

#R10-3

T O W N O F  
**ADDISON**

*John Birkhoff  
Matt Hickey*

**REPORT ON**

**1996 WASTEWATER  
COLLECTION SYSTEM**

*Prepared By*

**SHIMEK, JACOBS & FINKLEA  
CONSULTING ENGINEERS  
DALLAS, TEXAS**

*July, 1996*

**TOWN OF ADDISON**  
**1996 SANITARY SEWER STUDY REPORT**

**TABLE OF CONTENTS**

<u>Section</u>	<u>Page No.</u>
General .....	1
Planning Area .....	1
Wastewater Flows .....	5
Analysis and Recommendations .....	6
Category I Defects .....	10
Category II Defects .....	12
Sanitary Sewer Map - Lines Identified with Capacity Defects .....	16
Sanitary Sewer Map - Lines Identified with Grade Defects .....	17

John W. Birkhoff  
Texas P.E. No. 54137  
Date: August 9, 1996



*John W. Birkhoff*

8/9/96

# 1996 WASTEWATER COLLECTION SYSTEM REPORT

## GENERAL

This analysis and report covers the analysis of the existing wastewater collection system for the Town of Addison. Included are master plan maps highlighting system improvements, sanitary sewer segments identified as under capacity and sanitary sewer segments identified with grade defects. The wastewater collection system is near buildout conditions and this study is to confirm the adequacy of that system and to size future improvements.

Wastewater flows currently are collected through small lines and by gravity arrive at a number of meter stations that discharge into the City of Dallas, City of Carrollton and City of Farmers Branch wastewater collection systems. The Town of Addison has no wastewater treatment plant. Currently, under construction is a project that will relieve the City of Carrollton system and route that flow south to an interceptor in Marsh Lane and into the Trinity River Authority (TRA) collection system. Points of discharge into the City of Farmers Branch will be transferred into an interceptor jointly being constructed by Addison and Farmers Branch (NDCWSC) for discharge into the TRA system.

The interceptors mentioned above are not a part of this capacity study. Major collection trunk lines have been identified and analyzed in this report. These trunk lines are shown on the master plan maps shown at the end of this report.

## PLANNING AREA

The planning area for this report includes the entire area within the current Town limits and includes approximately 4-1/2 square miles. The existing Addison Airport remains as an airport in this analysis.

The following is a breakdown of land uses utilized in this report:

- High Density Single Family ..... 1,012 Lots
- Low Density Single Family ..... 89 Acres

- Apartments ..... 253.8 Acres
- Quorum Circle and Northern Undeveloped Areas ..... 274.6 Acres
- Tollway Corridor ..... 364.9 Acres
- Midway Road Office/Commercial ..... 81.5 Acres
- Commercial Retail ..... 456.5 Acres
- Industrial ..... 566 Acres
- School/Recreation Centers ..... 126 Acres

The following are descriptions of each sanitary sewer basin:

**Basin A**

Sanitary Sewer Basin A contains approximately 122 acres with a variety of land uses. The basin is zoned for a large amount of high density and office development. Basin A currently contains apartments, the Trinity Christina Academy and the Town of Addison Athletic Park. Sanitary sewer flows from Basin A are metered through the Trinity Christian Meter Station and passed onto the City of Dallas system.

**Basin B**

Sanitary Sewer Basin B contains approximately 376 acres. The basin has predominately light industrial uses with some apartments and low-rise offices. Most of the undeveloped portions of the basin located north of Addison Airport, are zoned as high density. Flows generated in Basin B, will be routed south to the Marsh Lane Interceptor.

**Basin C**

Sanitary Sewer Basin C contains approximately 329 acres. The basin currently contains a large amount of apartments along Westgrove Drive and Ledgemont Lane with some high-rise office buildings along Dallas North Tollway. A large amount of the basin remains undeveloped and is zoned for high density development and high-rise offices. Flows from Basin C are metered through the Dallas Parkway Meter Station and passed on to the City of Dallas system.

### **Basin D1**

Sanitary Sewer Basin D1 is near buildout and contains approximately 382 acres. The basin has mostly light industrial land uses north of Beltline Road with commercial/retail land uses and some small offices along Beltline Road. Flows generated in Basin D1 are directed into the Marsh Lane Sewer Interceptor.

### **Basin D2**

Sanitary Sewer Basin D2 is currently at or near buildout conditions and contains approximately 171 acres. Commercial/retail land uses are predominate along Beltline Road while the remainder of the basin contains high density single family homes. The flow from Basin D2 is routed to the Marsh Lane Interceptor.

### **Basin D3**

Sanitary Sewer Basin D3 contains approximately 167 acres of mostly high density single family homes, with some apartments located along Marsh Lane. The sanitary sewer basin flows into the Marsh Lane Interceptor.

