetation where possible; the use of pest and/or disease tolerant vegetation; the proper selection and application of fertilizer; proper supplemental watering; the use of mulch for weed control, and proper maintenance practices including mowing frequency, mowing height, mechanical dethatching, removal of dying or dead vegetation, etc.

The plan must also include information on the following:

a. Insecticides, nematicides, fungicides or herbicides to be used;

b. Method(s) of application;

c. Time frames for use and application; and

d. For the pesticides that will be used, specification of:

- Half-lives
- N-Octanol/water partition coefficient (Kow)
- Lethal dose coefficient (LD50)
- Solubility

Any pesticides selected must exhibit a short half-life (<10 weeks), a low n-octanol/water coefficient (<5.0), and be suitable for use with local soils and groundwater pH conditions. The use of organochlorides and other pesticides either listed by EPA as cancelled or suspended, or otherwise prohibited by state or federal law is not allowed.

32. The permittee must adhere to the fertilizer recommendations set forth in the manual for commercial turf grass management by the University of Florida compiled by the Florida Turf-Grass Association. The nutrient loading attributable to the application of effluent shall be considered a source of fertilizer for the golf course and additional non-effluent fertilizer sources shall be utilized only as a supplement.

Water Quality Sampling

33. All water quality data must be submitted to the District within 14 days of receipt of the analytical laboratory report using the appropriate District form (EN-15 - EN-20) or an equivalent format approved by District Staff.

34. The data collected for the water quality monitoring program must be submitted to the District annually by December 31 of each year using the appropriate District form (EN-16 - EN-20) or an equivalent format approved by District staff.

35. After 5 years of monitoring, the Permittee may request a modification of the parameters and frequency of the monitoring program by demonstrating that the collected data represents steady state conditions, is sufficient to establish baseline ranges for indicator parameters and provides an adequate basis for evaluating the project's compliance with state water quality standards.

36. Within 30 days of the issuance of this permit, the Permittee must submit a site specific quality assurance plan for approval by District staff. The quality assurance plan must conform with FDER Guidelines for Preparing Quality Assurance Plans (DER-QA-001/85, dated January 30, 1986).

INSPECTION REPORTS

37. The operation and maintenance entity shall submit inspection reports to the District two years after the operation phase permit becomes effective and every two years thereafter on District form EN-46. The inspection form must be signed and sealed by an appropriate registered professional.

38. The operation and maintenance entity shall submit inspection reports to the District two years after the operation phase permit becomes effective and every two years thereafter on District form EN-47.

39. The operation and maintenance entity shall submit inspection reports to the District one year after the operation phase permit becomes effective and every two years thereafter on District form EN-46. The inspection form must be signed and sealed by an appropriate registered professional.

Henry Dean, Executive Director
John R. Wehle, Assistant Executive Director

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT

POST OFFICE BOX 1429 PALATKA, FLORIDA 32178-1429
TELEPHONE 904/329-4500 SUNCOM 904/860-4500
FAX (EXECUTIVE/LEGAL) 329-4125 (PERMITTING) 329-4315 (ADMINISTRATION/FINANCE) 329-4508

FIELD STATIONS

618 E. South Street
Orlando, Florida 32801
407/894-5423

7775 Baymeadows Way
Suite 102
Jacksonville, Florida 32256
904/730-6270

PERMITTING:
305 East Drive
Melbourne, Florida 32904
407/984-4940

OPERATIONS:
2133 N. Wickham Road
Melbourne, Florida 32935-8109
407/254-1762

CERTIFIED MAIL 647 214 959

FEBRUARY 21, 1992

CITY OF SANFORD
POST OFFICE BOX 1788
SANFORD, FL 32772-1788

RE: NOTICE OF BOARD CONSIDERATION OF PERMIT APPLICATION
NUMBER 4-117-0326ACG IN SEMINOLE COUNTY

THE STAFF OF THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT HAS COMPLETED ITS REVIEW OF THE ABOVE-REFERENCED APPLICATION. ENCLOSED IS A COPY OF THE TECHNICAL STAFF REPORT (TSR) WHICH STATES THAT STAFF WILL RECOMMEND APPROVAL OF THE APPLICATION WITH THOSE CONDITIONS CONTAINED IN THE TSR. THIS TSR CONSTITUTES A NOTICE OF DISTRICT INTENT TO GRANT THE PERMIT APPLICATION. IF YOU DISAGREE WITH ANY PART OF THE TSR, YOU SHOULD IMMEDIATELY CONTACT THE DISTRICT STAFF TO DISCUSS YOUR CONCERNS. PLEASE REFER TO THE ENCLOSED NOTICE OF RIGHTS WHICH DESCRIBES ANY RIGHTS YOU MAY HAVE AND IMPORTANT TIME FRAMES REGARDING THE PROPOSED AGENCY ACTION.

YOU ARE ENTITLED TO ADDRESS THE GOVERNING BOARD CONCERNING THE APPLICATION. HOWEVER, WHETHER YOU DO SO OR NOT IS SOLELY YOUR DECISION. OBJECTIONS WHICH THE DISTRICT HAS RECEIVED CONCERNING THE ABOVE-REFERENCED APPLICATION ARE PROVIDED TO ASSIST YOU IN PREPARING ANY PRESENTATION TO THE GOVERNING BOARD. THE STAFF RECOMMENDATION, ANY PRESENTATION BY YOU OR OTHERS, AND ANY OBJECTIONS WILL BE CONSIDERED IN THE BOARD'S FINAL PERMIT DECISION.

THE GOVERNING BOARD WILL CONSIDER YOUR APPLICATION AT 1:00 P.M. MARCH 10, 1992, OR AS SOON THEREAFTER AS IT MAY COME ON TO BE HEARD AT: ST. JOHNS RIVER WATER MANAGEMENT DISTRICT HEADQUARTERS, HIGHWAY 100 WEST, PALATKA, FLORIDA 32178.

SINCERELY,

Shannon Barican

SHANNON BARICAN, SR. RECORDS TECHNICIAN
DIVISION OF RECORDS

CC: DISTRICT FILE
VICKI CURTIS, DATA MANAGEMENT SUPERVISOR
AGENT: CONKLIN, PORTER AND HOLMES-ENGINEERS, INC.

NOTICE OF RIGHTS

1. A party whose substantial interests are determined has the right to request an administrative hearing by filing a written petition with the St. Johns River Water Management District (District) within 14 days of receipt of notice of the District's intent to grant or deny a permit application as provided in Section 40C-1.511, Florida Administrative Code, at the office of the District Clerk located at District headquarters, Highway 100 West, Palatka, Florida.

2. A party whose substantial interests are determined has the right to request an administrative hearing by filing a written petition in the office of the District Clerk within 14 days of receipt of notice of final District action on a permit application, as provided in Section 40C-1.511, Florida Administrative Code, if the Governing Board took action which substantially differs from the notice of intent to grant or deny the permit application, or if a substantially interested party did not receive notice of the District's intent to grant or deny the permit application.

3. A substantially interested party has the right to a formal administrative hearing pursuant to Section 120.57(1), Florida Statutes, where there is a dispute between the District and the party regarding an issue of material fact. A petition for a formal hearing must comply with the requirements set forth in Section 40C-1.521(2), Florida Administrative Code.

4. A substantially interested party has the right to an informal hearing pursuant to Section 120.57(2), Florida Statutes, where no material facts are in dispute. A petition for an informal hearing must comply with the requirements set forth in Section 40C-1.521(2), Florida Administrative Code.

5. Filing of a petition for an administrative hearing occurs upon delivery to the District Clerk at the District headquarters in Palatka, Florida.

6. Failure to file a petition for an administrative hearing within the requisite time frame shall constitute a waiver of the right to an administrative hearing.

7. The right to an administrative hearing and the relevant procedures to be followed are governed by Chapter 120, Florida Statutes, and Chapter 40C-1, Florida Administrative Code.

8. Any substantially affected person who claims that final action of the District constitutes an unconstitutional taking of property without just compensation may seek review of the action in circuit court pursuant to Section 373.617, Florida Statutes, and the Florida Rules of Civil Procedures, by filing an action within 90 days of the rendering of the final District action.

9. Pursuant to Section 120.68, Florida Statutes, a party who is adversely affected by final District action may seek review of the action in the district court of appeal by filing a notice of appeal pursuant to Fla.R.App.P. 9.110 within 30 days of the rendering of the final District action.

10. A party to the proceeding who claims that a District order is inconsistent with the provisions and purposes of Chapter 373, Florida S
Statutes, by the Land and Water
Commission and serving a cop
order within 20 days of the r
by the Commission within
cance, the Commission

11. A Distric
Board on behalf

12. F
paragraph
right to

Management And Storage of Surface Waters Technical Staff Report
February 17, 1992

Applicant: City of Sanford
Post Office Box 1788
Sanford, Fl 32772-1788

Agent: Conklin, Porter, and Holmes Engineers, Inc.
Post Office Box 2808
Sanford, Fl 32772-2808

County: Seminole
Section(s): 39
Acres Owned: N/A

Project Name: Mill Creek and Cloud Branch
Township(s): 19S Range(s):31E
Project Acreage: 1392 Mill Creek and 664 Cloud Branch

Authority: Chapters 40C-4.041(1),(2)(b) , F.A.C.

General Description of Application No. 4-117-0326ACG:
This application is for the conceptual authorization to make drainage improvements to regions of the Mills Creek and Cloud Branch drainage basin located within the City of Sanford.

Receiving Water Body(ies): Mill Creek, Cloud Branch, and Lake Monroe (Class III)

Existing Land Use: Urban residential, forested wetlands, herbaceous wetlands, ditches, Mill Creek, and Cloud Branch.

Operation and Maintenance Entity: City of Sanford

Staff Comments:
The north central and northwestern portions of the City of Sanford contain surface water drainage system generally tributary to two existing natural drainage ways. These two streams are Mill Creek and Cloud Branch.

The Mill Creek system drains the northwestern portion of the city of Sanford, roughly bounded by Lake Monroe on the north, 25th Street on the south, Airport Boulevard and Bevier Road on the west, and Olive Avenue on the east. The Cloud Branch system is generally bounded by Lake Monroe on the north, 25th Street on the south, Park Avenue and Sanford Avenue on the east and Olive Avenue on the west in Seminole County.

This application is for the conceptual approval of drainage improvements to regions of Mills Creek and Cloud Branch located within the City of Sanford. The areas surrounding these two channels are thoroughly developed, economically depressed areas, mostly comprised of lower income housing, commercial, railroad, and industrial land use. Repeated hazardous flooding problems exist in these areas, because of the very inadequate drainage system. In many cases, homes and other structures are built right on the streams and ditches. Public health and safety has always been a major problem, as well as flooding damage.

The proposed conceptual surface water management system will consist of two man-made detention ponds within Mill Creek drainage basin, and two wet detention ponds. Two detention ponds within the Cloud Branch drainage basin. The actual design will be submitted in the construction application.

Mill Creek and Cloud Branch are Class III waters of the state that flow into Lake Monroe. Both water bodies have been channelized along their courses in the region of the proposed drainage improvements. The creeks are steeply sloped, grassed banked, eroding, conveyances through the residential neighborhoods. There are two areas of mixed forested wetlands, bisected by Cloud Branch, within the area of the conceptually proposed project. No encroachments are proposed into the wetlands; however, the conceptual plan indicates they will be used for detention or attenuation.

The residential regions of the City of Sanford served by these creeks experienced severe flooding and property damage during the storm events in spring/summer 1991.

On July 13, 1991, the Mill Creek and Cloud Branch area, as well as the rest of Sanford, was hit by an extreme rainfall event. At the Water Reclamation Facility located at the confluence of Cloud Branch and Mill Creek (at Lake Monroe), from 8:00 a.m. until 1:00 p.m., 5.8 inches of rainfall was measured.

The area has a long history of drainage related problems. The city's consulting engineer studied these two basins in 1968 and prepared a drainage study which proposed solutions to the drainage problems. The study was never implemented because of cost and unavailability of funds. The 1968 study was prior to the existence of current requirements of the District and other agencies for retention/detention and other criteria and regulations.

