

**TABLE 1**

**30 YEAR CENSUS DATA PROJECTIONS**

<b>YEAR</b>	<b>PROJECTED POPULATION</b>
<b>2005</b>	<b>14,100</b>
<b>2010</b>	<b>14,700</b>
<b>2015</b>	<b>16,300</b>
<b>2020</b>	<b>17,300</b>
<b>2025</b>	<b>18,300</b>
<b>2030</b>	<b>19,000</b>
<b>2035</b>	<b>19,900</b>
<b>2040</b>	<b>20,600</b>

**TABLE 2**

**SUMMARY OF EXISTING PUBLIC WATER SYSTEM DATA IN AIRLINE ID SERVICE AREA**

<b>Utility District / CCN Name</b>	<b>District No.</b>	<b>Service Area (acres)</b>	<b>Water PWSID</b>	<b>Water CCN</b>	<b>Pop. Count</b>	<b># Conn</b>	<b>Total Stor. (MG)</b>	<b>Elev. Stor. (MG)</b>	<b>Total Prod (MGD)</b>	<b>Service Pump Cap. (MGD)</b>	<b>Avg Daily Use (MGD)</b>	<b>Pres Tank Cap (MG)</b>
Sunbelt FWSD	7632500	2418	1010292	10833	8352	2784	0.462	0	2.232	3.744	0.74	0.025
Nitsch & Son Utility Co., Inc			1010145	11124	1977	659	0.135	0	0.576	1.44	0.296	
Westfield MHP, Inc.			1011947	11782	768	256	0.063	0	0.36	1.008	0.093	0.008
Champs Water Co., Inc. (Aldine Forest Sub.)	1010410			10972	108	36	0.01	0	0.063	0.345	0.02	0.001

TABLE 3

COMPUTATION OF SERVICE ZONE LAND AREAS IN AIRLINE ID

Water

Service Zone	Total Area Including CCNs & Districts (Acres)	Area of CCNs/ Districts (Acres)	Unserved Area (Acres)	Percent Area Served (%)	Percent Area Unserved (%)
1	310	24	286	8	92
2	928	0	928	0	100
3	516	243	273	47	53
4	776	250	526	32	68
5	280	0	280	0	100
<b>Total</b>	<b>2810</b>	<b>517</b>	<b>2293</b>	<b>87</b>	<b>413</b>

Sewer

Service Zone	Total Area Including CCNs & Districts (Acres)	Area of CCNs/ Districts (Acres)	Unserved Area (Acres)	Percent Area Served (%)	Percent Area Unserved (%)
1	310	0	310	0	100
2	928	0	928	0	100
3	516	226	290	44	56
4	776	250	526	32	68
5	280	0	280	0	100
<b>Total</b>	<b>2810</b>	<b>476</b>	<b>2334</b>	<b>76</b>	<b>424</b>

Parks & Cemeteries

Name	Area (Acres)
Melrose Park	104
<b>Total</b>	<b>104</b>

**TABLE 4**

**PROJECTED TOTAL WATER DEMAND IN AIRLINE ID**

<b>Service Zone</b>	<b>Total Area (Acres)</b>	<b>Floodway (Acres)*</b>	<b>Net Developable Acreage</b>
1	310	11	299
2	928	152	776
3	516	22	494
4	776	142	634
5	280	128	152
<b>TOTAL</b>	<b>2810</b>	<b>455</b>	<b>2355</b>

\*Current Harris County policy does not allow Development in FEMA designated floodways.

