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**PRELIMINARY REPORT  
PHASE I, EASTERN BRANCH  
29th STREET OUTFALL  
DRAINAGE SYSTEM**

**MODEL CITIES PROGRAM ..... PROJECT NO. 133,006.01**

**FEBRUARY, 1972**

**Prepared by  
DIAZ, SECKINGER & ASSOCIATES, INC.  
Engineers .... Planners  
for the  
CITY OF TAMPA**

**D.P.W. File No. A-7-13A**

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PRELIMINARY REPORT

PHASE I, EASTERN BRANCH  
29TH STREET OUTFALL DRAINAGE SYSTEM

REVIEWED AND APPROVED

Wayne Jump, Supt., Dept. of Public Works

Ronald T. Rotella, Director, C.E.P., Fla.E-9

Joel Koford, Director, Metropolitan  
Development Agency

Herman Massey, Supt., Parks Department

John Crislip, Director, Hillsborough County  
Planning Commission

Melvin B. Smith, Comptroller

DIAZ, SECKINGER AND ASSOCIATES  
Engineers                      Planners  
Tampa                              Florida



PRELIMINARY REPORT  
PHASE I, EASTERN BRANCH  
29TH STREET OUTFALL DRAINAGE SYSTEM  
MODEL CITIES PROGRAM PROJECT NO. 133,006.01

Prepared For  
THE  
CITY OF TAMPA

February, 1972

Mayor

Dick A. Greco, Jr.

City Council

Richard L. Cheney, Chairman

Vincent J. Meloy  
Lee Duncan  
Lloyd Copeland

Catherine Barja  
Joe Chillura, Jr.  
Joe Kotvas

W. L. Stark, City Clerk

Wayne Jump, Superintendent of the Department of Public Works

D I A Z, S E C K I N G E R & A S S O C I A T E S, I N C.  
Engineers Tampa Planners Florida



ENGINEERS • PLANNERS  
MUNICIPAL • ENVIRONMENTAL • TRANSPORTATION  
HIGHWAYS/BRIDGES • SANITARY • POLLUTION CONTROL  
CIVIL • STRUCTURAL • MECHANICAL • ELECTRICAL

H. JOSEPH DIAZ, P.E.  
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BUENAVENTURA C. CUNILL, P.E.  
CARLOS A. HERNANDEZ, P.E.  
ROBERT B. DRIVER, P.E.

February 7, 1972

Honorable Mayor and City Council  
CITY OF TAMPA  
City Hall  
Tampa, Florida

ATTENTION: MR. WAYNE JUMP, SUPERINTENDENT  
DEPARTMENT OF PUBLIC WORKS

RE: PRELIMINARY REPORT - PHASE I, EASTERN BRANCH  
29TH STREET OUTFALL DRAINAGE SYSTEM  
MODEL CITIES PROJECT NO. 133,006.01  
PUBLIC WORKS FILE NO. A-7-13A  
DSA CM. NO. 7052-F

Gentlemen:

In accordance with the terms of our Agreement of March 17, 1971, we present our Preliminary Report - Phase I, of the Eastern Branch of the 29th Street Outfall Drainage System. The complete Preliminary Report on the 29th Street Outfall Drainage System as called for under the Agreement, and designated Phase II, will be presented at a later date.

This report presents the results of a comprehensive engineering design study of two schemes for draining this Eastern Branch basin, together with our recommendations of the most desirable scheme for implementation. Of prime concern was the development of a suitable drainage scheme for the area designated as the Code Enforcement Program, Florida E-9, which would be incorporated in proposed street improvement programs.

During the course of this study it became evident that previously estimated construction costs for the proposed work would be exceeded, indicating the need to seek additional financial support from the participating Federal Agencies. The report, therefore, presents estimated construction costs in terms of participation required by the various agencies within their jurisdictional boundaries.

Also presented is a comprehensive project time schedule showing actual and revised completion dates compared with previously furnished dates. The revised dates have been set as a result of discussions held with the Federal Program Directors and are related to the securing of the additional financial assistance required for project implementation.

Continued...

Honorable Mayor and City Council  
City of Tampa  
February 7, 1972  
Tampa, Florida

RE:           PRELIMINARY REPORT  
              MODEL CITIES PROJECT NO. 133,006.01  
              DSA CM. NO. 7052-F

We appreciate this opportunity to provide professional engineering services to the City of Tampa, and we look forward to completing and presenting the results of our studies of Phase II of the 29th Street Outfall Drainage System.

Respectfully submitted,

DSA / ENGINEERS - PLANNERS



Allen H. Seckinger, P.E.  
President

AHS/jtp

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## CONCLUSIONS AND RECOMMENDATIONS

Based upon analyses of preliminary designs and cost estimates included herein, and after thorough study of the various factors involved, the following conclusions were reached:

1. From an engineering standpoint, it is feasible to drain the Eastern Branch of the 29th Street Outfall Drainage System by either System Number I or System Number II.
2. Both Systems offer approximately the same degree of protection from flooding.
3. Both Systems utilize the existing Palifox Basin to its maximum capability and insure the proper function of existing storm sewers now draining to the Palifox Basin.
4. Based upon preliminary engineering data and field investigation of the 29th Street Outfall Drainage System South of I-4, the capacity of this existing outfall is severely limited.
5. Based on an economic comparison of the two Systems proposed, System No. II (as shown on EXHIBIT "G") provides an estimated savings of approximately \$640,000 over System No. I for the area north of I-4.
6. Additional benefits are provided by using an extensive system of Retention Basins:
  - a. Considerable open space or "green-belt" area is available except for a short duration at peak design conditions (once in 25 years).



- b. While it is difficult to measure or predict, some pollution control benefits, in terms of nutrient removal and sedimentation of transported silts and debris, can be expected in the basins.

In view of the above conclusions and the other considerations outlined within this Report, the following recommendations are therefore presented:

1. It is recommended that System No. II be adopted as the System to be implemented.
2. It is recommended that the City authorize the Engineers to proceed with the preparation of Final Construction Plans, Specifications and Contract Documents for the drainage improvements within the Code Enforcement Program, Fla. E-9 area.
3. It is recommended that the City utilize the design methods, procedures, and criteria outlined herein, in the design of other major drainage systems, with the extensive use of retention basins being of prime consideration as the most economical system.
4. It is recommended that the City adopt the construction priorities contained in this Report as a basis for scheduling the completion of the proposed drainage system.

## INTRODUCTION AND AUTHORIZATION

The Firm of Diaz, Seckinger and Associates, Inc., and the City of Tampa, a Municipal Corporation of the State of Florida, entered into an Agreement on March 17, 1971. This Agreement authorized the Engineers to perform a comprehensive drainage study for the entire watershed area currently served by what is known as "The 29th Street Outfall Drainage System" and to prepare a written preliminary report.

The study and written report is to be performed in two (2) phases. Phase I is to encompass the area known as "The Eastern Branch of 29th Street Outfall Drainage System." The general location of this study is bordered by Hillsborough Avenue on the North, 37th Street on the East, Interstate 4 on the South, and 29th Street on the West. Phase II is "The Western Branch and Common Outfall of the 29th Street Outfall Drainage System."

The following report is Phase I only. Phase II is currently under study and is to be submitted at a later date.

ACKNOWLEDGMENTS

A project of this magnitude must rely upon the cooperation and support of many individuals and governmental agencies, both State and Local. This report has been no exception and throughout its compilation, Diaz, Seckinger and Associates, Inc., has received assistance and interested cooperation from various sources.

We would like to extend our special thanks and appreciation for the assistance and cooperation in the preparation of this Report to the following agencies and their staffs:

City of Tampa, Department of Public Works, Administrative, Operations, Engineering, Surveying, Drainage, and Right-of-Way Sections.

City of Tampa, Legal Department, Land Agent Section.

City of Tampa, Urban Renewal Agency.

City of Tampa, Model Cities

Florida Department of Transportation, District I,  
Drainage Department.

Southwest Florida Water Management District.

Hillsborough County, Clerk of Circuit Court.

Hillsborough County - Tax Assessor.

DRAINAGE DESIGN CRITERIA

I. DESIGN FREQUENCY:

- A. Storm sewers sized to flow just full for 5 Year Frequency Rainfall Intensity--Duration Curve for Zone 4, Tampa, as shown in the Florida Department of Transportation Drainage Manual.
- B. Design of retention basins with outlet to be based on inflow and outflow curves using the 25 Year Frequency Rainfall Intensity--Duration Curve for Zone 4, Tampa, as shown in the Florida Department of Transportation Drainage Manual. Design to be based on rainfall of 24 hours duration unless maximum capacity requirements obtain under less duration. Design high water elevation to be established in consideration of adjacent properties and facilities but normally a minimum of one foot below gutter of adjacent streets or one foot below ground surface adjacent to retention basin, whichever is the lowest. Design low water elevation to be established as the invert of the lowest outflow.
- C. Design of retention basins with no outflow to be based on the 50 Year Frequency Rainfall Intensity--Duration Curve for Zone 4, Tampa, as shown in the Florida Department of Transportation Drainage Manual and for a rainfall of 24 hours duration. Design high water elevation to be established in consideration of adjacent properties and facilities but normally a minimum of one foot below gutter of adjacent street or one foot below ground surface adjacent to retention basin, whichever is lower. Design low water elevation to be established in consideration of ground percolation factors,

water table and other contingencies. The unreliability of the actual low water elevation at the beginning of a storm emphasizes the requirement to use the 50 Year Frequency Rainfall Intensity--Duration Curve under such indeterminate conditions.

II. DESIGN METHODS:

A. Storm Sewers use Rational Method  $Q = CIA$

$Q$  = Run-off in cubic feet per second

$C$  = Coefficient of Run-off

$I$  = Intensity of rainfall in inches per hour

$A$  = Area in acres, determined by planimeter

B. Retention Basins and Pumping Stations:

Storage is equal to Inflow minus Outflow

III. RUNOFF COEFFICIENTS to be related to zoning as follows:

R:  $C = 0.25$

C:  $C = 0.95$

M & R-3:  $C = 0.75$

IV. PIPE AND DITCH HYDRAULIC DESIGN based on Mannings Formula

$$Q = A \frac{1.486}{n} R^{2/3} S^{1/2}$$

V. COEFFICIENTS OF ROUGHNESS "n" to be used in the Manning Formula

A. 15" - 30"  $n = 0.013$

36" - 48"  $n = 0.012$

54" & Up  $n = 0.011$

B. Cast In Place Concrete Structures

n = .010

C. Ditches:

n = 0.03 - 0.05

VI. ENTRANCE LOSS COEFFICIENTS:

Concrete Pipe: Ke = 0.2 - 0.5

Concrete Box Culv. Ke = 0.2 - 0.5

VII. TIME TO FIRST INLET shall be determined by using the Bureau of Public Roads Overland Flow Chart plus ditch or gutter times. A minimum time of 15 minutes to the first inlet shall be used.

VIII. VELOCITY: Storm sewer design flow shall be a minimum velocity of 2.5 feet per second, and a maximum velocity of 10 feet per second. Maximum velocity in ditches shall depend on the type of soil and the type of lining.

IX. MINIMUM COVER: The desirable minimum cover for reinforced concrete pipe shall be 24" below the top of pavement for residential or local streets. For collector or arterial streets the desirable minimum cover shall be 42".

X. INLET AND MANHOLE SPACING:

A. Desirable inlet spacing shall be 400 feet. Maximum desirable inlet spacing shall be 600 feet.

B. A manhole or inlet shall be placed at changes in alignment or grade.

XI. TYPES OF INLETS AND MANHOLES:

City of Tampa, Department of Public Works standard inlets shall be used as a basis for design.

XII. MINIMUM PIPE SIZES:

Minimum storm sewer pipe size shall be 18". Minimum size inlet pipe shall be 15".

## DISCUSSION OF CRITERIA

The previously detailed Drainage Criteria was formalized in June, 1971, and has strictly been adhered to throughout the preparation of the entire preliminary study. After considerable research and numerous conferences with representatives of the City of Tampa, the Engineers prepared a format of recommended criteria for this study as well as for future use within the Department of Public Works. These recommendations were then submitted to the City for their review and approval. After minor revisions, the City approved and returned the recommended criteria to the Engineers to be used as applicable within the design report.

As per the approved criteria, the Rational Method ( $Q = CIA$ ) is used as a basis of design. Zoning maps were acquired and are used for determining run-off for the sub-areas of drainage. The following factors were used: Residential at 0.25, Commercial at 0.95, and Multi-family at 0.75. Sub-drainage areas were set from known elevations as shown on the Drainage Atlas Maps and supplemented with field survey data.

Due to the relatively high density of population and buildings within the boundaries of this Study, sufficient land is not available to allow economical construction of drainage basins large enough to store the volume of run-off anticipated for a storm of once in fifty years frequency. Therefore, it was determined that a more logical approach was to compute the capacity of the proposed retention basins within the aforementioned restrictions, and to design the outflow pipes to carry the difference of the inflow of a once in twenty-five year storm frequency and the storage available.



As the design high water in each basin is set to utilize the maximum capacity of each proposed retention basin and the outflow pipes are set so as to completely drain these basins, a "head" is automatically formed and during the peak design frequency, the entire system functions under pressure. Consequently, a once in 25 year storm frequency design was used for sizing the trunk-line pipes to ensure the hydraulic gradient does not exceed an elevation one foot below existing ground.

Many low areas that frequently flood are within the boundaries of this drainage system. Stub-runs serving these sub-drainage areas were originally sized on a 5 year, flow full basis of design and then back-checked on a 25 year hydraulic gradient to determine the degree of flooding. Many sub-runs then required size changes as this became the stronger criteria.

By the nature of the design approach and relatively small basins of the recommended scheme, evaporation as well as percolation were not a factor. Proposed depths of basins are at or near the ground water table and from all available data the maximum reservoir evaporation for this area is less than 6 inches per month. All basins within this proposed system drain in less than 24 hours.

## STUDY APPROACH, DESIGN METHODS AND PROCEDURES

It is the basic aim of this study to provide a comparison between two drainage systems, both of which are designed for the most economical solution to the draining of the Eastern Branch of the 29th Street System.

System No. I, as shown on EXHIBIT "E", was initially approached as a "conventional" type drainage system, using the 5 year flow-full basis of design, with the additional benefit of using the existing Palifox Basin as a retention basin.

However, after several trial designs using this approach were made, it was discovered that the cover requirements for pipes designed on a flow-full basis, i.e. the hydraulic gradient at the crown of the pipe, dictated that pipe slopes be very flat in order to make use of the Palifox Basin. In order to carry the designed discharges on these flat slopes, large diameter pipes were required, leading to the decision to investigate other methods of design.

Additional trial designs were run on the 5 year flow-full design procedure, leading to the ultimate conclusion that if this procedure was employed the Palifox Basin could not be used, resulting in extremely large diameter structures down-stream from the existing basin. It was further concluded that by using a design based on an allowable hydraulic gradient above the crown of the pipes, the existing Palifox Basin could be employed in the system, providing valuable retention, and resulting in considerable savings in structure costs down-stream from the basin.

By employing the "surcharged" method of design under a hydraulic gradient and respecting the 25 year design criteria for retention basins, it was determined that the following benefits could be obtained:

1. Pipe diameters were reduced in comparison to the 5 year flow-full method.
2. The Palifox Basin could be used in the system.
3. Protection to a 25 year frequency could be provided to the extremely low areas and to areas with no outlet other than the storm sewer at less cost than the "conventional" design.

The main trunk sewer was therefore designed on a hydraulic gradient design, respecting the 25 year design high water in the existing Palifox Basin.

Stub or lateral lines were sized on the same basis, if flooding could occur in the area drained, due to the high water in the basin or the hydraulic gradient in the trunk sewer. If the stub lines were not influenced by these considerations, they were sized on the basis of a 5 year flow-full design. These calculations are presented in APPENDIX "A".

Design of the existing Palifox Basin as a retention basin was based on the development of Inflow curves for the area drained on a 25 year frequency and a volume of storage based on present basin geometry and an allowable high water elevation one foot below the low point on the basin perimeter. The required basin outflow curve to meet these conditions was then constructed and the resultant curve developed. A sample Inflow-Outflow curve is presented on EXHIBIT "B".

System No. II was approached as a complete retention basin type drainage system, using basins extensively where topography permitted, and suitable interconnects between basins could be developed.

Basin locations previously recommended by the City were investigated as to suitability and additional basin locations were studied. After careful consideration of alternate basin locations, the basins shown on "EXHIBIT "G" were selected and trial designs run to determine the relationship between various basin capacities and size of interconnecting structures.

Maximum physical dimensions for each basin location were determined, in keeping with the previously discussed criteria, and the affects of various design high water levels were investigated, in terms of flooding and in terms of resulting storage and detention times. Ultimately design high water elevations for each basin were set and the analysis of the system finalized.

Inflow curves for each basin were developed using the 25 year design frequency. Based on maximum allowable storage and high water levels, suitable outflow curves were generated and the resultant detention times computed. Sample Inflow-Outflow curves are shown on EXHIBIT "B".

Interconnects between basins were then sized in the usual manner, respecting upstream and downstream high water elevations in connected basins. Inflow from sub-drainage areas were computed on the 25 year frequency to insure the high water levels predicted would not be exceeded in the basins.

Stub lines connecting to the basins or the main sewer interconnecting the basins were investigated from the standpoint of possible flooding due to high waters in the basins or the elevation of the hydraulic gradient between basins. Where areas were subject to flooding due to their being connected to the retention basin system, they were sized on the 25 year hydraulic gradient to insure against such flooding. Maximum allowable gradient elevations were taken at one foot below the gutter or greater.

Where the stub lines were sufficiently high so as not be affected by the hydraulic gradient in the basins or main sewers between basins, they were sized on the 5 year flow-full basis. Calculations for this system are presented in APPENDIX "A".

In summary, the procedures used to design the two systems described in this report represent the results of careful study and trial designs to insure that the best use of the current technology of drainage design was made and the most economical systems to serve the purposes intended were proposed.

ALTERNATE STUDIES OF PROBLEM AREAS

AND RECOMMENDED SOLUTIONS

Numerous supplemental studies were performed of suspect problem areas.

A brief description, basis of analysis, and recommendations are as follows:

- I. A sub-area bordered generally on the North by East Chelsea Street, on the East by 39th Street, on the South by Lake Avenue, and on the West by 36th Street was incorporated into the Eastern Branch System. After performing design and cost estimates for the entire system with and without this sub-area, it was found an additional cost of \$161,958.00 was required to drain and bring this area into the 29th Street Outfall Drainage System versus a cost of \$428,506.00 to drain into the bordering 32nd-34th Street Outfall. After discussion with the Department of Public Works, it was determined to incorporate this area into the 29th Street Outfall Drainage System. This decision reflects a savings of \$266,548.00
  
- II. An area East of the original 29th Street Outfall Drainage Boundary and West of the Florida Department of Transportation's 40th Street Storm Sewer System was investigated for the most economical method of drainage. A meeting was held between the Engineers and the District Drainage Engineer, Florida Department of Transportation. It was found the State had not designed their system with sufficient capacity for this area, but would consider the acceptance of this run-off if a retention basin could be constructed large enough to contain all of the storm water until the peak storm had passed and

and then pumped from the basin into the existing system. After further investigation by the Engineers, this method proved to be unsatisfactory as sufficient land was not available for the requirements of a basin to contain this magnitude of water. A method of constructing a smaller basin with a limited gravity out-fall was investigated and found to be unsatisfactory; also, because the hydraulic gradient in the 40th Street System was higher than the ground in this area and therefore would have a reverse flow during the design storm causing flooding conditions within the sub-areas. The Engineers recommendation is to connect this area into the 29th Street System as shown in the plans.

III. The feasibility of using a series of retention basins East of 30th Street, between 18th Avenue and 26th Avenue was studied. After a preliminary design of a scheme with these basins was performed, it was found that the trunk sewer, by necessity, was several feet deeper than the basin bottom elevations could reach, due to side-slope requirements, width of tract available, etc. Cost estimates for using these sites for local retention basins proved this approach undesirable as the peak storm had passed for this area into the trunk sewer prior to the upstream peak reaching this point. A design and estimate was also made for cost comparison of carrying an open ditch through this area, therefore eliminating the use of large diameter pipe for this length. The estimate of cost for an enclosed pipe system through this area was \$174,600.00. Necessary Right-of-Way acquisition, excavation, sodding of side-slopes and ditch paving for an open channel design was estimated at \$191,650.00. Therefore,

the Engineers have recommended the closed circuit method as the most desirable design and a savings of \$17,050.00.

- IV. The possibility of drilling holes in the bottom of the proposed basins and sleeves placed so as to leach water into the aquifer was investigated. A meeting was held with representatives of the Southwest Florida Water Management District. These representatives informed the Engineers that approval and permits from various State Agencies would be required and to receive these permits, current standards insist on series of testing to insure all water entering the aquifer is "drinking water pure". Treatment of various sorts would then be required making this solution completely infeasible economically. The Engineers then abandoned any further investigation of this method.
- V. To determine priority, approximate cost, and functional capabilities, various approaches with alternate solutions were studied for the main outfall from I-4 south to McKay Bay. The basis of this preliminary design was of using all computed factors from the Eastern Branch Study and combining firstly with the existing physical contributing volume from the Western Branch. (2-60" R.C.P. flowing full equals 500 C.F.S.)
- Secondly, a proportionate run-off calculated per acre for the Eastern Branch was applied to the acreage of the Western Branch. This checked very closely with the original trial at 540 C.F.S. To implement final design and construction on this premise requires the Western Branch Study to acquire sufficient Retention Basin Volume to retain all run-



off in excess of this 540 C.F.S.

The following describes the six various studies of the Engineers and their respective Construction and Right-of-Way acquisition cost.

I. SYSTEM NO. I

- \* A. ALTERNATE #1 - Closed conduit system from I-4 to the east side of 34th St.: open channel from that point to McKay Bay.....\$1,832,233.00
- B. ALTERNATE #2 - Open channel from I-4 to McKay Bay with suitable bridge or culvert structures at road and railroad crossings.....\$1,506,770.00

II. SYSTEM NO. II

- A. ALTERNATE #1 - Open channel from I-4 to Retention Basins 'N; P-1, 2 and 3"; open channel from Basins to McKay Bay; suitable bridge or culvert structures at road and railroad crossings..... \$1,286,440.00
- B. ALTERNATE #2 - Closed conduit from I-4 to Retention Basins 'N; P-1, 2 and 3"; closed conduit from Basins to the east side of 34th St.; open channel from that point to McKay Bay..... \$1,412,430.00

\* Alternate used in Cost Summary

C. ALTERNATE #3 - Closed conduit from I-4 to Retention Basins 'N; P-1, 2 and 3; M-1, 2 and 3"; closed conduit from Basins to the east side of 34th St.; open channel from that point to McKay Bay.....\$1,492,950.00

\* D. ALTERNATE #4 - Closed conduit from I-4 to Retention Basins 'N; P-1, 2, 3; M-1, 2, 3; R-1 and 2; closed conduit from Basins to the east side of 34th St.; open channel from that point to McKay Bay.....\$1,852,911.00

\* Alternate used in Cost Summary

**COMPREHENSIVE PROJECT TIME SCHEDULE**

**PHASE I - 29TH STREET OUTFALL DRAINAGE SYSTEM**

**DESIGN AND CONSTRUCTION**

ITEM NO.	DESCRIPTION OF WORK	ORIGINAL SCHEDULED CALENDAR DAYS	ORIGINAL SCHEDULED DATE FOR COMPLETION	REVISED SCHEDULED CALENDAR DAYS	REVISED SCHEDULED DATE FOR COMPLETION
1.	Engineer's Agreement Signed		3-17-71	—	3-17-71
2.	Engineer's Notification to Proceed	2	3-19-71	2	3-19-71
3.	Request by the Engineer For Field Survey Data	7	3-26-71	4	3-23-71
4.	Receipt of Field Notes by the Engineer (Partial)	7	4-2-71	31	4-22-71
5.	Submittal of Preliminary Project Time Schedule	46	5-18-71	27	5-18-71
6.	Monthly Progress Reviews by Department of Public Works	—	—	—	—
7.	Request by the Engineer of Base Data for Proposed Retention Basins	21	6-8-71	30	6-17-71
8.	Pre-Final Submittal of Draft Report to D.P.W. & Utility Companies for Review and Comments	34	7-13-71	197	1-5-72
9.	Return of D.P.W. Comments to the Engineers	14	7-27-71	22	1-27-72
10.	Incorporate D.P.W. Comments Into Report & Submittal of Final Phase I Report to D.P.W.	21	8-17-71	13	2-8-72
11.	Review & Approval by D.P.W. & Other Governmental Agencies	30	9-16-71	7	2-15-72
12.	Review & Approval by Tampa City Council	30	10-16-71	7	2-22-72
13.	Engineer's Notification to Proceed with Phase I - Detailed Design Stage Within C.E.P., Fla. E-9 Area	10	10-26-71	1	2-23-72
14.	Completion of Field Surveys for Final Design by Engineer	67	1-2-72	30	3-24-72

COMPREHENSIVE PROJECT TIME SCHEDULE

PHASE I - 29TH STREET OUTFALL DRAINAGE SYSTEM

DESIGN AND CONSTRUCTION

ITEM NO.	DESCRIPTION OF WORK	ORIGINAL SCHEDULED CALENDAR DAYS	ORIGINAL SCHEDULED DATE FOR COMPLETION	REVISED SCHEDULED CALENDAR DAYS	REVISED SCHEDULED DATE FOR COMPLETION
15.	Pre-Final Submittal of Construction Plans to D.P.W. for Review & Comments	33	2-6-72	70	6-2-72
16.	Return of D.P.W. & Utility Companies Comments to the Engineers	30	3-7-72	15	6-17-72
17.	Incorporate D.P.W. Comments Into Final Plans & Submittal of All Documents to D.P.W.	20	3-27-72	16	7-3-72
18.	Review & Approval by D.P.W. & Other Governmental Agencies	30	4-27-72	30	8-2-72
19.	Review & Approval by Tampa City Council with Authorization to Advertise	30	5-27-72	30	9-1-72
20.	Advertising and Receiving of Bids	30	6-27-72	31	10-2-72
21.	Awarding of Contract	15	7-12-72	15	10-17-72
22.	Begin Construction of System Within C.E.P. Fla. E-9 Area	30	8-12-72	30	11-16-72
23.	Completion of System Within C.E.P., Fla. E-9 Area	730	8-12-74	730	11-16-74
	TOTAL CALENDAR DAYS FOR PROJECT COMPLETION	1237		1338	

COMPREHENSIVE PROJECT TIME SCHEDULE

PHASE I - 29TH STREET OUTFALL DRAINAGE SYSTEM

RIGHT-OF-WAY

ITEM NO.	DESCRIPTION OF WORK	ORIGINAL SCHEDULED CALENDAR DAYS	ORIGINAL SCHEDULED DATE FOR COMPLETION	REVISED SCHEDULED CALENDAR DAYS	REVISED SCHEDULED DATE FOR COMPLETION
1.	Engineer's Agreement Signed	—	3-17-71	—	3-17-71
2.	Engineers Notification to Proceed	2	3-19-71	2	3-19-71
3.	Request by the Engineer for Tax Records	79	6-8-71	160	8-26-71
4.	Tax Records Received by the Engineers	60	8-7-71	74	11-8-71
5.	Submittal of Required Right-of-Way & Construction Plans On Retention Basins, Including Descriptions	30	9-6-71	120	3-8-72
6.	First Submittal of Additional Right-of-Way Plans & Descriptions	140	1-26-72	77	5-25-72
7.	Advertising, Public Hearings and Condemnation Proceedings Completed	130	6-6-72	109	9-11-72
8.	Completion of Building Demolition	180	12-6-72	180	3-11-73

DISCUSSION OF PRELIMINARY COST ESTIMATES

Upon completion of preliminary designs for both System Number I (as shown on EXHIBIT "E") and System Number II (as shown on EXHIBIT "G"), a detailed cost analysis was made. Unit prices used were furnished by the Department of Public Works. Individual quantities and costs are designated by areas and are further sub-divided by the cost participation available from various contributing governmental agencies.

The summary of preliminary estimated cost also includes other information in addition to basic construction cost such as Engineering, Right-Of-Way, Relocation Cost, and 1st and 2nd Year Escalation.

Estimates for all Right-Of-Way acquisition were furnished to the Engineer by the Land Agent Section of the City of Tampa Legal Department. All relocation estimates were supplied by the City of Tampa Urban Renewal Agency.