### **Basin E**

Sanitary Sewer Basin E contains approximately 311 acres. The basin currently contains light industrial land uses along Addison Airport, some commercial/retail uses along Addison Road, and high rise offices along the Dallas North Tollway corridor. The Quorum Circle development and all remaining open areas are zoned for high density and high-rise office uses. The wastewater flow created in the basin is metered through the Arapaho Road Meter Station and passed onto the City of Dallas.

### **Basin F**

Sanitary Sewer Basin F has approximately 261 acres. Commercial/retail land uses are present along the Beltline and Midway Road corridors. The Loos Athletic Center and the Green Hill School encompass a majority of the land in the southern portion of the basin. The flow generated in this basin is metered through Spring Valley Meter Station and passed on to the North Dallas County Water Supply Corporation Interceptor/TRA (NDCWSC/TRA).

### **Basin G1**

Sanitary Sewer Basin G1 contains approximately 73 acres of commercial/retail and apartment land uses. The wastewater flow generated in this basin is routed into the Marsh Lane Interceptor.

### **Basin G2**

Sanitary Sewer Basin G2 contains approximately 100 acres of apartments. The flow generated in this basin is metered through the Brookhaven East Metering Station and passed on to the NDCWSC/TRA interceptors.

### **Basin H**

Sanitary Sewer Basin H contains approximately 126 acres. The basin contains commercial/retail land uses along Beltline Road and high-rise offices between Inwood Road and the Dallas North Tollway. The flow generated in the basin is metered through the Inwood Road Meter Station and passed on to the NDCWSC/TRA interceptors.

### **Basin I**

Sanitary Sewer Basin I contains approximately 51 acres of light industrial and commercial/retail land uses. The wastewater from Basin I is routed through the City of Farmers Branch without being metered.

### **Basin K**

Sanitary Sewer Basin K contains approximately 235 acres. The majority of Basin K contains both low and high density single family homes and commercial/retail land uses. The flow generated in Basin K is directed along Beltline Road to the City of Dallas System without being metered.

## WASTEWATER FLOWS

Flows for the various land uses were determined from the Town's water records less irrigation usage. These flows were compared to flows generated from information in previous studies of land uses similar to that in Addison. Inflow and infiltration is included in the design flows.

All flows for each subbasin within the primary basin were accumulated. Flows were converted to per capita flows, and a peaking factor applied to determine the peak flows for the sizing of pipes. Peaking factors utilized in this analysis are based on Curve "A" from the ASCE Manual of Practice in Gravity Sanitary Sewer Design and Construction, dated 1982, Page 39.

The following flows are utilized in this report:

Land Use	Peak Flows
High Density Single Family (3.2 persons/unit)	100 gpcd
Low Density Single Family (1.8 homes/acre)	100 gpcd
Apartments	3,000 gpad
Quorum Circle & Northern Undeveloped Areas	5,000 gpad
Tollway Corridor	4,500 gpad
Midway Road Office/Commercial	2,500 gpad
Commercial Retail	2,500 gpad
Industrial	1,500 gpad
Schools/Recreation Centers	1,000 gpad

gpcd = gallons per capital per day

gpad = gallons per acre per day

## **ANALYSIS AND RECOMMENDATIONS**

The flows generated in each basin were applied to the City's major sanitary sewer collection lines as shown in the tables at the back of this report. Each sanitary sewer segment was analyzed to insure that a positive grade and design criteria were maintained. The design criteria for sanitary sewer lines include capacity for peak flows with velocities between 2 and 5 feet per second. Segments that were identified with defects such as grade or capacity were categorized as follows:

**Category-1:** Indicates the need for immediate rehabilitation.

**Category-2:** Indicates lines that should be monitored and rehabilitated as required due to growth or high maintenance.

Results for the sanitary sewer lines in each of the basins are outlined as follows and graphically shown on the maps at the end of this report:

### **Basin A**

- Approximately 587 linear feet of sanitary sewer lines were identified as Category-2 with capacity deficiencies. The segments are located between Addison Road and the Dallas North Tollway.

### **Basin B**

- Information regarding the sanitary sewer lines in Basin B were not available. A sanitary sewer analysis was not conducted in this basin.

### **Basin C**

- Approximately 3,928 linear feet of sanitary sewer lines along Dallas North Tollway from Westgrove Drive to Airport Parkway were identified as Category-2 segments with capacity deficiencies.
- Approximately 1,339 linear feet of sanitary sewer lines from Airport Parkway and Quorum Drive to the Dallas North tollway were identified as Category-2 with grade and capacity defects.
- Approximately 2,102 liner feet of sanitary sewer lines from Ledgemont Lane to Westgrove Drive to the Dallas North Tollway were identified as Category-2 with grade and capacity defects.



**Basin D1**

- Approximately 510 linear feet of a sanitary sewer line from Lindeburg Drive to the S.L. & S.M. Railroad was identified as Category-2 with capacity deficiencies.