In the post-development condition (no new development has been proposed) Mill Creek and Cloud Branch, as well as run-off from the Mill Creek and Cloud Branch drainage basins, will be routed through two man-made detention ponds within Mill Creek, two man-made wet detention ponds and two detention ponds within Cloud Branch. A number of channel modifications and other improvements also are proposed to alleviate flooding, and increase public safety.

The applicant proposed to use a 25-year, 6-hour storm analysis for the main facilities in these basins, where it is economically feasible to do so. Also, the applicant propose to provide some strategically located detention facilities in the system, sized basically to attenuate or reduce peak flows. The basins will have bleed-down devices to re-establish the basin storage capacity in 14 days or less. The wet-detention ponds are designed to attenuate the peak rate of discharge for the 25-year, 6-hour storm event. It is also generally proposed that post-development peak rate of discharge to the Lake Monroe from the 25-year, 24-hour storm event will not exceed the pre-development peak rate of discharge for the 25-year 24-hour storm event at the point of discharge.

The applicant provided a cost analysis showing that the construction program utilizing the 25-year 6-hour storm event has a total preliminary cost estimated at $7,619,846, while the 25-year 24-hour storm event design has a total preliminary cost estimated at $10,088,874; a difference in cost of $2,469,028. There is a major difference in physical facilities and costs involved in providing the additional protection and there is no big difference in the protection provided.

The proposed project will not meet the design and performance criteria delineated in Section 40C-42.025 F.A.C, however the applicant has shown that the proposed Mill Creek and Cloud Branch drainage improvements will meet the overall objectives of the District pursuant to section 9 of the Applicant's Handbook (A.H).

Erosion-protection measures, including seeding and sodding, will be extensively utilized. Also, junction structures at side streets will be dual compartment structures providing some pollution abatement functions.

In lieu of meeting the District criteria as delineated in Chapter 40C-4, 40C-42, F.A.C. and section 10.2.1, A.H., the applicant proposals will meet the overall objectives and standards pursuant to section 9.0 and 10.1.2, A.H.

Therefore, staff believes that this project, as conceptually proposed is consistent with the objectives and standards of the District set forth in chapter 40C-4, and 40C-42, F.A.C.

Recommendation: Approval

Conditions For Application Number #4-117-0326ACG

General (See Condition Sheet): 6, 7

Other Conditions:

1. Pursuant to Section 3.4.2(s) of the MSSW Applicant's Handbook, this permit does not authorize any construction, operation, or alteration of the proposed system.

2. This Conceptual Approval permit is valid for twenty years from the date of issuance, provided that construction of the initial phase of the system is permitted and construction undertaken within two years of the issuance of this conceptual

approval permit, and provided that all phases of the system are designed and built in accordance with the terms of the conceptual approval permit and that all required permits for subsequent phases are obtained.

3. The permittee must obtain a General or Individual permit from the District prior to beginning construction of subsequent phases or any other work not specifically authorized by this permit.

4. The proposed conceptual surface water management system is approved as shown on plans received by the District on December 17, 1991.

Pakzadian/Thomas

MANAGEMENT AND STORAGE OF SURFACE WATERS/STORMWATER

SPECIAL CONDITIONS

OCTOBER 19, 1989

Duration and Completion

1. This permit for construction will expire five years from the date of issuance.

2. Construction or alteration of the surface water management system must be completed and all disturbed areas must be stabilized in accordance with permitted plans and permit conditions prior to any of the following events (whichever occurs first): issuance of a certificate of occupancy; use of the infra-structure for its intended use; or transfer of responsibility for operation and maintenance to a local government or other responsible entity.

Conceptual

3. Pursuant to section 3.4.2(s) of the MSSW Applicant's Handbook, this permit does not authorize any construction, operation, or alteration of the proposed system.

4. This Conceptual Approval permit is valid for twenty years from the date of issuance, provided that construction of the initial phase of the system is permitted and construction undertaken within two years of the issuance of this conceptual approval permit, and provided that all phases of the system are designed and built in accordance with the terms of the conceptual approval permit and that all required permits for subsequent phases are obtained.

5. The permittee must obtain a General or Individual permit from the District prior to beginning construction of subsequent phases or any other work not specifically authorized by this permit.

High Maintenance Systems

6. At a minimum, all retention and detention storage areas must be excavated to rough grade prior to building construction or placement of impervious surface within the area to be served by those facilities. To prevent reduction in storage volume and percolation rates, all accumulated sediment must be removed fro the storage area prior to final grading and stabilization.

7. A registered Professional Engineer (P.E.) or his or her designee must be on-site to verify that the filtration system is constructed according to the permitted plans. This P.E. must submit a signed and sealed inspection report to the District using form number EN-42 within 30 days of completion of the filter system. An annual inspection of the filter system must be made by a P.E. or his or her designee in the month of May. A signed and sealed inspection report must be submitted to the District by the inspecting P.E. within 30 days of the inspection date. If the filtration system is not functioning as designed and permitted, maintenance must be performed immediately and reported in the annual inspection report. If maintenance measures are insufficient to enable the system to meet the design and performance standards in chapter 40C-42, the permittee must obtain District approval of an alternate design.

8. A P.E. or his or her designee must inspect the pump system (including pumps and appurtenant works) in May of each year. The inspecting P.E. must submit a signed and sealed report to the District using form number EN-35) within 30 days of the inspection certifying that the pump system is operating as designed and permitted. If the pump system is not operating as designed and permitted, maintenance must be performed immediately to restore the system to permitted operating specifications. All necessary maintenance must be described by the P.E. as part of the annual report. If maintenance measures prove insufficient to restore the system to permitted operation specifications, the permittee must obtain District approval of an alternative design.

9. A Registered Professional Engineer or his or her designee must be onsite to ensure that the exfiltration system is constructed according to the permitted plans. Within 30 days of installation, the Professional Engineer must submit a signed and sealed report (EN-42) to the District certifying that the exfiltration system is installed in accordance with the permitted plans.

Inlets to exfiltration systems must be inspected and cleaned of debris and sediment on a quarterly basis in February, May, August, and November of each year. If the system becomes clogged, maintenance measures must be taken to ensure the system will function as designed. If maintenance measures prove insufficient to restore the system to permitting operating specifications, the permittee must obtain District approval of an alternate design that will perform the same function.

Wet Detention

10. The littoral zone of the wet detention system, as shown on the approved plans, must be vegetated with a mixture of native herbaceous vegetation, achieving an 80% cover within 18 months of completion of the system. At least an 80% cover must be maintained in perpetuity.

11. Monitoring reports (2 copies) evaluating the establishment of littoral zone vegetation must be submitted to the District within 30 days following completion of the system and 18 months after completion. The initial report must verify that the littoral zone has been constructed and describe the methods used to initiate establishment of a vegetative cover. The 18 month report must contain the following: an assessment of viability of the littoral zone vegetation; percent coverage by species; percent survival since original planting (if applicable); and a description of all maintenance measures taken to date.

12. All activities necessary to establish the vegetated littoral zone as required by permitted plans and other conditions of this permit, must be completed prior to any of the following events (whichever occurs first): issuance of the first certificate of occupancy; the use of infrastructure for its intended use; or, transfer of responsibility for operation and maintenance of the system to a local government or other responsible entity.

Karst Sensitive Areas

13. If limestone bedrock is encountered during construction of the retention basins or a sinkhole or solution cavity forms during construction, construction of the basin must be halted immediately and the District must be notified. At that time, a modification of this permit may be required.

14. The permittee must visually inspect all permitted surface water management basins monthly for the occurrence of sinkholes and document these inspections on District Condition Compliance Form Number EN33 . Two copies of the completed forms must be sent to the District annually by May 31st of each year.

15. The permittee must repair any sinkhole that develops within the surface water management system. Permittee must notify the District of any sinkhole development in the surface water management system within 48 hours of its discovery and must submit a detailed sinkhole repair plan within 30 days of such discovery for written approval by the District staff.

Wetland Preservation/Creation

16. All Wetland areas or water bodies that are outside of the specific limits of construction authorized by this permit must be protected from erosion, siltation, scouring or excess turbidity, and dewatering.

17. The permittee must submit two copies of an as-built survey of the wetland creation areas certified by a registered surveyor or professional engineer showing dimensions, grades, ground elevations, and water surface elevations. The as-built must be submitted with the first monitoring report.

18. Within the wetland creation areas, non-native vegetation, cattails (Typha spp.) and primrose willow (Ludwiga peruvianna), must be controlled by hand clearing or other methods approved by the District so that they constitute no more than 10% of the areal cover in each stratum.

19. Prior to construction, the permittee must clearly designate the limits of construction on-site. The permittee must advise the contractor that any work outside the limits of construction, including clearing, is a violation of this permit.

20. The wetland creation areas must be planted prior to any of the following events (whichever occurs first): issuance of the first certificate of occupancy; use of the infrastructure for its intended use; or transfer of responsibility for operation and maintenance of the system to a local government or other responsible entity.

21. Within 30 days of completion of initial planting, the permittee must submit to the District for review and approval a plan detailing the site-specific methods to be used for monitoring the wetland creation areas so that achievement of success criteria can be clearly demonstrated. The plan must include such information as the size, location and number of monitoring quadrants, the location and number of photographic stations, and other pertinent factors to demonstrate achievement of success criteria.

22. The permittee must furnish the District with monitoring reports for the wetland creation area(s) describing:

    A. Percent survival and diversity of planted species within each stratum;

    B. Recruitment density and composition within each stratum;

    C. Recorded growth via established parameters for planted trees and shrubs;

    D. Percent cover of herbaceous species;

    E. Surface water elevation referenced to N.G.V.D., or if surface water is not present, groundwater elevation referenced to N.G.V.D.; and

    F. Wildlife utilization.

    The data must be collected and submitted semi-annually, once during the wet season (August-September) and once during the dry season (March-April) for a total period of 3 years following initial planting. Reports to the District must also include photographs, descriptions of problems encountered, and solutions undertaken.

23. Successful establishment of the wetland creation area will have occurred when:

A. At least 80 percent of the planted individuals in each stratum have survived and are showing signs of normal annual growth, based upon standard growth parameters such as height and base diameter, or canopy circumference;

B. At least 80 percent cover by appropriate wetland herbaceous species has been obtained; and

C. The above criteria has been achieved by the end of a 3 year period following initial planting.

24. If successful establishment has not occurred as stated above, the permittee must apply to the District for a permit modification no later than 30 days following the termination of the 3 year monitoring period. The application must include a narrative describing the type and causes of failure and contain a complete set of plans for the redesign and/or replacement planting of the wetland creation area so that the success criteria will be achieved. Within 30 days of District approval and issuance of the permit modification, the permittee must implement the redesign and/or replacement planting. Following completion of such work, success criteria as stated above or modified by subsequent permit must again be achieved. In addition, the monitoring required by these conditions must be conducted.

25. Within 30 days of any monitoring event that indicates 50% or greater mortality of planted wetland species in any stratum within the mitigation area, the applicant must submit a remediation program for District staff review and approval.

26. Prior to initiating any construction, the permittee must record a conservation easement on the real property pursuant to section 704.06, F.S., prohibiting all construction including clearing, dredging, or filling, except that which is specifically authorized by this permit within the wetland creation, wetland enhancement, and upland conservation areas as delineated on the final plans as approved by the District. The easement must contain provisions as set forth in paragraphs 1(a)-(h) of section 704.06, F.S., as well as provisions indicating that they may be enforced by the District and may not be amended without District approval. Within 30 days of the date of issuance of this permit and prior to recording, said easement must be submitted to the District for review and approval.

Within 30 days of receipt of District approval, the permittee must provide the District with a certified copy of the recorded easement showing the date it was recorded and the official records book and page number.

27. Prior to initiating any construction, the permittee must record a deed restrictions on the real property pursuant to section 704.06, F.S., prohibiting all construction including clearing, dredging, or filling, except that which is specifically authorized by this permit within the wetland creation, wetland enhancement, and upland conservation areas as delineated on the final plans as approved by the District. The restrictions must contain provisions as set forth in paragraphs 1(a)-(h) of section 704.06, F.S., as well as provisions indicating that they may be enforced by the District and may not be amended without District approval. Within 30 days of the date of issuance of this permit and prior to recording, said restrictions must be submitted to the District for review and approval.