This Phase I Study is primarily of the area from Hillsborough Avenue to I-4. Various studies have been performed from I-4 to McKay Bay and are included so as to have a complete comparison of the two schemes. An assumption of the contributing volume of run-off from the Western Branch into the outfall South of I-4 is based upon engineering judgment gained through analysis of the Eastern Branch. Of course, sizing and pricing of this downstream drainage system cannot logically be finalized until the completion of the Phase II Study of the Western Branch and Common Outfall of the 29th Street Outfall Drainage System.

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH

SUMMARY OF ESTIMATED PROJECT COST

SYSTEM NO. I

(Hillsborough Avenue to I-4)

CONSTRUCTION COST \$3,913,146.00  
 ENGINEERING @ 15.00% 586,972.00  
 R/W ACQUISITION 40,700.00  
 RELOCATION COSTS 10,000.00  
 SUB TOTAL \$4,550,818.00

(I-4 to McKay Bay)

CONSTRUCTION COST \$1,944,547.00  
 ENGINEERING @ 15.00% 291,682.00  
 R/W ACQUISITION 33,100.00  
 RELOCATION COSTS NONE  
 SUB TOTAL \$2,269,329.00

TOTAL PROJECT COST

CONSTRUCTION COST \$5,857,693.00  
 ENGINEERING @ 15.00% 878,654.00  
 R/W ACQUISITION 73,800.00  
 RELOCATION COSTS 10,000.00  
 TOTAL \$6,820,147.00

SYSTEM NO. II

(Hillsborough Avenue to I-4)

CONSTRUCTION COST \$2,795,903.00  
 ENGINEERING @ 15.00% 419,385.00  
 R/W ACQUISITION 549,100.00  
 RELOCATION COSTS 178,940.00  
 SUB TOTAL \$3,943,328.00

(I-4 to McKay Bay)

CONSTRUCTION COST \$1,514,590.00  
 ENGINEERING @ 15.00% 227,189.00  
 R/W ACQUISITION 354,500.00  
 RELOCATION COSTS 145,400.00  
 SUB TOTAL \$2,241,679.00

TOTAL PROJECT COST

CONSTRUCTION COST \$4,310,493.00  
 ENGINEERING @ 15.00% 646,574.00  
 R/W ACQUISITION 903,600.00  
 RELOCATION COSTS 324,340.00  
 TOTAL 6,185,007.00

DIFFERENCE

\$607,490.00

\$ 27,650.00

\$635,140.00

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH

SUMMARY OF PRELIMINARY ESTIMATED COST - BY ADMINISTRATIVE AGENCIES

SYSTEM NO. I  
(From Hillsborough Avenue to I-4)

	NEIGHBORHOOD DEVELOPMENT PROGRAM	CODE ENFORCEMENT PROGRAM FLA. E-9	MODEL CITIES	PLANNED VARIATION	TOTAL
CONSTRUCTION COST	\$1,614,995.00	\$1,847,630.00	\$15,300.00	\$ 79,480.00	\$3,557,405.00
CONTINGENCY @ 10%	161,500.00	184,763.00	1,530.00	7,948.00	355,741.00
TOTAL CONSTRUCTION COST	\$1,776,495.00	\$2,032,393.00	\$16,830.00	\$ 87,428.00	3,913,146.00
* ENGINEERING @ 15%	266,474.00	304,859.00	2,525.00	13,114.00	586,972.00
RIGHT-OF-WAY ACQUISITION	34,700.00	6,000.00	NONE	NONE	40,700.00
RELOCATION COST	10,000.00	NONE	NONE	NONE	10,000.00
TOTAL PROJECT COST	\$2,087,669.00	\$2,343,252.00	\$19,355.00	\$100,542.00	\$4,550,818.00
1ST YEAR ESCALATION @ 8%	167,014.00	NONE	NONE	8,043.00	175,057.00
TOTAL COST 1ST YEAR	\$2,254,683.00			\$108,585.00	\$2,363,268.00
2ND YEAR ESCALATION @ 8%	180,375.00			8,687.00	189,062.00
TOTAL COST 2ND YEAR	\$2,435,058.00			\$117,272.00	\$2,552,330.00

\* ENGINEERING @ 15.00% INCLUDES: DESIGN, FIELD ENGINEERING, CONSTRUCTION SUPERVISION AND TESTING.



29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH

SUMMARY OF PRELIMINARY ESTIMATED COST - BY ADMINISTRATIVE AGENCIES

SYSTEM NO. I  
(From I-4 to McKay Bay)

	NEIGHBORHOOD DEVELOPMENT PROGRAM	CODE ENFORCEMENT PROGRAM FLA. E-9	MODEL CITIES	PLANNED VARIATION	TOTAL
CONSTRUCTION COST CONTINGENCY @ 10%				\$1,767,770.00 176,777.00	\$1,767,770.00 176,777.00
TOTAL CONSTRUCTION COST				\$1,944,547.00	\$1,944,547.00
* ENGINEERING @ 15% RIGHT-OF-WAY ACQUISITION RELOCATION COST				291,682.00 33,100.00 NONE	291,682.00 33,100.00 NONE
TOTAL PROJECT COST				\$2,269,329.00	\$2,269,329.00
1ST YEAR ESCALATION @ 8% TOTAL COST 1ST YEAR				181,546.00 \$2,450,875.00	181,546.00 \$2,450,875.00
2ND YEAR ESCALATION @ 8% TOTAL COST 2ND YEAR				196,070.00 \$2,646,945.00	196,070.00 \$2,646,945.00

\* ENGINEERING @ 15.00% INCLUDES: DESIGN, FIELD ENGINEERING, CONSTRUCTION SUPERVISION AND TESTING.

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH

SUMMARY OF PRELIMINARY ESTIMATED COST - BY ADMINISTRATIVE AGENCIES

SYSTEM NO. II  
(From Hillsborough Avenue to I-4)

	NEIGHBORHOOD DEVELOPMENT PROGRAM	CODE ENFORCEMENT PROGRAM FLA. E-9	MODEL CITIES	PLANNED VARIATION	TOTAL
CONSTRUCTION COST	\$1,533,519.00	\$ 888,735.00	\$14,400.00	\$105,075.00	\$2,541,729.00
CONTINGENCY @ 10%	153,352.00	88,874.00	1,440.00	10,508.00	254,174.00
TOTAL CONSTRUCTION COST	\$1,686,871.00	977,609.00	15,840.00	115,583.00	2,795,903.00
* ENGINEERING @ 15%	253,031.00	146,641.00	2,376.00	17,337.00	419,385.00
RIGHT-OF-WAY ACQUISITION	523,100.00	6,000.00	NONE	20,000.00	549,100.00
RELOCATION COST	178,940.00	NONE	NONE	NONE	178,940.00
TOTAL PROJECT COST	\$2,641,942.00	\$1,130,250.00	\$18,216.00	\$152,920.00	\$3,943,328.00
1ST YEAR ESCALATION @ 8%	211,355.00	NONE	NONE	12,234.00	223,589.00
TOTAL COST 1ST YEAR	\$2,853,297.00			\$165,154.00	\$3,018,451.00
2ND YEAR ESCALATION @ 8%	228,264.00			13,212.00	241,476.00
TOTAL COST 2ND YEAR	\$3,081,561.00			\$178,366.00	\$3,259,927.00

\* ENGINEERING @ 15.00% INCLUDES: DESIGN, FIELD ENGINEERING, CONSTRUCTION SUPERVISION AND TESTING.

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH

SUMMARY OF PRELIMINARY ESTIMATED COST - BY ADMINISTRATIVE AGENCIES

SYSTEM NO. II  
(FROM I-4 to McKay Bay)

	NEIGHBORHOOD DEVELOPMENT PROGRAM	CODE ENFORCEMENT PROGRAM FLA. E-9	MODEL CITIES	PLANNED VARIATION	TOTAL
CONSTRUCTION COST				\$1,376,900.00	\$1,376,900.00
CONTINGENCY @ 10%				137,690.00	137,690.00
TOTAL CONSTRUCTION COST				\$1,514,590.00	\$1,514,590.00
* ENGINEERING @ 15%				227,189.00	227,189.00
RIGHT-OF-WAY ACQUISITION				354,500.00	354,500.00
RELOCATION COST				145,400.00	145,400.00
TOTAL PROJECT COST				\$2,241,679.00	\$2,241,679.00
1ST YEAR ESCALATION @ 8%				179,334.00	179,334.00
TOTAL COST 1ST YEAR				\$2,421,013.00	\$2,421,013.00
2ND YEAR ESCALATION @ 8%				193,681.00	193,681.00
TOTAL COST 2ND YEAR				\$2,614,694.00	\$2,614,694.00

\* ENGINEERING @ 15.00% INCLUDES: DESIGN, FIELD ENGINEERING, CONSTRUCTION SUPERVISION AND TESTING.

FINANCING AND PRIORITIES

For the City to finance a project of this magnitude from its general fund is impractical. As the area is an older part of the City and is of fairly high density, extensive drainage improvements by developers are improbable. Also, capital improvement bonds or property assessments are unrealistic due to the economic nature of the neighborhood.

Because of the obvious need for improvements in Urban Areas, funds through Federal Programs have become available. The following Governmental Administrative Agencies are participating in this Project: Neighborhood Development Program, Code Enforcement Program Fla. E-9, Model Cities, and Planned Variation.

Normal procedure for most major drainage systems is to begin construction of the outfall and proceed upstream. Funding in this particular instance must take preference. Therefore, the following sequence of construction priorities is recommended:

1. Purchase of Right-Of-Way required for Retention Basin construction.

(a) Eastern Branch	\$549,100.00
(b) Outfall	<u>354,500.00</u>
(c) Total	\$903,600.00

2. Construction of all drainage improvements within the Code Enforcement Program, Fla. E-9 area.

(a)	Eligible Construction Cost (Inlets)	\$	65,670.00
(b)	Ineligible Construction Cost		<u>911,939.00</u>
(c)	Sub-Total Construction Cost	\$	<u>977,609.00</u>
(d)	Engineering @ 15.00%		146,641.00
*	(e) R/W Acquisition		6,000.00
	(f) Relocation Cost		-----
	(g) Sub-Total	\$	1,130,250.00
*	Included in Paragraph No. 1.		

3. Construction of improvements to the Common Outfall for the Eastern and Western Branches of the 29th Street Outfall Drainage System. These recommended improvements will be outlined in the forthcoming Phase II Study of the 29th Street Outfall System.

(a)	Construction Cost (Mainline of Outfall Only)	\$	1,353,011.00
(b)	Engineering @ 15.00%		202,952.00
*	(c) R/W Acquisition		354,500.00
	(d) Relocation Cost		145,400.00
	(e) Sub-Total	\$	2,055,863.00
*	Included in Paragraph No. 1.		

4. Construction of the remainder of the drainage improvements within the Eastern Branch of the 29th Street Outfall System proceeding from the downstream end north toward Hillsborough Avenue. This will include construction of all Retention Basins.

(a)	Construction Cost	\$1,979,873.00
(b)	Engineering @ 15.00%	296,981.00
* (c)	R/W Acquisition	543,100.00
(d)	Relocation Cost	190,940.00
(e)	Sub-Total	\$3,010,894.00
	<u>TOTAL PROJECT COST</u>	<u>\$6,197,007.00</u>

\* Included in Paragraph No. 1

EXHIBIT "A"

DATE FEB., 1972 UGH BY C.R. SWAIN SHEET NO. 1 OF 25

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	NOTES	
			DL	AI
			C=0.9	
			C=0.7	
			C=0.2	
			INCREMENT	REMARKS
MH	1 M	260		LINE AT CUL-DE-SAC ON T OF 37th ST.
			3.83	
MH	2 M	300		
			1.35	
MH	3 M	215		
			7.66	
MH	4 M	125		
			7.26	
MH	1 5	200	1.12	LINE AT GIDDONS AVENUE OF 37th ST.
			1.38	
MH	2 5	260		

D.S.A FORM NO. 71-1000-D

EXHIBIT "A"



EXHIBIT "B"

# RETENTION BASIN . . . . "A-1"

## DESIGN DATA

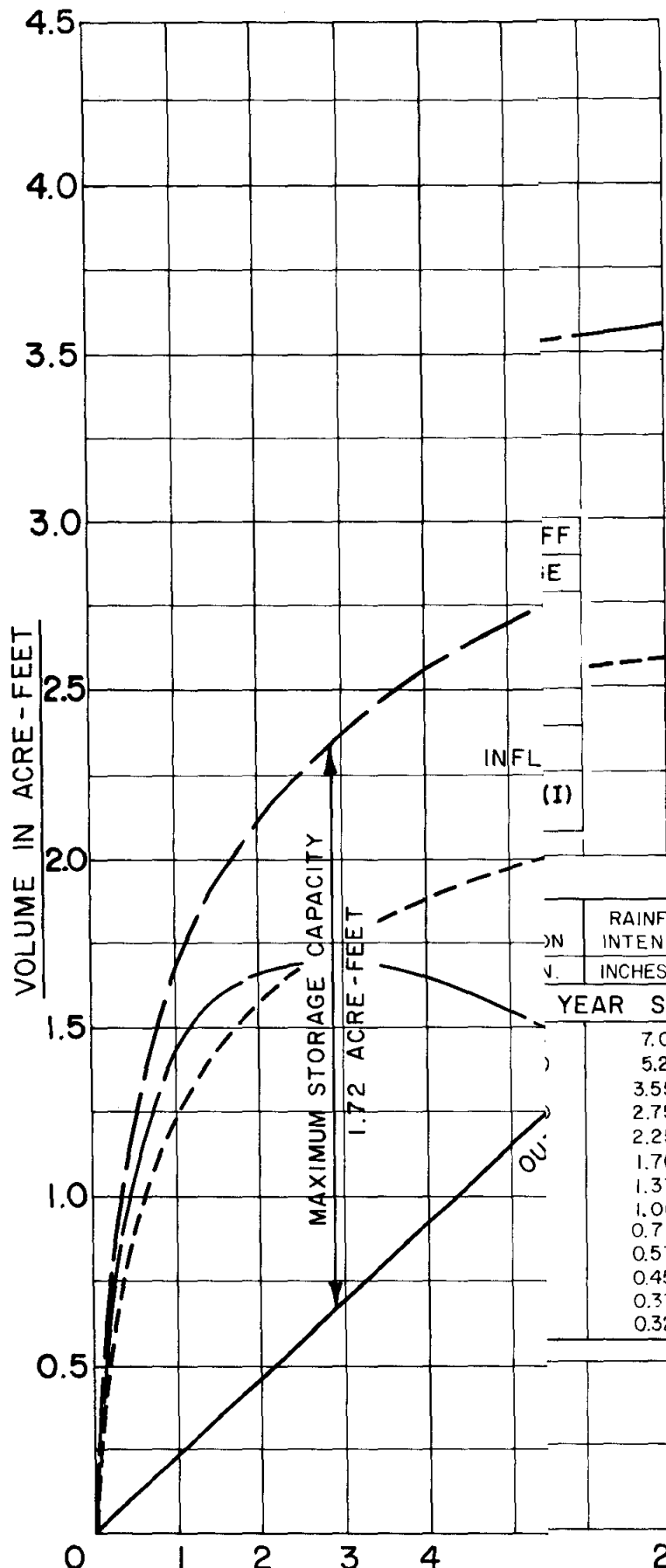
D.H.W. ELEV. . . . . 53.00  
 BOTTOM ELEV. . . . . 48.00  
 CAPACITY . . . . 1.72 AC.-FT.

### REQUIRED OUTFLOW RATE

$$= \frac{(43,560 \text{ Ft}^2/\text{Ac.}) (\text{Ac.-Ft.}/\text{Hr.})}{(3600 \text{ Sec.}/\text{Hr.})}$$

$$= \frac{(43,560) (0.23)}{(3600)}$$

$$= \underline{\underline{2.78 \text{ C.F.S.}}}$$



YEAR	RAINFALL INTENSITY INCHES/HR.	TOTAL TIME HRS.	ACCUM. RAINFALL INCHES	INFLOW AC.-FT.
ZONE IV CURVE				
7.0		.25	1.75	0.82
5.2		.50	2.60	1.21
3.55		1.0	3.55	1.66
2.75		1.5	4.13	1.93
2.25		2.0	4.50	2.10
1.70		3.0	5.10	2.38
1.37		4.0	5.48	2.56
1.00		6.0	6.00	2.80
0.79		8.0	6.32	2.95
0.57		12.0	6.84	3.19
0.45		16.0	7.20	3.36
0.37		20.0	7.40	3.45
0.32		24.0	7.68	3.58

ENGINEERS • PLANNERS  
**DIAZ, SECKINGER & ASSOCIATES, INC.**  
TAMPA, FLORIDA

## EXHIBIT "B" DHW - OUTFLOW CURVE

EXHIBIT "C"

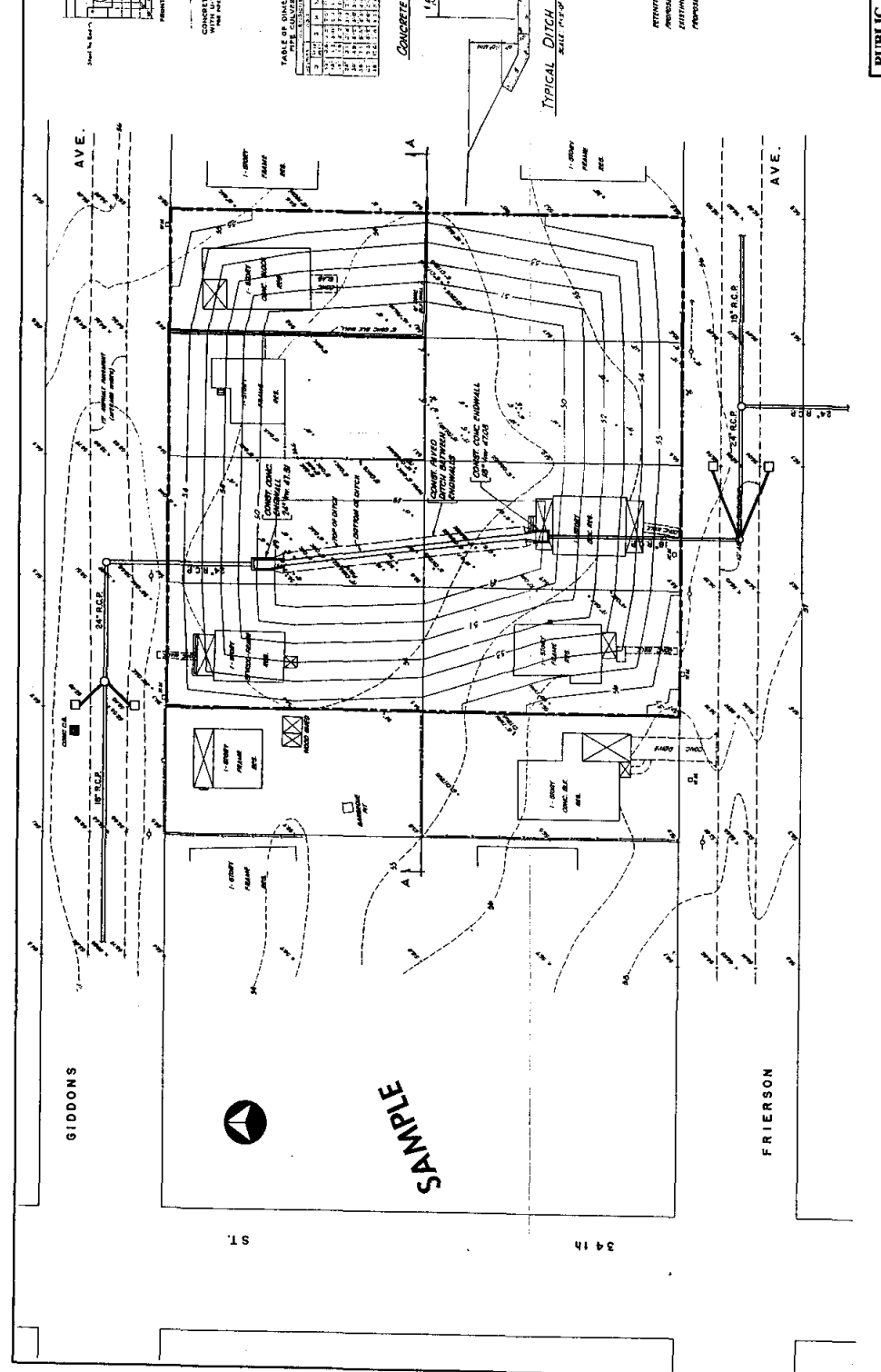


TABLE OF DIMENSIONS AND ESTIMATED QUANTITIES FOR THE CONCRETE ENDWALLS WITH A 12" DIA. LUMINA

NO.	DESCRIPTION	QUANTITY	EST. QTY.
1	CONCRETE ENDWALL	100.00	100.00
2	CONCRETE ENDWALL	100.00	100.00
3	CONCRETE ENDWALL	100.00	100.00
4	CONCRETE ENDWALL	100.00	100.00
5	CONCRETE ENDWALL	100.00	100.00
6	CONCRETE ENDWALL	100.00	100.00
7	CONCRETE ENDWALL	100.00	100.00
8	CONCRETE ENDWALL	100.00	100.00
9	CONCRETE ENDWALL	100.00	100.00
10	CONCRETE ENDWALL	100.00	100.00

**PUBLIC WORKS DEPARTMENT**  
CITY OF TAMPA, FLORIDA

**RETENTION BASIN "A-1"**  
**CONSTRUCTION PLAN**

PROJECT No. A-7-13A  
SHEET 1 of 1

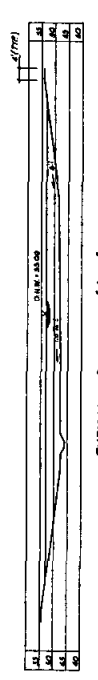


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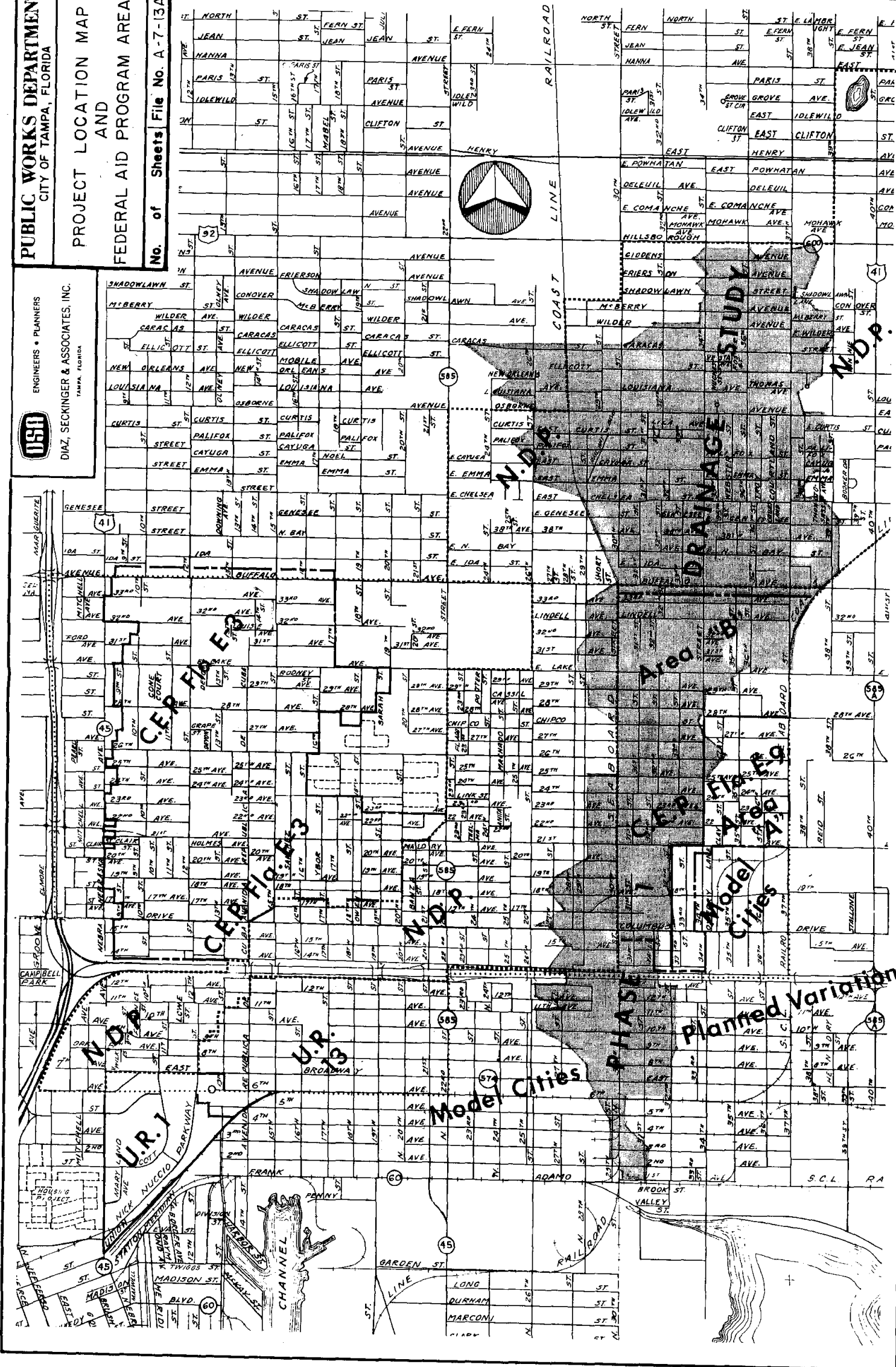
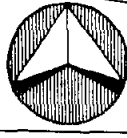
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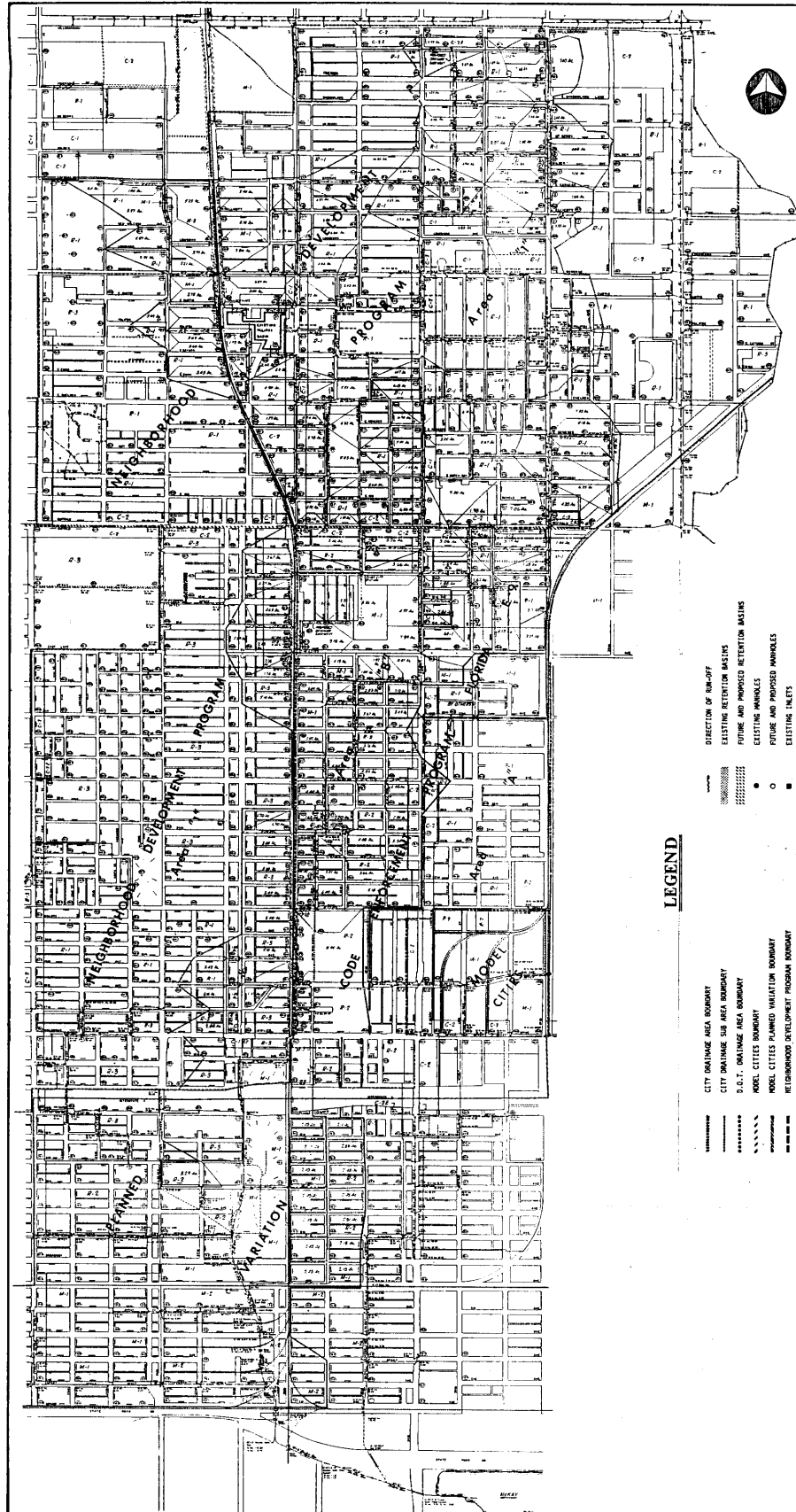
**PUBLIC WORKS DEPARTMENT**  
CITY OF TAMPA, FLORIDA

**PROJECT LOCATION MAP**  
**AND**  
**FEDERAL AID PROGRAM AREAS**

No. of Sheets File No. A-7-13A

ENGINEERS • PLANNERS  
**DIAZ, SECKINGER & ASSOCIATES, INC.**  
TAMPA, FLORIDA





**PUBLIC WORKS DEPARTMENT**  
 CITY OF TAMPA, FLORIDA  
**DRAINAGE MAP**  
**SYSTEM No. I**

PROJECT No. A-7-13A  
 SHEET 1 of 1

**LEGEND**

- CITY DRAINAGE AREA BOUNDARY
- SUB AREA BOUNDARY
- D.C.T. DRAINAGE AREA BOUNDARY
- MODEL CITIES BOUNDARY
- MODEL CITIES PLANNED VARIATION BOUNDARY
- NEIGHBORHOOD DEVELOPMENT PROGRAM BOUNDARY
- CODE ENFORCEMENT PROGRAM, FLORIDA E.P., BOUNDARY
- CODE ENFORCEMENT PROGRAM, FLORIDA E.P., SUB AREA BOUNDARY
- EXISTING ZONING CLASSIFICATION
- EXISTING CITY STORM SEWERS \*
- FUTURE AND PROPOSED CITY STORM SEWERS \*
- EXISTING DITCHES
- EXISTING ELEVATIONS
- FUTURE OR PROPOSED DRAINAGE CASSEMENTS
- DIRECTION OF RUN-OFF
- EXISTING RETENTION BASINS
- FUTURE AND PROPOSED RETENTION BASINS
- EXISTING MANHOLES
- FUTURE AND PROPOSED MANHOLES
- EXISTING TANKS
- FUTURE AND PROPOSED TANKS
- EXISTING STREET INTERSECTING ELEVATIONS \*\*
- EXISTING LOW OR HIGH POINT ELEVATIONS \*\*
- DESIGN HIGH WATER
- LOW WATER
- PROPOSED STRUCTURE NUMBER

\* All Pipes are S.C.P., unless otherwise indicated.  
 \*\* All Existing Elevations shown are as provided by the City of Tampa.