**Basin D2**

- Approximately 1,323 liner feet of sanitary sewer lines north of Beltway Drive at Beltline Road to Beltline Road and Business Avenue were identified as Category-1 with grade defects. A negative grade was identified and segments of the sewer line did not meet the design criteria for velocity.
- Approximately 233 linear feet of sanitary sewer line west of Marsh Lane, flowing to the Marsh Lane Interceptor, was identified as Category-2 with grade deficiencies.

**Basin D3**

- Basin D3 was not analyzed. The flow from this basin is routed to the Marsh Lane Interceptor.

**Basin E**

- Approximately 4,848 linear feet of sanitary sewer lines near the Addison Airport from Glen Curtis Drive to Rosco Turner Drive and Addison Road were identified as Category-1 with grade defects. The collection lines did not meet the design criteria for velocity or capacity.
- Approximately 1,160 linear feet of sanitary sewer lines from Rosco Turner Road and Addison Road to Julian Street and Clara Street were identified as Category-2 with capacity deficiencies.
- Approximately 360 liner feet of sanitary sewer line from the S.L. & S.M. Railroad at the Dallas North Tollway was identified as Category-2 with grade deficiencies.

### **Basin G1**

- Basin G1 was not analyzed. The flow from this basin is directed into the Marsh Lane Interceptor.

### **Basin F**

- In order to allow the major collection lines in Basin F along Midway Road to continue providing capacity, it is recommended that flow generated from any additional growth or the high density single family homes in the Proton Drive and Heritage Lane area, be routed directly to the Spring Valley Metering Station. The proposed sewer line created approximately 2,300 linear feet of new collection lines in the Green Hill School vicinity and prevented rehabilitation of the collection lines along Midway Road and Spring Valley Drive.

### **Basin G2**

- Approximately 1,106 linear feet of sanitary sewer lines along the southern city limits near Brookhaven Club Drive to the Brookhaven East Metering Station were identified as Category-2 with grade defects. The collection lines did meet the design criteria for velocity.
- Approximately 1,301 linear feet of sanitary sewer lines in the vicinity of Brookhaven Club Drive were identified as Category-2 with capacity and grade deficiencies.

### **Basin H**

- Approximately 1,777 linear feet of sanitary sewer lines along Inwood Road to the Inwood Road Meter Station were identified with Category-1 capacity defects. The existing 8-inch collection lines did not meet peak flow design criteria.

### **Basin I**

- The sanitary sewer lines in Basin I met all design criteria. No rehabilitation is needed in the basin.

**Basin K**

- Approximately 1,356 linear feet of sanitary sewer lines from the vicinity of Sakowitz Drive to Oaks North Drive and along Beltline Road were identified as Category-2 with grade defects.

Our opinion of probable cost to rehabilitate the sanitary sewer segments identified as Category-1, or Category-2, with capacity or grade defects is as follows:

**Category-1 Defects**

<u>Defect</u>	<u>Rehabilitation Estimate</u>
Capacity .....	\$177,240
Grade .....	<u>\$967,100</u>
<b>Subtotal</b>	<b>\$1,144,340</b>

**Category-2 Defects**

<u>Defect</u>	<u>Rehabilitation Estimate</u>
Capacity .....	\$1,298,090
Grade .....	<u>\$661,710</u>
<b>Subtotal</b>	<b>\$1,959,800</b>

**Total for All Rehabilitation      \$3,104,140**

The recommended line size, grade and opinion of rehabilitation cost for each defective segment of sanitary sewer are listed by category and basin in the tables that follow.

TOWN OF ADDISON  
 SANITARY SEWER STUDY  
 LINES IDENTIFIED AS UNDER CAPACITY - CATEGORY 1  
 OPINION OF REHABILITATION COST

SANITARY SEWER LINE H-1

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. DIAMETER (IN)	EXIST. SLOPE (%)	TOTAL PEAK FLOW (MGD)	OVERSIZE/UNDERSIZE (MGD)	RECOMMENDED REPLACEMENT LINE (IN)	UNIT COST	TOTAL COST
H11	H10	632.02	9.55	622.47	57	8	0.82	0.97	-0.26	12	120.00	\$6,840.00
H10	H9	632.45	10.45	622	605	8	0.90	0.97	-0.23	12	120.00	\$72,600.00
H9	H3	626.17	9.50	616.67	390	8	0.67	1.27	-0.61	12	120.00	\$46,800.00
H3	H2	621.92	8.00	613.92	425	8	0.74	1.27	-0.59	12	120.00	\$51,000.00
SUBTOTAL:											\$177,240.00	

TOTAL FOR LINES IDENTIFIED AS UNDER CAPACITY - CATEGORY 1: \$177,240.00

**TOWN OF ADDISON  
SANTARY SEWER STUDY  
LINES IDENTIFIED AS GRADE DEFECTS - CATEGORY 1  
OPINION OF REHABILITATION COST**