Within 30 days of receipt of District approval, the permittee must provide the District with a certified copy of the recorded restrictions showing the date it was recorded and the official records book and page number.

Erosion and Sediment Control

28. The permittee must submit two copies of an erosion and sediment control plan detailing measures to be taken during construction to prevent the discharge of turbid water or eroded soil to adjacent properties, wetlands, or water bodies outside of the specific limits of construction approved by this permit. Said plan must be submitted to the District for staff review and written approval at least 14 days prior to the initiation of construction. The approved plan must be provided to and discussed with the construction contractor prior to the initiation of construction.

29. Permittee must select, implement, and operate all erosion and sediment control measures required to retain sediment on-site and to prevent violations of water quality standards as specified in chapters 17-301, 17-302, and 17-4, F.A.C. The permittee is encouraged to use appropriate Best Management Practices for erosion and sediment control as described in the Florida Land Development Manual: A guide to Sound Land and Water Management (DER, 1988).

30. The permittee must construct and maintain a permanent protective vegetative and/or artificial cover for erosion and sediment control on all land surfaces exposed or disturbed by construction or alteration of the permitted project. Unless modified by another condition of this permit or specified otherwise on a District-approved erosion and sediment control plan, this protective cover must be installed within fourteen (14) days after final grading of the affected land surfaces. A permanent vegetative cover must be established within 60 days after planting or installation. The permittee must maintain cover on adjacent ground surfaces which may be impacted by construction activities until the District receives the P.E. certification that the project is constructed according to the permitted plans.

Integrated Pest Management Plan/Golf Course

31. Within 90 days of the beginning of construction or prior to application of any pesticides to the project area, whichever occurs first, the permittee must obtain District approval of a site specific, integrated Pesticide Management Plan. The management plan must specify the usage of non-chemical or cultural means as the primary defense against nuisance and/or destructive pests. These non-chemical measures should include practices such as: the planting and maintenance of native vegetation where possible; the use of pest and/or disease tolerant vegetation; the proper selection and application of fertilizer; proper supplemental watering; the use of mulch for weed control, and proper maintenance practices including mowing frequency, mowing height, mechanical dethatching, removal of dying or dead vegetation, etc.

The plan must also include information on the following:

a. Insecticides, nematicides, fungicides or herbicides to be used;

b. Method(s) of application;

c. Time frames for use and application; and

d. For the pesticides that will be used, specification of:

- Half-lives
- N-Octanol/water partition coefficient (Kow)
- Lethal dose coefficient (LD50)
- Solubility

Any pesticides selected must exhibit a short half-life (<10 weeks), a low n-octanol/water coefficient (<5.0), and be suitable for use with local soils and groundwater pH conditions. The use of organochlorides and other pesticides either listed by EPA as cancelled or suspended, or otherwise prohibited by state or federal law is not allowed.

32. The permittee must adhere to the fertilizer recommendations set forth in the manual for commercial turf grass management by the University of Florida compiled by the Florida Turf-Grass Association. The nutrient loading attributable to the application of effluent shall be considered a source of fertilizer for the golf course and additional non-effluent fertilizer sources shall be utilized only as a supplement.

Water Quality Sampling

33. All water quality data must be submitted to the District within 14 days of receipt of the analytical laboratory report using the appropriate District form (EN-15 - EN-20) or an equivalent format approved by District Staff.

34. The data collected for the water quality monitoring program must be submitted to the District annually by December 31 of each year using the appropriate District form (EN-16 - EN-20) or an equivalent format approved by District staff.

35. After 5 years of monitoring, the Permittee may request a modification of the parameters and frequency of the monitoring program by demonstrating that the collected data represents steady state conditions, is sufficient to establish baseline ranges for indicator parameters and provides an adequate basis for evaluating the project's compliance with state water quality standards.

36. Within 30 days of the issuance of this permit, the Permittee must submit a site specific quality assurance plan for approval by District staff. The quality assurance plan must conform with FDER Guidelines for Preparing Quality Assurance Plans (DER-QA-001/85, dated January 30, 1986).

INSPECTION REPORTS

37. The operation and maintenance entity shall submit inspection reports to the District two years after the operation phase permit becomes effective and every two years thereafter on District form EN-46. The inspection form must be signed and sealed by an appropriate registered professional.

38. The operation and maintenance entity shall submit inspection reports to the District two years after the operation phase permit becomes effective and every two years thereafter on District form EN-47.

39. The operation and maintenance entity shall submit inspection reports to the District one year after the operation phase permit becomes effective and every two years thereafter on District form EN-46. The inspection form must be signed and sealed by an appropriate registered professional.

JOHNS RIVER
Henry Dean, Executive Director
John R. Wehle, Assistant Executive Director

WATER MANAGEMENT DISTRICT

POST OFFICE BOX 1429 PALATKA, FLORIDA 32178-1429
TELEPHONE 904/329-4500 SUNCOM 904/860-4500
FAX (EXECUTIVE/LEGAL) 329-4125 (PERMITTING) 329-4315 (ADMINISTRATION/FINANCE) 329-4508

FIELD STATIONS

618 E. South Street, Orlando, Florida 32801, 407/894-5423
7775 Baymeadows Way, Suite 102, Jacksonville, Florida 32256, 904/730-6270
PERMITTING: 305 East Drive, Melbourne, Florida 32904, 407/984-4940
OPERATIONS: 2133 N. Wickham Road, Melbourne, Florida 32935-8109, 407/254-1762

April 9, 1992

City of Sanford
Mr. W. A. Simmons, City Manager
P. O. Box 1788
Sanford FL 32772-1788

Re: Mill Creek & Cloud Branch; #4-117-0326CG

Dear Mr. Simmons:

The District issued your organization a permit for the above-referenced project on March 10, 1992. We would like to offer our assistance in assuring that the project is constructed in accordance with the District's permit. We can offer our assistance by attending any pre-construction meetings that may be scheduled for the project. We ask that you notify us at least 10 days prior to the scheduled meeting. This will make it possible for us to obtain needed information concerning your permit. This pre-construction meeting can be one that you schedule with other individuals, or it can be a separate meeting with only District staff.

Please call me at 407/897-4312, for notice of any pre-construction meetings, or if you would like to arrange for a meeting with District staff. Thank you for your assistance.

Sincerely,

Karen B. Davis

Karen B. Davis, Administrative Assistant
Department of Resource Management

KBD:kbd

cc: Vicki Curtis
Orlando Permit File
Pat Frost
David Dewey
Pam Thomas
Rod Pakzadian

Conklin, Porter & Holmes, Inc.
Mr. Conklin
P. O. Box 2808
Sanford FL 32772-2808

WATER MANAGEMENT DISTRICT

Henry Dean, Executive Director
John R. Wehle, Assistant Executive Director

POST OFFICE BOX 1429 PALATKA, FLORIDA 32178-1429
TELEPHONE 904/329-4500 SUNCOM 904/860-4500
FAX (EXECUTIVE/LEGAL) 329-4125 (PERMITTING) 329-4315 (ADMINISTRATION/FINANCE) 329-4508

FIELD STATIONS

618 E. South Street
Orlando, Florida 32801
407/894-5423

7775 Baymeadows Way
Suite 102
Jacksonville, Florida 32256
904/730-6270

PERMITTING:
305 East Drive
Melbourne, Florida 32904
407/984-4940

OPERATIONS:
2133 N. Wickham Road
Melbourne, Florida 32935-8109
407/254-1762

March 10, 1992

CITY OF SANFORD
P.O. BOX 1788
SANFORD, FL 32772-1788

SUBJECT: Management and Storage of Surface Waters
Individual Permit Number 4-117-0326CG

Dear Sir:

Enclosed is your permit as authorized by the Governing Board of the St. Johns River Water Management District on March 10, 1992. This permit will expire on March 10, 2012.

This permit is a legal document and should be kept with your other important documents. The attached Completion Report should be filled in and returned to the Palatka office within thirty days after the work is completed. By so doing, you will enable us to schedule a prompt inspection of the permitted activity.

In addition to the completion report, your permit also contains conditions which require submittal of additional information. All information submitted as compliance to permit conditions must be submitted to the Palatka office address.

Permit issuance does not relieve you from the responsibility of obtaining permits from any federal, state and/or local agencies asserting concurrent jurisdiction for this work.

In the event you sell your property, the permit will be transferred to the new owner, if we are notified by you within thirty days of the sale. Please assist us in this matter so as to maintain a valid permit for the new property owner.

Thank you for your cooperation and if this office can be of any further assistance to you, please do not hesitate to contact us.

Sincerely,

Vicki Curtis

Vicki Curtis, Data Management Supervisor
Division of Records

Enclosures: Permit with Completion Report

cc: District Permit File
CONKLIN, PORTER AND HOLMES-ENGINEERS, INC
STENSTROM, MCINTOSH, COLBERT & WHIGHAM

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
Post Office Box 1429
Palatka, Florida 32178-1429

PERMIT NO. 4-117-0326CG DATE ISSUED March 10, 1992

A PERMIT AUTHORIZING:

CONCEPTUAL AUTHORIZATION TO MAKE DRAINAGE IMPROVEMENTS TO REGIONS OF THE MILLS CREEK AND CLOUD BRANCH DRAINAGE BASIN LOCATED WITHIN THE CITY OF SANFORD

LOCATION:

Section 39, Township 19 South, Range 31 East
Seminole County

ISSUED TO:
(owner)

CITY OF SANFORD
P.O. BOX 1788
SANFORD, FL 32772-1788

Permittee agrees to hold and save the St. Johns River Water Management District and its successors harmless from any and all damages, claims, or liabilities which may arise from permit issuance. Said application, including all plans and specifications attached thereto, is by reference made a part hereof.

This permit does not convey to permittee any property rights nor any rights or privileges other than those specified herein, nor relieve the permittee from complying with any law, regulation or requirement affecting the rights of other bodies or agencies. All structures and works installed by permittee hereunder shall remain the property of the permittee.

This Permit may be revoked, modified or transferred at any time pursuant to the appropriate provisions of Chapter 373, Florida Statutes:

PERMIT IS CONDITIONED UPON:

See conditions on attached "Exhibit A", dated March 10, 1992

AUTHORIZED BY: St. Johns River Water Management District

Department of Resource Management

By: [signature]
(DIRECTOR)
JEFF ELLEDGE

Governing Board

By: [signature]
(ASSISTANT SECRETARY)
HENRY DEAN

"EXHIBIT A"

CONDITIONS FOR ISSUANCE OF PERMIT NUMBER 4-117-0326CG

CITY OF SANFORD

DATED MARCH 10, 1992

1. IF ANY OTHER REGULATORY AGENCY SHOULD REQUIRE REVISIONS OR MODIFICATION TO THE PERMITTED PROJECT, THE DISTRICT IS TO BE NOTIFIED OF THE REVISIONS SO THAT A DETERMINATION CAN BE MADE WHETHER A PERMIT MODIFICATION IS REQUIRED.