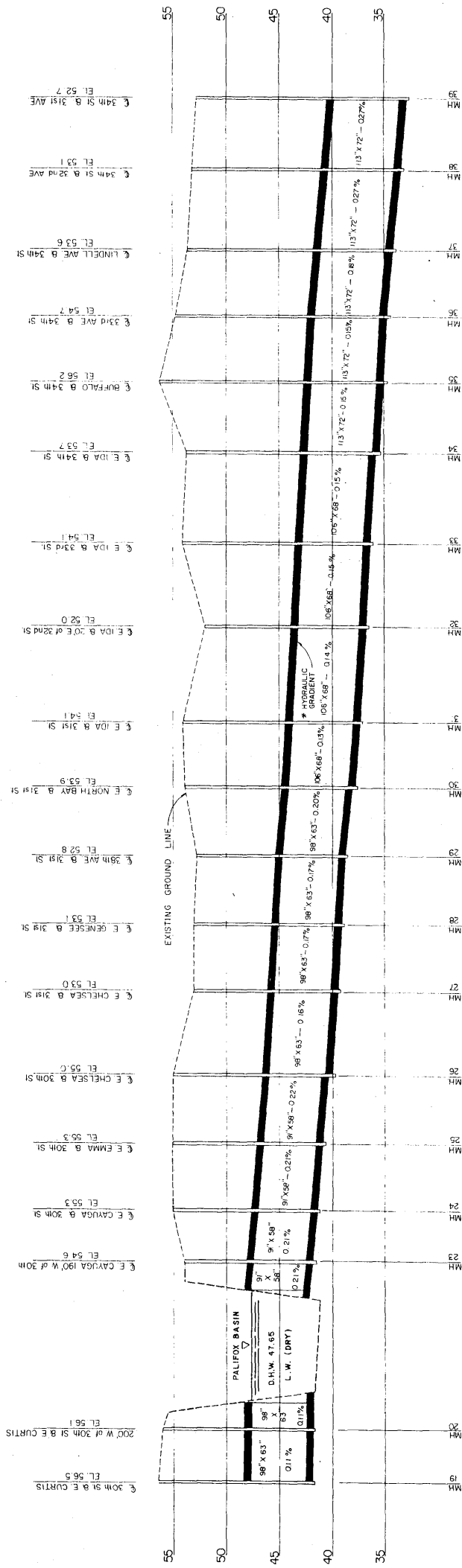
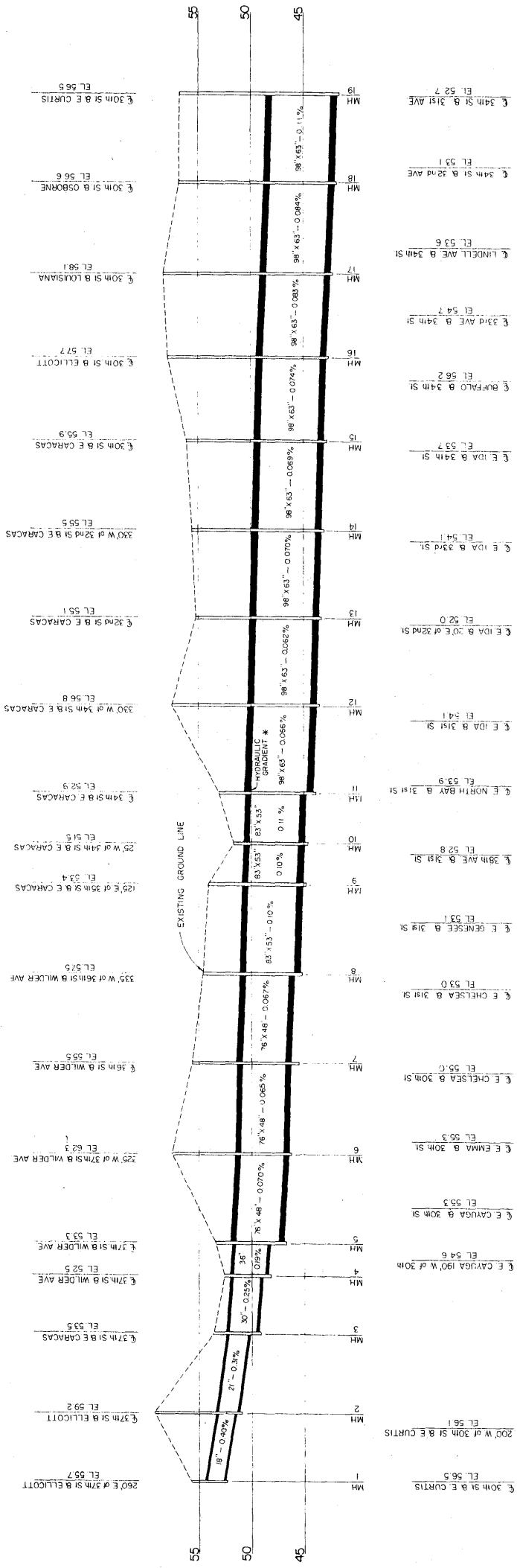
EXHIBIT "E"

EXHIBIT "F"

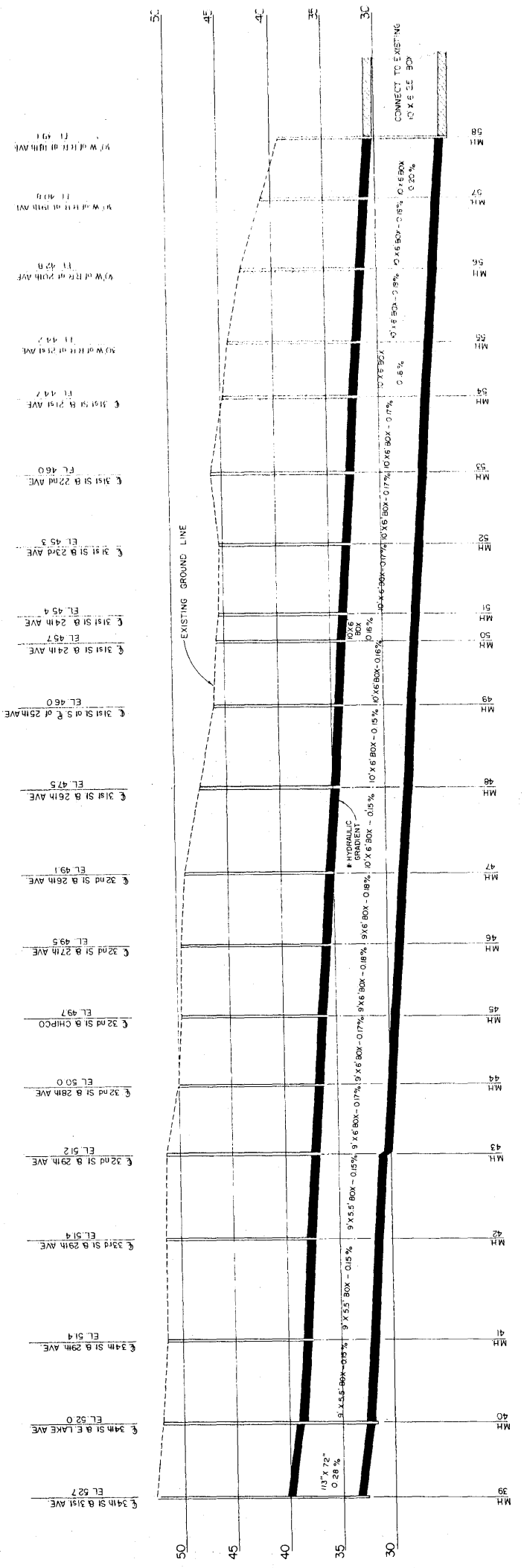


PROFILES  
SYSTEM No. I

Designed	Date	Drawn	Date	Checked	Date
Reviewed	Date	Approved	Date	Scale	
E.L.D. 8506					
PROJECT No A-7-13A					
SHEET 1 of 2					

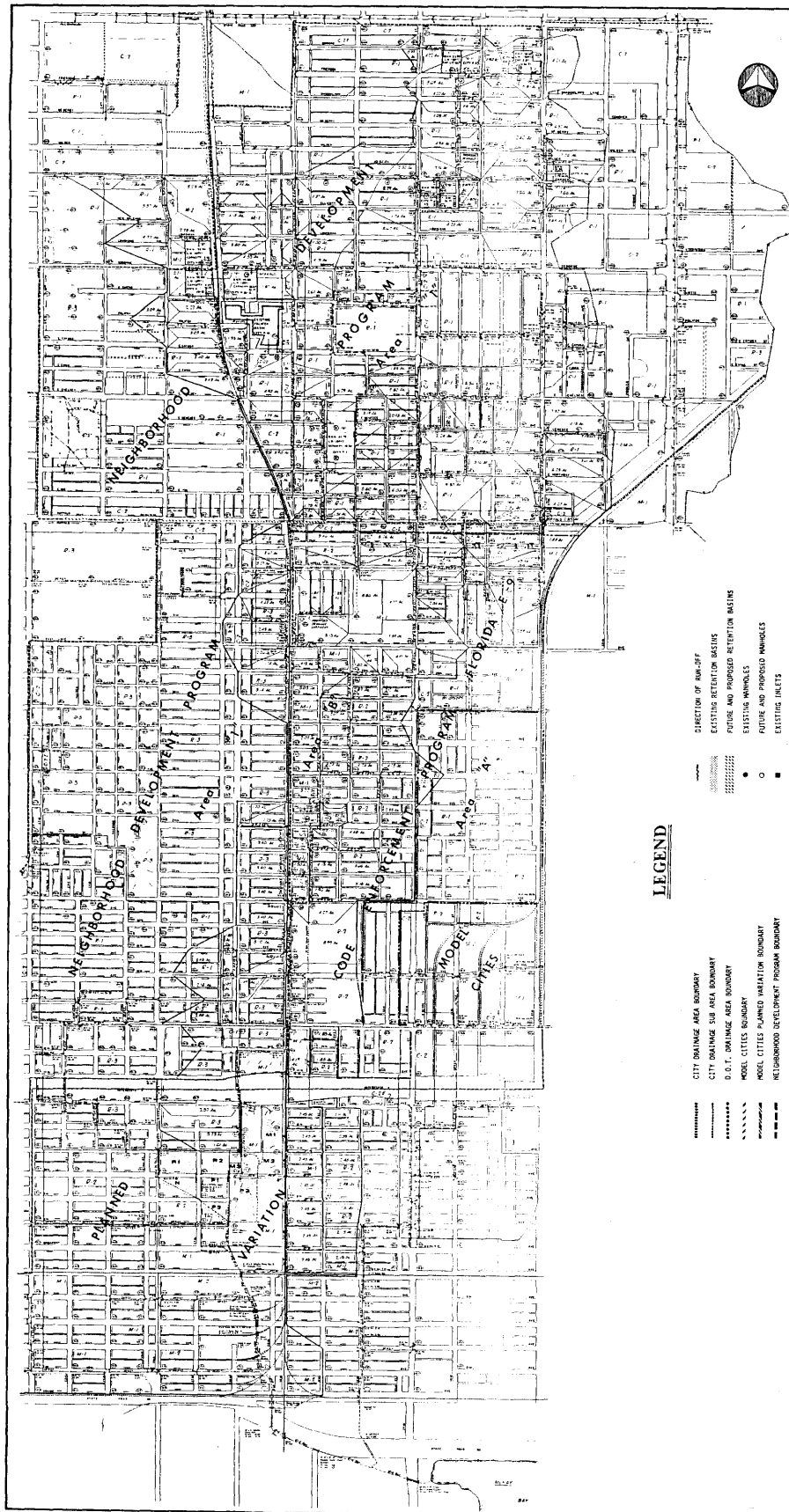


\* BASED ON 25 YEAR STORM



\* BASED ON 25 YEAR STORM

EXHIBIT "G"



**LEGEND**

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>----- CITY DRAINAGE AREA BOUNDARY</li> <li>----- CITY DRAINAGE SUB AREA BOUNDARY</li> <li>----- D.O.T. DRAINAGE AREA BOUNDARY</li> <li>----- MODEL CITIES BOUNDARY</li> <li>----- NEIGHBORHOOD DEVELOPMENT PROGRAM BOUNDARY</li> <li>----- CODE ENFORCEMENT PROGRAM, FLORIDA E-3 BOUNDARY</li> <li>----- CODE ENFORCEMENT PROGRAM, FLORIDA E-3, SUB AREA BOUNDARY</li> <li>----- EXISTING ZONING BOUNDARY</li> <li>----- EXISTING ZONING CLASSIFICATIONS</li> <li>----- EXISTING CITY STORM SEWERS *</li> <li>----- FUTURE AND PROPOSED CITY STORM SEWERS *</li> <li>----- EXISTING DITCHES</li> <li>----- EXISTING EASEMENTS</li> <li>----- FUTURE OR PROPOSED DRAINAGE EASEMENTS</li> </ul> | <ul style="list-style-type: none"> <li>----- DIRECTION OF FLOW/SEIF</li> <li>----- EXISTING RETENTION BASINS</li> <li>----- FUTURE AND PROPOSED RETENTION BASINS</li> <li>----- EXISTING MANHOLES</li> <li>----- FUTURE AND PROPOSED MANHOLES</li> <li>----- EXISTING INLETS</li> <li>----- FUTURE AND PROPOSED INLETS</li> <li>----- EXISTING STREET INTERSECTING ELEVATIONS **</li> <li>----- EXISTING LOW OR HIGH FLOW ELEVATIONS **</li> <li>----- DESIGN HIGH WATER</li> <li>----- LOW WATER</li> <li>----- PROPOSED STRUCTURE NUMBER</li> </ul> |
|--|---|

\* All Pipes are R.C.P. unless otherwise indicated.  
 \*\* All Existing Elevations shown are as provided by the City of Tampa.

**PUBLIC WORKS DEPARTMENT**  
 CITY OF TAMPA, FLORIDA

**DRAINAGE MAP**  
**SYSTEM No. II**

PROJECT No. A-7-13A

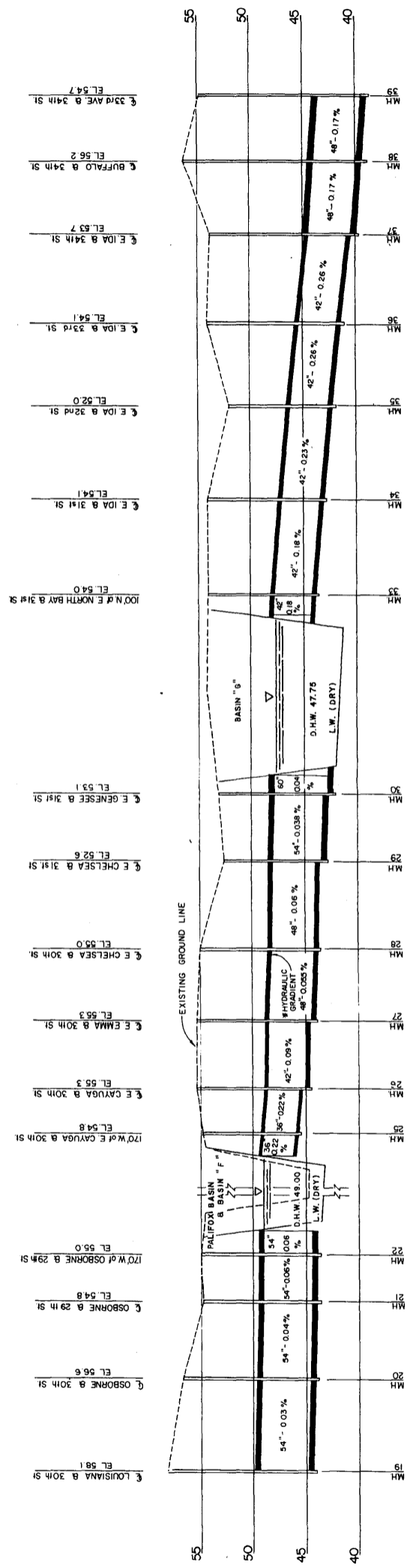
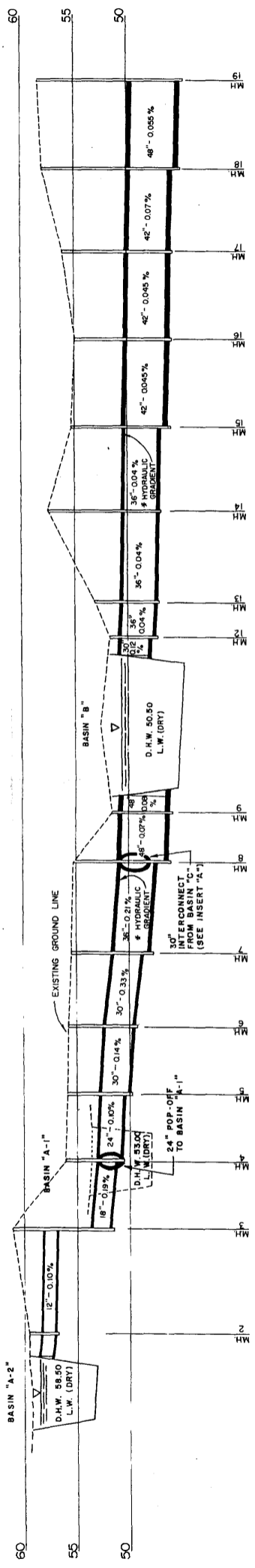
SHEET 1 of 1

EXHIBIT "G"

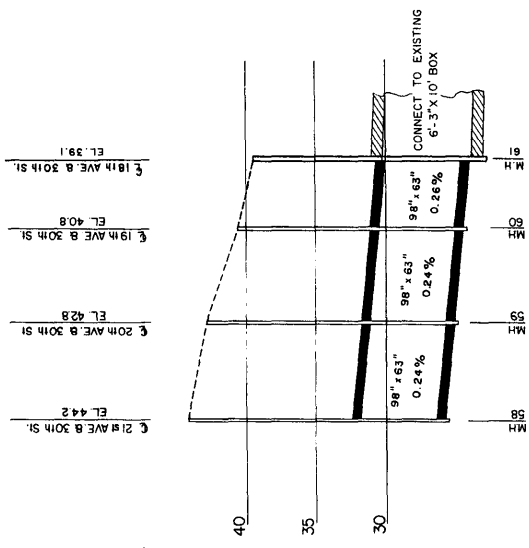
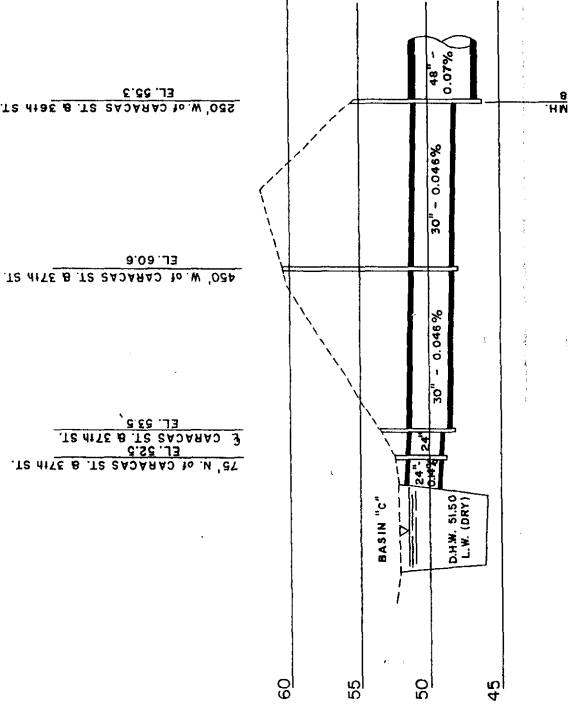
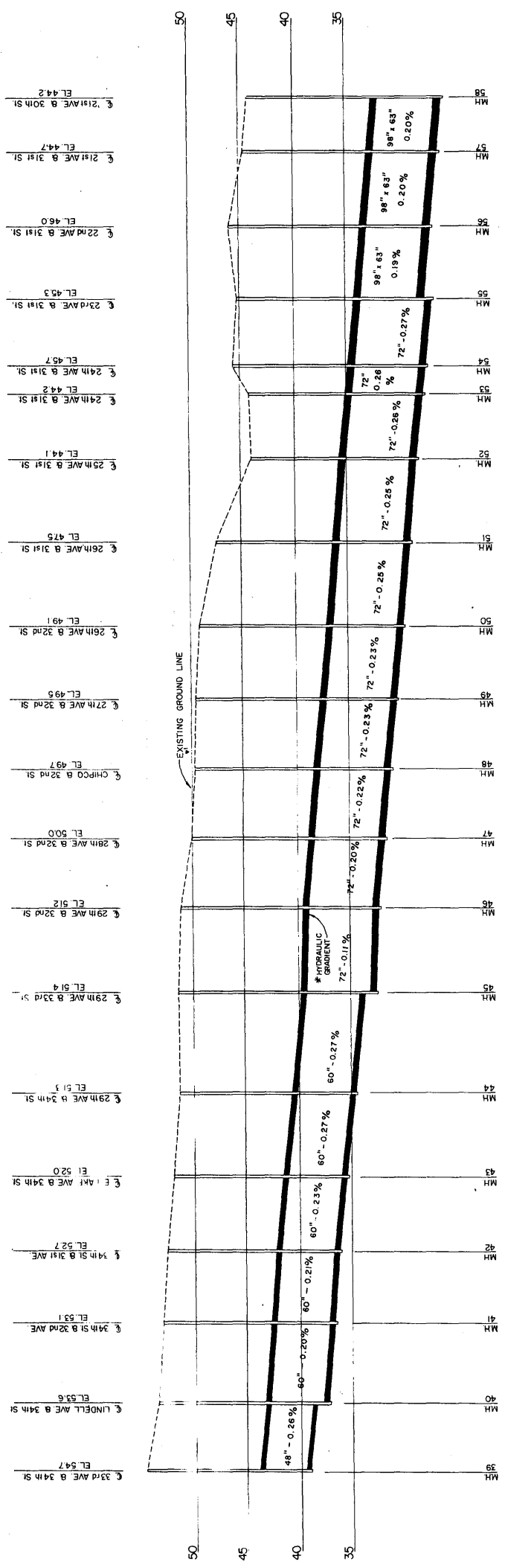
EXHIBIT "H"

PROFILES  
SYSTEM No. II

Checked	Date	Checked	Date
Designed	Date	Reviewed	Date
FIELD BOOK			
PROJECT No. A-7-13A			
SHEET 1 of 2			



\* BASED ON 25 YEAR STORM



\* BASED ON 25 YEAR STORM

**APPENDICES**



DRAINAGE CALCULATIONS

SYSTEM I

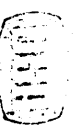
STORM SEWER TABULATION FORM

PROJECT 7052-F ROAD MODEL CITIES DRAINAGE STUDY

COUNTY HILLSBOROUGH BY C.R.S. SHEET NO. 1 OF 25

DATE 9-30-71

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			C = 0.95	C = 0.75	C = 0.25						Q 5	Q 25		UPPER END	LOWER END	FALL (IN FEET)					
M	1 260	260	2.83	3.83	0.96	15.0	1.2	7.0	0.96	6.72	55.7	54.14	53.10	1.04	18"	0.40	3.7	6.7	START TRUNK LINE AT CUL-DE-SAC ON ELLICOTT WEST OF 37TH ST.		
M	2 300	300	1.35	5.18	1.30	16.2	1.4	6.75	1.30	8.78	59.2	53.10	52.17	0.93	21"	0.31	3.6	8.8			
M	3 215	215	7.66	12.84	3.21	17.6	0.9	6.5	3.21	20.87	53.5	52.17	51.63	0.54	30"	0.25	4.2	20.9			
M	4 125	125	7.26	20.10	5.03	18.5	0.4	6.4	5.03	32.19	52.5	51.63	51.39	0.24	36"	0.19	4.5	32.2			
	1		1.12	1.12	1.06	15.0	0.8	7.0	1.41	9.87	60.1	59.33	58.57	0.76	21"	0.38	4.0	9.9	START STUB LINE AT GREEN AVE. 220' WEST OF 37TH ST.		
S	5 200	200	1.38	1.38	0.35				1.41	9.87	60.1	58.57	57.61	0.96	21"	0.37	3.9	9.6			
2				1.12	1.06	15.8	1.1	6.8	1.41	9.59	64.3	58.57	57.61	0.96	21"	0.37	3.9	9.6			
S	5 260	260		1.38	0.35				1.41	9.59	64.3	58.57	57.61	0.96	21"	0.37	3.9	9.6			
3			3.86	4.98	4.73	16.9	1.1	6.6	5.96	39.34	60.1	57.61	53.21	4.40	30"	0.88	7.8	39.3			
S	5 500	500	3.54	4.92	1.23				5.96	39.34	60.1	57.61	53.21	4.40	30"	0.88	7.8	39.3			
4				4.98	4.73	18.0	0.2	6.5	6.57	42.71	57.9	53.21	52.05	1.16	30"	1.05	8.4	42.7			
S	5 110	110	2.44	7.36	1.84				6.57	42.71	57.9	53.21	52.05	1.16	30"	1.05	8.4	42.7			
5				4.98	4.73	18.2	0.4	6.45	7.59	48.96	55.3	52.05	51.39	0.66	36"	0.44	6.8	49.0	STUB LINE TIES INTO TRUNK LINE AT WILDER AVE. AND 37TH ST.		
S	5 150	150	4.08	11.44	2.86				7.59	48.96	55.3	52.05	51.39	0.66	36"	0.44	6.8	49.0			
5						19.0	1.3	6.3	13.22	83.29	53.3	51.39	51.16	0.23	36"	0.70	4.1	83.3			
M	5 325	325	2.42	33.96	8.49				13.22	83.29	53.3	51.39	51.16	0.23	36"	0.70	4.1	83.3			



SYSTEM NO. I

SHEET NO. 1 OF 25

DATE 9-30-71

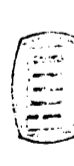
PROJECT 7052-F

ROAD MODEL CITIES DRAINAGE STUDY

COUNTY HILLSBOROUGH BY C.R.S.