**SANTARY SEWER LINE D2**

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. SLOPE (%)	RECOMMENDED REPLACEMENT LINE (IN)	PROP SLOPE (%)	UNIT COST	TOTAL COST
D175	D209	602.39	14.40	587.99	40.5	6.93	8	1.24	120.00	\$4,860.00
D209	D70	597.30	12.15	585.15	136	-0.47	8	1.24	120.00	\$16,320.00
D70	D208	595.29	9.50	585.79	450	3.16	8	1.82	150.00	\$67,500.00
D208	D207	586.62	15.05	571.57	349	1.31	8	1.82	150.00	\$52,350.00
D207	D206	581.61	14.60	567.01	347	0.61	8	1.82	150.00	\$52,050.00
<b>SUBTOTAL:</b>										<b>\$193,080.00</b>

**SANTARY SEWER LINE E-1**

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. SLOPE (%)	RECOMMENDED REPLACEMENT LINE (IN)	PROP SLOPE (%)	UNIT COST	TOTAL COST
E84	E88	640.59	4.58	636.01	1355	0.08	12	0.23	130.00	\$176,150.00
E88	E83	640.23	5.45	634.93	442	0.21	12	0.23	130.00	\$57,460.00
E83	E82	639.22	5.25	634.02	365	0.19	12	0.23	130.00	\$47,450.00
E82	E81	640.52	7.00	633.32	785	0.19	12	0.23	130.00	\$102,050.00
E81	E52	639.79	8.00	631.79	670	0.15	12	0.23	130.00	\$87,100.00
E52	E79	637.54	6.75	630.79	199	0.06	12	0.23	130.00	\$25,870.00
E79	E78	637.42	6.75	630.67	95	0.35	12	0.23	130.00	\$12,350.00
E78	E77	637.14	6.80	630.34	122	0.18	12	0.23	130.00	\$15,860.00
E77	E75	637.12	7.00	630.12	294	0.24	12	0.23	130.00	\$38,220.00
E75	E73	640.12	10.70	629.42	521	0.31	12	0.23	130.00	\$67,730.00
<b>SUBTOTAL:</b>										<b>\$630,240.00</b>

**SANTARY SEWER LINE G2-1**

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. SLOPE (%)	RECOMMENDED REPLACEMENT LINE (IN)	PROP SLOPE (%)	UNIT COST	TOTAL COST
G23	G22	549.66	6.17	543.49	640	0.22	15	0.24	130.00	\$83,200.00
G22	G21	551.52	9.42	542.10	456	0.09	15	0.24	130.00	\$59,280.00
G21	G20	548.04	6.33	541.71	10	9.00	15	0.24	130.00	\$1,300.00
<b>SUBTOTAL:</b>										<b>\$143,780.00</b>

**TOTAL FOR LINES IDENTIFIED WITH GRADE DEFECTS - CATEGORY 1: \$967,100.00**

TOWN OF ADDISON  
 SANITARY SEWER STUDY  
 LINES IDENTIFIED AS UNDER CAPACITY - CATEGORY 2  
 OPINION OF REHABILITATION COST

SANITARY SEWER LINE A

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	US MH LENGTH (FT)	EXIST. DIAMETER (IN)	EXIST. SLOPE (%)	EXIST. SLOPE (%)	TOTAL PEAK FLOW (MGD)	OVERSIZE/UNDERSIZE (MGD)	RECOMMENDED REPLACEMENT LINE (IN)	UNIT COST	TOTAL COST
A4	A1	642.07	18.30	623.77	327	10	0.17	NA	1.10	-0.51	15	140.00	\$45,780.00
A1	A30 NO MH	640.21	17.00	623.21	260	10	NA	NA	1.24	NA	15	140.00	\$36,400.00
<b>SUBTOTAL:</b>													<b>\$82,180.00</b>

SANITARY SEWER LINE C-1

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	US MH LENGTH (FT)	EXIST. DIAMETER (IN)	EXIST. SLOPE (%)	EXIST. SLOPE (%)	TOTAL PEAK FLOW (MGD)	OVERSIZE/UNDERSIZE (MGD)	RECOMMENDED REPLACEMENT LINE (IN)	UNIT COST	TOTAL COST
C23	C22	617.66	9.67	607.99	292	10	1.23	1.23	1.82	-0.24	12	150.00	\$43,800.00
C22	C21	615.90	11.50	604.40	265	10	0.38	0.38	1.97	-1.09	15	150.00	\$39,750.00
C21	C20	614.05	10.67	603.38	260	10	0.62	0.62	1.97	-0.85	15	150.00	\$39,000.00
C20	C76	612.63	10.86	601.77	260	10	0.29	0.29	1.97	-1.20	15	150.00	\$39,000.00
C76	C19	612.62	11.60	601.02	126	10	0.69	0.69	1.97	-0.79	15	150.00	\$18,900.00
C19	C1	613.15	13.00	600.15	300	10	0.30	0.30	1.97	-1.19	15	150.00	\$45,000.00
<b>SUBTOTAL:</b>													<b>\$225,450.00</b>