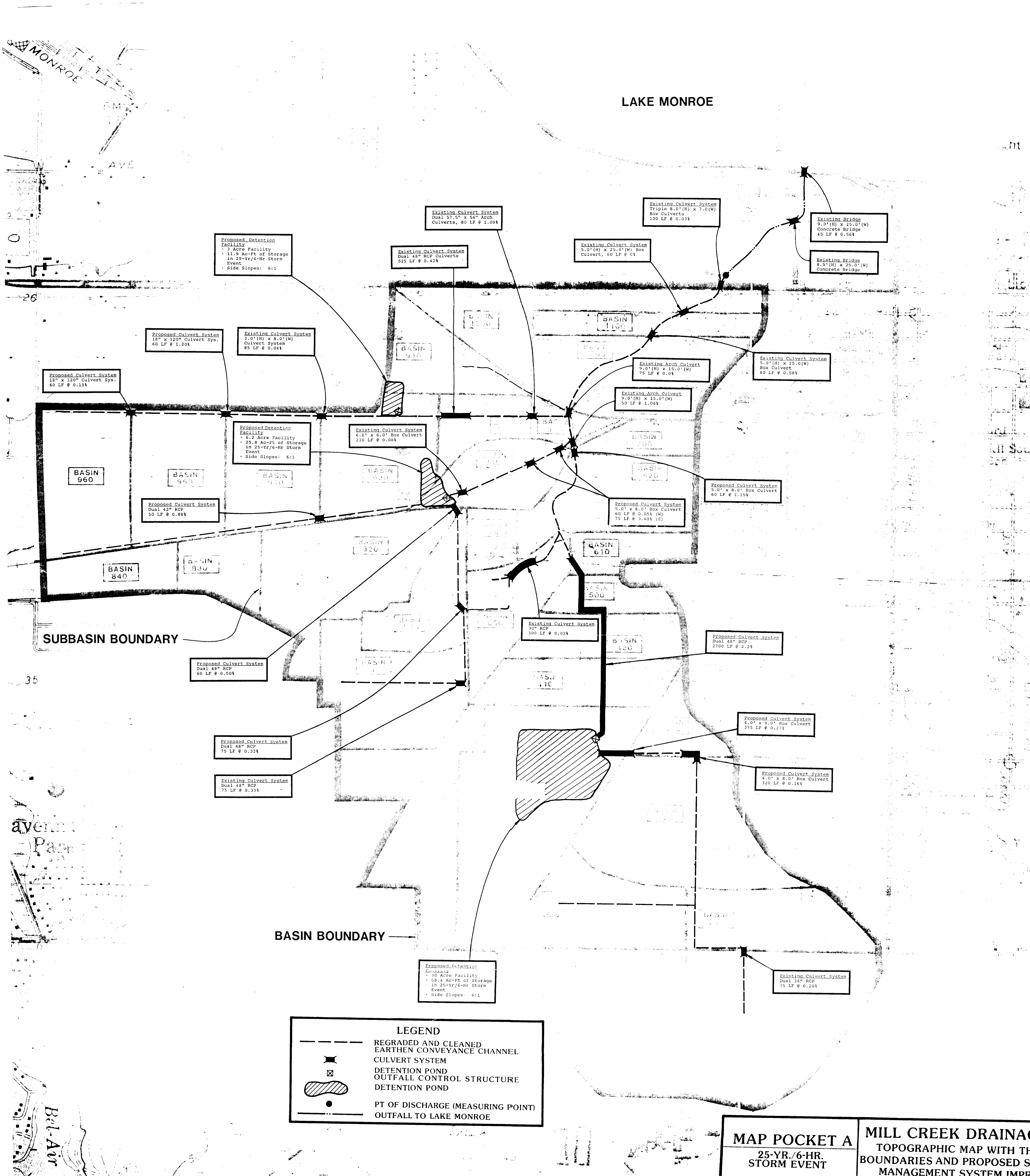
2. THE DISTRICT MUST BE NOTIFIED, IN WRITING, WITHIN 30 DAYS OF ANY SALE, CONVEYANCE, OR OTHER TRANSFER OF A PERMITTED SYSTEM OR FACILITY OR WITHIN 30 DAYS OF ANY TRANSFER OF OWNERSHIP OR CONTROL OF THE REAL PROPERTY AT WHICH THE PERMITTED SYSTEM OR FACILITY IS LOCATED. ALL TRANSFERS OF OWNERSHIP OR TRANSFERS OF A PERMIT ARE SUBJECT TO THE REQUIREMENTS OF CHAPTER 40C-1.

3. PURSUANT TO SECTION 3.4.2(C) OF THE MSSW APPLICANT'S HANDBOOK, THIS PERMIT DOES NOT AUTHORIZE ANY CONSTRUCTION, OPERATION, OR ALTERATION OF THE PROPOSED SYSTEM.

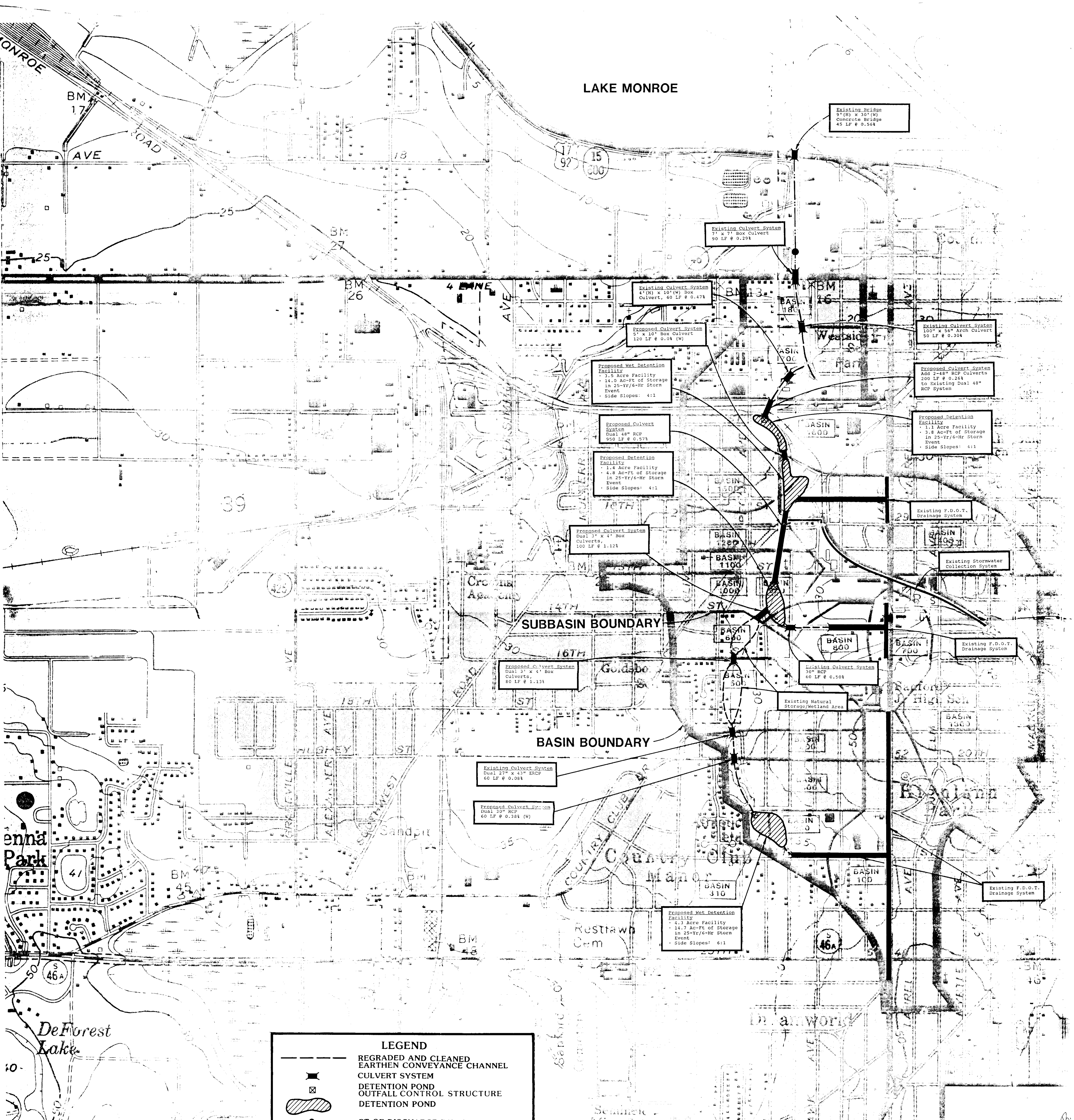
4. THIS CONCEPTUAL APPROVAL PERMIT IS VALID FOR TWENTY YEARS FROM THE DATE OF ISSUANCE, PROVIDED THAT CONSTRUCTION OF THE INITIAL PHASE OF THE SYSTEM IS PERMITTED AND CONSTRUCTION UNDERTAKEN WITHIN TWO YEARS OF THE ISSUANCE OF THIS CONCEPTUAL APPROVAL PERMIT, AND PROVIDED THAT ALL PHASES OF THE SYSTEM ARE DESIGNED AND BUILT IN ACCORDANCE WITH THE TERMS OF THE CONCEPTUAL APPROVAL PERMIT AND THAT ALL REQUIRED PERMITS FOR SUBSEQUENT PHASES ARE OBTAINED.

5. THE PERMITTEE MUST OBTAIN A GENERAL OR INDIVIDUAL PERMIT FROM THE DISTRICT PRIOR TO BEGINNING CONSTRUCTION OF SUBSEQUENT PHASES OR ANY OTHER WORK NOT SPECIFICALLY AUTHORIZED BY THIS PERMIT.

6. THE PROPOSED CONCEPTUAL SURFACE WATER MANAGEMENT SYSTEM IS APPROVED AS SHOWN ON PLANS RECEIVED BY THE DISTRICT ON DECEMBER 17, 1991.



LAKE MONROE
MONROE
AVE
Existing Culvert System
Dual 57.5" x 56" Arch
Culverts, 80 LF @ 1.09%
Proposed Detention Facility
· 3 Acre Facility
· 11.9 Ac-Ft of Storage in 25-Yr/6-Hr Storm Event
· Side Slopes: 6:1
Existing Culvert System
Dual 48" RCP Culverts
525 LF @ 0.42%
Existing Culvert System
Triple 8.0'(H) x 7.0(W)
Box Culverts
100 LF @ 0.03%
Existing Culvert System
5.0'(H) x 25.0'(W) Box
Culvert, 60 LF @ 0%
Existing Bridge
9.0'(H) x 25.0'(W)
Concrete Bridge
45 LF @ 0.56%
Existing Bridge
8.5'(H) x 25.0'(W)
Concrete Bridge
BASIN 1100
Proposed Culvert System
18" x 120" Culvert Sys.
60 LF @ 1.20%
Existing Culvert System
3.0'(H) x 8.0'(W)
Culvert System
85 LF @ 0.04%
Proposed Culvert System
18" x 120" Culvert Sys.
60 LF @ 0.15%
Existing Culvert System
5.0'(H) x 25.0(W)
Box Culvert
80 LF @ 0.58%
Existing Arch Culvert
9.0'(H) x 15.0'(W)
75 LF @ 0.0%
Existing Arch Culvert
9.0'(H) x 15.0'(W)
50 LF @ 1.06%
Proposed Detention Facility
· 6.2 Acre Facility
· 25.8 Ac-Ft of Storage in 25-Yr/6-Hr Storm Event
· Side Slopes: 6:1
Existing Culvert System
6.0' x 6.0' Box Culvert
230 LF @ 0.08%
BASIN 960
BASIN 950
BASIN 940
BASIN 920
BASIN 700
BASIN 620
Proposed Culvert System
5.0' x 8.0' Box Culvert
60 LF @ 1.15%
Proposed Culvert System
Dual 42" RCP
50 LF @ 0.88%
Proposed Culvert System
5.0' x 8.0' Box Culvert
60 LF @ 0.05% (W)
75 LF @ 0.40% (E)
BASIN 820
BASIN 610
BASIN 840
BASIN 830
BASIN 500
SUBBASIN BOUNDARY
Existing Culvert System
30" RCP
300 LF @ 0.02%
BASIN 420
Proposed Culvert System
Dual 48" RCP
2700 LF @ 2.2%
Proposed Culvert System
Dual 48" RCP
60 LF @ 0.50%
BASIN 410
Proposed Culvert System
4.0' x 9.0' Box Culvert
375 LF @ 0.27%
Proposed Culvert System
Dual 48" RCP
75 LF @ 0.33%
Proposed Culvert System
4.0' x 8.0' Box Culvert
320 LF @ 0.16%
Existing Culvert System
Dual 48" RCP
75 LF @ 0.33%
BASIN BOUNDARY
Existing Culvert System
Dual 36" RCP
75 LF @ 0.20%
Proposed Detention Facility
· 30 Acre Facility
· 58.4 Ac-Ft of Storage in 25-Yr/6-Hr Storm Event
· Side Slopes: 6:1
LEGEND
REGRADED AND CLEANED EARTHEN CONVEYANCE CHANNEL
CULVERT SYSTEM
DETENTION POND OUTFALL CONTROL STRUCTURE
DETENTION POND
PT OF DISCHARGE (MEASURING POINT)
OUTFALL TO LAKE MONROE
MAP POCKET A
25-YR./6-HR. STORM EVENT
MILL CREEK DRAINA
TOPOGRAPHIC MAP WITH TH
BOUNDARIES AND PROPOSED S
MANAGEMENT SYSTEM IMPR