<b>Service Zone</b>	<b>Net Area (Acres)</b>	<b>(gpd/acre)</b>	<b>(mgd)</b>	<b>(gpm)</b>	<b>(gpd/acre)</b>	<b>(mgd)</b>	<b>(gpm)</b>
1	299	1500	0.45	311	1000	0.3	207
2	776	1500	1.16	808	1000	0.78	539
3	494	1500	0.74	515	1000	0.49	343
4	634	1500	0.95	660	1000	0.63	440
5	152	1500	0.23	158	1000	0.15	106
<b>Subtotal</b>	<b>2355</b>	<b>7500</b>	<b>3.53</b>	<b>2452</b>	<b>5000</b>	<b>2.35</b>	<b>1635</b>

<b>Period</b>	<b>* Estimated Service Area Water Usage (GPD)</b>
10 Year Plan	2,965,000
20 Year Plan	3,256,000
30 Year Plan	3,530,000

\* Based on Projected population and an average per capita municipal water use of approximately 170 gallons per day.

TABLE 5

TCEQ DISCHARGE PERMITS

PERMIT#	PERMITTEE	PLANT	RN	EPA PERMIT	A/I	TEAM	KEY MAP	PIN#	SEGM	CO
WQ0012237001	HARRIS CO MUD 189		RN103040846	TX0083712	A	WEST	372 B	074 P	1006	101
WQ0012934001	RANKING ROAD W MUD		RN102341070	TX0097047	A	WEST	372 E	057 P	1006	101
WQ0012294001	HARRIS CO MUD 200		RN102849288	TX0085413	A	WEST	372 F	033 P	1006	101
WQ0002550000	R&A HARRIS SOUTH	INTRCONT MOTORS	RN101610970	TX0088897	A	WEST	372 G	099 P	1006	101
WQ0014621001	RANKIN PARK MAINT	RANKIN PARK	RN104680830	TX0127957	A	WEST	372 H	023 P	1006	101
WQ0010495115	HOUSTON, CITY OF	NORTHBOROUGH	RN101607273	TX0054798	A	WEST	372 L	156 B	1006	101
WQ0002611000	HOUSTON 1031 & FMC	WELLHEAD	RN100558022	TX0029564	A	WEST	372 N	111 B	1006	101
WQ0011238002	HARRIS CO MUD 005		RN102340726	TX0026344	A	WEST	372 N	096P	1006	101
WQ0010495133	HOUSTON, CITY OF	HCMUD 203	RN101607869	TX0084875	A	WEST	372 P	089 P	1006	101
WQ0010495100	HOUSTON, CITY OF	NORTHGATE	RN101608685	TX0055310	A	WEST	372 R	065 O	1006	101
WQ0011678001	PLA NORTH TRACTS	Grnspt In	RN102344066	TX0064424	I	WEST	372 Y	195 B	1006	101
WQ0010919001	FALLBROOK UD		RN102333861	TX0021237	A	WEST	412 B	085 P	1006	101
WQ0013211001	HARRIS CO MUD 321		RN102340718	TX0099104	I	WEST	412 B	053 B	1006	101
WQ0002761000	WEST RD WSC	MCDONALDS	RN101610277	TX0092037	A	WEST	412 D	035 O	1006	101
WQ0011154001	MOUNT HOUSTON RD MUD		RN102340288	TX0023515	A	WEST	412 E	021 P	1006	101
WQ0011473001	BLUE BELL MANOR UTIL		RN101919231	TX0066478	A	WEST	412 F	043 P	1006	101
WQ0010610001	SOUTHERN WATER CORP	HIDDEN VALLEY	RN102341658	TX0030988	A	WEST	412 G	044 P	1006	101
WQ0012919001	THOMAS, T.J.	Drtrl MHP	RN101237923	TX0099171	A	WEST	412 G	056 P	1006	101
WQ0013560001	LEE, JACK CHENG		RN102915378	TX0107158	A	WEST	412 G	066 B	1006	101
WQ0013770001	SMITH WILLIAM D.	KINGMONT MHP	RN101701555	TX0124257	A	WEST	412 J	247 B	1006	101
WQ0010495151	HOUSTON, CITY OF	WILLOW RUN	RN102340940	TX0075663	A	WEST	412 K	311 B	1006	101
WQ0011231001	SUNBELT FWSD	HEATHER GLEN	RN102340379	TX0021245	A	WEST	412 K	020 P	1006	101
WQ0010518001	SUNBELT FWSD	NORTHLINE	RN102952561	TX0021261	A	WEST	412 M	081 O	1006	101
WQ0014156001	LAM, MINH THANH		RN101524510	TX0122190	A	WEST	412 M	104 O	1006	101
WQ0010694001	SOUTHWEST UTILITIES	COLNL HILLS	RN102180569	TX0027707	A	WEST	413 A	076 O	1006	101
WQ0012450001	YOUNG, DARLENE ANN	Advance	RN101263754	TX0088650	A	WEST	413 B	014 O	1006	101
WQ0013882001	J&S WATER COMPANY	ALDINE VILLAGE	RN102807070	TX0070769	A	WEST	413 B	094 O	1006	101
WQ0011739001	CHAMP'S WATER CO	ALDINE	RN101514198	TX0069582	A	WEST	413 C	089 O	1006	101
WQ0012617001	HOUSTON METRO RV	PARK	RN102328713	TX0091651	A	WEST	413 D	076 Y	1006	101
WQ0010825001	HARVEST COMMUNITIES		RN102186889	TX0032255	A	WEST	413 E	099 O	1006	101
WQ0010436001	CHAMP'S WATER CO	WESTERN HOMES	RN101525673	TX0032093	A	WEST	413 H	079 O	1006	101
WQ0011821001	JOHNSON, ANA A.		RN102180346	TX0072184	A	WEST	413 H	054 O	1006	101