SANITARY SEWER LINE C-2

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	US MH LENGTH (FT)	EXIST. DIAMETER (IN)	EXIST. SLOPE (%)	EXIST. SLOPE (%)	TOTAL PEAK FLOW (MGD)	OVERSIZE/UNDERSIZE (MGD)	RECOMMENDED REPLACEMENT LINE (IN)	UNIT COST	TOTAL COST
C41	C39	628.30	13.00	615.30	535	10	0.30	0.30	1.02	-0.24	12	130.00	\$69,550.00
C38	C37	624.75	11.83	612.92	307	10	0.36	0.36	1.30	-0.45	12	130.00	\$39,910.00
C37	C31	622.00	10.17	611.83	400	10	0.33	0.33	1.30	-0.48	12	130.00	\$52,000.00
C31	C30	622.68	12.17	610.51	225	10	0.56	0.56	1.30	-0.24	12	130.00	\$29,250.00
C30	C23	620.08	10.83	609.25	320	10	0.39	0.39	1.30	-0.41	12	130.00	\$41,600.00
<b>SUBTOTAL:</b>													<b>\$232,310.00</b>

SANITARY SEWER LINE C-3

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	US MH LENGTH (FT)	EXIST. DIAMETER (IN)	EXIST. SLOPE (%)	EXIST. SLOPE (%)	TOTAL PEAK FLOW (MGD)	OVERSIZE/UNDERSIZE (MGD)	RECOMMENDED REPLACEMENT LINE (IN)	UNIT COST	TOTAL COST
C80	C11	616.71	4.58	612.13	348	8	0.59	0.59	1.07	-0.52	10	130.00	\$45,240.00
C10 NO MH	C9	614.92	4.83	610.09	358	8	NA	NA	1.07	NA	10	150.00	\$53,700.00
C9	C5	618.01	10.58	607.43	297	8	0.67	0.67	1.07	-0.43	10	150.00	\$90,000.00
C5	C4	618.69	13.25	605.44	283	10	0.24	0.24	1.42	-0.73	15	150.00	\$44,550.00
C4	C3	620.77	16.00	604.77	294	10	0.31	0.31	1.42	-0.63	15	150.00	\$44,100.00
C3	C2	618.81	14.95	603.86	297	10	0.30	0.30	1.42	-0.64	15	150.00	\$44,550.00
C2	C1	617.29	14.33	602.96	296	10	1.25	1.25	1.42	0.16	12	150.00	\$44,400.00
<b>SUBTOTAL:</b>													<b>\$408,990.00</b>

**TOWN OF ADDISON  
SANITARY SEWER STUDY  
LINES IDENTIFIED AS UNDER CAPACITY - CATEGORY 2  
OPINION OF REHABILITATION COST**

**SANITARY SEWER LINE D1-2**

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. DIAMETER (IN)	EXIST. SLOPE (%)	TOTAL PEAK FLOW (MGD)	OVERSIZE/UNDERSIZE (MGD)	RECOMMENDED REPLACEMENT LINE (IN)	UNIT COST	TOTAL COST
D151	D150	621.32	5.90	615.42	510	6	1.01	0.49	-0.12	8	120.00	\$61,200.00
<b>SUBTOTAL:</b>											<b>\$61,200.00</b>	

**SANITARY SEWER LINE E-1**

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. DIAMETER (IN)	EXIST. SLOPE (%)	TOTAL PEAK FLOW (MGD)	OVERSIZE/UNDERSIZE (MGD)	RECOMMENDED REPLACEMENT LINE (IN)	UNIT COST	TOTAL COST
E73	E72	636.60	8.80	627.80	60	8	1.30	0.65	0.25	12	130.00	\$7,800.00
E72	E71	636.53	9.61	626.92	185	8	0.50	0.72	-0.17	12	130.00	\$24,050.00
E71	E68	636.25	10.26	625.99	190	8	0.50	0.72	-0.17	12	130.00	\$24,700.00
E68	E4A	635.30	10.35	624.95	400	8	0.40	0.82	-0.33	12	130.00	\$52,000.00
E4A	E5A	635.75	12.40	623.35	325	8	0.40	0.82	-0.33	12	130.00	\$42,250.00
<b>SUBTOTAL:</b>											<b>\$150,800.00</b>	

**SANITARY SEWER LINE G2-2**

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. DIAMETER (IN)	EXIST. SLOPE (%)	TOTAL PEAK FLOW (MGD)	OVERSIZE/UNDERSIZE (MGD)	RECOMMENDED REPLACEMENT LINE (IN)	UNIT COST	TOTAL COST
G32	G58	555.73	9.00	546.73	250	10	0.21	0.87	-0.21	12	120.00	\$30,000.00
G58	G31	558.45	12.25	546.20	127	10	0.20	0.87	-0.23	12	120.00	\$15,240.00
G31	G30	558.11	12.17	545.94	120	10	0.28	0.87	-0.12	12	120.00	\$14,400.00
G30	G29	557.19	11.58	545.61	321	10	0.32	0.87	-0.06	12	120.00	\$38,520.00
G29	G23	553.16	8.58	544.58	325	10	0.34	0.87	-0.04	12	120.00	\$39,000.00
<b>SUBTOTAL:</b>											<b>\$137,160.00</b>	