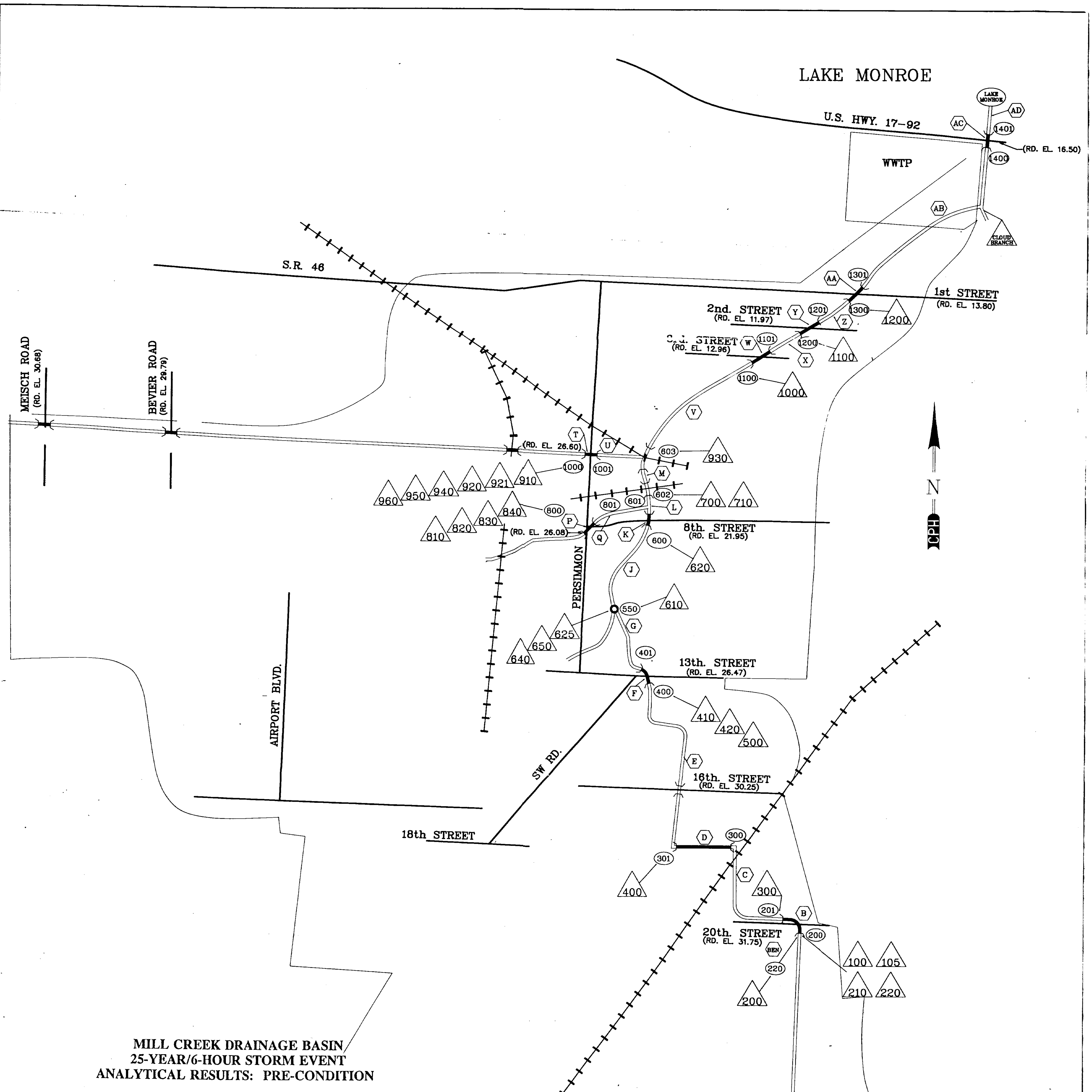


MAP POCKET B
25-YR./6-HR. STORM EVENT

CLOUD BRANCH DRAINAGE BA[S]

TOPOGRAPHIC MAP WITH THE SYS[TEM] BOUNDARIES AND PROPOSED STOR[M] MANAGEMENT SYSTEM IMPROVEME[NTS]

1st. STREET
HW
AW
AW
MILL CREEK BASIN
CLOUD BRANCH BASIN
SW
SW
FW
FW
HW
AW
HW
FW
HW
25th. STREET
FW
FW
BASIN BOUNDARY
OVERALL SYSTEM
AERIAL/WETLANDS
MAP POCKET C
1" : 400'
LEGEND
BASIN BOUNDARY
WATERWAYS/STREAMS
WETLAND BOUNDARYS
FW FORESTER WETLANDS
SW SHRUB WETLANDS
HW HERBACEOUS WETLANDS
AW AQUATIC WETLANDS
DEC 6 1991



MILL CREEK DRAINAGE BASIN
25-YEAR/6-HOUR STORM EVENT
ANALYTICAL RESULTS: PRE-CONDITION

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
220	200	35.72	8.84	16	6.00
200	100,105 210,220	32.03	9.03	194	3.13
201	300	31.43	2.93	189	3.50
300	---	31.30	8.24	185	3.57
301	400	29.29	2.53	247	3.67
400	410,420 500	25.85	5.43	276	3.87
401	---	24.04	0.68	276	3.87
550	610,625 640,650	22.97	4.56	399	3.80
600	620	22.22	10.78	446	3.10
601	---	17.46	0.33	444	3.13
800	810,820 830,840	22.97	8.60	139	3.47
801	---	21.13	0.64	139	3.47
602	700,710	17.37	3.28	603	3.77
1000	910,920 921,940 950,960	17.92	13.86	186	2.83
1001	---	17.14	1.25	181	3.63
603	930	17.05	9.54	788	3.83
1100	1000	13.50	10.00	830	3.83
1101	---	13.18	1.60	830	3.83
1200	1100	12.56	4.36	841	3.83
1201	---	12.33	2.10	840	3.87
1300	1200	11.79	7.22	890	3.90
1301	---	10.70	6.25	890	3.93
1400	CLDBRNCH	3.62	8.73	1247	3.90
1401	---	3.11	2.10	1247	3.87
LK MONROE	---	3.00	263.65	--	---

MAP POCKET D

LEGEND

XXX BASIN (RUNOFF PRODUCING AREA)

XXX NODE

X REACH

CULVERT (MODELED)

CULVERT (NOT MODELED OR ASSUMED NON-RESTRICTIVE)

WEIR

CHANNEL(S)

MILL CREEK DRAINAGE BASIN

NODAL DIAGRAM

PRE-CONDITION ANALYSIS

25 YR. / 6 HR. STORM EVENT

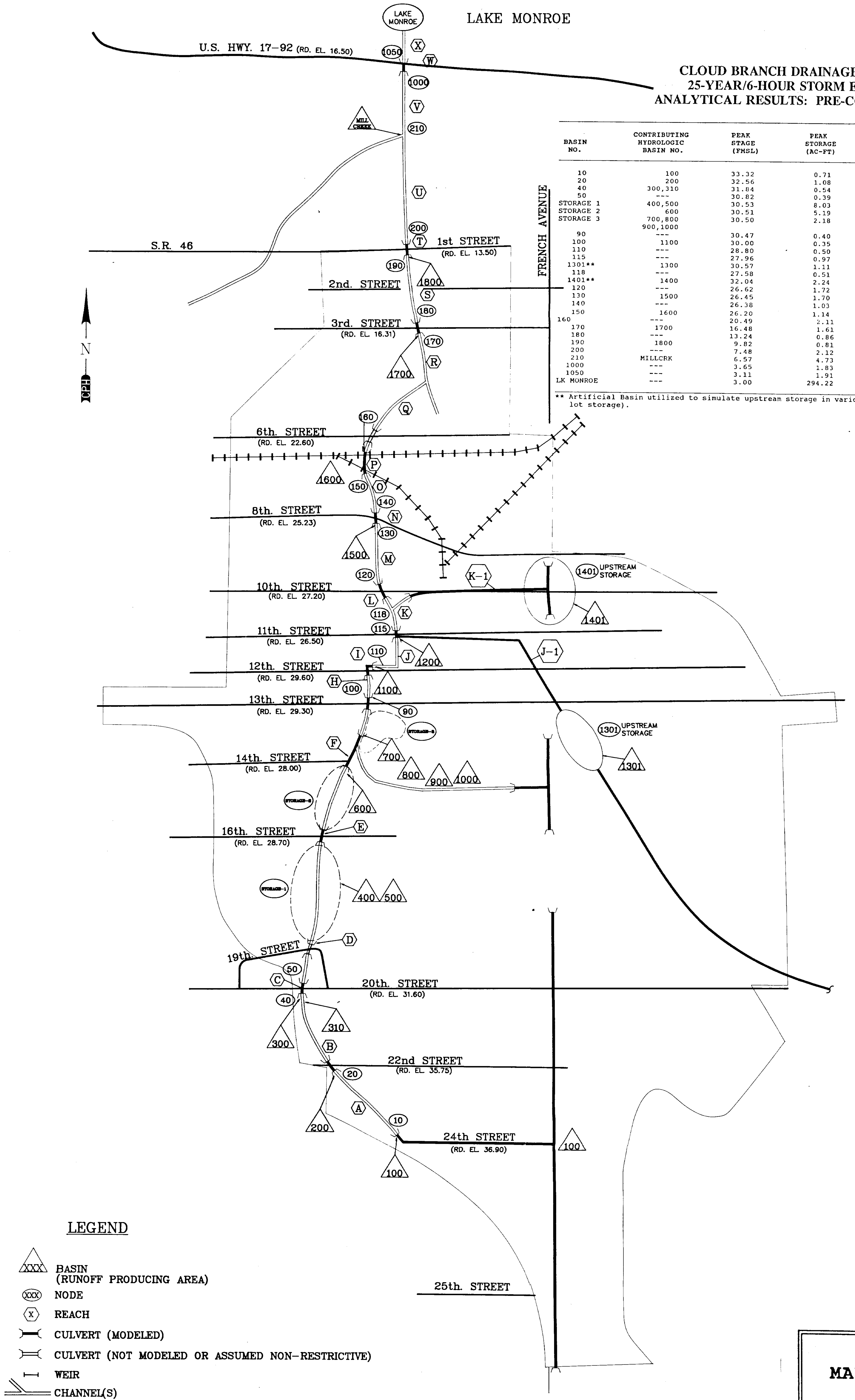
Bristol 12/6/

FILE: MC-PRE

CLOUD BRANCH DRAINAGE BASIN
25-YEAR/6-HOUR STORM EVENT
ANALYTICAL RESULTS: PRE-CONDITION

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
10	100	33.32	0.71	123	2.77
20	200	32.56	1.08	130	2.80
40	300,310	31.84	0.54	154	2.77
50	---	30.82	0.39	154	2.80
STORAGE 1	400,500	30.53	8.03	122	3.57
STORAGE 2	600	30.51	5.19	137	3.67
STORAGE 3	700,800 900,1000	30.50	2.18	194	3.57
90	---	30.47	0.40	194	3.57
100	1100	30.00	0.35	206	3.57
110	---	28.80	0.50	206	3.57
115	---	27.96	0.97	257	3.60
1301**	1300	30.57	1.11	48	3.80
118	---	27.58	0.51	312	3.70
1401**	1400	32.04	2.24	63	4.23
120	---	26.62	1.72	312	3.70
130	1500	26.45	1.70	358	4.40
140	---	26.38	1.03	323	3.70
150	1600	26.20	1.14	356	3.67
160	---	20.49	2.11	356	3.73
170	1700	16.48	1.61	384	3.70
180	---	13.24	0.86	384	3.70
190	1800	9.82	0.81	395	3.73
200	---	7.48	2.12	394	3.77
210	MILLCRK	6.57	4.73	1278	3.83
1000	---	3.65	1.83	1278	3.83
1050	---	3.11	1.91	1278	3.83
LK MONROE	---	3.00	294.22	--	--