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**TCEQ DISCHARGE PERMITS**

PERMIT#	PERMITTEE	PLANT	RN	EPA PERMIT	A/I	TEAM	KEY MAP	PIN#	SEGM	CO
WQ0012070002	ALDINE ISD	CHRISMAN	RN101719953	TX0094188	A	WEST	413 H	084 Y	1006	101
WQ0012261002	SOHLJOU, HOUSHANG	PIN OAK	RN101457653	TX0119610	A	WEST	413 J	012 Y	1006	101
WQ0012917001	HARTZOG, WILLIAM	LONE WILW	RN102517372	TX0095516	A	WEST	413 J	092 Y	1006	101
WQ0013749001	SULYUKMANOV N & A		RN102340403	TX0122521	A	WEST	413 J	198 B	1006	101
WQ0012882001	SOHLJOU, BAHRANM	ROSE MHP	RN102079043	TX0094986	A	WEST	413 K	089 Y	1006	101
WQ0012918001	HARTZOG, LINDA	LONE WILW	RN102178423	TX0095508	A	WEST	413 K	093 Y	1006	101
WQ0013767001	FATIMA FAMILY VILLAG		RN101236685	TX0095656	A	WEST	413 K	109 O	1006	101
WQ0001536000	ASHBROOK-SIMON-HARTL		RN102845831	TX0007650	A	WEST	413 L	046 O	1006	101
WQ0011673001	WOODLOCH MHP, LLC	WOODLOCH	RN102915709	TX0063860	A	WEST	413 L	080 O	1006	101
WQ0012399001	KARBALAI, RITA	SUNDN MHP	RN101514271	TX0087785	A	WEST	413 M	010 O	1006	101
WQ0014620001	SOHLJOU, BAHRAM		RN104640255	TX0127949	A	WEST	413 M	078 O	1006	101
WQ0010419001	NITSCH & SON COMPANY	DURKEE MN	RN102340072	TX0070611	A	WEST	413 N	084 O	1006	101
WQ0012261001	SOHLJOU, HOUSHANG	MELROSE	RN101523256	TX0084671	A	WEST	413 P	091 O	1006	101
WQ0014217001	KARBALAI, LAURA R	CARBY STREET	RN102075769	TX0123579	A	WEST	413 P	015 O	1006	101
WQ0014277001	SOLHJOU MHP, LTD.	ALDIN OAKS	RN101526242	TX0124265	A	WEST	413 P	002 O	1006	101
WQ0012083001	HOOKS MHP, LTD.	HOOKS MHP	RN102177698	TX0078883	A	WEST	413 R	043 O	1006	101
WQ0012555001	WESTFIELD MHP	GULF BANK	RN101527018	TX0090492	A	WEST	413 R	075Y	1006	101
WQ0013084001	MCCULLOCH, XIUHUILI	HARTWICK	RN103015418	TX0097527	A	WEST	413 R	019 O	1006	101