SHEET NO. 2 OF 25

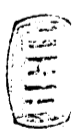
# DRAINAGE ENGINEERING ASSOCIATES STORM SEWER TABULATION FORM



SYSTEM No. 1

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			C = 0.95	C = 0.75	C = 0.25						0.25	0.5		CROWN EL.	FLOW LINE EL.						
	6	340	4.98	4.73	20.3	1.5	6.15	1/3.22	81.30	57.5±	51.16	50.94	0.22	76" x 48"	0.065	3.9	81.3				
	M	340	33.96	8.49							50.94	50.72	0.22								
	7	335	4.98	4.73	21.8	1.4	5.95	1/3.86	82.47	55.5				76" x 48"	0.067	4.0	82.5				
	M	335	36.53	9.13																	
	1	335	0.36	0.34	15.0	2.8	7.0	0.50	3.50	56.3	53.74	52.87	0.37	18"	0.11	2.0	3.5				START STUB LINE AT GIDDONS AVE. AND 34th STREET.
	5	260	0.63	0.16	17.8	1.1	6.5	3.10	20.15	53.8	52.87	52.27	0.60	30"	0.23	4.0	20.2				
	2	260	2.21	2.44	18.9	1.0	6.3	4.56	28.73	56.1	52.27	51.89	0.38	36"	0.15	4.0	28.7				INCLUDES AREA (DRAINAGE) OF STUB RUN TO EAST. FRIERSON AVE & 36th STREET.
	3	250	0.24	2.67	19.9	0.8	6.2	6.19	38.38	54.8±	51.89	51.21	0.68	36"	0.27	5.3	38.4				INCLUDES AREA (DRAINAGE) OF STUB RUN TO EAST SHADOWLAWN & 36th STREET.
	4	250	4.94	2.67	20.7	0.9	6.15	7.84	48.22	54.5±	51.21	50.72	0.49	42"	0.19	4.9	48.2				INCLUDE AREA (DRAINAGE) OF STUB RUN TO EAST M5 BERRY & 36th STREET.
	5	260	6.49	3.52	23.2	1.1	5.75	22.94	131.91	54.5±	50.72	50.38	0.34	83" x 53"	0.10	5.3	131.9				STUB LINE FROM NORTH TIES INTO TRUNK LINE AT WILDER AVE. 360'± WEST OF 36th STREET.
	5	260	2.81	2.67	24.3	0.5	5.7	22.94	130.76	54.0±	50.38	50.23	0.15	83" x 53"	0.10	5.3	130.8				
	8	340	7.79	7.40	24.8	0.6	5.6	24.19	135.46	51.5	50.23	50.02	0.21	83" x 53"	0.11	5.4	135.5				
	M	340	4.94	15.54																	
	9	150	7.79	7.40																	
	M	150	62.14	15.54																	
	10	190	7.79	7.40																	
	M	190	67.14	16.79																	

STORM SEWER TABULATION FORM



DATE 10-18-71 PROJECT 7052-F ROAD MODEL CITIES DRAINAGE STUDY COUNTY HILLSBOROUGH BY GRS & JLN SHEET NO. 3 OF 25

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G. CROWN EL.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			INCREMENT	SUB TOTAL	0.25						0.5	UPPER END		LOWER END							
1	340	0.24	0.24	0.23	15.0	7.0	0.54	3.78	61.2	52.88	52.27	0.61	18"	0.18	2.5	4.4	START STUB LINE AT 36th ST. AND FRIERSON AVE. TIES INTO STUB LINE 340' W. OF 36th ST.				
1	340	2.27	2.27	0.57	15.0	7.0	0.57	3.99	58.0	52.50	51.89	0.61	18"	0.18	2.5	4.4	START STUB LINE AT 36th ST. AND SHADOWLAWN AVE. TIES INTO STUB LINE 340' W. OF 36th ST.				
3	340	2.34	2.34	0.59	15.0	7.0	0.59	4.13	55.8	51.82	51.21	0.61	18"	0.18	2.5	4.4	START STUB LINE AT 36th ST. AND McBERRY. TIES INTO STUB LINE 340' W. OF 36th ST.				

NOTES

STORM SEWER TABULATION FORM

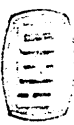
DATE 9-30-71

PROJECT 7052-F

ROAD MODEL CITIES DRAINAGE STUDY

COUNTY HILLSBOROUGH BY C.R.S.

SHEET NO. 4 OF 25

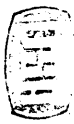


STATION NO. 110.12

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			C = 0.95	C = 0.75	C = 0.25						0.25	0.5		UPPER END	LOWER END	FALL (IN FEET)					
1	240		4.31	4.31	1.08	15.0	1.0	7.0	1.08	7.56	62.1	57.56	56.31	1.25	18"	0.52	4.2	7.6		START STUB LINE AT ELLICOTT AVENUE AND 34TH STREET.	
2	210		-	-	-	16.0	0.6	6.8	1.52	10.34	60.1	56.31	54.25	2.06	18"	0.98	5.8	10.4			
3	215		0.72	0.72	0.68	16.6	0.6	6.7	2.98	19.97	54.9	54.25	52.57	1.68	24"	0.78	6.3	20.0			
4	190		3.13	9.20	2.30	17.2	0.5	6.6	3.42	22.57	56.2	52.57	50.75	1.82	24"	0.96	7.0	22.6			
5	140		1.74	10.94	2.74	17.7		6.5	4.56	29.64	51.6	50.75	50.02	0.73	30"	0.52	6.0	29.6			
5			4.59	15.53	3.88																
11	330		-	8.51	8.08	25.4	1.2	5.55	29.32	162.73	52.9	50.02	49.80	0.22	30"x63"	0.066	4.7	162.7		STUB LINE FROM SOUTH TIES INTO TRUNK LINE AT E. CARACAS AND 34TH STREET	
12	330		2.30	84.97	21.24																
12			-	8.51	8.08	26.6	1.2	5.45	29.32	159.79	57.4	49.80	49.60	0.20	30"x63"	0.062	4.6	159.8			
13	330		-	84.97	21.24																
13			-	8.51	8.08	27.8	1.1	5.3	31.96	169.39	55.1	49.60	49.37	0.23	30"x63"	0.070	4.9	169.4			
14	330		10.54	95.51	23.88																
14			-	8.51	8.08	28.9	1.1	5.25	31.96	166.37	55.57	49.37	49.14	0.23	30"x63"	0.069	4.8	166.4			
15	320		-	95.51	23.88																
15			-	8.51	8.08	30.0	1.1	5.15	34.09	175.56	55.9	49.14	48.90	0.24	30"x63"	0.074	5.0	175.6			
16	320		2.07	2.07	1.55																
16			2.30	71.81	24.45																
16			-	8.51	8.08	31.1	1.0	5.05	36.73	185.49	57.7	48.90	48.63	0.27	30"x63"	0.083	5.3	185.5			
M			2.57	4.64	3.48																
M			2.85	100.66	25.17																

INCLUDES AREA (DRAINAGE) OF STUB RUN WEST ELLICOTT AVE & 29TH STREET.

STORM SEWER TABULATION FORM



DATE 10-18-71

PROJECT 7052-F

ROAD MODEL CITIES DRAINAGE STUDY

COUNTY HILLSBOROUGH BY J.C. NASH

SHEET NO. 5 OF 25

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			INCREMENT	SUB TOTAL	Q 25						Q 5	UPPER END		LOWER END	FLOW LINE EL.						
1	240		2.57	2.57	1.93	15.0		7.0	1.93	13.51	57.3	52.81	48.90	3.91	18"	1.63	7.5	13.5		START STUB LINE AT 29TH ST. AND ELLICOTT ST. TIES INTO TRUNK LINE AT 30th ST. AND ELLICOTT ST.	
S																					
1	290		0.18	0.18	0.17	15.0		7.0	3.39	23.73	54.8	51.68	48.34	3.34	24"	1.15	7.4	23.7		START STUB LINE AT 29th ST. AND OSBORNE AVE. TIES INTO TRUNK LINE AT 30th ST. AND OSBORNE AVE.	
S			3.58	3.58	2.69																
			2.13	2.13	0.53																
1	605					15.0		7.0	0.61	4.27	57.0	49.43	48.34	1.09	18"	0.18	2.5	4.4		START STUB LINE AT 32nd ST. AND OSBORNE AVE. TIES INTO TRUNK LINE AT 30th ST. AND OSBORNE AVE.	
S			2.43	2.43	0.61																

NOTES

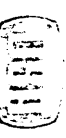
DATE 9-30-71

PROJECT 7052-JF

ROAD MODEL CITIES DRAINAGE STUDY

COUNTY HILLSBOROUGH BY C.R.S.

SHEET NO. 6 OF 25



SYSTEM NO. 1

TYPE OF STRUCTURE	STRUCTURE NO.	TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
				INCREMENT	SUB TOTAL	C = 0.95						C = 0.75	C = 0.25		Q 25	Q 5						
MH	17	M	340	-	8.51	8.08	32.1	1.1	4.95	37.73	186.76	58.1	48.63	48.34	0.29	18" x 63"	0.084	5.4	186.8			
MH	18	M	330	0.38	8.89	8.45	33.2	1.0	4.9	43.02	210.80	56.6	48.34	47.98	0.36	18" x 63"	0.11	6.0	210.8	INCLUDES AREA (DRAINAGE) OF STUB RUN EAST TO 32 <sup>ND</sup> ST. & OSBORNE. ALSO INCLUDES STUB RUN TO WEST 29 <sup>TH</sup> ST. & OSBORNE AVE.		
MH	19	M	200	1.35	10.24	9.73	34.2	0.5	4.8	44.52	213.70	56.5	47.98	47.76	0.22	18" x 63"	0.11	6.1	213.7			
MH	20	M	100	-	10.24	9.73	34.7	0.3	4.8	44.61	214.12	56.1	47.76	47.65	0.11	18" x 63"	0.11	6.1	214.1			
MH	21	M		0.37	11.40	28.50	35.0						47.65								OUTFLOW INTO EXISTING PALIFOX RETENTION BASIN.	

NOTES

REMARKS

# DIAZ, SECKINGER & ASSOCIATES

## STORM SEWER TABULATION FORM

PROJECT 7052-F ROAD MODEL CITIES DRAINAGE STUDY

COUNTY HILLSBOROUGH BY J.C.N.

SHEET NO. 7 OF 25



SYSTEM NO. I

DATE 9-29-71

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	NOTES
			INCREMENT	SUB TOTAL	0.25						0.5	UPPER END		LOWER END	FALL (IN FEET)						
	1	440	-	-	0.53	15.0	2.9	7.0	0.53	3.71		57.80	57.00	0.80	18"	0.18	2.5	4.5		BEGIN STUB LINE 440' WEST OF 26TH ST. ON CARACAS ST.	
	5		2.11	2.11																	
	2	320	-	-		17.9	1.5	6.5	0.99	6.44		57.00	55.85	1.15	18"	0.36	3.6	6.4			
	3		1.84	3.95	0.99																
	3	150	-	-	0.63	19.4	0.5	6.3	2.80	17.64		55.85	54.98	0.87	24"	0.58	5.5	17.6			
	3		0.84	0.84	0.63																
	3		4.73	8.68	2.17																
	4	250	-	-	0.63	19.9	0.8	6.2	2.80	17.36		54.98	53.58	1.40	24"	0.56	5.4	17.4			
	5		-	-	0.63																
	5	250	-	-	0.63	20.7	1.0	6.1	3.52	21.47		53.58	52.93	0.65	30"	0.26	4.3	21.5			
	5		2.87	11.55	2.89																
	6	250	-	-	0.99	21.7	0.8	6.0	4.42	26.52		52.93	51.90	1.03	30"	0.41	5.3	26.5			
	6		0.48	1.32	0.99																
	6		2.17	13.72	3.43																
	7	250	-	-	0.99	22.5	0.5	5.9	4.42	26.08		51.90	49.76	2.14	30"	0.86	7.6	38.0			
	7		-	-	0.99																
	7		-	-	3.43																
	1	275	-	-	3.93	15.0	1.6	7.0	3.93	27.51		50.60	50.43	0.17	42"	0.062	2.8	27.5		BEGIN STUB LINE @ CARACAS ST & R.R. (WEST SIDE OF R/W)	
	1		5.23	5.23	3.93																
	2	325	-	-	3.93	16.6	2.0	6.7	3.93	26.33		50.43	50.24	0.19	42"	0.058	2.7	26.3			
	2		-	-	3.93																
	3	320	-	-	6.82	18.6		6.4	6.85	43.84		50.24	49.76	0.48	42"	0.15	4.4	43.8		TIES INTO MAIN STUB LINE @ OSBORNE AVE. & R.R.	
	3		3.86	9.09	6.82																
	3		0.13	0.13	0.03																



# DIAZ, SECKINGER & ASSOCIATES

## STORM SEWER TABULATION FORM



SYSTEM NO. 7

DATE 9-29-71 PROJECT 1052-F ROAD MODEL CITIES DRAINAGE STUDY COUNTY HILLSBOROUGH BY J.C.N. SHEET NO. 8 OF 25

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)		SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS	
			C=	C=						Q 25	Q 5		CROWN EL.	FLOW LINE EL.							
	8	330	3.03	13.44	10.08	23.0	0.9	5.8	13.59	78.82		49.76	48.97	0.79	48"	0.24	6.2	78.8			
	9		0.18	14.03	3.51																
	1	300	-			15.0	0.6	7.0	0.77	5.39		57.30	56.52	0.78	18"	0.26	3.0	5.4		BEGIN STUB LINE @ PALIFOX ST. & 26TH ST.	
	5-2		3.09	3.09	0.77																
	2	250	-			15.6	0.7	6.8	0.77	5.25		56.52	53.65	2.87	18"	1.15	6.4	11.4			
	5-2		-																		
	1	260	-			15.0	0.8	7.0	0.86	6.02		56.10	55.24	0.86	18"	0.32	3.3	6.0		BEGIN STUB LINE @ EMMA ST. & R.R.	
	5-3		3.43	3.43	0.86																
	2	270	-			15.8		6.9	1.76	12.14		55.24	53.65	1.59	21"	0.69	5.0	12.1		TIES INTO STUB LINE S-2 @ PALIFOX ST. & R.R.	
	5-3		3.60	7.03	1.76																
	3	255	-			16.3		6.7	3.29	22.04		53.65	48.97	3.68	24"	1.44	8.5	27.3		TIES INTO MAIN STUB LINE @ CURTIS ST. & R.R. (WEST SIDE OF R/W)	
	5-2		3.03	13.15	3.29																
	9	50	-			23.9	0.1	5.7	18.73	106.76		48.97	48.78	0.19	48"	0.38	8.4	106.8		R.R. CROSSING	
	5		1.82	15.26	11.44																
	5		1.96	29.14	7.29																



SYSTEM NO. 1

SHEET NO. 25 OF 25

# DIAZ, SECKINGER & ASSOCIATES STORM SEWER TABULATION FORM

HILLSBOROUGH COUNTY  
NOTES

PROJECT 1052-F  
ROAD MODEL CITIES DRAINAGE STUDY

DATE 9.29.71

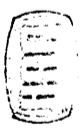
STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
		INCREMENT	SUB TOTAL	SUB-TOTAL (CA)					Q 5	Q 25		UPPER END	LOWER END	FALL (IN FEET)					
1	280	3.44	3.44	2.58	15.0	1.9	7.0	2.58	18.06		50.60	50.43	0.17	36"	0.06	2.5	18.1		
S-4																			
2	325	4.18	7.62	5.72	16.9	1.4	6.6	5.72	37.75		50.43	50.04	0.39	42"	0.12	3.8	37.8		
S-5																			
3	360	3.80	11.42	8.57	18.3	1.4	6.4	8.57	54.85		50.04	49.61	0.43	48"	0.12	4.3	54.9		
S-5																			
4	285		11.42	8.57	19.7		6.3	8.57	53.99		49.61	48.78	0.83	48"	0.29	6.7	85.0		TIES INTO MAIN STUB LINE @ CURTIS ST. & R.R. (EAST SIDE OF R/W)
S-5																			
10	100		26.68	20.01	24.0	0.2	5.7	28.15	160.46		48.78	48.23	0.45	54"	0.45	9.8	160.5		
S		3.40	32.54	8.14															
11	100		26.68	20.01	24.2	0.2	5.7	28.15	160.46		48.23	47.78	0.45	54"	0.45	9.8	160.5		
S			32.54	8.14															
12					24.4						47.78								
S																			
H'WALL																			
S																			

OUTFLOW INTO EXISTING PALIFOX  
RETENTION BASIN

REMARKS  
BEGIN STUB LINE @ CARACAS ST. & R.R.  
(EAST SIDE OF R/W)

DIAZ, SECKINGER & ASSOCIATES

STORM SEWER TABULATION FORM



SYSTEM NO. 1

SHEET NO. 10 OF 25

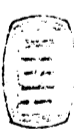
DATE 9-30-71 PROJECT 7052-F ROAD MODEL CITIES DRAINAGE STUDY COUNTY HILLSBOROUGH BY C.R.S.

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			C = 0.95	C = 0.75	C = 0.25						Q 25	Q 5		UPPER END	LOWER END						
HEAD WALL	22 M	100				72.0	1.1				241.4		47.65	47.44	0.21	9" x 58"	0.21	8.2	241.4	OUTFALL FROM EXISTING PALIFOX RETENTION BASIN - A FIXED RATE OF 241.4 CFS D.H.W. 47.65	
MH	23 M	190										54.07	47.44	47.04	0.40	9" x 58"	0.21	8.2	241.4		
MH	24 M	250										55.3	47.04	46.51	0.53	9" x 58"	0.21	8.2	241.4		
MH	25 M	255	0.96	0.96	0.91	73.1	0.5	3.08		3.70	55.3	46.51	45.95	0.56	9" x 58"	0.22	8.2	245.1			
MH	26 M	315	1.15	1.15	0.29				1.20	245.10	55.3	45.95	45.45	0.50	9" x 58"	0.16	7.3	252.4			
MH	26 M	315	1.69	2.65	2.52	73.6	0.7	3.05	3.61	11.01	55.0	45.45	45.45	0.50	18" x 63"	0.16	7.3	252.4			
MH	26 M	315	3.21	4.36	1.09					252.41	55.0										
INLET	1 S	230									51.7	49.38	48.51	0.87	18"	0.38	3.6	6.5		START STUB LINE AT E. GENESEE & 32 <sup>ND</sup> ST. SIZED ON FLOW FULL 5 YEAR DESIGN - ABOVE 25 YEAR HYDRAULIC GRADIENT	
MH	2 S	350	4.82	4.82	1.21	15.0	1.1	5.4	1.21	6.53	51.7	49.38	48.51	0.87	18"	0.38	3.6	6.5		INTERSECTION OF E. CHELSEA & 32 <sup>ND</sup> ST. SIZED ON 5 YEAR FLOW FULL	
MH	2 S	350	0.51	5.33	1.33	16.1		5.2	1.33	6.92	54.7	48.51	47.00	1.51	18"	0.43	3.9	6.9			
MH	27 M	250	0.46	3.11	2.95	74.3	0.6	3.03	6.64	20.12	53.0	45.45	45.02	0.43	18" x 63"	0.17	7.5	261.5		STUB LINE FROM EAST TIES IN AT INTERSECTION E. CHELSEA & 31 <sup>ST</sup> ST.	
MH	27 M	250	5.05	14.74	3.69					261.52	53.0										
MH	1 S	320	0.32	0.32	0.30				0.67		55.0	49.61	49.00	0.61	18"	0.19	2.5	4.5		INTERSECTION OF E. GENESEE & 30 <sup>TH</sup> ST. SIZED ON 5 YEAR DESIGN - FOR MIN. VELOCITY OF 2.5 F.P.S.	
MH	1 S	320	1.47	1.47	0.37	15.0		5.4	0.67	3.62	55.0	49.61	49.00	0.61	18"	0.19	2.5	4.5			

STORM SEWER TABULATION FORM

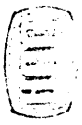
DATE 9-30-71 PROJECT 7052-F ROAD MODEL CITIES DRAINAGE STUDY COUNTY HILLSBOROUGH BY C.R.S. SHEET NO. 11 OF 25

TYPE OF STRUCTURE	STRUCTURE NO.	TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
				C = 0.95	C = 0.75	C = 0.25						0.25	0.5		UPPER END	LOWER END						
M	28	255	0.28	3.71	3.52	74.9	0.6	3.01	7.69	23.15	264.55	53.1	45.02	44.59	0.43	28" x 63"	0.17	7.6	264.6	STUB LINE FROM WEST TIES IN. AT E. GENESEE & 31ST ST.		
I	5	320	3.90	3.90	3.71	15.0	0.8	5.4	3.71	20.03	54.6	51.60	49.14	2.46	24"	0.77	6.3	20.0	STUB LINE AT 38TH AVE & 30TH ST. SIZE 5 YEAR FLOW FULL			
M	29	255	1.26	8.87	8.43	75.5	0.5	3.0	13.22	39.66	281.06	52.8	44.59	44.08	0.51	28" x 63"	0.20	8.2	281.1	STUB LINE FROM WEST TIES IN. AT 38TH AVE & 31ST ST.		
I	5	320	0.73	0.73	0.69	15.0	5.4	0.76	4.10	55.5	53.00	52.39	0.61	18"	0.19	2.5	4.5	STUB LINE AT INTERSECTION E. NORTH BAY & 30TH ST. - SIZED TO 2.5 FPS. VELOCITY				
M	30	250	0.60	10.20	9.69	76.0	0.6	2.99	15.86	47.42	288.82	53.9	44.08	43.76	0.32	16" x 68"	0.13	7.2	288.8	STUB LINE FROM WEST TIES IN		
I	1	240	1.42	1.42	1.35	15.0	5.4	1.35	7.29	54.8	51.80	50.65	1.15	18"	0.48	4.0	7.3					



SYSTEM NO. I

STORM SEWER TABULATION FORM



DATE 9-30-71

PROJECT 7052-F

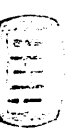
ROAD MODEL CITIES DRAINAGE STUDY

COUNTY HILLSBOROUGH BY C.R.S.

SHEET NO. 12 OF 25

TYPE OF STRUCTURE	STRUCTURE NO.	TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	NOTES
				INCREMENT	SUB TOTAL	0.25						0.5	CROWN EL.		FLOW LINE EL.							
M	31	360	1.11	12.73	12.09	18.43	76.6	0.8	2.98	18.43	54.92	296.32	43.76	43.26	0.50	89" x 68"	0.14	7.4	296.5		REMARKS	
M	32	310	0.64	25.34	6.34	20.31	77.4	0.7	2.96	20.31	60.12	301.52	43.26	42.79	0.47	106" x 68"	0.15	7.5	301.5			
M	33	340	4.91	30.25	7.56	20.31	78.1	0.8	2.95	20.31	59.91	301.31	42.79	42.28	0.51	106" x 68"	0.15	7.5	301.3			
1	1	360	-	-	-	1.51	15.0	1.3	5.4	1.51	8.15	58.5	54.35	52.23	2.12	18"	0.59	4.5	8.2		START STUB RUN AT INTERSECTION OF CHELSEA & 36TH ST.	
2	2	450	6.04	6.04	1.51	3.04	16.3	1.5	5.2	3.04	15.81	55.5	52.23	50.11	2.12	24"	0.47	4.9	15.8			
3	3	240	0.83	0.83	0.21	0.82	15.0	1.6	5.4	0.82	4.43	57.0	53.63	53.20	0.43	18"	0.18	2.5	4.4			
3	3	330	3.06	3.70	3.52	7.54	17.8	1.1	5.0	7.54	37.70	56.2	50.11	49.25	0.86	36"	0.26	5.2	37.7			
4	4	190	0.60	4.30	4.08	8.77	18.9	0.5	4.9	8.77	42.97	56.2	49.25	48.60	0.65	36"	0.34	6.0	43.0			
5	5		2.65	18.75	4.69																	

STORM SEWER TABULATION FORM

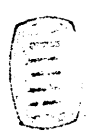


DATE 9-30-71 PROJECT 7052-F ROAD MODEL CITIES DRAINAGE STUDY COUNTY HILLSBOROUGH BY C.R.S. SHEET NO. 13 OF 25

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			INCREMENT	SUB TOTAL	C = 0.95						C = 0.75	C = 0.25		Q 25	Q 5	UPPER END					
1	S-E 270		0.14	0.14	0.13				0.34	1.89	54.6	50.82	50.33	0.49	18"	0.18	2.5	4.5		START STUB LINE AT E. GENESEE & 33RD ST SIZE ON 5 YR - 2.5 F.P.S. MIN. VELOCITY	
2	S-E 345		0.87	1.01	0.96			5.1	2.24	11.42	53.3	50.33	48.60	1.73	21"	0.50	4.6	11.4			
5	S 280		-	5.31	5.04			4.8	11.01	52.85	55.9	48.60	47.20	1.40	36"	0.50	7.3	52.9			
5-E	230		2.87	2.87	0.72			5.4	0.72	3.89	57.7	53.62	53.21	0.41	18"	0.18	2.5	4.5		START STUB LINE AT 38TH AVE & WEBSTER SIZED ON 5 YEAR - 2.5 F.P.S. MIN. VELOCITY	
2	S-E 350		-	-	-			5.2	1.51	7.85	55.9	53.21	51.25	1.96	18"	0.56	4.4	7.9			
3	S-E 160		1.97	1.97	1.87			5.0	5.21	26.05	53.5	51.25	49.20	2.05	24"	1.28	8.0	26.1			
6	S 250		0.59	7.87	7.48			4.75	16.89	80.23	54.2	47.20	45.92	1.28	42"	0.51	8.2	80.2			
34	M 270		4.13	25.42	24.15			2.93	41.61	121.92	53.7	42.28	41.88	0.40	24"	0.15	7.8	363.3		INTERSECTION OF E. 10A & 24TH ST.	
			1.93	69.84	17.46					363.32											

NOTES

DIAZ, SECKINGER & ASSOCIATES



SYSTEM NO. 1

SHEET NO. 14 OF 25

STORM SEWER TABULATION FORM

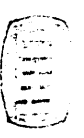
ROAD MODEL CITIES DRAINAGE STUDY COUNTY HILLSBOROUGH BY C.R.S.

NOTES

DATE 9-30-71

PROJECT 7052-F

STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS	
		INCREMENT	SUB TOTAL	Q 25						Q 5	UPPER END		LOWER END	FALL (IN FEET)							
35	250	-	25.42	24.15	79.5	0.5	2.92	41.61	121.50	362.90	56.2	41.88	41.50	0.38	15x72"	0.15	7.8	362.9			
M	250	-	69.84	17.46																	
1	220	6.68	6.68	5.01	15.0	0.6	5.4	5.56	30.02		55.9	53.16	49.90	3.26	24"	1.48	9.3	30.0		STUB LINE - INTERSECTION OF LINDELL AVE # 32 RD ST.	
S		2.18	2.18	0.55																	
1	250	1.51	1.51	1.43	15.0	1.0	5.4	1.43	7.72		54.4	51.23	49.90	1.33	18"	0.53	4.3	7.7		STUB LINE - INTERSECTION OF BUFFALO AVE. # 32 RD ST.	
S		-	-	-																	
2	180	1.29	2.80	2.66	16.0	0.4	5.2	9.26	48.15		52.4	49.90	49.11	0.79	36"	0.44	6.7	48.2		STUB LINE FROM NORTH TIES IN AT 33RD AVE # 32 RD ST.	
S		4.17	6.35	1.59																	
3	450	1.95	4.75	4.51	16.4	0.9	5.1	11.94	60.89		52.3	49.11	46.05	3.06	36"	0.68	8.4	60.9			
S		-	6.68	5.01																	
3	450	3.31	9.66	2.42																	
S		-	-	-																	
36	250	1.45	31.62	30.04	80.0	0.5	2.9	55.33	160.46		54.7	41.50	41.05	0.45	15x72"	0.18	8.6	401.9			
M		-	6.68	5.01																	
M	250	1.61	81.11	20.28																	
1	240	0.46	0.46	0.34	15.0	0.9	7.0	1.13	7.91		57.4	55.41	54.07	1.34	18"	0.56	4.4	7.9		START STUB LINE "DIAZ-PEOPLE" ALT. AREA	
S		3.15	3.15	0.79																	
2	320	-	0.46	0.34	15.9	1.1	6.8	1.28	8.70		57.2	54.07	51.96	2.11	18"	0.66	4.7	8.7			
S		0.58	3.73	0.93																	



DATE 9-30-71

PROJECT 7052-F

ROAD MAPLE CITIES DRAINAGE STUDY

COUNTY HILLSBOROUGH BY C.R.S.