**TOTAL FOR LINES IDENTIFIED AS UNDER CAPACITY - CATEGORY 2: \$1,298,090.00**

**TOWN OF ADDISON**  
**SANTARY SEWER STUDY**  
**LINE IDENTIFIED AS GRADE DEFECTS - CATEGORY 2**  
**OPINION OF REHABILITATION COST**

SANTARY SEWER LINE C-1

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. SLOPE (%)	RECOMMENDED REPLACEMENT LINE (IN)	PROP SLOPE (%)	UNIT COST	TOTAL COST
C28	C75	640.59	5.68	634.91	493	0.88	8	0.70	150.00	\$73,950.00
C75	C27	636.74	6.18	630.56	254	0.46	8	0.51	150.00	\$38,100.00
C27	C26	636.42	7.04	629.38	500	0.27	8	0.51	150.00	\$75,000.00
<b>SUBTOTAL:</b>										<b>\$187,050.00</b>

SANTARY SEWER LINE C-2

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. SLOPE (%)	RECOMMENDED REPLACEMENT LINE (IN)	PROP SLOPE (%)	UNIT COST	TOTAL COST
C39	C38	623.85	10.17	613.68	315	0.24	12	0.30	130.00	\$40,950.00
<b>SUBTOTAL:</b>										<b>\$40,950.00</b>

SANTARY SEWER LINE C-3

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. SLOPE (%)	RECOMMENDED REPLACEMENT LINE (IN)	PROP SLOPE (%)	UNIT COST	TOTAL COST
C13	C12	628.76	6.33	622.43	498	1.86	8	1.70	130.00	\$64,740.00
C12	C80	619.00	5.83	613.17	493	0.21	10	0.41	130.00	\$64,090.00
<b>SUBTOTAL:</b>										<b>\$128,830.00</b>

SANTARY SEWER LINE D2

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. SLOPE (%)	RECOMMENDED REPLACEMENT LINE (IN)	PROP SLOPE (%)	UNIT COST	TOTAL COST
D195	D4	579.06	18.00	561.06	233	2.48	18	0.45	160.00	\$37,280.00
<b>SUBTOTAL:</b>										<b>\$37,280.00</b>

SANTARY SEWER LINE E-1

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. SLOPE (%)	RECOMMENDED REPLACEMENT LINE (IN)	PROP SLOPE (%)	UNIT COST	TOTAL COST
E2	E1	611.64	12.93	598.75	360	3.19	12	0.73	150.00	\$54,000.00
<b>SUBTOTAL:</b>										<b>\$54,000.00</b>



**TOWN OF ADDISON  
SANITARY SEWER STUDY  
LINES IDENTIFIED AS GRADE DEFECTS - CATEGORY 2  
OPINION OF REHABILITATION COST**

**SANITARY SEWER LINE G2-2**

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. SLOPE (%)	RECOMMENDED REPLACEMENT LINE (IN)	PROP SLOPE (%)	UNIT COST	TOTAL COST
G33	G32	554.29	7.33	546.96	158	0.15	10	0.74	120.00	\$18,960.00
<b>SUBTOTAL:</b>										<b>\$18,960.00</b>