TABLE 6  
HARRIS-GALVESTON SUBSIDENCE DISTRICT  
PERMITTED WELLS IN THE AIRLINE ID VICINITY

ID	OWNERS-NAME	USAGE	DIAMETER
10549	8520 SWEETWATER BUSINESS PARK	0	5
5123	AINSWORTH, J.J. & J.P.	0	4
10596	ALAEI, MIKE	0	2
3119	ALDINE COMMUNITY CARE CENTER	0	4
2924	ALDINE I.S.D.	0	4
2926	ALDINE I.S.D.	0	6
6112	ALL STATE CORPORATION INC.	0	2
4665	BALABAN'S APARTMENTS	0	4
7236	BEST WESTERN HOTEL	0	5
8576	BEST WESTERN HOTEL	0	5
10637	BIG TIME CAR & TRUCK	0	2
4209	BLUE BELL PLACE BUILDERS	0	4
4211	BLUE BELL PLACE BUILDERS	0	4
4213	BLUE BELL PLACE BUILDERS	0	4
9173	CASTILLO, MARIA	0	4
3521	CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC	0	4
7567	DAMERON, BOBBY & MARKIE	0	2
7546	DOAN, DAVID	0	2
6978	DUNN, JESSE	0	4
7162	EDWARDS JR., BERT T.	0	2
2564	ENTEX, INC	0	4
2829	EXXON COMPANY, U.S.A	0	4
3001	EXXON COMPANY, U.S.A	0	10
2961	FATIMA FAMILY VILLAGE	0	4
2962	FATIMA FAMILY VILLAGE	0	4
9953	FLORES, GUADALUPE	0	4
9803	FLORES, RUBEN	0	2
4756	FONDREN, C.E.	0	2
3114	GARCIA, GUSTAVO	0	4
3115	GARCIA, GUSTAVO	0	4
5182	GREENSPPOINT GINGHAM GOOSE SCHOOL	0	4
9571	GUERRA, JUAN	0	4
3130	HARTZOG, WILLIAM E.	0	4
7819	HAYES TRUCK GROUP	0	4
5178	HERRERA, FRANCISCO	0	4
2801	HOUSTON, CITY OF	0	6
3137	HOUSTON, CITY OF	0	6
3138	HOUSTON, CITY OF	0	4
7555	J & J LAWN EQUIPMENT & SERVICE	0	2
4828	JET MACHINE WORKS INC.	0	4
9506	JIMENEZ, RAFAEL	0	4
10612	LOPEZ, ROSA	0	4
4629	MARKET PLACE INNOVATION, INC.	0	4
2194	MCGEE, JOHNNY B. & MELINDA	0	4
2510	MEYER, N.C.	0	3
2865	MOBIL OIL CORPORATION	0	4