SHEET NO. 15 OF 25

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			C = 0.95	C = 0.75	C = 0.25						Q 25	Q 5		CROWN EL.	FLOW LINE EL.	UPPER END						
3	350		-	0.46	0.34	17.0	1.9	6.55	2.32	15.20	53.1	51.96	51.50	0.46	30"	0.13	3.0	15.2				
5			4.18	7.91	1.98							51.50	50.56	0.94								
4	240		-	0.46	0.34	18.9	0.8	6.35	4.15	26.35	57.5	50.56	49.61	0.95	30"	0.39	5.2	26.4				
5			7.32	15.23	3.81							50.56	49.61	0.95								
5	250		-	0.46	0.34	19.7	0.8	6.25	4.15	25.94	57.8	49.61	48.75	0.86	30"	0.38	5.1	25.9				
5			-	15.23	3.81							49.61	48.75	0.86								
6	330		0.83	1.29	0.97	20.5	1.1	6.1	6.13	37.39	57.2	48.75	48.39	0.36	36"	0.26	5.1	37.4				
5			5.42	20.65	5.16							48.75	48.39	0.36								
7	150		1.38	1.38	1.31	21.6	0.5	6.0	9.16	54.96	56.8	48.39	47.79	0.60	42"	0.24	5.5	55.0				
5			1.38	2.67	2.00							48.39	47.79	0.60								
8	250		-	1.38	1.31	22.1	0.8	5.95	9.16	54.50	57.7	47.79	47.79	0.02	42"	0.24	5.5	54.5				
5			-	2.67	2.00							47.79	47.79	0.02								
1	170		5.79	5.79	4.34	15.0	0.4	7.0	5.41	37.87	54.2	5.20	49.81	1.39	30"	0.82	7.5	37.9				
5-1			4.28	4.28	1.07							5.20	49.81	1.39								
2	215		-	5.79	4.34	15.4	0.4	6.9	5.82	40.16	54.5	49.81	47.79	2.02	30"	0.94	8.0	40.2				
5-1			1.65	5.79	1.48							49.81	47.79	2.02								
9	300		-	1.38	1.31	22.9	0.7	5.85	14.99	87.69	55.1	47.79	46.89	0.90	48"	0.30	6.8	87.7				
5			-	8.46	6.35							47.79	46.89	0.90								
10	300		0.78	2.16	2.05	23.6	0.7	5.75	16.53	95.05	55.1	46.89	45.84	1.05	48"	0.35	7.4	95.1				
5			-	8.46	6.35							46.89	45.84	1.05								
5	300		3.21	32.54	8.13																	



DIAZ, SECKINGER & ASSOCIATES  
**STORM SEWER TABULATION FORM**



SYSTEM NO. 1

SHEET NO. 16 OF 25

PROJECT 7052-F  
 ROAD MODEL CITIES DRAINAGE  
 STUDY HILLSBOROUGH  
 COUNTY HILLSBOROUGH  
 BY C.R.S.

DATE 9-30-71

PROJECT

ROAD

MODEL CITIES DRAINAGE

STUDY

COUNTY

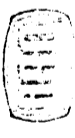
HILLSBOROUGH

BY C.R.S.

NOTES

STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
		INCREMENT	SUB TOTAL	Q 25						Q 5	UPPER END		LOWER END	FALL (IN FEET)						
11 S	245	-	2.16	2.05	24.3	0.6	5.7	16.53	94.22	55.2	45.84	44.98	0.86	48"	0.35	7.4	94.2			
1	260	2.84	2.84	2.70				3.75	20.25	55.3	52.80	50.82	1.98	24"	0.76	6.2	20.3			
5-2	260	4.22	4.22	1.05	15.0	0.7	5.4	3.75	20.25	55.3	50.82	47.45	3.37	24"	1.35	8.3	26.8			
2	250	1.15	3.99	3.79				5.05	26.77	55.2	50.82	47.45	3.37	24"						
5-2	250	0.83	5.05	1.26	15.7	0.5	5.3	5.05	26.77	55.2										
12	250	1.29	7.44	7.07	24.9	0.4	5.65	23.21	131.14	55.1	44.98	43.30	1.68	48"	0.67	10.2	131.1			
5	250	1.61	34.20	9.80																
1	160	0.18	0.18	0.14				0.70	3.78	54.6	49.85	49.64	0.21	18"	0.13	2.2	3.8			
5-3	160	2.26	2.26	0.56	15.0	1.2	5.4	0.70	3.78	54.6	49.85	49.64	0.21	18"						
1	160	2.20	2.20	1.65				2.13	11.50	53.2	50.46	49.64	0.82	21"	0.51	6.3	11.5			
5-4	160	1.93	1.93	0.48	15.0	0.4	5.4	2.13	11.50	53.2	50.46	49.64	0.82	21"						
2	240	-	-	-				2.83	14.72	54.9	49.64	48.66	0.98	24"	0.41	4.6	14.7			
5-3	240	-	4.19	1.05	16.2	0.9	5.2	2.83	14.72	54.9	49.64	48.66	0.98	24"						

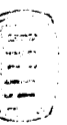
STORM SEWER TABULATION FORM



SYSTEM NO. I

DATE 9-30-71 PROJECT 7052-F ROAD MODEL CITIES DRAINAGE STUDY COUNTY HILLSBOROUGH BY C.R.S. SHEET NO. 17 OF 25

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			INCREMENT	SUB TOTAL	C = 0.95						C = 0.75	C = 0.25		Q 25	Q 5	UPPER END						
	1	140	-	-	1.07	15.0	0.5	5.4	1.52	8.21	52.1	49.50	48.66	0.84	18"	0.60	4.5	8.2				
	5-5		1.42	1.42	0.45																	
			1.80	1.80																		
	3	165	-	-	-	17.1	0.6	5.1	4.35	22.18	54.1	48.66	48.20	0.46	30"	0.28	4.4	22.2				
	5-3		-	-																		
			3.80	3.80	2.85																	
			5.99	5.99	1.50																	
	13	250	-	-	7.07	25.3	0.4	5.6	2.798	156.69	54.1	43.30	42.22	1.08	54"	0.43	9.6	156.7				
	5		-	-																		
			1.67	1.67	11.72																	
	14	260	0.48	7.92	7.52	25.7	0.4	5.55	28.98	160.84	51.5	42.22	41.05	1.17	54"	0.45	9.9	160.8				
	5		-	-																		
			2.21	49.07	12.27																	
	37	300	0.76	40.30	38.28	80.5	0.5	2.90	86.52	250.91	53.6	41.05	40.24	0.81	13" N	0.27	10.6	492.3				
	M		1.52	20.46	15.35																	
			1.38	131.56	32.89																	
	1	295	0.29	0.29	0.28	15.0	1.5	5.4	1.04	5.62	51.1	48.60	47.74	0.86	18"	0.29	3.2	5.6				
	5		0.25	0.25	0.19																	
			2.30	2.30	0.57																	
	38	265	0.55	41.14	39.08	81.0	0.4	2.88	88.41	254.62	53.1	40.24	39.52	0.72	13" N	0.27	10.7	497.8				
	M		-	20.71	15.53																	
			1.33	135.19	33.80																	



DATE 10-11-71

PROJECT 7052-F

ROAD MODEL CITIES DRAINAGE STUDY

COUNTY HILLSBOROUGH BY C.R.S.

SHEET NO. 18 OF 25

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			C = 0.95	C = 0.75	C = 0.25						Q 25	Q 5		UPPER END	LOWER END						
	39 M	280	0.64 0.41	41.78 135.60	39.69 33.90	81.4	0.4	2.86	91.91	262.86 504.26		52.7	39.52 38.74	38.74	0.78	13"x72"	0.28	10.8	504.3		
	40 M	310	-	41.78 135.60	39.69 33.90	81.8	0.5	2.85	97.46	277.76 519.16		52.0	38.24 37.77	37.77	0.47	9"x5.5"	0.15	10.4	519.2	START CONCRETE BOX - LOWER CROWN ELEV. 0.50'	
	41 M	375	-	41.78 135.60	39.69 33.90	82.3	0.6	2.83	100.76	285.15 526.55		51.4	37.77 37.21	37.21	0.56	9"x5.5"	0.15	10.5	526.6		
	42 M	320	-	41.78 135.60	39.69 33.90	82.9	0.5	2.82	102.24	288.32 529.72		51.4	37.21 36.73	36.73	0.48	9"x5.5"	0.15	10.6	529.7		
	1 M	465	1.88 1.39	1.88 1.39	1.79 1.04	15.0	1.6	5.4	2.83	15.28		57.1	54.10 52.01	52.01	2.09	24"	0.45	4.8	15.3	STUB LINE WEST OF S.R. @ INTERSECTION OF LINDELL AVE. AND 29TH ST. - PIPE LINE SIZED ON 5 YEAR FLOW FULL DESIGN	
	1 M	240	1.19 2.48	1.19 2.48	1.13 1.86	15.0	0.8	5.4	2.99	16.15		57.4	53.19 52.01	52.01	1.18	24"	0.49	5.0	16.2	STUB LINE NORTH ON 30TH ST. TO 33RD AVE.	
	2 M	260	-	3.07 3.87	2.92 2.90	16.6	0.7	5.15	5.82	29.97		58.0	52.01 50.66	50.66	1.35	30"	0.52	6.0	30.0	STUB LINE FROM NORTH TIES IN AT R.R. & LINDELL (WEST SIDE)	
	3 M	270	0.96 3.67	4.03 7.54	3.83 5.65	17.3	0.7	5.05	9.48	47.87		55.2	50.66 49.50	49.50	1.16	36"	0.43	6.6	47.9		

STORM SEWER TABULATION FORM

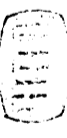
SYSTEM NO. I

DATE 10-11-71 PROJECT T052-F ROAD MODEL CITIES DRAINAGE STUDY COUNTY HILLSBOROUGH BY C.R.S. SHEET NO. 19 OF 25

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			INCREMENT	C = 0.95	C = 0.75						C = 0.25	Q 25		Q 5	UPPER END						
MM	1 5-2	235	2.89	2.89	2.75	15.0	0.8	5.4	2.75	14.85	55.6	52.44	50.44	2.00	21"	0.85	6.0	14.9		STUB LINE STARTS AT INTERSECTION OF 31ST AVE & 29TH ST.	
MM	2 5-2	235	-	2.89	2.75	15.8	0.9	5.3	2.75	14.58	50.7	50.44	49.50	0.94	24"	0.40	4.5	14.6		MM MID BLOCK ON 31ST 200' WEST OF R.R.	
MM	4 5	160	-	6.92	6.57	18.0	0.4	5.0	12.22	61.10	52.7	49.50	49.00	0.50	42"	0.31	6.2	61.1		STUB LINE TIES IN FROM WEST	
MM	5 5	100	0.34	7.26	6.90	18.4	0.2	4.95	14.12	69.89	50.7	49.00	48.61	0.39	42"	0.39	7.1	69.9		INLET ON MAIN STUB RUN	
INLET	1 5-3	270	-	5.14	5.14	15.0	1.1	5.4	3.86	20.84	53.1	49.38	48.70	0.68	30"	0.25	4.1	20.8		STUB LINE STARTS AT INTERSECTION OF 28TH AVE. AT R.R. (WEST SIDE)	
INLET	2 5-3	260	-	1.74	6.88	5.16	16.1	0.8	5.25	27.09	53.6	48.70	47.61	1.09	30"	0.42	5.4	27.1		INTERSECTION OF 29TH AVE. AT R.R. (WEST SIDE) MEET INV. OF 42" FROM WEST.	
	6 5	90	1.11	8.37	7.95	18.6	0.2	4.9	21.20	103.88	54.1	48.61	48.22	0.39	48"	0.43	8.1	103.9		STUB LINE FROM SOUTH TIES IN. MAIN STUB RUN CROSSES UNDER R.R.	
INLET	1 5-4	230	-	2.33	2.33	15.0	1.0	5.4	1.75	9.45	54.7	51.04	50.23	0.81	21"	0.35	3.8	9.5		START STUB LINE ON 32ND ST. 500' S SOUTH OF LINDELL AVE.	

NOTES

STORM SEWER TABULATION FORM



SYSTEM No. 2

DATE 10-12-71

PROJECT 7052-F

ROAD MODEL CITIES DRAINAGE STUDY

COUNTY HILLSBOROUGH BY C.R.S. SHEET NO. 20 OF 25

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			INCREMENT	SUB TOTAL	C = 0.95						C = 0.75	C = 0.25		Q 25	Q 5	UPPER END					
INLET	2	280	1.84	4.17	3.13	16.0	0.9	5.25	3.13	16.43	55.0	50.23	48.80	1.43	24"	0.51	5.1	16.4			
	5-4		-	-	-																
MH	3	240	-	4.17	3.13	16.9	1.3	5.1	3.13	15.96	51.5	48.80	48.44	0.36	30"	0.15	3.2	16.0			
	5-4		-	-	-																
INLET	4	100	5.15	9.32	6.99	18.2	0.3	4.95	6.99	34.60	51.1	48.44	48.22	0.22	36"	0.22	4.8	34.6			
	5-4		-	-	-																
MH	7	265	-	8.37	7.95	18.8	0.4	4.9	28.19	138.13	53.0	48.22	46.29	1.93	48"	0.73	10.5	138.1			
	5		-	-	-																
MH	8	280	-	8.37	7.95	19.2	0.5	4.8	28.19	135.31	53.3	46.29	44.30	1.99	48"	0.71	10.2	135.3			
	5		-	-	-																
MH	9	320	4.13	3.11	23.33	19.7		4.8	31.28	150.14	51.1	44.30	43.05	1.25	54"	0.39	9.2	150.1			
	5		-	-	-																
MH	43	260	-	50.15	47.64	83.4	0.4	2.82	134.27	378.64	51.2	36.73	36.29	0.44	19"	0.17	11.0	620.0			
	M		1.00	70.31	52.73					620.04											
			-	135.60	33.90																
INLET	1	350	0.70	0.70	0.67	15.0		5.4	1.02	5.51	50.5	47.00	46.02	0.98	18"	0.28	3.0	5.5			
	5		1.42	1.42	0.35																

INLET ON STUB LINE AT LOW AREA NORTH OF EAST LAKE & EAST OF R.R.

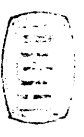
STUB LINE FROM NORTH TIES IN AT MH#7 WITH LINE FROM WEST UNDER R.R.

MAIN STUB LINE FROM WEST TIES IN AT 29TH AVE. & 32ND ST. - BOX SIZE CHANGES

START STUB AT INTERSECTION OF 32ND ST & 28TH AVE.

DIAZ, SECKINGER & ASSOCIATES

STORM SEWER TABULATION FORM



SYSTEM NO. I

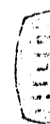
DATE 10-12-71

PROJECT 7052-F ROAD MODEL CITIES DRAINAGE STUDY

COUNTY HILLSBOROUGH BY C.R.S. SHEET NO. 21 OF 25

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			INCREMENT	SUB TOTAL	C = 0.95						C = 0.75	C = 0.25		Q 5	Q 25	UPPER END					
MH	1 S	320	4.18	4.18	3.13	15.0		5.4	3.35	18.09	50.6	48.10	43.94	4.16	21"	1.30	7.4	18.1	START STUB AT INTERSECTION OF 31ST & 28TH AVE.		
MH	44 M	260	-	50.85	48.31	83.8	0.4	2.81	139.36	391.60	50.0	36.29	35.85	0.44	19"	0.17	11.2	633.0	STUB LINES EAST & WEST TIE-IN AT INTERSECTION OF 32ND ST & 28TH AVE.		
MH	1 S	315	0.32	0.32	0.30	15.0		5.4	1.09	5.89	48.5	46.00	44.99	1.01	18"	0.32	3.3	5.9			
MH	45 M	265	-	51.17	48.61	84.2	0.4	2.80	141.37	395.84	49.7	35.85	35.37	0.48	19"	0.18	11.5	637.2			
MH	46 M	270	3.67	147.56	55.87					637.24	49.5	35.37	34.88	0.49	19"	0.18	11.6	639.9			
MH	1 S	375	1.54	1.54	1.46	15.0		5.4	1.58	8.53	50.6	48.10	45.66	2.44	18"	0.65	4.6	8.5	STUB LINE AT INTERSECTION 26TH AVE & 34TH ST.		
MH	1 S-1	280	0.88	0.88	0.84	15.0		5.4	1.21	6.53	50.8	46.78	45.66	1.12	18"	0.40	3.7	6.5	STUB LINE AT INTERSECTION 25TH AVE & 33RD ST.		

STORM SEWER TABULATION FORM



SYSTEM NO. I

DATE 10-12-71 PROJECT 7052 - F ROAD MODEL CITIES DRAINAGE STUDY COUNTY HILLSBOROUGH BY C.R.G. SHEET NO. 22 OF 25

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			INCREMENT	SUB TOTAL	Q 25						Q 5	UPPER END		LOWER END	FLOW LINE EL.						
M4	2 S	320	1.56	3.98	3.78	16.4	0.6	5.15	4.99	25.71	50.0	45.66	42.08	3.58	24"	1.12	8.0	27.3			
			2.90	4.85	1.21																
M4	47 M	320		55.15	52.39	85.0	0.4	2.80	148.31	415.27	49.1	34.88	34.27	0.61	18"	0.19	12.2	656.7			
				74.49	55.87																
				4.04	160.21	40.05															
M4	1 S	320		2.07	1.55	15.0	1.2	5.4	1.55	8.37	50.6	46.02	44.00	2.02	18"	0.63	4.6	8.4			
M4	48 M	310		55.15	52.39	85.4	0.5	2.80	151.89	425.29	47.5	34.27	33.80	0.47	19"	0.15	10.7	666.7			
				78.58	58.94																
				2.02	162.25	40.56															
M4	49 M	240		55.15	52.39	85.9	0.4	2.80	154.34	432.15	46.1	33.80	33.44	0.36	19"	0.15	11.0	673.6			
				81.07	60.80																
				2.35	164.58	41.15															
M4	1 S	240				15.0	1.2	5.4	1.12	6.05	46.4	41.49	40.70	0.79	18"	0.33	3.4	6.1			
				4.48	4.48	1.12															
M4	50 M	105		55.15	52.39	86.3	0.2	2.80	156.01	436.83	44.2	33.44	33.27	0.17	19"	0.16	11.2	678.2			
				81.07	60.80																
				2.20	171.26	42.82															

STUB LINE FROM EAST TIES IN AT 26TH AVE. # 32" ST.

STUB LINE AT INTERSECTION 24TH AVE # 32" ST.

STUB LINE FROM EAST TIES - IN AT 24TH AVE # 31" ST. (No)

STORM SEWER TABULATION FORM

PROJECT 7052-F

ROAD MODEL CITIES DRAINAGE STUDY COUNTY HILLSBOROUGH BY C.R.S.

SYSTEM 100, I

SHEET NO. 23 OF 25

DATE 10-12-71

PROJECT 7052-F

ROAD MODEL CITIES DRAINAGE STUDY COUNTY HILLSBOROUGH BY C.R.S.

SYSTEM 100, I

SHEET NO. 23 OF 25

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS	
			INCREMENT	SUB TOTAL	C = 0.95						C = 0.75	C = 0.25		0.25	0.5							UPPER END
MH	51 M	260	1.65	55.15	82.72	171.26	42.82	86.5	0.4	2.80	157.25	440.30	681.70	45.4	33.27	32.85	0.42	10"	0.16	11.3	681.7	
MH	1 S	395	1.24	1.24	1.18																	
MH	2 S	310	2.30	2.30	0.57																	
			0.32	1.56	1.48																	
MH	52 M	270	2.89	179.79	44.95																	
				56.71	53.87																	
MH	53 M	285	2.89	179.79	44.95																	
				56.71	53.87																	
MH	1 S	310	0.63	0.63	0.60																	
				4.55	4.55	1.14																
MH	54 M	205	2.19	87.53	65.65																	
			4.21	188.55	41.14																	
				57.34	54.47																	
				87.7	0.3	2.76																
				167.26	703.04																	
				461.64	703.04																	
				44.7																		
				31.91	31.56	0.35																
				43.65	41.20	2.45																
				18"																		
				0.79	5.2	9.4																
				0.17	11.7	703.0																
				0.17	11.5	694.1																
				0.17	11.5	694.1																
				0.17	11.5	694.1																



STORM SEWER TABULATION FORM

DATE 10-13-71 PROJECT 7052-IF ROAD MODEL CITIES DRAINAGE STUDY COUNTY HILLSBOROUGH BY C.R.S. SHEET NO. 24 OF 25

TYPE OF STRUCTURE	STRUCTURE NO.	TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
				INCREMENT	SUB TOTAL	0.25						0.5	CROWN EL.		FLOW LINE EL.							
MH	1	470	1.70	1.70	1.26	15.0	2.1	5.4	1.26	6.80	51.0	46.43	44.41	2.02	18"	0.43	3.8	6.8	START STUB LINE WEST OF R.R. AT INTERS. OF 24TH AVE & 29TH ST. - SIZED FOR 5 YEAR FLOW FULL			
MH	2	270	1.70	3.40	2.55	17.1	0.6	5.05	2.55	12.88	49.8	44.41	40.52	3.89	18"	1.44	7.0	12.9	INTERSECTION OF 24TH AVE & R.R. (WEST SIDE)			
MH	3	270	3.40	6.80	5.10	17.7	0.6	5.0	5.10	25.50	47.9	40.52	37.23	3.29	24"	1.22	7.9	25.5				
MH	4	270	3.40	10.20	7.65	18.3	0.6	4.95	7.65	37.87	44.5	37.23	35.07	2.16	30"	0.80	7.4	37.9	STUB LINE CROSSES UNDER R.R.			
MH	5	50	3.40	13.60	10.20	18.9		4.9	10.20	49.98	43.4	35.07	34.36	0.71	30"	1.42	10.0	50.0				
MH	55	270	-	51.34	54.47	88.0	0.4	2.76	177.46	489.79	44.2	31.56	31.07	0.49	10"x6"	0.18	12.0	731.2	STUB LINE FROM WEST OF R.R. TIES IN			
MH	M	270	-	101.13	75.85					731.19					10"x6"							
MH	56	265	-	57.34	54.47	88.4	0.4	2.76	177.46	489.79	42.8	31.07	30.59	0.48	10"x6"	0.18	12.0	731.2				
MH	M	265	-	101.13	75.85					731.19					10"x6"							
MH	1	160	0.15	0.15	0.11				0.61	3.29	47.2	40.29	40.00	0.29	18"	0.18	2.5	4.5	START STUB LINE AT INTERSECTION OF 18TH AVE & 28TH ST. (WEST OF R.R.) - SIZED FOR MIN. V=2.5 F.P.S.			
MH	2	270	1.05	1.20	0.90				1.40	7.28	44.5	40.00	38.70	1.30	18"	0.48	4.0	7.3				
MH	5	270	-	2.01	0.50																	

DATE 10-13-71

PROJECT 7052-F

ROAD MODEL CITIES DRAINAGE STUDY

COUNTY HILLSBOROUGH BY C.R.S

SHEET NO. 25 OF 25

DIAZ, SEBASTIAN & ASSOCIATES

STORM SEWER TABULATION FORM

SYSTEM NO. 1

NOTES

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			INCREMENT	SUB TOTAL	Q 25						Q 5	UPPER END		LOWER END	FLOW LINE EL.						
MH	1 5-1	160	0.25 3.18	0.25 3.18	0.19 0.80	15.0	0.9	5.4	0.99	5.35	43.9	39.12 38.70	38.70	0.42	18"	0.26	3.0	5.4	STUB LINE AT INTERSECTION OF 19TH AVE. & 28TH ST		
MH	3 5	300	1.88 5.19	3.33 5.19	2.50 1.30	17.2	0.8	5.05	3.80	19.19	43.5	38.70 36.54	36.54	2.16	24"	0.72	6.1	19.2	STUB LINE FROM WEST TIES IN AT INTER. OF 19TH AVE. & 29TH ST.		
MH	4 5	220	- 5.19	3.33 5.19	2.50 1.30	18.0	0.6	5.0	3.80	19.00		36.54 35.00	35.00	1.54	24"	0.70	6.0	19.0			
INLET	1 5-2	270	3.40 -	3.40 -	2.55 -	15.0	0.8	5.4	2.55	13.77	41.7	37.02 35.00	35.00	2.02	21"	0.75	5.6	13.8	STUB LINE AT INTERSECTION OF 20TH AVE. AT R.R. (WEST SIDE)		
MH	5 5	50	5.10 5.19	11.83 5.19	8.87 1.30	18.6	0.1	4.9	10.17	49.83	40.0	35.00 34.40	34.40	0.60	30"	1.20	10.0	49.8	STUB LINE FROM NORTH TIES IN - MAIN STUB RUN CROSSES UNDER R.R.		
MH	57 M	230	- -	57.34 112.96	54.47 84.72	88.8	0.4	2.75	187.63	515.98	40.8	30.57 30.13	30.13	0.46	10' x 6'	0.20	12.5	757.4			
EXIST. MANHOLE BOX	58 M		- 8.95	57.34 202.69	54.47 50.67	89.2		2.75	189.86	522.12	39.1	30.13			10' x 6.25'			763.5	TRUNK LINE TIES INTO EXIST. 10' x 6.25' CONC. BOX.		