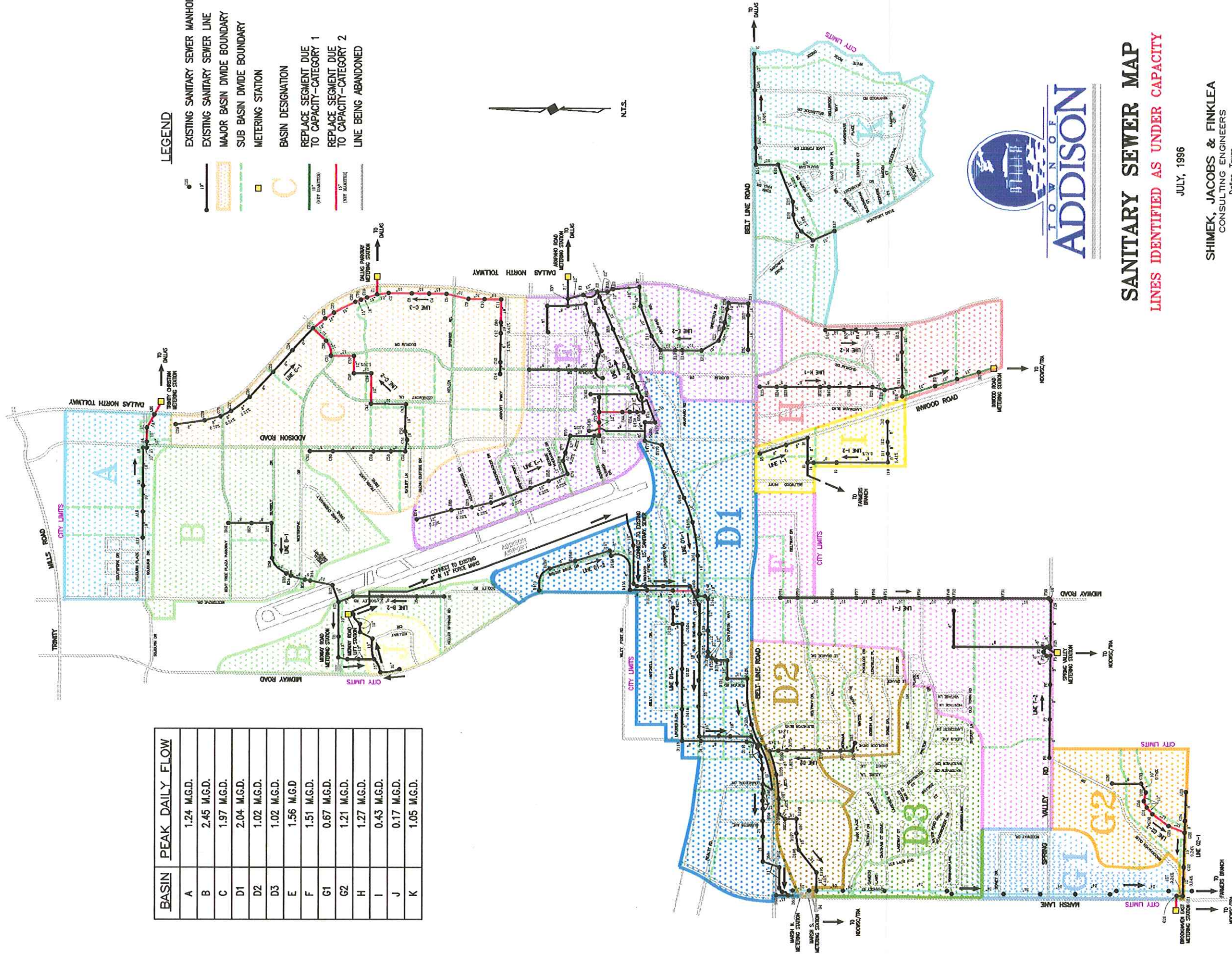
**SANITARY SEWER LINE K**

REACH OF SEWER US	REACH OF SEWER DS	US MH RIM ELEVATION (FT)	US MH MEAS. DOWN (FT)	US MH FLOW LINE (FT)	LENGTH (FT)	EXIST. SLOPE (%)	RECOMMENDED REPLACEMENT LINE (IN)	PROP SLOPE (%)	UNIT COST	TOTAL COST
K20	K22	601.09	20.00	581.09	317	2.28	10	1.50	130.00	\$41,210.00
K23	K49	588.74	17.58	571.16	121	8.07	12	0.50	130.00	\$15,730.00
K56	K NO MH	560.02	18.00	542.02	918	3.59	12	0.50	150.00	\$137,700.00
<b>SUBTOTAL:</b>										<b>\$194,640.00</b>

**TOTAL FOR LINES IDENTIFIED WITH GRADE DEFECTS - CATEGORY 2: \$661,710.00**

BASIN	PEAK DAILY FLOW
A	1.24 M.G.D.
B	2.45 M.G.D.
C	1.97 M.G.D.
D1	2.04 M.G.D.
D2	1.02 M.G.D.
D3	1.02 M.G.D.
E	1.56 M.G.D.
F	1.51 M.G.D.
G1	0.67 M.G.D.
G2	1.21 M.G.D.
H	1.27 M.G.D.
I	0.43 M.G.D.
J	0.17 M.G.D.
K	1.05 M.G.D.

- LEGEND**
- EXISTING SANITARY SEWER MANHOLE
  - EXISTING SANITARY SEWER LINE
  - MAJOR BASIN DIVIDE BOUNDARY
  - SUB BASIN DIVIDE BOUNDARY
  - METERING STATION
  - BASIN DESIGNATION
  - REPLACE SEGMENT DUE TO CAPACITY - CATEGORY 1
  - REPLACE SEGMENT DUE TO CAPACITY - CATEGORY 2
  - LINE BEING ABANDONED