TABLE 6  
HARRIS-GALVESTON SUBSIDENCE DISTRICT  
PERMITTED WELLS IN THE AIRLINE ID VICINITY

ID	OWNERS-NAME	USAGE	DIAMETER
2866	MOBIL OIL CORPORATION	0	4
4609	MONAKINO, SAM JR.	0	4
4610	MONAKINO, SAM JR.	0	4
2354	MORRIS, GORDON R.	0	2
2355	MORRIS, GORDON R.	0	2
4215	MOTIVA ENTERPRISES L.L.C.	0	4
7218	OCHOA, JUAN	0	4
5412	OKABAYSHI, EIKO	0	4
8006	OWNER NOT FOUND	0	4
2110	PALMS NURSERY	0	4
8544	PHAN & NGO CORP.	0	4
10218	PRIMERVERA SOCCER CLUB	0	4
5493	RACETRAC PETROLEUM, INC.	0	5
9861	RANKING HOUSING PARTNERS, LP	0	5
4880	SAINT DENNISE, JENNIFER	0	4
10066	SANTIAGO AUTO SALES	0	4
7377	SATURN OF HOUSTON-NORTH FREEWAY	0	4
3026	SCHULZE, GENE	0	2
2872	SHELL OIL COMPANY	0	4
2873	SHELL OIL COMPANY	0	4
2876	SHELL OIL COMPANY	0	4
6598	SHOJAIE, MANSOUR	0	2
3246	SIGMOR CORPORATION	0	4
3249	SIGMOR CORPORATION	0	4
5416	SMITH RV RENTALS	0	4
5097	SOLHJOU, BAHRAM	0	4
4442	SOLHJOU, HOUSHANG	0	4
4443	SOLHJOU, HOUSHANG	0	4
4484	SOLHJOU, HOUSHANG	0	9
1523	SOUTHERN WATER CORPORATION	0	2
1525	SOUTHERN WATER CORPORATION	0	8
3211	SOUTHWEST EQUITIES CORP.	0	4
3212	SOUTHWEST EQUITIES CORP.	0	4
2371	SOUTHWEST UTILITES, INC	0	3
6748	SPRING GARDENS NURSERY	0	5
2804	STAR ENTERPRISE	0	4
1871	SUNBELT UTILITIES	0	8
4022	SUNBELT UTILITIES	0	10
8623	SUNNYWOOD PARTNERSHIP LP	0	5
5093	SWINEHART, B.J.	0	4
10563	TAFARROJI, JAFAR	0	2
3099	TAUTENHAN, O.R.	0	4
3102	TAUTENHAN, O.R.	0	2
3103	TAUTENHAN, O.R.	0	2
6948	TERPSTRA, W.G.	0	2
3310	WESTFIELD NURSERY	0	4



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ID	OWNERS-NAME	USAGE	DIAMETER
3311	WESTFIELD NURSERY	0	4
7394	WIEGHAT, NILAH	0	2
3939	WILLOW RUN PUBLIC SERVICE, INC	0	10
3607	WOODLOCH DEVELOPMENT COMPANY	0	4
8895	HERNANDEZ, JOSE & ROBERT GONZALES	120	2
9020	MUNOZ, RAFAEL	180	2
6726	HERRERA, FRANK	183	4
10375	SMITH RV RENTALS	307	4
6926	MUSE, PHILLIP	360	4
10356	LOPEZ, FREUDO	500	2
6841	CHURCH OF CHRIST IN MELROSE PARK	600	4
6866	HERITAGE CUSTOMS FURNITURE	600	4
8213	GLAZE, LONNIE	640	2
6486	JET MACHINE WORKS INC.	720	4
9375	AZTEC MACHINING & FABRICATING	900	2
5175	SALDANA, VINCENTE	960	4
10357	A-1 RADIATOR	1,000	2
8173	VASQUEZ, ROBERT	1,000	4
9798	PRICE, CHRIS	1,200	2
9180	KAMAL, MUSTAFA	1,690	2
8380	C & B UTILITIES	1,800	4
8506	NORTHWOOD BASPTIST CHURCH	1,895	5
7258	GARNER, ANGA	2,350	2
6918	TEXAS ICE CREAM CORP.	2,500	4
2835	HOUSTON, CITY OF	3,000	8
8453	DAVIS, VIRGIL	3,320	2
7793	VASQUEZ, D. ANTONIO	3,630	2
7754	THREEPENANCE LIMITED	3,900	4
9954	NINO'S AUTO SALES # 2	4,000	4
5811	MATERIAL INSEPECTION TECHNOLOGY	4,160	4
5347	AIRLINE SKATE CENTER	4,300	5
6346	MANUEL'S USED AUTO PARTS # 2	4,800	2
3305	HANDAL, BRIAN A	5,057	4
3306	HANDAL, BRIAN A	5,057	4
10006	LARA, CARLOS	6,000	4
8956	MCKEAN INC., L.N.	6,000	4
8997	MUNOZ, DOMINGO G.	6,000	4
7663	BABAHMADI, MANOOCHER	6,722	2
9810	TEEL, GARY	7,200	4
8422	WILTOR MACHINE INC.	7,200	2
6985	GULF WESTERN VENTURES, INC.	7,500	4
6801	HI-TECH TRUCK RIGGING & EQUIPMENT CO.	7,800	3
6815	LOUDIN & SONS, INC.	9,215	2
4732	HOYAFAM HOLDINGS, LTD DBA BUILTRITE REEL & LUMBER	9,504	4
9013	LUX, RIGOBETO	9,705	2
5490	HOWELL, JUANITA	10,000	4