*© Paley*

174 cfs 5 yr flow  
214 25 yr flow

# DRAINAGE CALCULATIONS

## SYSTEM II

DIAZ, SECKINGER & ASSOCIATES

STORM SEWER TABULATION FORM



THE ENGINEER  
 CL: B. Holsenback SHEET NO. 1 OF 10

DATE 9-9-71

PROJECT 7052-F

ROAD MODEL CITIES DRAINAGE STUDY (Phase I)

COUNTY HILLSBOROUGH

BY SWAIN

1 OF 10

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		TOTAL ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			INCREMENT	SUB TOTAL	SUB-TOTAL (CA)					Q25	Q5		UPPER END	LOWER END	FALL (IN FEET)					
M.H.	M 1	83	-	-	-	150	0.9	+3.5	Ret.	1.14	FIXED	58.50	58.42	.08	12	0.10	1.5	1.14	12" R.C.P. OUTFLOW FROM BASIN A-2 @ 0.10% SLOPE = 1.14 C.F.S. FULL.	
M.H.	M 2	390	-	-	-	19.4	4.3	-	-	1.14	-	58.42	58.03	.39	12	0.10	1.5	1.14	H.G. VERTICAL DROP IN M.H.#2	
M.H.	M 3	250	1.42	1.42	0.36	23.7	1.6	5.8	0.57	3.31	+1.14 =4.45	-	52.92	-	18	0.19	2.6	4.5	-	
M.H.	M 4	108	-	-	-	-	-	-	-	2.78	FIXED	53.00	52.92	.08	18	0.15	1.6	2.78	D.H.W. Retention Basin A-1 = 53.00 Rate of Outflow = 2.78 C.F.S.	
M.H.	M 4	250	-	0.23	0.21	25.3	1.9	5.6	0.57	3.19	+3.92 =7.11	52.92	52.67	.25	24	.10	2.2	7.2	A-1 = 2.78 C.F.S. + 4.2 = 7.11 C.F.S. TOTAL FIXED C.F.S. OF (3.92)	
M.H.	M 4	250	-	1.42	0.36	27.2	1.3	5.4	2.15	11.61	+3.92 =15.53	52.67	52.32	.35	30	.14	3.1	15.6	-	
M.H.	M 5	250	6.33	7.75	1.94	-	-	-	-	-	-	-	-	-	30	.33	4.8	24.1	-	
M.H.	M 6	260	5.69	13.44	3.36	28.5	0.9	5.3	3.57	18.92	+3.92 =22.84	52.32	51.46	.86	30	.33	4.8	24.1	-	
M.H.	M 7	340	-	0.23	0.21	29.4	1.2	5.2	5.45	28.34	+3.92 =32.26	51.46	50.75	.71	36	.21	4.6	33.6	To Junction H.H.W. Outflow from Basin "C" + 8.71 C.F.S.	
M.H.	M 7	340	1.51	20.95	5.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
M.H.	M 9	85	-	-	-	-	.5	-	-	8.71	FIXED Rate	51.50	51.38	.12	24	.14	2.7	8.7	Infer. Connect between Basin "C" & "B" (Lower Sub-headers run by 0.10%)	
M.H.	M 10	75	-	-	-	-	-	-	-	8.71	"	51.38	51.27	.11	24	.14	2.7	8.7	-	
M.H.	M 11	450	-	-	-	-	-	-	-	8.71	"	51.27	51.02	.25	30	.46	1.8	8.7	-	

NOTES  
 HYDRAULIC GRADIENT DESIGN BASED ON 25 YEAR RAINFALL CURVE --- FLOW FULL DESIGN BASED ON 5 YEAR RAINFALL CURVE

DIAZ, SECKINGER & ASSOCIATES  
 STORM SEWER TABULATION FORM



SYSTEM REVISION  
 No. II

DATE 9-9-71

PROJECT 7052-F

ROAD MODEL CITIES DRAINAGE STUDY (Phase I)

COUNTY HILLSBOROUGH

BY SWAIN  
 SHEET NO. 2 OF 10

M.H.	TYPE OF STRUCTURE	STRUCTURE NO.	TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
					C = 0.95	C = 0.75	C = 0.25						Q <sub>25</sub>	Q <sub>5</sub>		UPPER END	LOWER END						
M.H. 12	S			465	-	-	-	-	-	-	-	8.71	Fixed rate	51.06	50.83	.21	30	.046	1.8	8.7	H.G. @ Junction I.H. = 50.75 Lower all inverts by 0.10.		
M.H. 8	M			190	-	0.23	0.21	0.21	30.6	1.0	5.1	28.66	+12.63	50.75	50.62	.13	48	.07	3.3	42.7	Junction M.H. (Flood 12.63 C.F.S. from other basins)		
M.H. 9	M			52	-	0.69	0.23	0.21	31.6	0.2	5.0	31.55	+4.18	50.62	50.58	.04	48	.08	3.5	45.6	Outfall @ Basin "B" (Lower H.G. by .08) D.H.W. = 50.50		
M.H. 11	HD-WL			65	-	-	-	-	31.8	+27.0	-	14.32	Fixed rate	50.50	50.42	.08	30	.12	2.9	14.4	Outfall of "B" = 14.32 C.F.S. Requires 27 inches fill "B" to crown of 3rd		
M.H. 10	H/Wall				-	-	-	-	58.8	+4.4	-	14.32		50.42	50.37	.05	36	.04	2.0	14.6	RUN BETWEEN BASIN "B" & PAL FOX		
M.H. 13	M			340	-	-	-	-	60.3	2.8		14.32		50.37	50.23	.14	36	.04	2.0	14.6			
M.H. 14	M			310	-	-	-	-	63.1	2.6		14.32		50.23	50.11	.12	36	.04	2.0	14.6			
M.H. 15	M			330	-	-	-	-	65.7	2.3	3.4	8.98	+14.32	50.11	49.96	.15	42	.045	2.4	23.5			
M.H. 16	M			325	-	10.54	10.54	2.64	68.0	2.3		23.30		49.96	49.81	.15	42	.045	2.4	23.5			
M.H. 17	M			315	-	2.07	2.07	1.55	70.3	1.8	3.25	15.47	+14.32	49.81	49.59	.22	42	.07	3.0	29.8			
					-	2.30	12.84	3.21															

STORM SEWER TABULATION FORM (Phase I)



SYSTEM NO. II

DATE 10-13-71

PROJECT 1052-F

ROAD RETENTION SCUMING - STUDY

COUNTY Hillsborough BY B.H.

SHEET NO. 2 OF 10

M.H.	TYPE OF STRUCTURE	STRUCTURE NO.	TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
					C = 0.75	C = 0.25	INCREMENT						UPPER END	LOWER END		FLOW LINE EL.							
M.H. 18	M	18		325	2.57	2.85	4.64	3.48	72.1	1.8	3.2	7.40	23.68	+14.32	49.59	49.41	.18	48	.055	3.0	380		
M.H. 19	M	19		345	-	4.00	4.64	3.48	73.9	2.3	3.15	8.40	26.46	+14.32	49.41	49.31	.10	54	.03	2.5	41.0		
M.H. 10	S	10		300	-	2.43	2.43	.61	15.0	2.1	7.0	0.61	4.27	-	50.27	49.79	.48	18	.16	2.4	4.3		
M.H. 11	S	11		300	-	-	-	-	17.1	1.9	7.0	0.61	4.27	-	49.79	49.31	.48	18	.16	2.4	4.3		
M.H. 20	M	20		290	.15	.69	5.33	4.00	76.2	1.6	3.1	10.49	32.52	+14.32	49.31	49.19	.12	54	.04	3.0	46.9		
M.H. 21	M	21		170	.23	4.32	9.65	7.24	77.8	.8	3.0	13.95	41.85	+14.32	49.19	49.10	.10	54	.06	3.6	51.0		
M.H. 22	H	22		92	-	-	-	-	78.6	.4	-	-	-	56.17	49.10	49.04	.06	54	.06	3.6	51.0		
M.H. 23	M	23		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

OUTFALL INTO BASIN "E" D.H.W. = 49.00  
 LOWER H.G. ELEV. = 0.04 UP-STREAM



DATE Oct. 18, 71

PROJECT

ROAD PHASE I E-9 STUDY

COUNTY HILLSBOROUGH BY BILL H SHEET NO. 4 OF 10

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			INCREMENT	SUB TOTAL	0.25						0.5	UPPER END		LOWER END	FALL (IN FEET)						
M.H.	1	115	5.23	5.23	3.92	15	.5	7.0	3.92	27.44		53.50	53.34	.16	36	.14	3.8	27.5		EASTERN REACH	
M.H.	2	300	3.44	8.67	6.50	15.5	1.4	6.9	6.50	44.85		53.34	58.10	.24	48	.08	3.5	45.0			
M.H.	3	330	4.18	12.85	9.64	16.9	1.4	6.6	9.64	63.62		53.10	52.87	.23	54	.07	3.9	64.0			
M.H.	4	200	3.80	6.65	12.49	18.3	1.7	6.5		81.19		52.87	52.63	.24	54	.12	5.0	82.0		JUNCTION of WESTERN REACH	
INLET	5	440	2.11	2.11	.53	15	3.3	7.0	.53	3.71		57.50	56.93	.57	18	.13	2.2	3.8		WESTERN REACH	
M.H.	2	310	1.84	3.95	.99	18.3	1.4	6.5	.99	6.44		56.93	55.78	1.15	18	.37	3.6	6.5			
M.H.	3	170	.84	.84	.63	19.7	.5	6.2	2.80	17.36		56.78	54.81	.97	24	.57	5.3	17.4			
M.H.	4	185	-.84	8.68	2.17	20.2	.6	6.2	2.80	17.36		54.81	53.76	1.05	24	.57	5.3	17.4			
M.H.	5	340	4.77	13.45	3.36	20.8	1.2	6.1	3.99	24.34		53.76	52.60	1.16	30	.34	4.8	24.4			
M.H.	6	80	2.60	20.09	15.07	22.0	.2	6.0	18.47	110.8		52.60	52.50	.10	60	.13	5.6	11.0		HEADWALL OUTFALL INTO BASIN "D" (D.H.W. = 52.50)	

DATE Oct 26, 1971

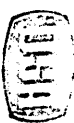
PROJECT 7052.F.F

ROAD Phase I. E. of Study

COUNTY Allegheny

BY BILL H SHEET NO. 5 OF 10

DIAZ, SECKINGER & ASSOCIATES  
STORM SEWER TABULATION FORM



SYSTEM No. # REVISION

TYPE OF STRUCTURE	STRUCTURE NO.	TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
				INCREMENT	SUB TOTAL	SUB-TOTAL (CA)					0.25	0.5		UPPER END	LOWER END						
INLET	1	260	-	3.43	3.43	0.86	15	1.3	7.0	0.86	6.02	56.88	56.05	.83	18	.32	3.3	6.0	Run from end of North to Basin #1		
M.H.	2	260	-	3.60	7.03	1.76	16.3	-	6.8	1.76	11.97	56.05	54.57	1.48	21	.57	4.9	12.0			
INLET	3	300	-	3.09	3.09	0.77	15	1.4	7.0	0.77	5.39	56.00	55.22	.78	18	.26	3.0	5.4			
M.H.	4	250	-	-	3.09	0.77	164	1.4	-	0.77	5.39	55.22	54.57	.65	18	.26	3.0	5.4			
M.H.	5	265	-	-	3.03	3.15	17.8	7	6.5	3.29	21.39	54.57	52.24	2.33	24	.88	6.6	21.4			
M.H.	6	120	-	0.28	.28	.21	18.5	.6	6.4	4.00	25.60	52.24	52.10	.14	30	.12	3.5	25.6			
Howe	7	80	-	1.99	15.14	3.79	19.1	4	-	4.00	25.60	52.10	52.00	.10	36	.12	3.5	25.6	OUTFALL INTO EXISTING "E" (P.H.W. = 52.00)		



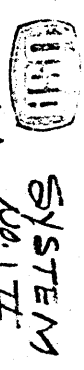
DIAZ, SECKINGER & ASSOCIATES  
STORM SEWER TABULATION FORM

DATE Nov 3, 1971

PROJECT ROAD 7052-F

Phase I E-g Study

COUNTY Hillsborough BY Bill H SHEET NO. 6 OF 10



SYSTEM No. 11

M.H. NO.	TYPE OF STRUCTURE	STRUCTURE NO.	TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
					INCREMENT	SUB TOTAL	0.25						0.5	UPPER END		LOWER END	FALL (IN FEET)						
M.H. 31																							
M.H. 30				75																			
M.H. 29				250																			
M.H. 28				325																			
M.H. 27				260																			
M.H. 26				250																			
M.H. 25				170																			
M.H. 24				85																			
M.H. 23																							
M.H. 22																							
M.H. 21																							
M.H. 20																							
M.H. 19																							
M.H. 18																							
M.H. 17																							
M.H. 16																							
M.H. 15																							
M.H. 14																							
M.H. 13																							
M.H. 12																							
M.H. 11																							
M.H. 10																							
M.H. 9																							
M.H. 8																							
M.H. 7																							
M.H. 6																							
M.H. 5																							
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M.H. 3																							
M.H. 2																							
M.H. 1																							
M.H. 0																							

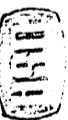
RUN FROM PALM FOX TO BASING

INTERCONNECT BETWEEN BASIN "D" & "E"

INTER-CONNECT WITH BASIN "E" & "F"

HEADWALL OUTFALL INTO BASIN "G"  
O.H.W. = 47.75 O.K.

STORM SEWER TABULATION FORM



SYSTEM NO. II

BY BILL H

SHEET NO. 7 OF 10

DATE Nov. 3, 1971

PROJECT

-1052 - F

ROAD

Phase I - E. 9<sup>th</sup> STATION

COUNTY

Willsboro, N.Y.

NOTES

M.H.	TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
				C = 0.95	C = 0.75	C = 0.25						0.25	0.5		UPPER END	LOWER END	FALL (IN FEET)					
M.H. 32	M	75	75	-	-	-	-	121.9	.3	-	-	47.65	FIXED	47.15	47.61	.4	42	.18	4.8	49.7	OUTFALL FROM BASIN 3" SOUTH	
M.H. 33	M	350	350	-	-	-	-	140.2	1.2	-	-	47.65	FIXED	47.61	46.98	0.63	42	.18	4.8	47.7		
M.H. 34	M	350	350	2.53	2.53	240	2.56	141.4	1.1	2.0	5.12	52.77		46.98	46.17	0.81	42	.23	5.4	52.9		
M.H. 35	M	310	310	0.64	0.64	0.16	4.45	142.5	.9	2.0	8.90	54.55		46.17	45.36	0.81	42	.26	5.8	56.6		
M.H. 36	M	330	330	4.91	5.55	1.39	4.45	143.4	.9	2.0	8.90	56.55		45.36	44.50	0.86	42	.26	5.8	56.6		
M.H. 37	M	275	275	4.13	7.35	6.98	0.85	144.3	.9	2.0	17.70	65.35		44.50	44.03	0.47	18	.17	5.1	65.4		
M.H. 38	M	250	250	1.93	7.48	1.87	0.85	145.2	.8					44.03	43.60	0.43	18	.17	5.1	65.4	M.H. @ Buffalo	
M.H. 39	M	250	250	6.20	13.55	12.87	17.02	146.0	.7	1.95	33.19	80.84		43.60	42.95	0.65	18	.26	6.4	80.8		
M.H. 40	M	300	300	9.09	16.57	9.14	40.18	146.7	.7	1.95	93.95	141.60		42.95	42.35	0.60	60	.20	7.0	141.6		
M.H. 41	M	265	265	8.65	22.20	21.09	50.07	147.4	.6	1.95	97.64	145.29		42.35	41.79	0.56	60	.21	7.3	145.3		
M.H. 42	M	280	280	0.84	23.04	21.89	53.57	148.0	.6	1.95	104.46	152.11		41.79	41.15	0.64	60	.23	7.6	152.1		
M.H. 43	M	310	310	3.72	17.75	13.31	59.12	148.6	.6	1.95	115.28	162.93		41.15	40.31	0.84	60	.27	8.2	162.9		

# DIAZ, SECKINGER & ASSOCIATES

## STORM SEWER TABULATION FORM



SYSTEM NO. 11

DATE Nov 3, 1971

PROJECT 7052-F

ROAD Phogee I, E-9

Study

COUNTY Hillsborough

BY Bill #

SHEET NO. 8 OF 10

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.			DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			INCREMENT	SUB TOTAL	C = 0.95						C = 0.75	C = 0.25		0.25	0.5	UPPER END					
M.H.	M 44	375	4.41	23.68	22.50	149.2	1.1	1.9	62.42	118.16	121.41	40.31	39.30	1.01	60	0.27	8.3	166.3			
M.H.	M 45	320	1.97	23.68	22.50	150.3	.9	1.9	63.90	169.06	182.10	39.30	38.43	0.35	72	0.11	6.0	169.1			
M.H.	M 46	260	0.70	32.75	31.11	151.7	.5	1.9	95.94	229.75	229.75	38.43	37.86	0.57	72	0.22	8.3	240			
M.H.	M 47	260	4.18	67.81	50.86	151.7	.5	1.9	101.02	191.94	239.59	37.86	37.25	0.61	72	0.23	8.5	243.4			
M.H.	M 48	265	0.32	33.07	31.42	152.7	.5	1.9	103.03	195.76	243.41	37.25	36.63	0.62	72	0.23	8.6	245.2			
M.H.	M 49	270	1.61	86.78	21.70	150.0	1.4	5.4	103.97	245.19		47.10	44.89	2.21	18	0.37	4.5	8.8			
M.H.	M 50	315	0.47	0.41	.10	15.0	1.4	5.4	1.63	8.80		47.10	44.89	2.21	18	0.37	4.5	8.8			
"	" 3	320	1.58	4.04	3.84	15.0	1.8	5.4	1.19	6.43		46.35	44.89	1.46	18	0.33	3.6	6.5			
"	" 3	320	1.58	4.04	3.84	15.0	1.8	5.4	1.19	6.43		46.35	44.89	1.46	18	0.33	3.6	6.5			
M.H.	M 51	315	3.15	50.6	1.97	16.8	.6	1.9	5.11	26.57		44.89	43.61	1.28	30	0.44	5.3	26.6			
M.H.	M 52	275	2.07	2.07	1.55	15.0	1.0	5.4	1.55	8.37		45.71	44.00	1.71	18	.62	4.6	8.4			
M.H.	M 53	35	9.04	6.11	4.58	16.0		5.2	4.58	23.82		44.00	43.63	.37	24	1.05	7.5	23.9			

Sub-Run on 26th Ave.

NOTES

# DIAZ, SECKINGER & ASSOCIATES



SYSTEM  
No. II

## STORM SEWER TABULATION FORM

DATE Nov. 3 1971 PROJECT 7052-F ROAD Phase 1, E-9 COUNTY Hillsborough BY Bill # SHEET NO. 9 OF 10

TYPE OF STRUCTURE	STRUCTURE NO. TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)		SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
			C=0.95	C=0.75						0.25	0.5		CROWN EL.	FLOW LINE EL.						
M.H.	M 51	310	4.09	71.90	53.95	153.8	.4	1.85	113.66	210.27	251.92	35.84	35.06	0.78	72	0.25	9.0	253		
M.H.	M 52	240	2.61	100.51	25.13	154.4	.4	1.85	116.26	215.08	262.73	35.06	34.44	0.62	72	0.26	9.1	263		
M.H.	M 53	105	1.91	106.90	26.73	154.8	.2	1.85	117.86	218.04	265.69	34.44	34.17	0.27	72	0.26	9.2	266		
M.H.	M 54	260	1.56	76.07	57.05	155.0	.5	1.85	119.03	220.21	267.86	34.17	33.47	0.70	72	0.27	9.3	268		
M.H.	M 55	270	1.37	77.44	59.08	155.5	.4	1.85	123.51	228.60	276.25	41.20	43.45	3.75	18	0.95	5.7	10.3		
M.H.	M 56	280	1.50	1.50	1.13	15.0		5.4	1.13	6.10		43.45	40.91	2.54	21	0.82	6.0	14.7		
M.H.	M 57	170	1.50	1.50	1.13	15.0		5.4	1.13	6.10		42.80	42.24	0.56	18	0.33	3.4	6.1		
M.H.	M 58	280	1.50	1.50	1.13	15.0		5.4	1.13	6.10		32.96	32.40	0.56	18	0.20	8.1	280		
M.H.	M 59	310	1.50	1.50	1.13	15.0		5.4	1.13	6.10		43.90	41.42	2.48	18	0.80	6.1	9.4		
M.H.	M 60	210	1.50	1.50	1.13	15.0		5.4	1.13	6.10		32.40	31.98	0.42	18	0.20	8.1	283		

Equip to 78" line

# DIAZ, SECKINGER & ASSOCIATES

## STORM SEWER TABULATION FORM

PROJECT 7052-F

DATE Nov 3, 1971

ROAD Phase I, E9 Study

COUNTY Hillsborough BY Bill H

SHEET 10 OF 10



SYSTEM No. II

M.H.	TYPE OF STRUCTURE	STRUCTURE NO.	TYPE OF LINE	LENGTH (FT.)	DRAINAGE AREA (ACRES)			SUB-TOTAL (CA)	TIME OF CONCENTRATION MIN.	TIME OF FLOW IN SECTION MIN.	INTENSITY	TOTAL (CA)	TOTAL RUNOFF (CFS)		MANHOLE OR INLET ELEVATION (FEET)	ELEV. OF H.G.		FALL (IN FEET)	DIAMETER (IN.)	SLOPE (%)	VELOCITY (FPS)	CAPACITY (CFS)	REMARKS
					C=0.95	C=0.75	C=0.25						0.25	0.5		UPPER END	LOWER END						
M.H. 58	M	270		270	38.99	95.71	71.45	157.1	.5	1.85	139.56	258.19	305.84	31.98	31.53	0.45	15	0.24	9.0	306			
M.H. 59	M	265		265				157.6	.5	1.85	139.56	258.19	305.84	31.33	30.69	0.64	15	0.24	9.0	306			
M.H. 60	M	230		230	11.43	106.70	80.03	158.1	.4	1.85	149.83	276.63	324.18	30.69	30.09	0.60	15	0.24	9.4	325	Meet Existing Box Crown		
M.H. 61	M							153.5															

# RETENTION BASIN . . . . "A-1"

## DESIGN DATA

DHW. ELEV. . . . . 53.00  
 BOTTOM ELEV. . . . . 48.00  
 CAPACITY . . . . . 1.72 AC.-FT

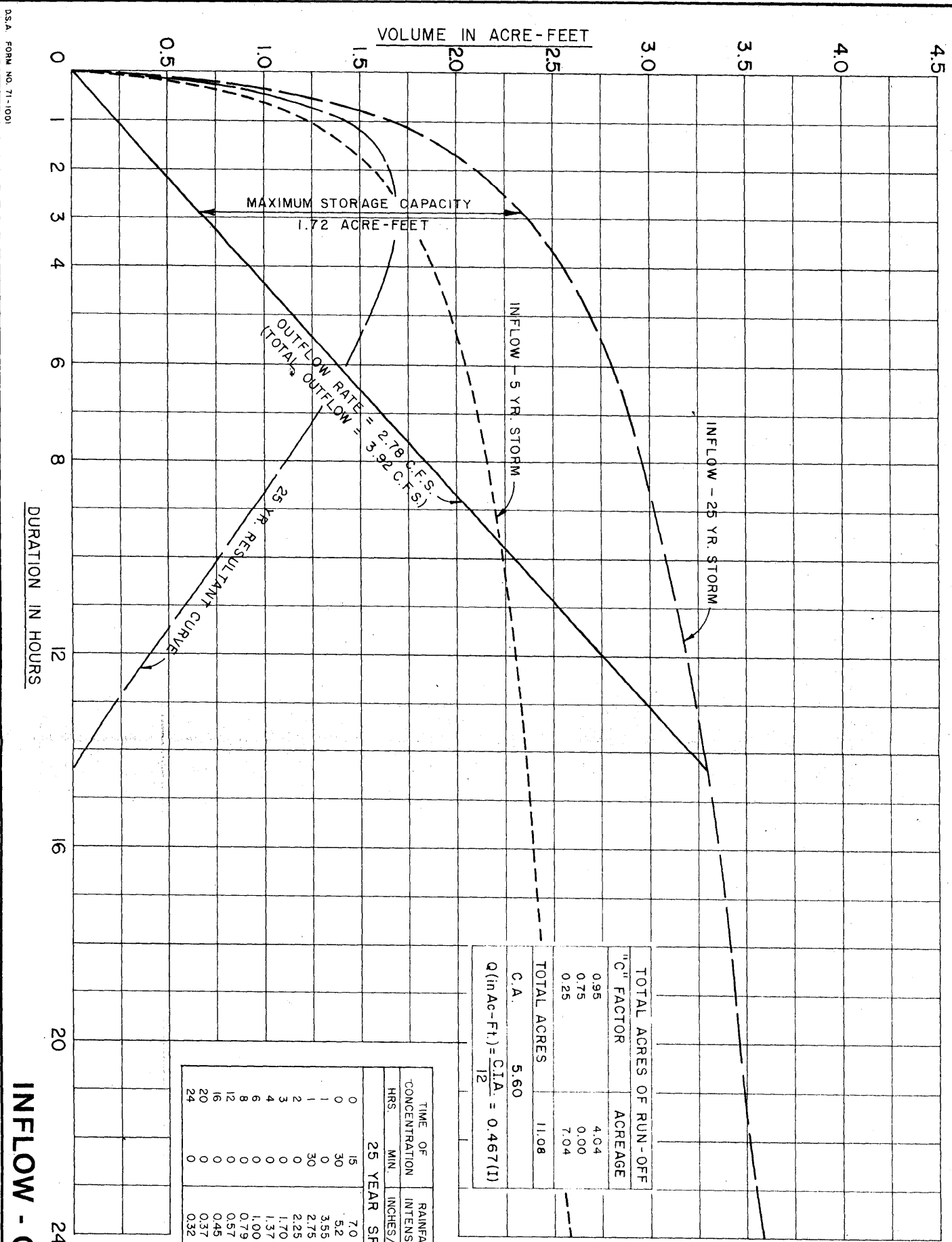
## REQUIRED OUTFLOW RATE

$$= \frac{(43,560 \text{ Ft}^2/\text{Ac.}) (\text{Ac.-Ft.} / \text{Hr.})}{(3600 \text{ Sec./Hr.})}$$

$$= \frac{(43,560) (0.23)}{(3600)}$$

$$= \underline{\underline{2.78 \text{ C.F.S.}}}$$

TOTAL ACRES OF RUN-OFF	5.60
"C" FACTOR	0.25
ACREAGE	11.08
C.A.	0.95
	0.75
	0.25
TOTAL ACRES	5.60
	11.08
$Q (\text{in Ac.-Ft.}) = \frac{\text{C.I.A.}}{12} = 0.467(1)$	



TIME OF CONCENTRATION HRS.	RAINFALL INTENSITY INCHES/HR.	TOTAL TIME HRS.	ACCU. RAINFALL INCHES	INFLOW AC.-FT.
0	7.0	25	1.75	0.82
0	5.2	30	2.60	1.21
1	3.55	1.0	3.55	1.66
1	2.75	1.5	4.13	1.93
2	2.25	2.0	4.50	2.10
3	1.70	3.0	5.10	2.38
4	1.37	4.0	5.48	2.56
6	1.00	6.0	6.00	2.80
8	0.79	8.0	6.32	2.95
12	0.57	12.0	6.84	3.19
16	0.45	16.0	7.20	3.36
20	0.37	20.0	7.40	3.45
24	0.32	24.0	7.68	3.58

**D&A** ENGINEERS • PLANNERS  
 DIAZ, SECKINGER & ASSOCIATES, INC.  
 TAMPA, FLORIDA

## INFLOW - OUTFLOW CURVE

# RETENTION BASIN . . . . "A-2"

## DESIGN DATA

D.H.W. ELEV. . . . . 58.50  
 BOTTOM ELEV. . . . . 53.00  
 CAPACITY . . . . . 2.87 AC.-FT.

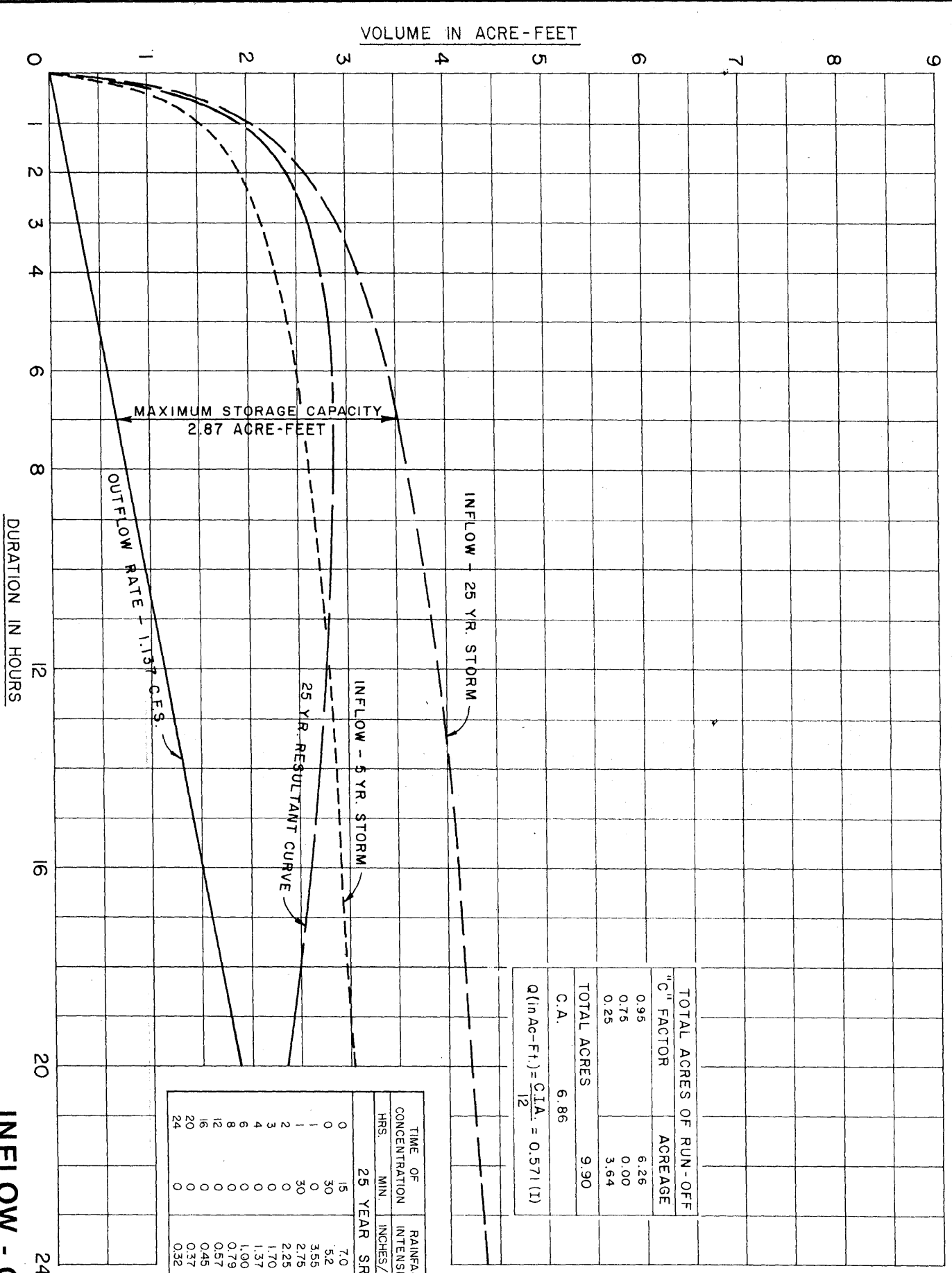
## REQUIRED OUTFLOW RATE

$$= \frac{(43,560 \text{ Ft}^2/\text{Ac.}) (\text{Ac.-Ft.}/\text{Hr.})}{(3600 \text{ Sec./Hr.})}$$

$$= \frac{(43,560) (0.094)}{(3600)}$$

$$= 1.137 \text{ C.F.S.}$$

TOTAL ACRES OF RUN-OFF	
C" FACTOR	ACREAGE
0.95	6.26
0.75	0.00
0.25	3.64
TOTAL ACRES	
9.90	
C.A.	
6.86	
$Q (\text{in Ac.-Ft.}) = \frac{C.I.A.}{12} = 0.571 (1)$	



TIME OF CONCENTRATION HRS.	RAINFALL INTENSITY INCHES/HR.	TOTAL TIME HRS.	ACCUM. RAINFALL INCHES	INFLOW AC.-FT.
0	7.0	25	1.75	1.00
0	5.2	50	2.60	1.48
0	3.53	1.0	3.53	2.03
1	2.75	1.5	4.13	2.36
2	2.25	2.0	4.50	2.57
3	1.70	3.0	5.10	2.91
4	1.37	4.0	5.48	3.13
6	1.00	6.0	6.00	3.42
8	0.79	8.0	6.32	3.61
12	0.57	12.0	6.84	3.90
16	0.45	16.0	7.20	4.11
20	0.37	20.0	7.40	4.22
24	0.32	24.0	7.68	4.38

**DS&I** ENGINEERS • PLANNERS  
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TAMPA, FLORIDA

## INFLOW - OUTFLOW CURVE

# RETENTION BASIN " B "

## DESIGN DATA

D.H.W. ELEV. .... 50.50  
 BOTTOM ELEV. .... 45.00  
 CAPACITY .... 6.183 AC.-FT.