** Artificial Basin utilized to simulate upstream storage in various areas (roadway, parking area and lot storage).



MAP POCKET E

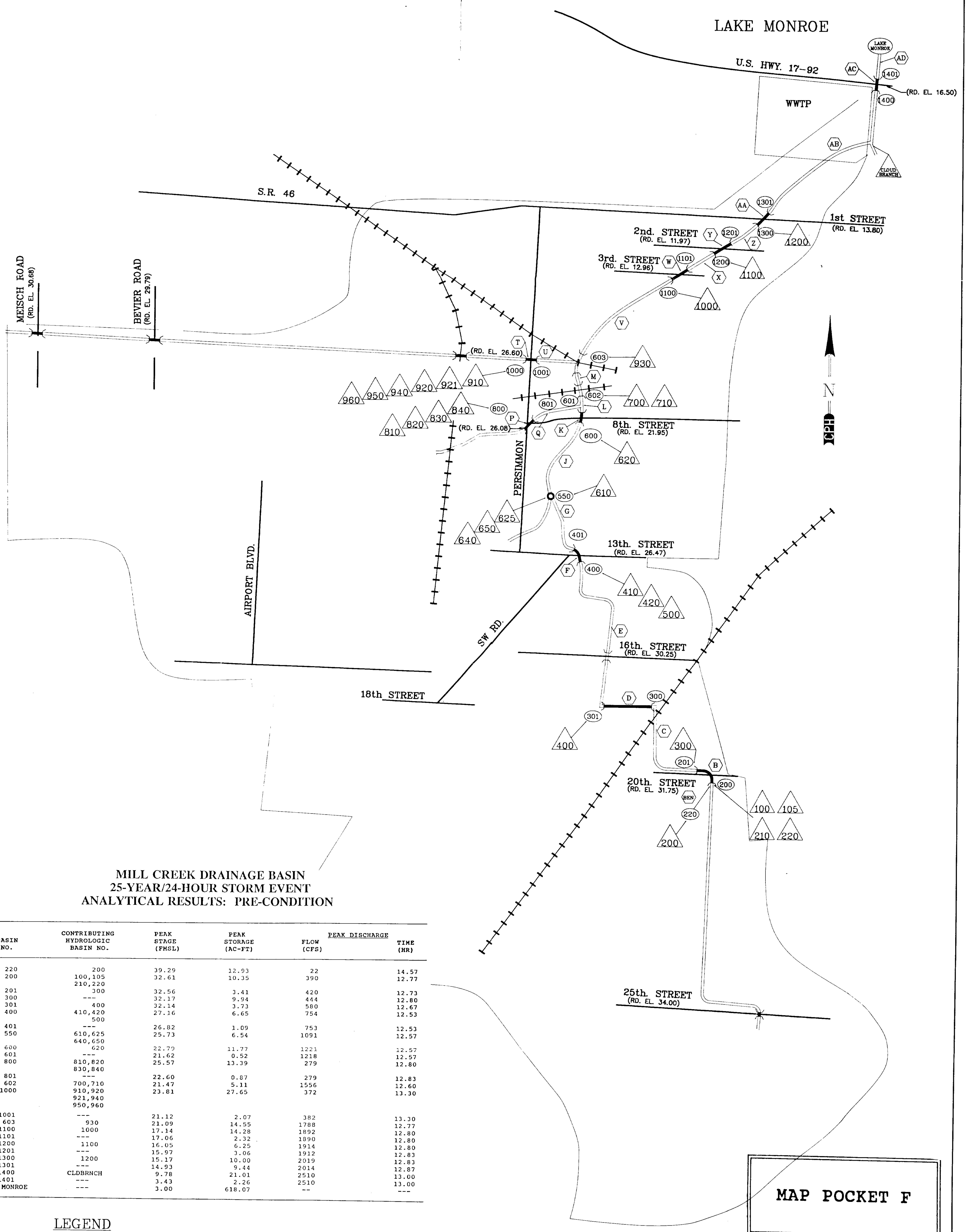
CLOUD BRANCH DRAINAGE BASIN

NODAL DIAGRAM

PRE-CONDITION ANALYSIS

25 YR./ 6 HR. STORM EVENT

FILE: CB-PRE



MILL CREEK DRAINAGE BASIN
25-YEAR/24-HOUR STORM EVENT
ANALYTICAL RESULTS: PRE-CONDITION

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	TIME (HR)
220	200	39.29	12.93	22	14.57
200	100,105 210,220	32.61	10.35	390	12.77
201	300	32.56	3.41	420	12.73
300	---	32.17	9.94	444	12.80
301	400	32.14	3.73	580	12.67
400	410,420 500	27.16	6.65	754	12.53
401	---	26.82	1.09	753	12.53
550	610,625 640,650	25.73	6.54	1091	12.57
600	620	22.79	11.77	1221	12.57
601	---	21.62	0.52	1218	12.57
800	810,820 830,840	25.57	13.39	279	12.80
801	---	22.60	0.87	279	12.83
602	700,710	21.47	5.11	1556	12.60
1000	910,920 921,940 950,960	23.81	27.65	372	13.30
1001	---	21.12	2.07	382	13.30
603	930	21.09	14.55	1788	12.77
1100	1000	17.14	14.28	1892	12.80
1101	---	17.06	2.32	1890	12.80
1200	1100	16.05	6.25	1914	12.80
1201	---	15.97	3.06	1912	12.83
1300	1200	15.17	10.00	2019	12.83
1301	---	14.93	9.44	2014	12.87
1400	CLDBRNCH	9.78	21.01	2510	13.00
1401	---	3.43	2.26	2510	13.00
LK MONROE	---	3.00	618.07	--	---

MAP POCKET F

LEGEND

- XXX BASIN (RUNOFF PRODUCING AREA)
- XXX NODE
- X REACH
- CULVERT (MODELED)
- CULVERT (NOT MODELED OR ASSUMED NON-RESTRICTIVE)
- WEIR
- CHANNEL(S)

MILL CREEK DRAINAGE BASIN

NODAL DIAGRAM

Bristol [illegible] 12/6/91

PRE-CONDITION ANALYSIS

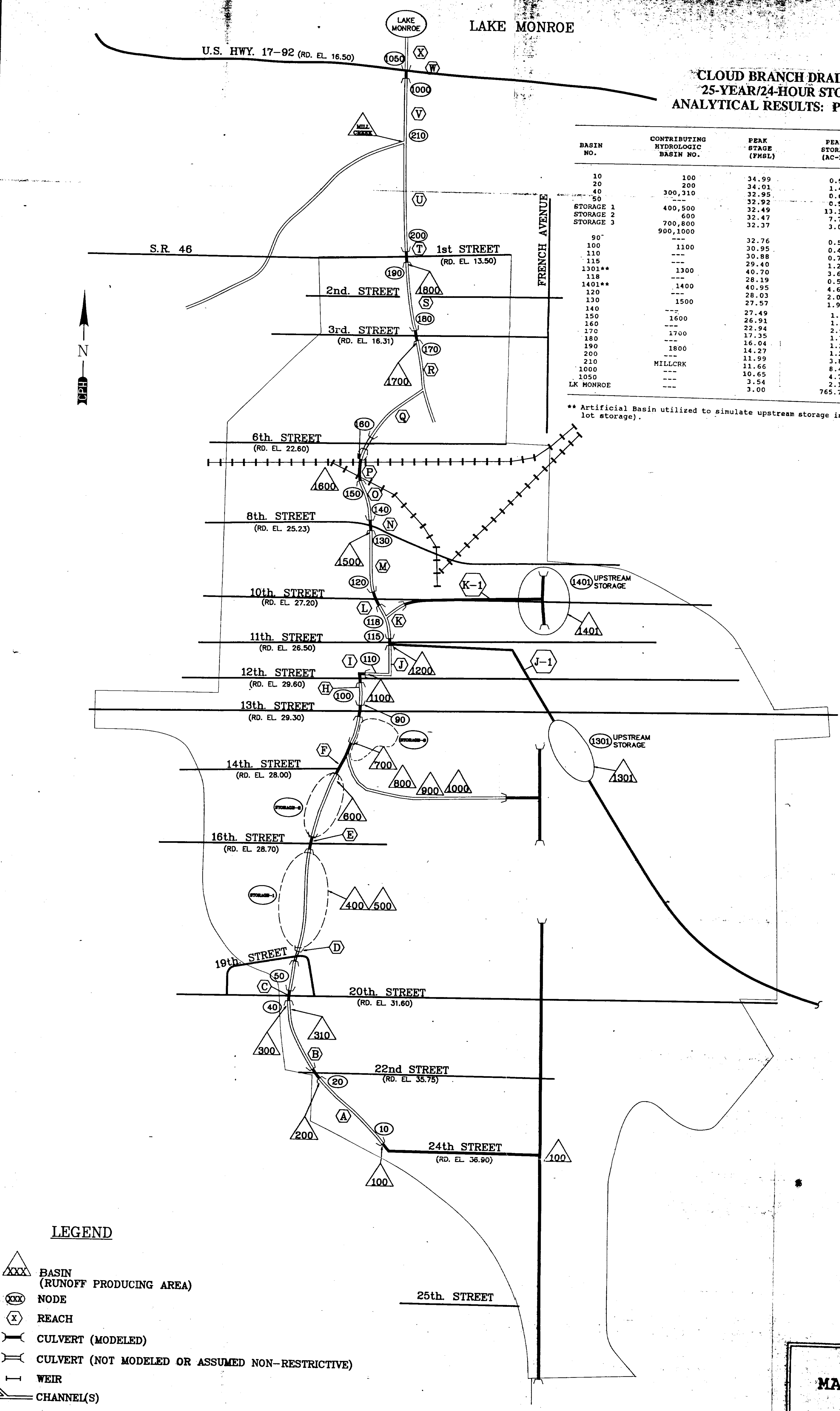
25 YR. / 24 HR. STORM EVENT

FILE: MC-PRE

CLOUD BRANCH DRAINAGE BASIN
25-YEAR/24-HOUR STORM EVENT
ANALYTICAL RESULTS: PRE-CONDITION

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
10	100	34.99	0.94	236	12.40
20	200	34.01	1.40	255	12.43
40	300,310	32.95	0.66	336	12.60
50	---	32.92	0.58	317	12.40
STORAGE 1	400,500	32.49	13.14	228	12.63
STORAGE 2	600	32.47	7.79	202	12.83
STORAGE 3	700,800 900,1000	32.37	3.01	176	14.07
90	---	32.76	0.51	549	12.83
100	1100	30.95	0.41	385	12.53
110	---	30.88	0.71	462	12.80
115	---	29.40	1.20	563	12.83
1301**	1300	40.70	3.60	100	13.10
118	---	28.19	0.55	718	12.80
1401**	1400	40.95	4.69	107	13.60
120	---	28.03	2.03	651	12.90
130	1500	27.57	1.92	674	13.33
140	---	27.49	1.16	672	12.87
150	1600	26.91	1.22	743	12.80
160	---	22.94	2.94	743	12.83
170	1700	17.35	1.78	812	12.73
180	---	16.04	1.27	811	12.77
190	1800	14.27	1.28	834	12.73
200	---	11.99	3.81	829	12.77
210	MILLCRK	11.66	8.43	2829	12.87
1000	---	10.65	4.73	2829	12.90
1050	---	3.54	2.10	2829	12.90
LK MONROE	---	3.00	765.75	--	--