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ID	OWNERS-NAME	USAGE	DIAMETER
10471	ROLOS CARBURETORS	10,000	2
10203	B & F MAINTENANCE SERVICES INC.	10,200	2
6601	RANI FOODS LP	10,400	2
9732	RACETRAC PETROLEUM, INC.	10,950	4
7856	ALDINE FUNERAL CHAPEL, LLC	12,000	4
7031	ALVARADO, JOE	12,000	2
9097	BISHOP, CARL A.	12,000	4
10263	AZTEC MACHINING & FABRICATING	12,900	4
7683	9820 NORTH FREEWAY	13,000	4
8597	GOOD SHEPHERD CHRISTIAN CHURCH	14,000	4
8225	DE-MAX, INC.	14,700	4
9938	TRUJILLO, FRANCISO	17,280	4
5685	SEELY, RAYMOND	17,475	4
7282	WALTER HOMES, JIM	17,680	4
10102	LIRA, JOSE DANIEL	18,000	5
6940	MCFARLAND VILLAGE, INC.	19,095	4
8770	MACGREGOR, EDWARD R.	20,000	4
10476	MIRANDA, TONY	20,000	4
7769	B & F MTC.	22,400	2
6875	AIRLINE USED PARTS	24,000	2
4252	HARRIS CO. TOLL ROAD AUTHORITY	24,000	4
9932	SOUTHWEST CANOPY OF TEXAS	24,000	4
5368	DADEKS MACHINE WORKS, INC	24,890	5
6290	VINES, VIKKI	28,000	4
6961	NORTHVILLE COMPANY	28,800	4
6057	AUTO ZONE	29,000	5
6800	LAM, PHOUNG	35,000	4
8249	MILANI, PEJMAN	36,000	2
7110	WYMAN, RICHARD	36,000	4
6425	MATANGKASOMBUT, PAUL	36,500	4
9543	GUZMAN, ALDEMAR	37,700	2
7823	THOMPSON, ROGER & PATRICK WILLIAMS	40,000	2
8829	FAITH & GRACE MINISTRIES	40,700	4
9744	CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC	42,000	4
5444	BAUMGARTNER, MIKE	43,200	4
6886	GENERAL PLUMBING CONTRACTORS, INC	48,000	4
4696	FLORES, ROBERT M/MARIA L. SALAS	50,000	5
8112	CUDE, LORINCE A.	51,100	4
6743	HUTCHERSON TILE CO. INC	54,000	4
9319	CRAIG RENTAL & LEASING	57,200	4
9181	ALPHA AUTO PARTS	60,000	2
8652	LAM, PHOUNG THI	68,000	4
8095	HUYNH, CHARLEY	70,000	4
9643	NAVARRO, JUVENAL	82,500	4
6877	BAR-YAM ENGINEERING CO.	90,500	2
6236	AVW, INC	96,000	2