### REQUIRED OUTFLOW RATE

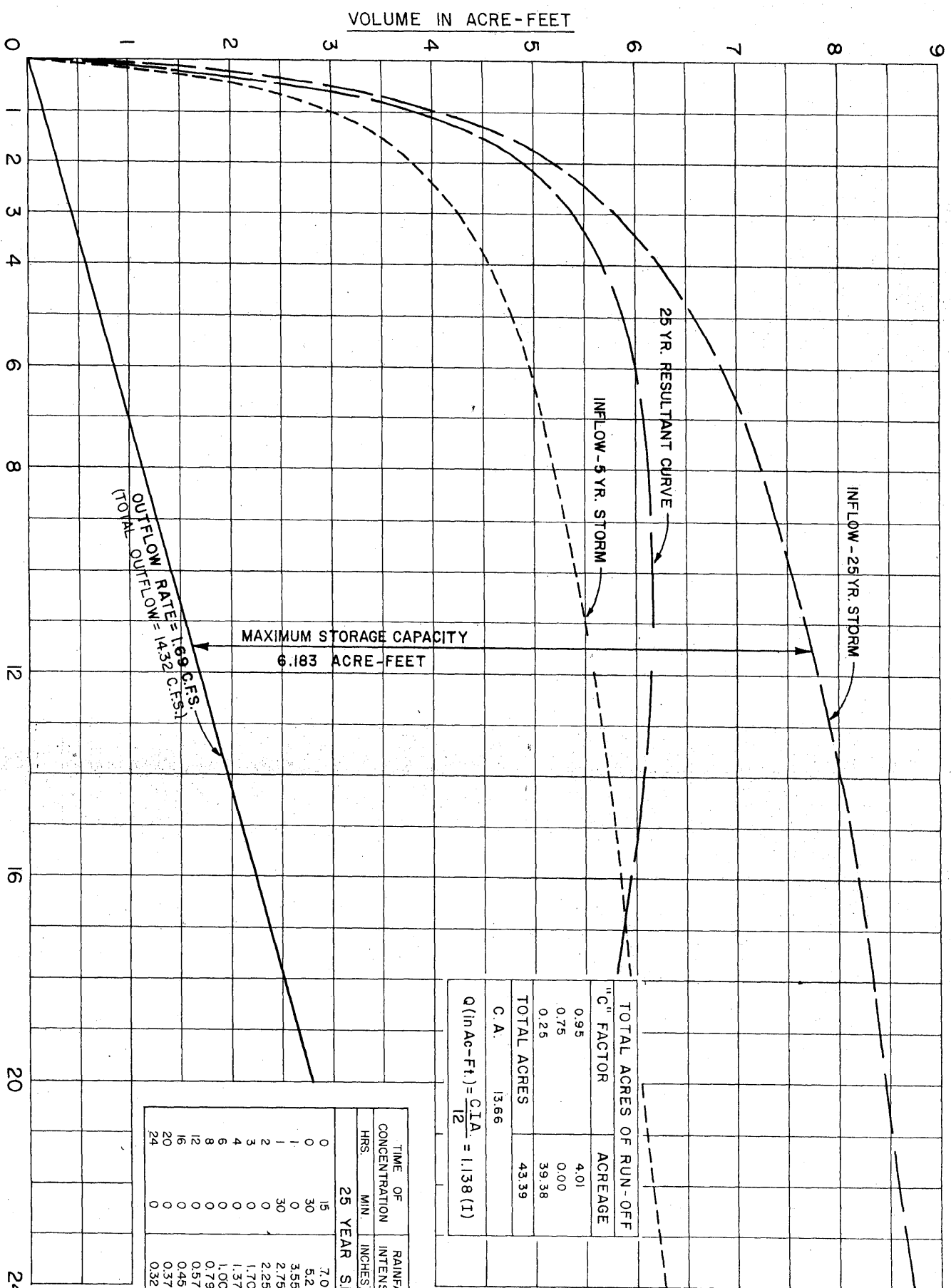
$$= \frac{(43,560 \text{ Ft}^2/\text{Ac.})(\text{Ac.-Ft./Hr.})}{(3600 \text{ Sec./Hr.})}$$

$$= \frac{(43,560)(0.140)}{(3600)}$$

$$= \underline{\underline{1.69 \text{ C.F.S.}}}$$

TOTAL ACRES OF RUN-OFF ACREAGE	"C" FACTOR
43.39	0.25
0.00	0.75
4.01	0.95
<b>TOTAL ACRES</b> 43.39	
<b>C. A.</b> 13.66	

$$Q(\text{In Ac-Ft.}) = \frac{C \cdot I \cdot A}{12} = 1.138 (I)$$



TIME OF CONCENTRATION	RAINFALL INTENSITY	TOTAL TIME	ACCUM. RAINFALL	INFLOW
HRS. MIN.	INCHES/HR.	HRS.	INCHES	AC.-FT.
0	7.0	25	1.75	1.99
0	5.2	50	2.60	2.96
1	3.55	1.0	4.04	4.04
1	2.75	1.5	4.13	4.70
2	2.25	2.0	4.50	5.12
3	1.70	3.0	5.10	5.81
4	1.37	4.0	5.48	6.24
6	1.00	6.0	6.00	6.83
8	0.79	8.0	6.32	7.19
12	0.57	12.0	6.84	7.79
16	0.45	16.0	7.20	8.20
20	0.37	20.0	7.40	8.42
24	0.32	24.0	7.68	8.74

**DSB**  
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 DIAZ, SECKINGER & ASSOCIATES, INC.  
 TAMPA, FLORIDA

## INFLOW - OUTFLOW CURVE



# RETENTION BASIN . . . . " C "

## DESIGN DATA

D.H.W. ELEV. . . . . 51.50  
 BOTTOM ELEV. . . . . 46.00  
 CAPACITY . . . . 1.721 AC.-FT

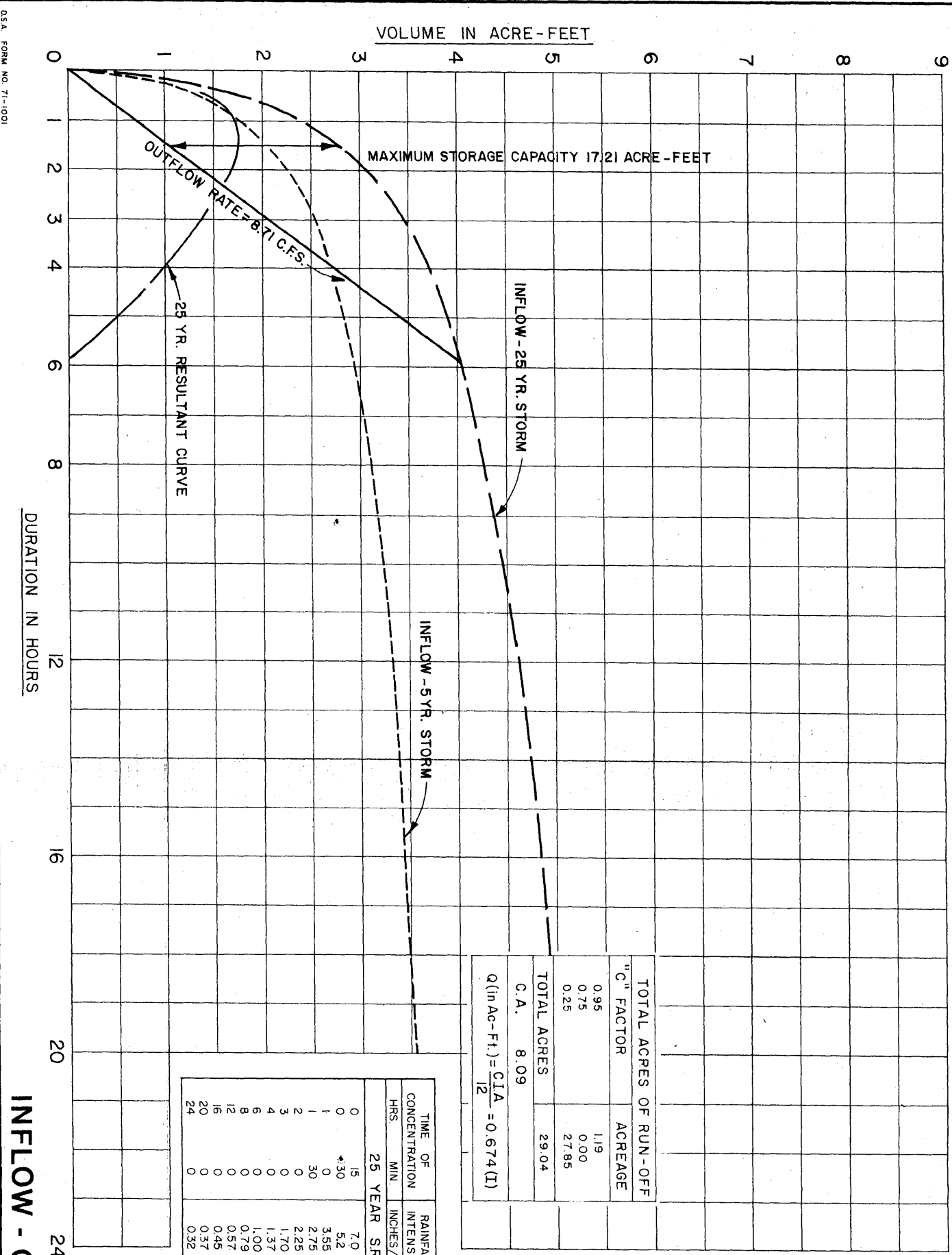
### REQUIRED OUTFLOW RATE

$$= \frac{(43,560 \text{ Ft}^2/\text{Ac.}) (\text{Ac.-Ft./Hr.})}{(3600 \text{ Sec./Hr.})}$$

$$= \frac{(43,560) (0.72)}{(3600)}$$

$$= 8.71 \text{ C.F.S.}$$

TOTAL ACRES OF RUN-OFF ACREAGE	
"C" FACTOR	ACREAGE
0.95	1.19
0.75	0.00
0.25	27.85
TOTAL ACRES	
C. A. 8.09	
$Q (\text{in Ac.-Ft.}) = \frac{C \cdot I \cdot A}{12} = 0.674 (I)$	



TIME OF CONCENTRATION HRS.	25 YEAR S.R.D. MIN.	RAINFALL INTENSITY INCHES/HR.	TOTAL TIME HRS.	ACCUM. RAINFALL INCHES	INFLOW AC.-FT.
0	15	7.0	25	1.75	1.18
0	*:30	5.2	.50	2.60	1.75
1	0	3.55	1.0	3.55	2.39
1	30	2.75	1.5	4.13	2.78
2	0	2.25	2.0	4.50	3.03
3	0	1.70	3.0	5.10	3.44
4	0	1.37	4.0	5.48	3.69
6	0	1.00	6.0	6.00	4.05
8	0	0.79	8.0	6.32	4.26
12	0	0.57	12.0	6.84	4.61
16	0	0.45	16.0	7.20	4.85
20	0	0.37	20.0	7.40	4.99
24	0	0.32	24.0	7.68	5.18

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TAMPA, FLORIDA

## INFLOW - OUTFLOW CURVE

# RETENTION BASIN . . . . " D "

## DESIGN DATA

D.H.W. ELEV. . . . . 52.50  
 BOTTOM ELEV. . . . . 46.00  
 CAPACITY . . . . . 3,923 AC.-FT.

REQUIRED OUTFLOW RATE  

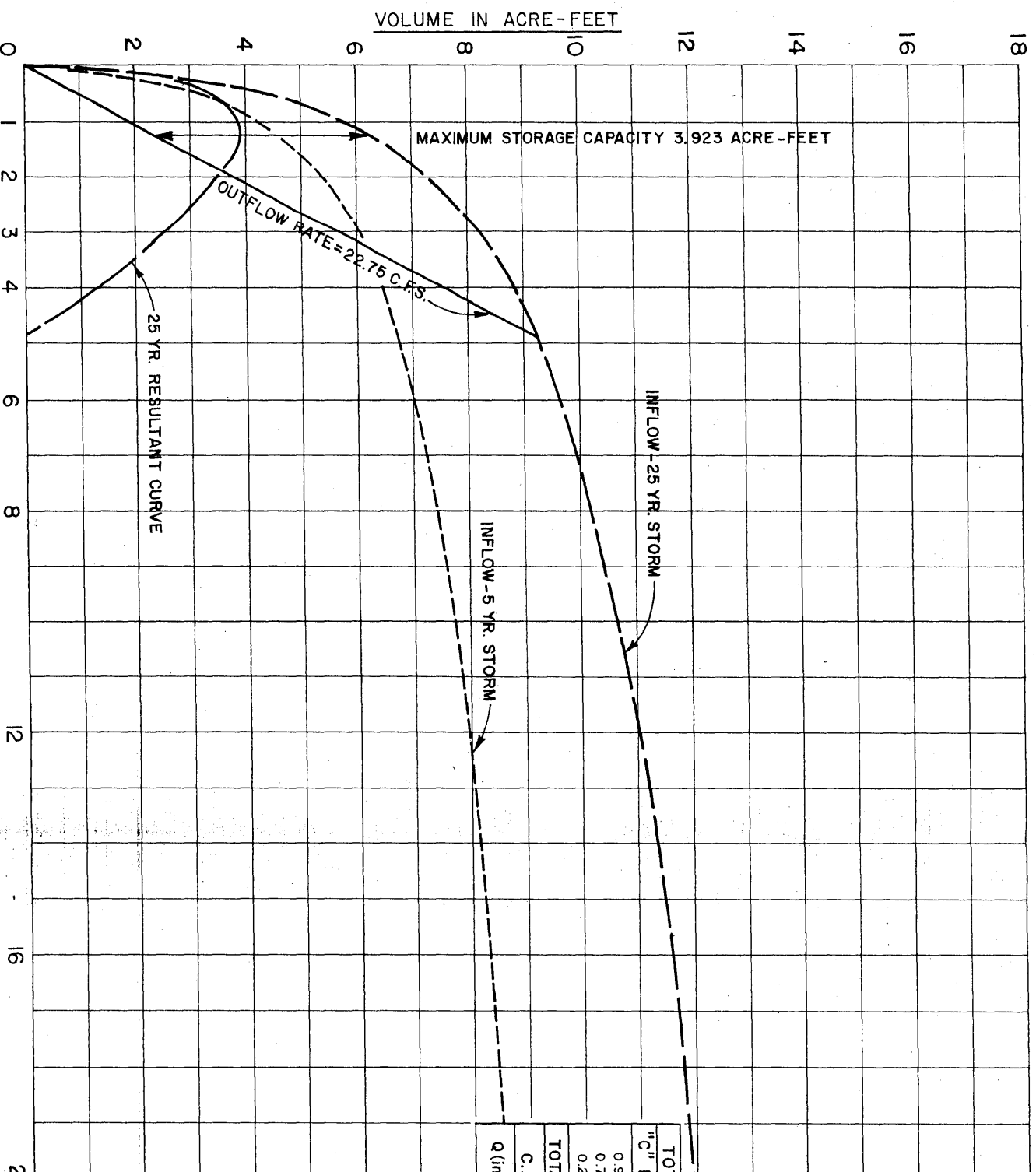
$$= \frac{(43,560 \text{ Ft}^2/\text{Ac.}) (\text{Ac.-Ft.}/\text{Hr.})}{(3600 \text{ Sec./Hr.})}$$

$$= \frac{(43,560) (188)}{(3600)}$$

$$= 22.75 \text{ C.F.S.}$$

TOTAL ACRES OF RUN-OFF	ACREAGE
"I <sub>c</sub> " FACTOR	
0.95	1.74
0.75	19.04
0.25	13.56
TOTAL ACRES	34.34
C.A.	19.32

$Q (\text{in Ac.-Ft.}) = \frac{C.I.A.}{12} = 1.610 (I)$



TIME OF CONCENTRATION		RAINFALL INTENSITY INCHES/HR.	TOTAL TIME		ACCUM. RAINFALL INCHES	INFLOW AC.-FT.
HRS.	MIN.		HRS.	MIN.		
25 YEAR SRD. ZONE IV CURVE						
0	15	7.0	25	1.75	2.82	
0	30	5.2	50	2.60	4.19	
0	0	3.55	1.0	3.55	5.72	
1	1	2.75	1.5	4.13	6.65	
2	0	2.25	2.0	4.50	7.25	
3	0	1.70	3.0	5.10	8.21	
4	0	1.37	4.0	5.48	8.82	
6	0	1.00	6.0	6.00	9.66	
8	0	0.79	8.0	6.32	10.18	
12	0	0.57	12.0	6.84	11.01	
16	0	0.45	16.0	7.20	11.59	
20	0	0.37	20.0	7.40	11.91	
24	0	0.32	24.0	7.68	12.36	

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 TAMPA, FLORIDA

## INFLOW - OUTFLOW CURVE

# RETENTION BASIN . . . . " E "

## DESIGN DATA

D.H.W. ELEV. . . . . 52.00  
 BOTTOM ELEV. . . . . 45.50  
 CAPACITY . . . . . 4,268 AC.-FT.

## REQUIRED OUTFLOW RATE

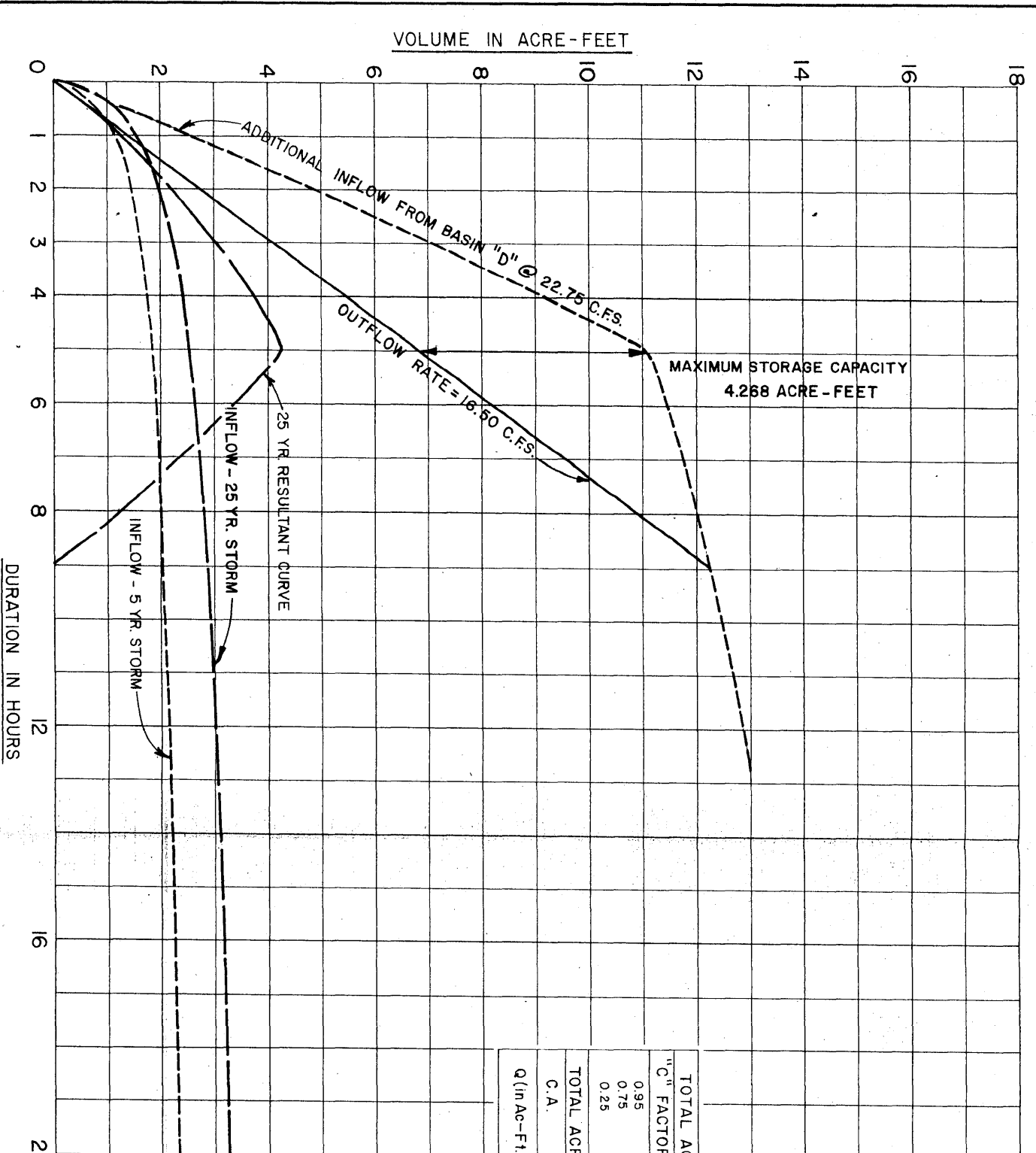
$$= \frac{(43,560 \text{ Ft}^2/\text{Ac.})(\text{Ac.-Ft./Hr.})}{(3600 \text{ Sec./Hr.})}$$

$$= \frac{(43,560)(1,364)}{(3600)}$$

$$= 16.50 \text{ C.F.S.}$$

"C" FACTOR	ACREAGE
0.95	1.34
0.75	0.28
0.25	15.14
<b>TOTAL ACRES</b>	
16.76	
<b>C.A.</b>	
5.27	

$Q(\text{in Ac.-Ft.}) = \frac{\text{C.I.A.}}{12} = 0.439 (\text{I})$



TIME OF CONCENTRATION HRS.	25 YEAR MIN.	RAINFALL INTENSITY INCHES/HR.	TOTAL TIME HRS.	ACCUM. RAINFALL INCHES	INFLOW AC.-FT.
0	15	7.0	.25	1.75	0.77
0	30	5.2	.50	2.60	1.14
1	0	3.55	1.0	3.55	1.56
1	30	2.75	1.5	4.13	1.81
2	0	2.25	2.0	4.50	1.98
3	0	1.70	3.0	5.10	2.24
4	0	1.37	4.0	5.48	2.41
6	0	1.00	6.0	6.00	2.64
8	0	0.79	8.0	6.32	2.78
12	0	0.57	12.0	6.84	3.00
16	0	0.45	16.0	7.20	3.16
20	0	0.37	20.0	7.40	3.25
24	0	0.32	24.0	7.68	3.37

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 TAMPA, FLORIDA

## INFLOW - OUTFLOW CURVE

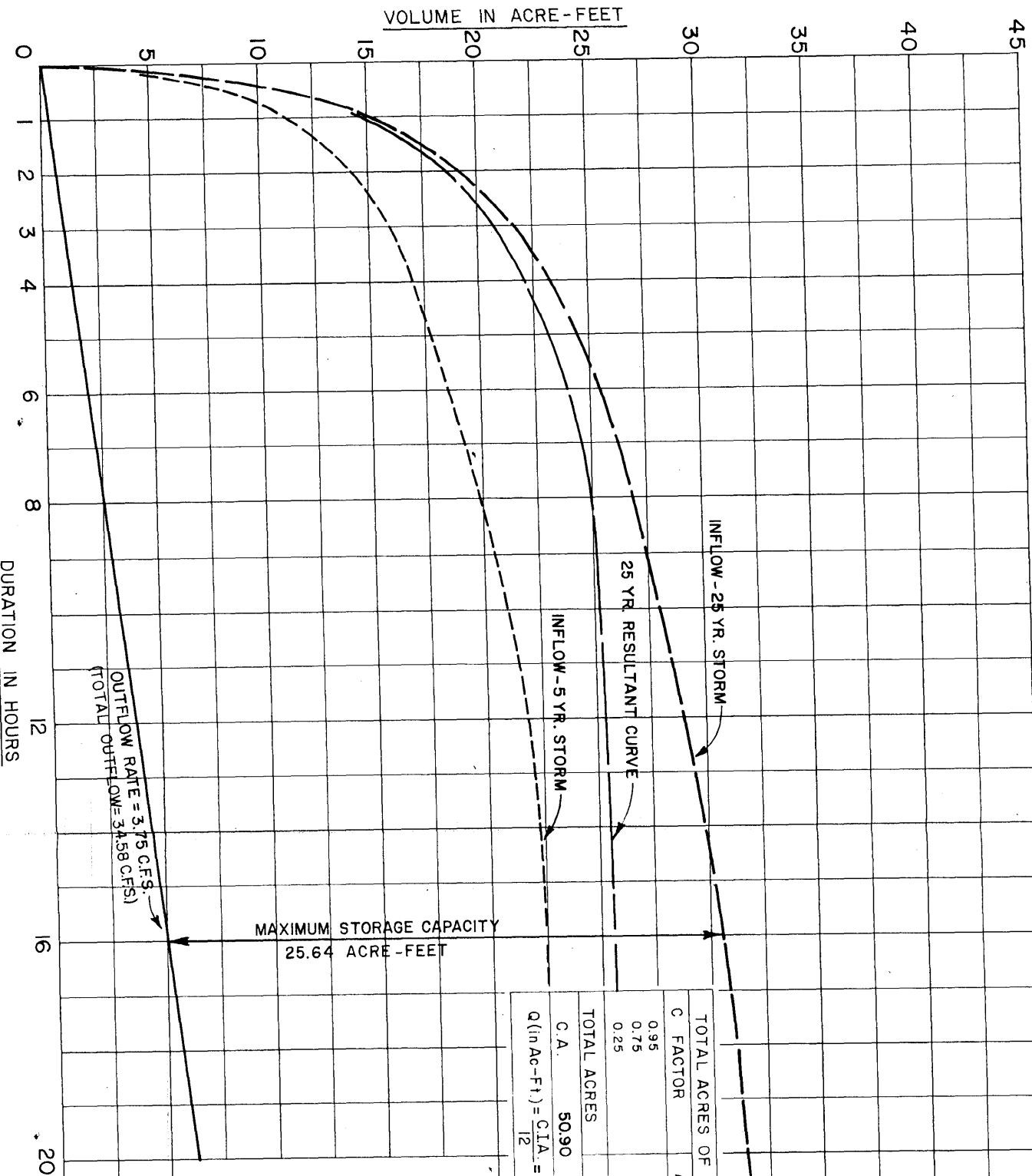
# RETENTION BASIN " F "