** Artificial Basin utilized to simulate upstream storage in various areas (roadway, parking area and lot storage).



MAP POCKET G

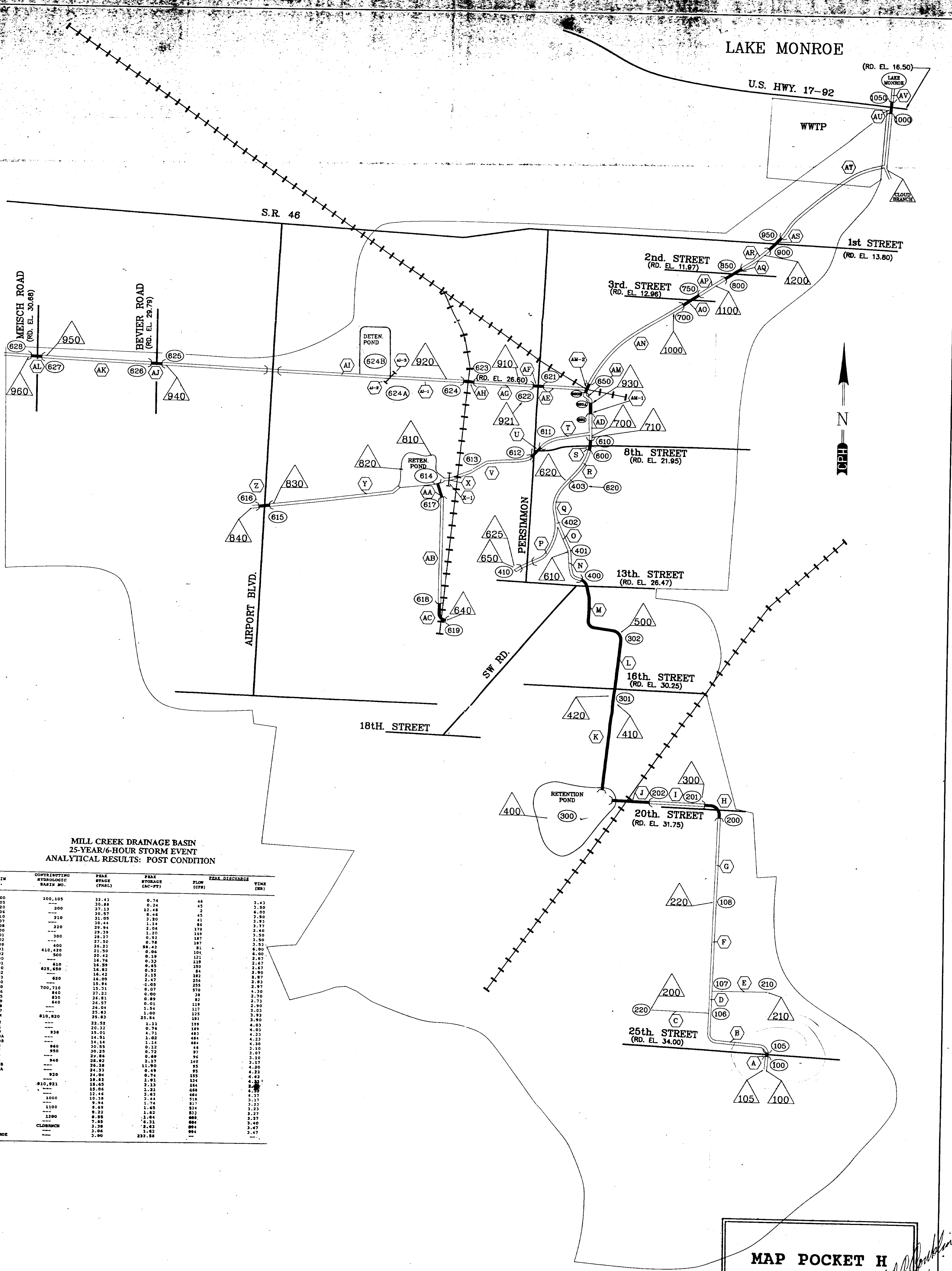
CLOUD BRANCH DRAINAGE BASIN

NODAL DIAGRAM

PRE-CONDITION ANALYSIS

25 YR. / 24 HR. STORM EVENT

FILE: CB-PRE



MILL CREEK DRAINAGE BASIN
25-YEAR/6-HOUR STORM EVENT
ANALYTICAL RESULTS: POST CONDITION

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
100	100,105	32.43	0.74	46	3.43
105	---	30.88	0.24	45	3.50
220	200	37.13	12.48	2	6.00
106	---	30.57	0.46	45	3.50
210	210	31.05	3.20	41	3.93
107	---	30.44	1.14	86	3.77
108	220	29.94	2.06	170	3.40
200	---	29.39	1.20	169	3.50
201	300	28.27	0.92	187	3.50
202	---	27.50	0.78	187	3.53
300	400	26.23	58.42	81	6.00
301	410,420	21.50	0.06	104	6.00
302	500	20.42	0.19	121	2.67
400	---	16.76	0.33	119	2.67
401	610	16.59	0.65	150	2.67
410	625,650	16.82	0.52	64	2.90
402	---	16.42	2.15	282	2.87
403	620	16.09	2.47	256	2.93
600	---	15.94	1.05	255	2.97
610	700,710	15.31	0.07	570	4.30
616	840	27.23	0.00	38	2.70
615	830	26.81	0.89	82	2.73
619	640	26.57	0.01	119	2.90
618	---	26.04	1.54	117	3.03
617	---	25.83	1.00	125	3.93
614	810,820	25.83	25.84	191	3.90
612	---	22.52	1.11	199	4.03
611	---	20.32	0.76	189	4.03
620	930	15.01	4.71	483	4.23
620A	---	14.51	1.02	484	4.23
620B	---	14.14	1.14	484	4.20
628	960	30.55	0.12	46	3.10
627	950	30.25	0.72	97	3.07
626	---	29.86	0.69	96	3.10
625	940	28.92	2.17	140	3.17
624B	---	26.28	11.90	95	4.20
624A	---	24.33	0.49	95	4.22
624	920	24.04	0.74	155	4.43
623	---	19.82	1.91	134	[illegible]
622	910,921	15.65	2.13	164	[illegible]
621	---	15.06	1.21	168	[illegible]
650	---	12.46	3.63	484	4.37
700	1000	10.38	3.44	518	3.17
750	---	9.94	1.74	517	3.23
800	1100	9.69	1.65	534	3.23
850	---	9.22	1.62	533	3.27
900	1200	8.55	1.04	608	3.27
950	---	7.65	6.31	604	3.40
1000	CLDBRNCH	3.38	2.63	994	3.47
1050	---	3.06	1.62	994	3.47
LK MONROE	---	3.00	232.58	--	--

MAP POCKET H

MILL CREEK DRAINAGE BASIN

NODAL DIAGRAM

LEGEND

XXX BASIN (RUNOFF PRODUCING AREA)
XXX NODE
X REACH
CULVERT (MODELED)
CULVERT (NOT MODELED OR ASSUMED NON-RESTRICTIVE)
WEIR
CHANNEL(S)

POST-CONDITION ANALYSIS

25 YR/ 6 HR. STORM EVENT

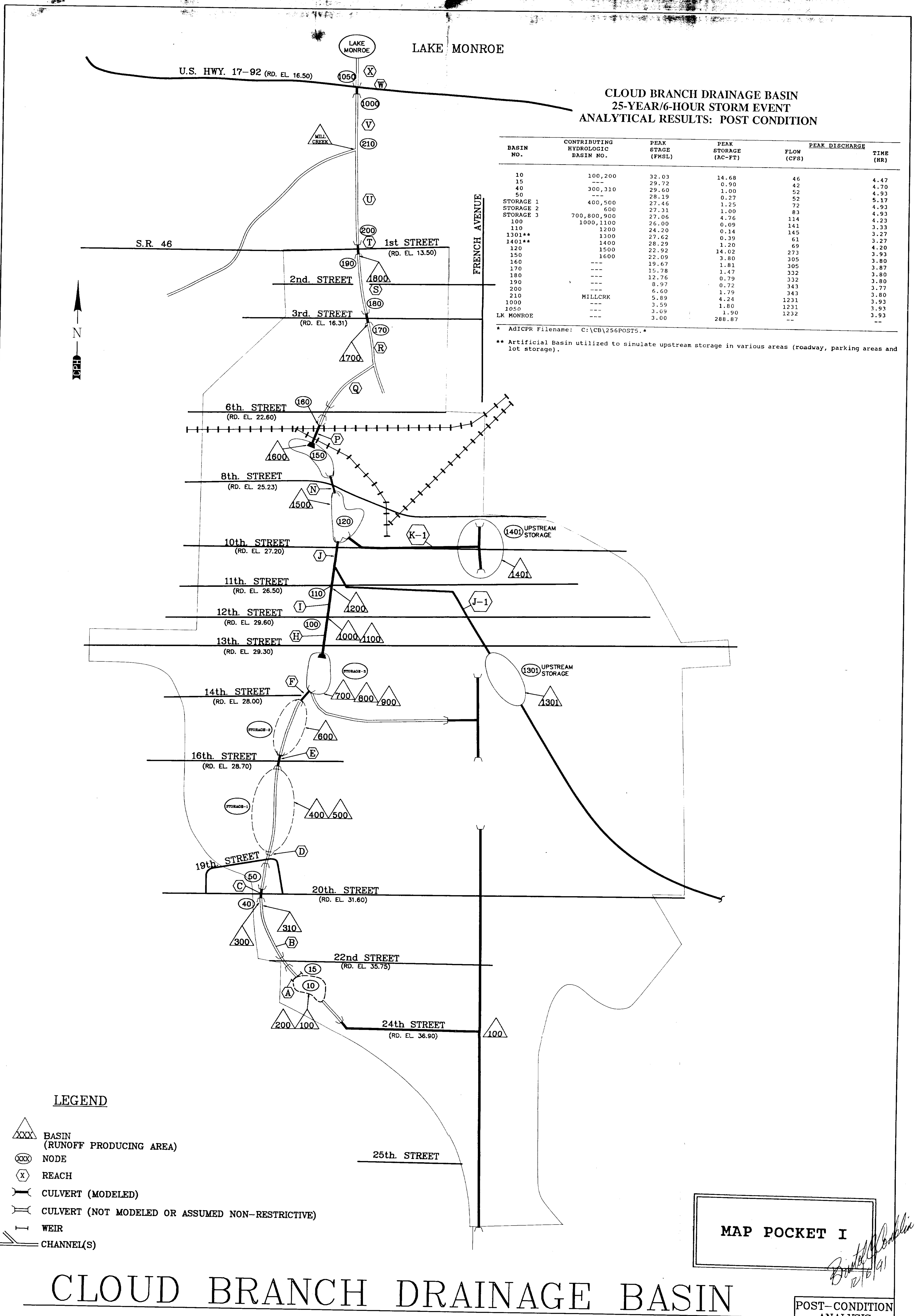
FILE: MC-POST

CLOUD BRANCH DRAINAGE BASIN
25-YEAR/6-HOUR STORM EVENT
ANALYTICAL RESULTS: POST CONDITION

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
10	100,200	32.03	14.68	46	4.47
15	---	29.72	0.90	42	4.70
40	300,310	29.60	1.00	52	4.93
50	---	28.19	0.27	52	5.17
STORAGE 1	400,500	27.46	1.25	72	4.93
STORAGE 2	600	27.31	1.00	83	4.93
STORAGE 3	700,800,900	27.06	4.76	114	4.23
100	1000,1100	26.00	0.09	141	3.33
110	1200	24.20	0.14	145	3.27
1301**	1300	27.62	0.39	61	3.27
1401**	1400	28.29	1.20	69	4.20
120	1500	22.92	14.02	273	3.93
150	1600	22.09	3.80	305	3.80
160	---	19.67	1.81	305	3.87
170	---	15.78	1.47	332	3.80
180	---	12.76	0.79	332	3.80
190	---	8.97	0.72	343	3.77
200	---	6.60	1.79	343	3.80
210	MILLCRK	5.89	4.24	1231	3.93
1000	---	3.59	1.80	1231	3.93
1050	---	3.09	1.90	1232	3.93
LK MONROE	---	3.00	288.87	--	--