**SANITARY SEWER MAP**  
**LINES IDENTIFIED AS UNDER CAPACITY**

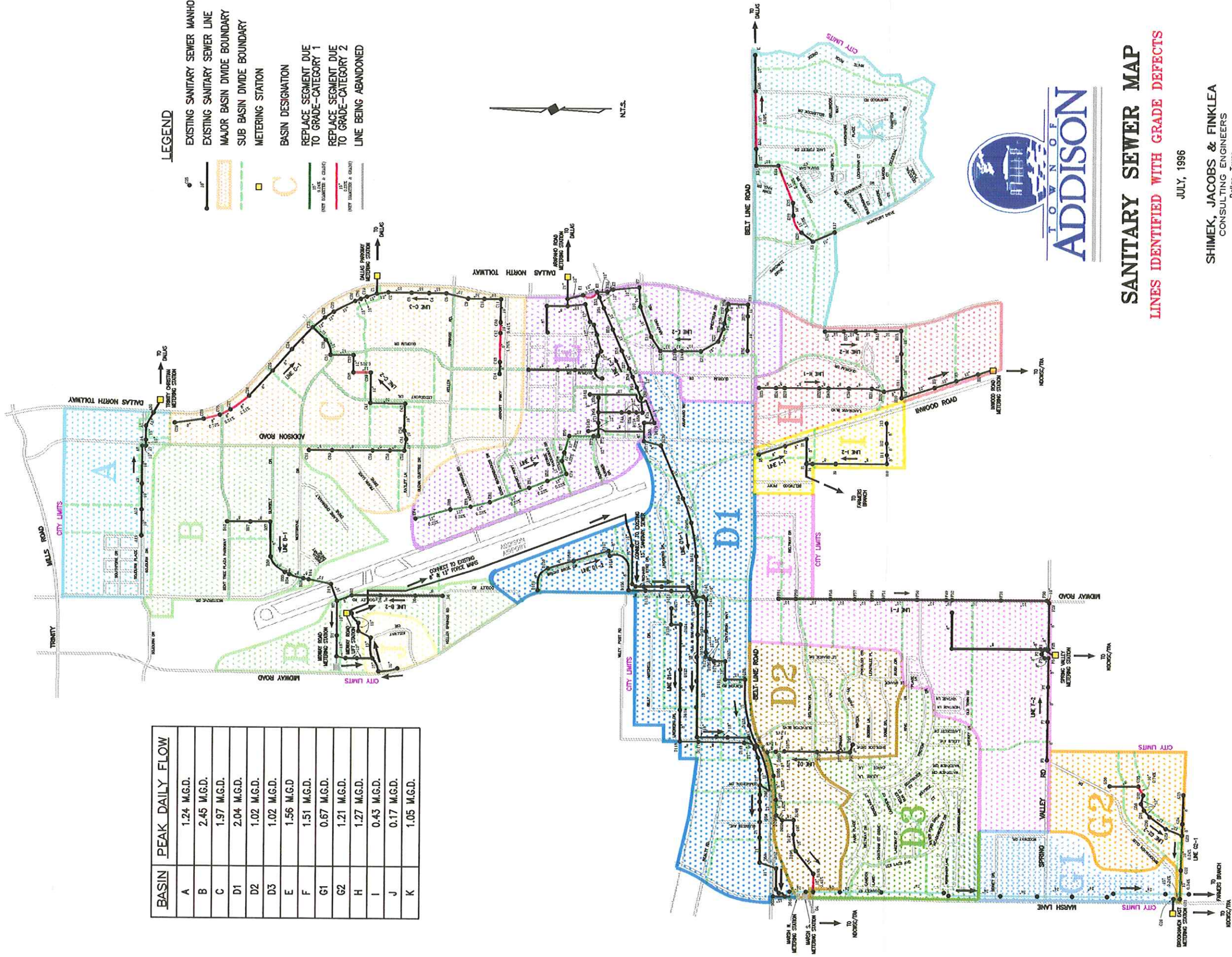
JULY, 1996

SHIMEK, JACOBS & FINKLEA  
CONSULTING ENGINEERS  
Dallas, Texas

BASIN	PEAK DAILY FLOW
A	1.24 M.G.D.
B	2.45 M.G.D.
C	1.97 M.G.D.
D1	2.04 M.G.D.
D2	1.02 M.G.D.
D3	1.02 M.G.D.
E	1.56 M.G.D.
F	1.51 M.G.D.
G1	0.67 M.G.D.
G2	1.21 M.G.D.
H	1.27 M.G.D.
I	0.43 M.G.D.
J	0.17 M.G.D.
K	1.05 M.G.D.

**LEGEND**

- EXISTING SANITARY SEWER MANHOLE
- EXISTING SANITARY SEWER LINE
- MAJOR BASIN DIVIDE BOUNDARY
- SUB BASIN DIVIDE BOUNDARY
- METERING STATION
- BASIN DESIGNATION
- REPLACE SEGMENT DUE TO GRADE—CATEGORY 1
- REPLACE SEGMENT DUE TO GRADE—CATEGORY 2
- LINE BEING ABANDONED



**SANITARY SEWER MAP**  
**LINES IDENTIFIED WITH GRADE DEFECTS**

JULY, 1996

SHIMEK, JACOBS & FINKLEA  
CONSULTING ENGINEERS  
Dallas, Texas