## DESIGN DATA

D.H.W. ELEV. .... 49.00  
 BOTTOM ELEV. .... 43.50  
 CAPACITY .... 25.64 AC.-FT

REQUIRED OUTFLOW RATE  
 $= \frac{(43,560 \text{ Ft}^2/\text{Ac.}) (\text{Ac.-Ft./Hr.})}{(3600 \text{ Sec./Hr.})}$   
 $= \frac{(43,560) (0.310)}{(3600)}$   
 $= 3.75 \text{ C.F.S.}$

TOTAL ACRES OF RUN-OFF	50.90
C FACTOR	0.95
	0.75
	0.25
TOTAL ACRES	145.80
C.A.	50.90
$Q (\text{In Ac.-Ft.}) = \text{C.I.A.} = 4,242 (I)$	



TIME OF CONCENTRATION HRS.	25 YEAR SR.D. ZONE IV CURVE	RAINFALL INTENSITY INCHES/HR.	TOTAL TIME HRS.	ACCUM. RAINFALL INCHES	INFLOW AC.-FT.
0	15	7.0	25	1.75	7.42
0	30	5.2	30	2.60	11.03
0	0	3.55	1.0	3.55	15.06
1	30	2.75	1.5	4.15	17.52
2	0	2.25	2.0	4.50	19.09
3	0	1.70	3.0	5.10	21.64
4	0	1.37	4.0	5.48	23.25
6	0	1.00	6.0	6.00	25.46
8	0	0.79	8.0	6.32	26.81
12	0	0.57	12.0	6.84	29.02
16	0	0.45	16.0	7.20	30.55
20	0	0.37	20.0	7.40	31.39
24	0	0.32	24.0	7.68	32.58

**DSI**  
 ENGINEERS • PLANNERS  
 DIAZ, SECKINGER & ASSOCIATES, INC.  
 TAMPA, FLORIDA

## INFLOW - OUTFLOW CURVE

# RETENTION BASIN . . . . " G "

## DESIGN DATA

D.H.W. ELEV. . . . . 47.75  
 BOTTOM ELEV. . . . . 41.75  
 CAPACITY . . . . . 10,584 AC.-FT

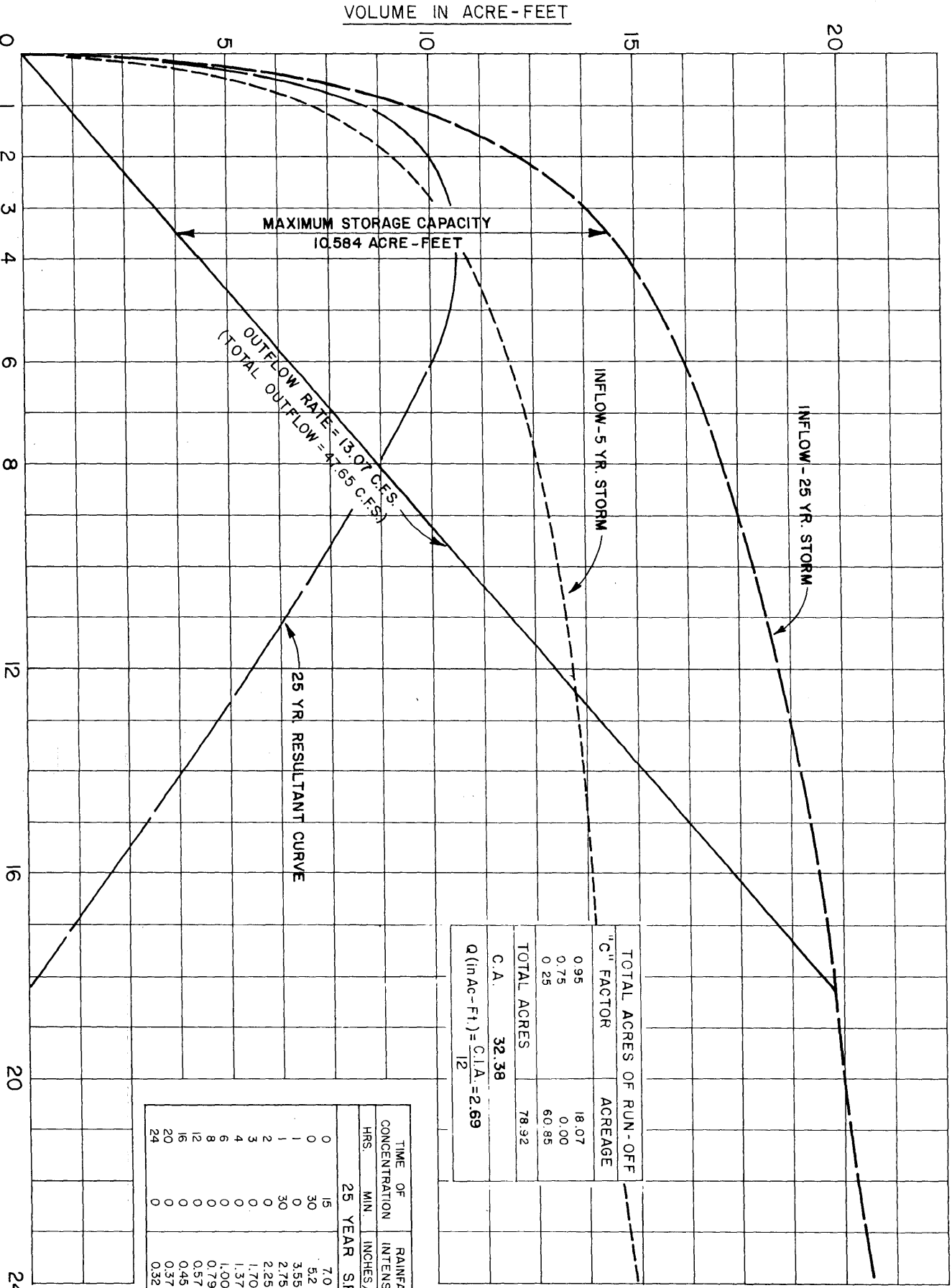
## REQUIRED OUTFLOW RATE

$$= \frac{(43,560 \text{ Ft}^2/\text{Ac.})(\text{Ac.-Ft./Hr.})}{(3600 \text{ Sec./Hr.})}$$

$$= \frac{(43,560)(1.08)}{(3600)}$$

$$= 13,068 \text{ C.F.S.}$$

TOTAL ACRES OF RUN-OFF ACREAGE	"C" FACTOR
18.07	0.95
0.00	0.75
60.85	0.25
<b>TOTAL ACRES</b>	<b>78.92</b>
<b>C. A.</b>	<b>32.38</b>
$Q (\text{in Ac.-Ft.}) = \frac{C \cdot I \cdot A}{12} = 2.69$	



TIME OF CONCENTRATION HRS.	RAINFALL INTENSITY INCHES/HR.	TOTAL TIME HRS.	ACCU. RAINFALL INCHES	INFLOW AC.-FT.
0	7.0	25	1.75	4.73
0	5.2	30	2.60	7.02
0	3.55	1.0	3.55	9.59
1	2.75	1.5	4.13	11.15
2	2.25	2.0	4.50	12.15
3	1.70	3.0	5.10	13.77
4	1.37	4.0	5.48	14.80
6	1.00	6.0	6.00	16.20
8	0.79	8.0	6.32	17.06
12	0.57	12.0	6.84	18.47
16	0.45	16.0	7.20	19.44
20	0.37	20.0	7.40	19.98
24	0.32	24.0	7.68	20.74

**ENGINEERS • PLANNERS**  
 DIAZ, SECKINGER & ASSOCIATES, INC.  
 TAMPA, FLORIDA

## INFLOW - OUTFLOW CURVE

PRELIMINARY QUANTITIES  
AND  
COST ESTIMATE

SYSTEM NO. 1  
 FROM C.E.P. FLA. - E-9  
 AT BUFFALO AVENUE NORTH  
 TO HILLSBOROUGH AVENUE

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
 PRELIMINARY QUANTITIES & ESTIMATED COST

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
15" R.C.P.	L.F.	12.00	4,050	48,600.00					375	4,500.00	
18" R.C.P.	L.F.	13.50	8,870	119,745.00					760	10,260.00	
21" R.C.P.	L.F.	15.50	1,375	21,312.50							
24" R.C.P.	L.F.	17.00	1,745	29,665.00					400	6,800.00	
30" R.C.P.	L.F.	23.00	2,535	58,305.00					250	5,750.00	
36" R.C.P.	L.F.	28.00	1,905	53,340.00							
42" R.C.P.	L.F.	35.00	780	27,300.00							
54" R.C.P.	L.F.	52.00	200	10,400.00							
76" x 48" H.E.R.C.P.	L.F.	82.00	1,000	82,000.00							
83" x 53" H.E.R.C.P.	L.F.	90.00	680	61,200.00							
91" x 58" H.E.R.C.P.	L.F.	95.00	795	75,525.00							
98" x 63" H.E.R.C.P.	L.F.	100.00	4,005	400,500.00							
106" x 68" H.E.R.C.P.	L.F.	110.00	1,260	138,600.00							
113" x 72" H.E.R.C.P.	L.F.	130.00	390	50,700.00							
18" R.C.P. CLASS IV	L.F.	16.00	290	4,640.00					30	480.00	
21" R.C.P. CLASS IV	L.F.	18.00	270	4,860.00							
24" R.C.P. CLASS IV	L.F.	20.00	255	5,100.00							
30" R.C.P. CLASS IV	L.F.	27.00	30	810.00							

SYSTEM NO. I

FROM C.E.P. FLA. - E-9  
AT BUFFALO AVENUE NORTH  
TO HILLSBOROUGH AVENUE

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
PRELIMINARY QUANTITIES & ESTIMATED COST

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
36" R.C.P. CLASS IV	L.F.	39.00	280	10,920.00					920	38,640.00	
42" R.C.P. CLASS IV	L.F.	42.00	325	13,650.00							
48" R.C.P. CLASS IV	L.F.	51.00	1,025	52,275.00							
TYPE "E" INLET	EA.	450.00	180	81,000.00					13	5,850.00	
CONCRETE ENDWALL	EA.	1000.00	5	5,000.00							
MANHOLE (AVERAGE)	EA.	900.00	100	90,000.00					8	7,200.00	
ADDITIONAL FOR CONST.											
48" R.C.P. UNDER R.R.	L.S.	LUMP SUM	LUMP SUM	1,800.00							
TOTAL				1,447,247.50						79,480.00	



SYSTEM NO. 1  
 FROM C.E.P. FLA. E-9 BOUNDARY  
 AT BUFFALO AVENUE  
 SOUTH TO I-4

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
 PRELIMINARY QUANTITIES & ESTIMATED COST

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
15" R.C.P.	L.F.	12.00	425	5,100.00	2150	25,800.00	100	1,200.00			
18" R.C.P.	L.F.	13.50	2190	29,565.00	3920	52,920.00	500	6,750.00			
21" R.C.P.	L.F.	15.50	235	3,642.50	1220	18,910.00					
24" R.C.P.	L.F.	17.00	1220	20,740.00	1405	23,885.00					
30" R.C.P.	L.F.	23.00			405	9,315.00					
36" R.C.P.	L.F.	28.00			730	20,440.00					
42" R.C.P.	L.F.	35.00			130	4,550.00					
48" R.C.P.	L.F.	43.00			1640	70,520.00					
54" R.C.P.	L.F.	52.00			830	43,160.00					
113" x 72" H.E.R.C.P.	L.F.	130.00			1225	159,250.00					
5.5' x 9.0' CONC. BOX	L.F.	250.00			1005	251,250.00					
6.0' x 9.0' CONC. BOX	L.F.	250.00			1375	343,750.00					
6.0' x 10.0' CONC. BOX	L.F.	290.00			2440	707,600.00					
18" R.C.P. CLASS IV	L.F.	16.00	310	4,960.00							
21" R.C.P. CLASS IV	L.F.	18.00	270	4,860.00							
24" R.C.P. CLASS IV	L.F.	20.00	540	10,800.00			70	1,400.00			
30" R.C.P. CLASS IV	L.F.	27.00	1100	29,700.00	60	1,620.00					
36" R.C.P. CLASS IV	L.F.	39.00	270	10,530.00							

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
PRELIMINARY QUANTITIES & ESTIMATED COST

SYSTEM NO. 1

FROM C.E.P. FLA. E-9 BOUNDARY  
AT BUFFALO AVENUE  
SOUTH TO I-4

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
42" R.C.P. CLASS IV	L.F.	42.00	260	10,920.00							
48" R.C.P. CLASS IV	L.F.	51.00	30	1,530.00	60	3,060.00					
TYPE "E" INLET	EA.	450.00	32	14,400.00	7	3,150.00 *	3	1,350.00			
TYPE "B-S-1" INLET	EA.	600.00			32	19,200.00 *					
TYPE "B-V-1" INLET	EA.	650.00			18	11,700.00 *					
TYPE "B-R-1" INLET	EA.	700.00			32	22,400.00 *	1	700.00			
TYPE "B-R-2" INLET	EA.	650.00			5	3,250.00 *					
MANHOLE (AVERAGE)	EA.	900.00	18	16,200.00	56	50,400.00	3	2,700.00			
REBUILD STRUCT. @ EX. BOX	L.S.	LUMP SUM			L.S.	1,500.00					
ADDITIONAL FOR CONST.											
24" R.C.P. UNDER R.R.	L.S.	LUMP SUM					L.S.	1,200.00			
30" R.C.P. UNDER R.R.	L.S.	LUMP SUM		1,500.00							
30" R.C.P. UNDER R.R.	L.S.	LUMP SUM		1,500.00							
48" R.C.P. UNDER R.R.	L.S.	LUMP SUM		1,800.00							
TOTAL				167,747.50		1,847,630.00		15,300.00			

\* ELIGIBLE COST (INLETS) UNDER C.E.P. FLA. E-9

59,700.00

TOTAL INELIGIBLE COST

1,787,930.00

SYSTEM NO. 1  
SOUTH OF I-4 TO MCKAY BAY

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
PRELIMINARY QUANTITIES & ESTIMATED COST

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
15" R.C.P.	L.F.	12.00							350	4,200.00	
18" R.C.P.	L.F.	13.50							2900	39,150.00	
42" R.C.P.	L.F.	35.00							880	30,800.00	
21" R.C.P. CLASS IV	L.F.	18.00							260	4,680.00	
24" R.C.P. CLASS IV	L.F.	20.00							260	5,200.00	
30" R.C.P. CLASS IV	L.F.	27.00							520	14,040.00	
36" R.C.P. CLASS IV	L.F.	39.00							260	10,140.00	
42" R.C.P. CLASS IV	L.F.	42.00							30	1,260.00	
TYPE "E" INLET	EA.	450.00							16	7,200.00	
TYPE "BX-1A" MANHOLE	EA.	600.00							11	6,600.00	
TYPE "BX-2A" MANHOLE	EA.	675.00							3	2,025.00	
TYPE "BX-1B" MANHOLE	EA.	600.00							2	1,200.00	
TYPE "BX-2B" MANHOLE	EA.	700.00							3	2,100.00	



SYSTEM NO. 1  
(OUTFALL)  
SOUTH OF I-4 TO MCKAY BAY

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
PRELIMINARY QUANTITIES & ESTIMATED COST

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
11.0' x 6.0' CONC. BOX	L.F.	231.00							1300	300,300.00	
9.5' x 6.0' CONC. BOX	L.F.	332.00							800	265,600.00	
10.0' x 6.0' CONC. BOX	L.F.	354.00							2600	920,400.00	
11.0' x 6.0' DEL.CONC.BOX	L.F.	405.00							300	121,500.00	
CHANNEL EXCAVATION	C.Y.	2.25							11,100	24,975.00	
CLEARING & GRUBBING	Ac.	600.00							1.7	1,020.00	
GRASSING & MULCHING	S.Y.	0.30							2800	840.00	
GRASS SODDING	S.Y.	1.50							560	840.00	
WATER FOR GRASSING	M.GAL.	5.00							20	100.00	
TOTAL										1,635,575.00	

SYSTEM NO. II  
 FROM C.E.P. FLA. E-9 BOUNDARY  
 AT BUFFALO AVENUE NORTH TO  
 HILLSBOROUGH AVENUE

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
 PRELIMINARY QUANTITIES & ESTIMATED COST

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
12" R.C.P.	L.F.	10.00	473	4,730.00							
15" R.C.P.	L.F.	12.00	4745	56,940.00					265	3,180.00	
18" R.C.P.	L.F.	13.50	9750	131,625.00					810	10,935.00	
21" R.C.P.	L.F.	15.50	985	15,267.50							
24" R.C.P.	L.F.	17.00	1400	23,800.00					355	6,035.00	
30" R.C.P.	L.F.	23.00	3550	81,650.00					425	9,775.00	
36" R.C.P.	L.F.	28.00	2925	81,900.00							
42" R.C.P.	L.F.	35.00	2905	101,675.00							
48" R.C.P.	L.F.	43.00	2310	99,330.00							
54" R.C.P.	L.F.	52.00	1147	59,644.00					120	6,240.00	
60" R.C.P.	L.F.	62.00	75	4,650.00					80	4,960.00	
18" R.C.P. CLASS IV	L.F.	16.00	260	4,160.00							
21" R.C.P. CLASS IV	L.F.	18.00	360	6,480.00							
24" R.C.P. CLASS IV	L.F.	20.00	265	5,300.00							
36" R.C.P. CLASS IV	L.F.	39.00	30	1,170.00					90	3,510.00	
48" R.C.P. CLASS IV	L.F.	51.00	300	15,300.00							
54" R.C.P. CLASS IV	L.F.	67.00	360	24,120.00					50	3,350.00	

SYSTEM NO. II  
 FROM C.E.P. FLA. E-9 BOUNDARY  
 AT BUFFALO AVENUE NORTH TO  
 HILLSBOROUGH AVENUE

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
 PRELIMINARY QUANTITIES & ESTIMATED COST

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
TYPE "E" INLET	EA.	450.00	185	83,250.00					13	5,850.00	
TYPE "BX-1A" MANHOLE	EA.	600.00	56	33,600.00					3	1,800.00	
TYPE "BX-2A" MANHOLE	EA.	675.00	6	4,050.00							
TYPE "BX-3A" MANHOLE	EA.	725.00	7	5,075.00							
TYPE "BX-4A" MANHOLE	EA.	875.00	3	2,625.00					1	1,000.00	
TYPE "BX-5A" MANHOLE	EA.	1,000.00	1	1,000.00					2	1,200.00	
TYPE "BX-1B" MANHOLE	EA.	600.00	24	14,400.00							
TYPE "BX-2B" MANHOLE	EA.	700.00	4	2,800.00							
TYPE "BX-3B" MANHOLE	EA.	775.00	4	3,100.00							
TYPE "BX-4B" MANHOLE	EA.	875.00	4	3,500.00							
CONCRETE ENDWALL	EA.	1,000.00	25	25,000.00					2	2,000.00	
EXCAVATION	C.Y.	2.25	160,600	361,350.00					14,700	33,075.00	
GRASS SODDING	S.Y.	1.50	70,600	105,900.00					7,950	11,925.00	
WATER FOR GRASSING	M.GAL.	5.00	424	2,120.00					48	240.00	

SYSTEM NO. II  
 FROM C.E.P. FLA. E-9 BOUNDARY  
 AT BUFFALO AVENUE NORTH TO  
 HILLSBOROUGH AVENUE

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
 PRELIMINARY QUANTITIES & ESTIMATED COST

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
ADDITIONAL FOR CONST.											
21" R.C.P. UNDER R.R.	L.S.	LUMP SUM	LUMP SUM	1,000.00							
36" R.C.P. UNDER R.R.	L.S.	LUMP SUM	LUMP SUM	1,500.00							
54" R.C.P. UNDER R.R.	L.S.	LUMP SUM	LUMP SUM	2,000.00							
TOTAL				1,370,011.50						105,075.00	



SYSTEM NO. 11  
 FROM C.E.P. FLA. E-9 BOUNDARY  
 AT BUFFALO AVENUE  
 SOUTH TO I-4

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
 PRELIMINARY QUANTITIES & ESTIMATED COST

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
15" R.C.P.	L.F.	12.00	460	5,520.00	2175	26,100.00	100	1,200.00			
18" R.C.P.	L.F.	13.50	2190	29,565.00	3920	52,920.00	500	6,750.00			
21" R.C.P.	L.F.	15.50	235	3,642.50	1460	22,630.00					
24" R.C.P.	L.F.	17.00	1220	20,740.00	1010	17,170.00					
30" R.C.P.	L.F.	23.00			560	12,880.00					
36" R.C.P.	L.F.	28.00			730	20,440.00					
42" R.C.P.	L.F.	35.00			130	4,550.00					
48" R.C.P.	L.F.	43.00			1770	76,110.00					
54" R.C.P.	L.F.	52.00			1080	56,160.00					
60" R.C.P.	L.F.	62.00			1530	94,860.00					
72" R.C.P.	L.F.	85.00			2605	221,425.00					
98" x 63" H.E.R.C.P.	L.F.	100.00			760	76,000.00					
18" R.C.P. CLASS IV	L.F.	16.00	310	4,960.00							
21" R.C.P. CLASS IV	L.F.	18.00	270	4,860.00							
24" R.C.P. CLASS IV	L.F.	20.00	540	10,800.00			70	1,400.00			
30" R.C.P. CLASS IV	L.F.	27.00	1080	29,160.00	30	810.00					
36" R.C.P. CLASS IV	L.F.	39.00	290	11,310.00	30	1,170.00					
42" R.C.P. CLASS IV	L.F.	42.00	260	10,920.00							

SYSTEM NO. II

FROM C.E.P. FLA. E-9 BOUNDARY  
AT BUFFALO AVENUE  
SOUTH TO I-4

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
PRELIMINARY QUANTITIES & ESTIMATED COST

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
48" R.C.P. CLASS IV	L.F.	51.00	30	1,530.00	60	3,060.00					
98" x 63" H.E.R.C.P.											
CLASS IV	L.F.	120.00			765	91,800.00					
TYPE "E" INLET	EA.	450.00	32	14,400.00	7	3,150.00 *	3	1,350.00			
TYPE "B-S-1" INLET	EA.	600.00			32	19,200.00 *					
TYPE "B-V-1" INLET	EA.	650.00			18	11,700.00 *					
TYPE "B-R-1" INLET	EA.	700.00			32	22,400.00 *	1	700.00			
TYPE "B-R-2" INLET	EA.	650.00			5	3,250.00 *					
TYPE "BX-1A" MANHOLE	EA.	600.00	14	8,400.00	23	13,800.00	2	1,200.00			
TYPE "BX-2A" MANHOLE	EA.	675.00	1	675.00							
TYPE "BX-3A" MANHOLE	EA.	725.00	1	725.00	4	2,900.00					
TYPE "BX-4A" MANHOLE	EA.	875.00			1	875.00					
TYPE "BX-5A" MANHOLE	EA.	1,000.00			4	4,000.00					
TYPE "BX-7A" MANHOLE	EA.	1,250.00			5	6,250.00					
TYPE "BX-8A" MANHOLE (SP.)	EA.	1,500.00			4	6,000.00					
TYPE "BX-1B" MANHOLE	EA.	600.00	2	1,200.00	2	1,200.00	1	600.00			
TYPE "BX-3B" MANHOLE	EA.	775.00			2	1,550.00					

SYSTEM NO. 11

FROM C.E.P. FLA. E-9 BOUNDARY  
AT BUFFALO AVENUE  
SOUTH TO I-4

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
PRELIMINARY QUANTITIES & ESTIMATED COST

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
TYPE "BX-4B" MANHOLE	EA.	875.00			3	2,625.00					
TYPE "BX-5B" MANHOLE	EA.	1000.00			1	1,000.00					
TYPE "BX-7B" MANHOLE	EA.	1250.00			5	6,250.00					
TYPE "BX-8B" MANHOLE (SP.)	EA.	1500.00			2	3,000.00					
REBUILD STRUCT. @ EX. BOX	L.S.	LUMP SUM			LUMP SUM	1,500.00					
ADDITIONAL FOR CONST.								LUMP SUM	1,200.00		
24" R.C.P. UNDER R.R.	L.S.	LUMP SUM									
30" R.C.P. UNDER R.R.	L.S.	LUMP SUM									
36" R.C.P. UNDER R.R.	L.S.	LUMP SUM									
48" R.C.P. UNDER R.R.	L.S.	LUMP SUM									
TOTAL				163,507.50		888,735.00			14,400.00		

\* ELIGIBLE COST (INLETS) UNDER C.E.P. FLA. E-9

59,700.00

TOTAL MATERIAL COST

829,035.00

SYSTEM NO. II  
SOUTH OF I-4 TO MCKAY BAY

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
PRELIMINARY QUANTITIES & ESTIMATED COST

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
15" R.C.P.	L.F.	12.00							500	6,000.00	
18" R.C.P.	L.F.	13.50							2750	37,125.00	
21" R.C.P.	L.F.	15.50							290	4,495.00	
42" R.C.P.	L.F.	35.00							950	33,250.00	
21" R.C.P. CLASS IV	L.F.	18.00							260	4,680.00	
24" R.C.P. CLASS IV	L.F.	20.00							260	5,200.00	
30" R.C.P. CLASS IV	L.F.	27.00							520	14,040.00	
36" R.C.P. CLASS IV	L.F.	39.00							260	10,140.00	
42" R.C.P. CLASS IV	L.F.	42.00							30	1,260.00	
TYPE "E" INLET	EA.	450.00							22	9,900.00	
TYPE "BX-1A" MANHOLE	EA.	600.00							12	7,200.00	
TYPE "BX-2A" MANHOLE	EA.	675.00							4	2,700.00	
TYPE "BX-1B" MANHOLE	EA.	600.00							2	1,200.00	
TYPE "BX-2B" MANHOLE	EA.	700.00							3	2,100.00	
CONCRETE ENDWALL	EA.	1,000.00							4	4,000.00	



SYSTEM NO. 11  
(OUTFALL)  
SOUTH OF I-4 TO MCKAY BAY

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
PRELIMINARY QUANTITIES & ESTIMATED COST

DESCRIPTION	UNITS	UNIT PRICE	NEIGHBORHOOD DEVELOPMENT PROGRAM		CODE ENFORCEMENT PROGRAM FLA. E-9 AREA "B"		MODEL CITIES		PLANNED VARIATION		REMARKS
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	
8.0' x 6.0' CONC. BOX	L.F.	161.00							3800	611,800.00	
10.0' x 6.0' CONC. BOX	L.F.	202.00							300	60,600.00	
TRANSITIONS, BENDS AND STEP DOWNS	L.F.	405.00							100	40,500.00	
CLEARING & GRUBBING	Ac.	600.00							18.6	11,160.00	
EXCAVATION	C.Y.	2.25							168,800	379,800.00	
GRASS SODDING	C.Y.	1.50							82,450	123,675.00	
WATER FOR GRASSING	M.GAL.	5.00							495	2,475.00	
TOTAL										1,230,010.00	

29TH STREET DRAINAGE SYSTEM - EASTERN BRANCH  
 RETENTION BASIN - PRELIMINARY ESTIMATED COST  
 (Hillsborough Avenue South to I-4)

BASIN	CONCRETE ENDWALLS	EXCAVATION	SODDING	WATER	CONST. COST SUB-TOTAL	R/W COST	RELOCATION COST	TOTAL COST
"A-1"	3,000.00	13,005.00	6,375.00	130.00	22,510.00	42,500.00	13,390.00	78,400.00
"A-2"	4,000.00	20,948.00	10,674.00	215.00	35,837.00	52,100.00	28,980.00	116,917.00
"B"	3,000.00	52,042.00	17,506.00	350.00	72,898.00	151,800.00	74,360.00	299,058.00
"C"	3,000.00	13,624.00	6,306.00	125.00	23,055.00	45,700.00	13,780.00	82,535.00
"D"	2,000.00	33,075.00	11,907.00	240.00	47,222.00	20,000.00	-----	67,222.00
"E"	4,000.00	39,645.00	13,019.00	260.00	56,924.00	48,000.00	18,430.00	123,354.00
"F"	4,000.00	110,362.00	21,462.00	430.00	136,254.00	66,300.00	11,310.00	213,864.00
"G"	4,000.00	111,724.00	30,558.00	610.00	146,892.00	91,000.00	18,690.00	256,582.00
MISC. Const.	---	---	---	---	30,000.00	31,700.00	12,000.00	73,700.00
TOTAL	27,000.00	394,425.00	117,807.00	2,360.00	571,592.00	549,100.00	190,940.00	1,311,632.00