* AdICPR Filename: C:\CB\256POST5.*

** Artificial Basin utilized to simulate upstream storage in various areas (roadway, parking areas and lot storage).



MAP POCKET I

CLOUD BRANCH DRAINAGE BASIN

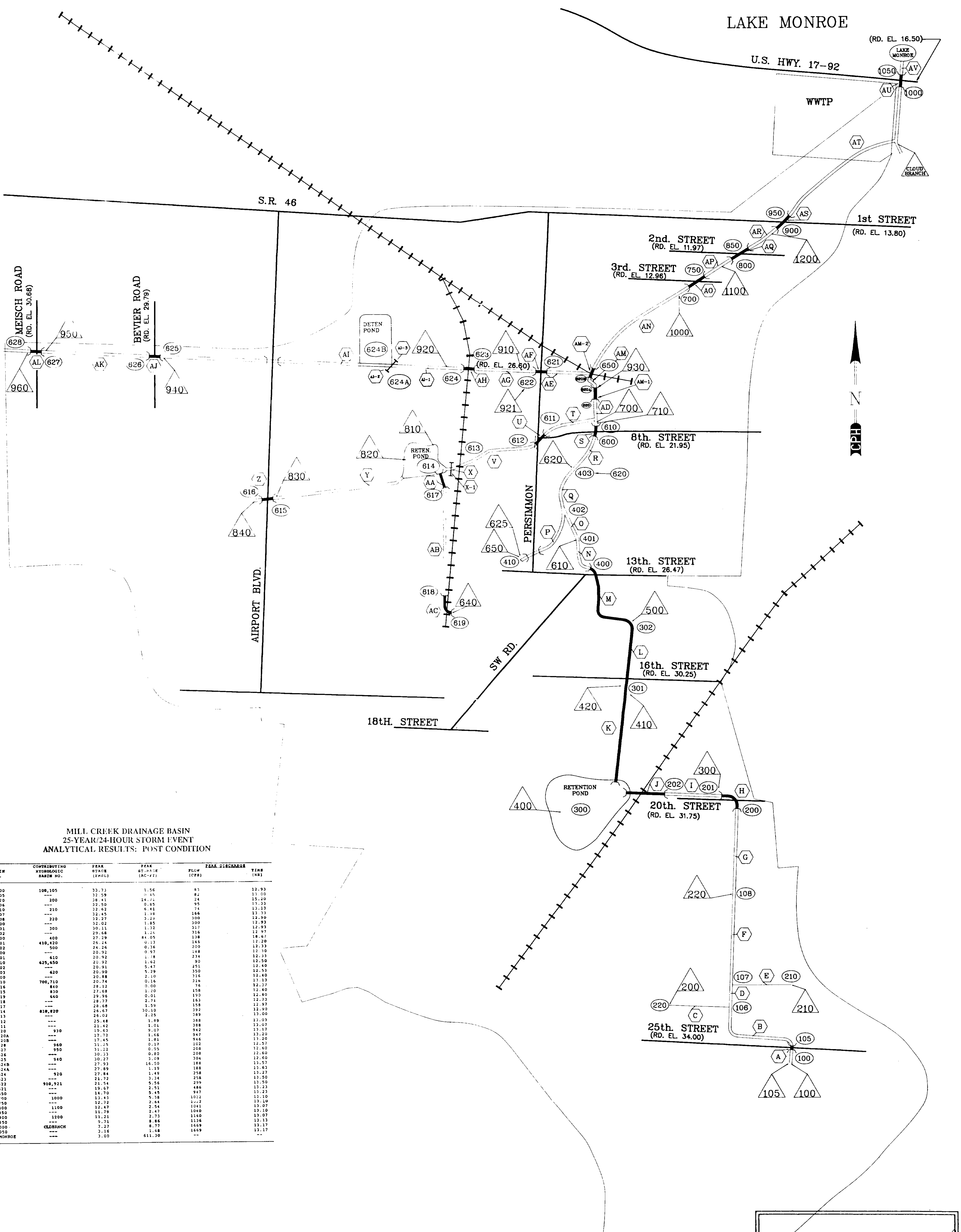
NODAL DIAGRAM

POST-CONDITION ANALYSIS

25 YR./ 6 HR. STORM EVENT

FILE: CB-POST

12/6/91



MILL CREEK DRAINAGE BASIN
25-YEAR/24-HOUR STORM EVENT
ANALYTICAL RESULTS: POST CONDITION

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
100	100,105	33.73	1.56	83	12.93
105	---	32.59	0.45	82	13.00
220	200	38.41	14.71	24	15.20
106	---	32.50	0.85	95	13.33
210	210	32.62	6.41	74	13.13
107	---	32.45	1.98	166	13.33
108	220	32.27	3.29	300	12.90
200	---	32.02	1.85	300	12.93
201	300	30.11	1.32	317	12.93
202	---	29.68	1.26	316	12.97
300	400	27.29	84.05	138	18.67
301	410,420	26.24	0.13	146	12.20
302	500	24.26	0.36	200	12.33
400	---	20.92	0.97	188	12.30
401	610	20.92	1.78	234	12.33
410	625,650	20.92	1.62	90	12.50
402	---	20.91	5.47	251	12.40
403	620	20.90	5.29	350	12.53
600	---	20.88	2.10	316	12.40
610	700,710	20.74	0.16	316	13.13
616	840	28.12	0.00	76	12.37
615	830	27.68	1.20	158	12.40
619	640	29.96	0.01	190	12.60
618	---	28.77	2.74	163	12.73
617	---	28.68	1.59	158	12.97
614	810,820	26.67	30.10	392	12.90
613	---	26.02	2.25	389	13.00
612	---	25.48	1.89	388	13.03
611	---	21.42	1.01	388	13.07
620	930	19.63	9.07	942	13.17
620A	---	17.72	1.66	947	13.20
620B	---	17.45	1.81	946	13.20
628	960	31.25	0.17	102	12.57
627	950	31.22	0.95	208	12.60
626	---	30.33	0.80	208	12.60
625	940	30.27	3.09	304	12.60
624B	---	27.93	16.50	188	13.57
624A	---	27.89	1.19	188	13.63
624	920	27.84	1.49	258	13.27
623	---	21.72	3.34	258	13.50
622	910,921	21.54	5.56	299	13.50
621	---	19.67	2.51	486	13.23
650	---	14.70	5.45	947	13.23
700	1000	13.43	5.38	1022	13.10
750	---	12.72	2.64	1022	13.10
800	1100	12.47	2.54	1041	13.07
850	---	11.79	2.47	1040	13.10
900	1200	11.21	2.73	1140	13.07
950	---	9.71	8.86	1136	13.13
1000	CLDBRNCH	7.27	8.77	1669	13.17
1050	---	3.16	1.68	1669	13.17
LK MONROE	---	3.00	611.30	--	--

MAP POCKET J

LEGEND

- BASIN (RUNOFF PRODUCING AREA)
- NODE
- REACH
- CULVERT (MODELED)
- CULVERT (NOT MODELED OR ASSUMED NON-RESTRICTIVE)
- WEIR
- CHANNEL(S)

MILL CREEK DRAINAGE BASIN

NODAL DIAGRAM

POST-CONDITION ANALYSIS

25 YR/ 24 HR. STORM EVENT

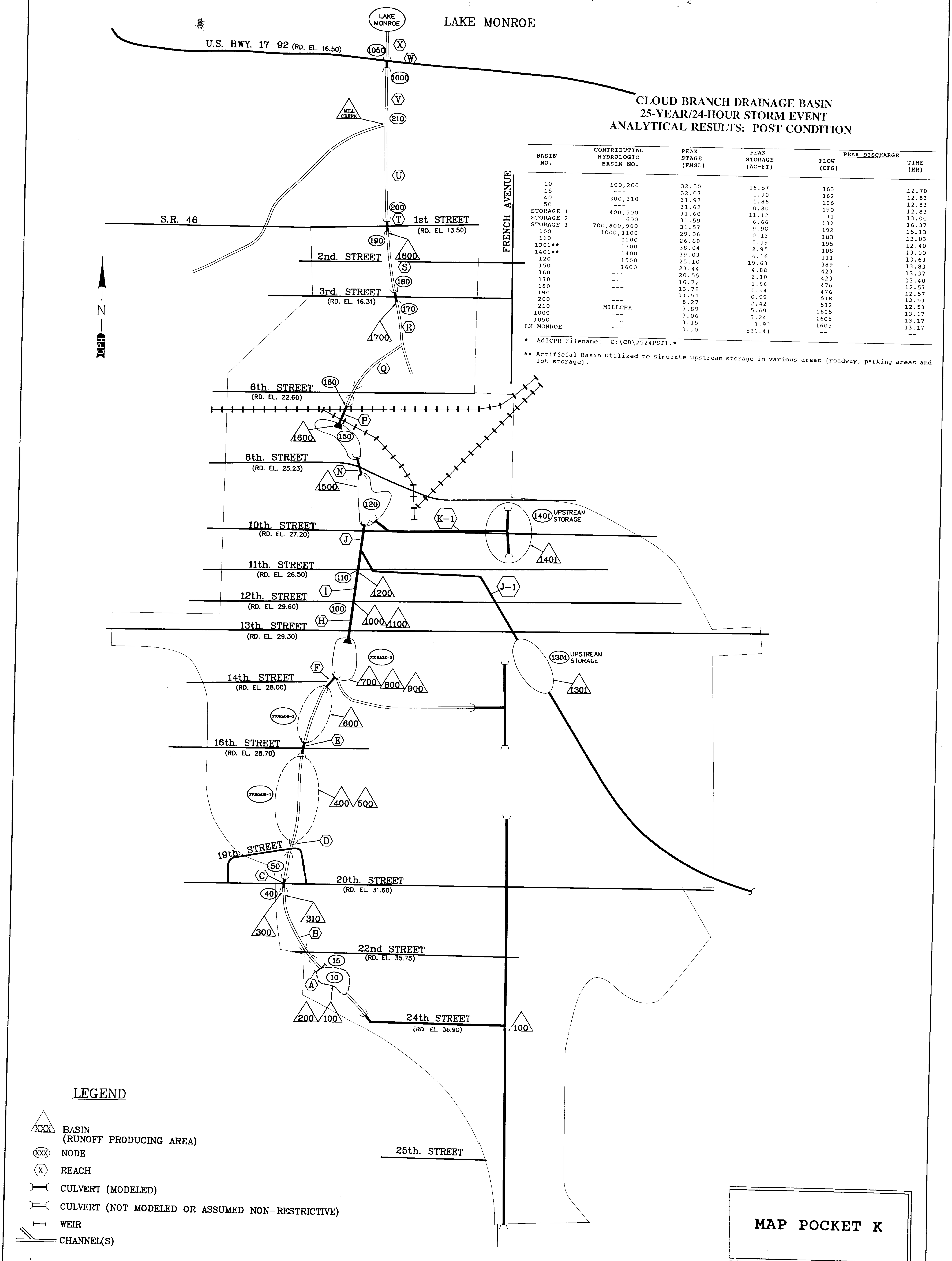
FILE: MC-POST

CLOUD BRANCH DRAINAGE BASIN
25-YEAR/24-HOUR STORM EVENT
ANALYTICAL RESULTS: POST CONDITION

BASIN NO.	CONTRIBUTING HYDROLOGIC BASIN NO.	PEAK STAGE (FMSL)	PEAK STORAGE (AC-FT)	PEAK DISCHARGE FLOW (CFS)	PEAK DISCHARGE TIME (HR)
10	100,200	32.50	16.57	163	12.70
15	---	32.07	1.90	162	12.83
40	300,310	31.97	1.86	196	12.83
50	---	31.62	0.80	190	12.83
STORAGE 1	400,500	31.60	11.12	131	13.00
STORAGE 2	600	31.59	6.66	132	16.37
STORAGE 3	700,800,900	31.57	9.98	192	15.13
100	1000,1100	29.06	0.13	183	13.03
110	1200	26.60	0.19	195	12.40
1301**	1300	38.04	2.95	108	13.00
1401**	1400	39.03	4.16	111	13.63
120	1500	25.10	19.63	389	13.83
150	1600	23.44	4.88	423	13.37
160	---	20.55	2.10	423	13.40
170	---	16.72	1.66	476	12.57
180	---	13.78	0.94	476	12.57
190	---	11.51	0.99	518	12.53
200	---	8.27	2.42	512	12.53
210	MILLCRK	7.89	5.69	1605	13.17
1000	---	7.06	3.24	1605	13.17
1050	---	3.15	1.93	1605	13.17
LK MONROE	---	3.00	581.41	--	--

* AdICPR Filename: C:\CB\2524PST1.*

** Artificial Basin utilized to simulate upstream storage in various areas (roadway, parking areas and lot storage).



MAP POCKET K

APR 30 1992

CLOUD BRANCH DRAINAGE BASIN

NODAL DIAGRAM

POST-CONDITION ANALYSIS

25 YR. / 24 HR. STORM EVENT

FILE: CB-POST