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PERMITTED WELLS IN THE AIRLINE ID VICINITY

ID	OWNERS-NAME	USAGE	DIAMETER
9694	NELSON, KEITH W.	96,000	4
4990	CRANFORD X-RAY CO.	100,000	4
7330	HERNANDEZ, RAYMOND	100,000	2
9739	MOLINA TRUCKING, INC.	100,000	2
4733	NORTHEY, MEL	100,000	4
6746	REFUGE TEMPLE	100,000	4
7354	ZION TEMPLE CHURCH/GOD IN CHRIST	100,000	4
5925	SHARPTON, MIKE	108,300	4
4854	WKND CORP.-MOBILE HOME PARK	118,000	5
9915	JET MACHINE	120,000	5
7581	PHAM, BE	120,000	4
4866	SMITH, JOE BOB	120,000	3
8403	STARTING POINT	120,000	3
5695	POKOROVA UKRAINIAN PARISH	124,000	4
6578	SMI MANUFACTURING, INC	129,776	4
7192	ARBR CARE INC	140,000	4
4914	KIGER, JIM	144,000	5
7040	KIM, HWAN	147,697	4
5350	KIM, SONG IL	156,900	5
7977	HALLIEJO, LTD.	175,000	4
8197	HALLIEJO, LTD.	175,000	4
9547	ARGUELLO, EMILIO	180,000	4
5421	HARRIS CO. R.F.P.D. 17	180,000	4
7649	B J USED AUTO PARTS	186,000	2
7198	ABGHARY, DAVID J.	186,800	4
8196	SOUDJANI, ALI	198,100	4
7637	CACTUS KING	200,000	2
8901	DELAGARZA, MYRNA	200,000	4
7372	FLEETWOOD INC.	200,000	4
7325	TREVINO, JUAN	200,000	4
9021	SCHOOL OF MARTIAL ARTS INC.	204,000	4
7803	WEAVER, A.J.	228,600	5
5396	JEN, YUNG-CHING	237,600	4
9365	MORALES, LORENZO	240,000	4
5006	PETCC FAMILY PARTNERSHIP, LTD.	250,000	5
10108	GOLDEN ARIBAH INVESTMENTS, LLC.	251,000	5
7559	LEE, JACK	252,396	5
4583	SHARAFI, SHAWN & FARZANH MOZAFRIAN	266,350	4
4892	LONE STAR FASTENERS, L.P.	275,810	4
8445	SATURN OF HOUSTON-NORTH FREEWAY	281,000	5
5055	RAYMOND, DONNA R.	300,000	4
9526	ALL STATE CORPORATION INC.	305,400	5
5124	BEREAN BAPTIST CHURCH	322,500	4
7257	RIDE AWAY AUTO SALES, INC.	355,000	2
6857	BIEDRZYCKI ENTERPRISE	360,000	2
9994	NGUYEN, BINH	360,000	4

TABLE 6  
HARRIS-GALVESTON SUBSIDENCE DISTRICT  
PERMITTED WELLS IN THE AIRLINE ID VICINITY

ID	OWNERS-NAME	USAGE	DIAMETER
4606	BOULAIS, JOE	365,000	4
5812	WELDING OUTLETS INC.	389,000	4
5408	REYES, MARIO	400,000	2
5255	ADVENT PRESBYTERIAN CHURCH	415,992	5
4794	NEW OASIS OF FAITH	477,030	5
7243	ALDINE CONGREGATION JEHOVAH'S	500,000	4
9278	JAIME, FELIX	500,000	4
7348	MARLOW, HOLLIS	500,000	4
5031	SMART STOP #2	500,000	4
10113	HOUSTON GARDEN CENTER (TACO DOWNS)	566,370	5
10365	HOUSTON GARDEN CENTER (TACO DOWNS)	566,370	5
5426	AQUINO SIGNS	573,620	4
7261	HOUSTON MOTOR INN	680,000	4
2178	ASHBROOK CORPORATION	724,800	4
2179	ASHBROOK CORPORATION	724,800	4
8775	ROLOS CARBURETORS	730,000	4
5987	GARCIA, JAMIE	754,500	5
9561	MARTINEZ, JUANITA	760,000	4
4867	RED DOT RV PARK	768,000	4
4208	AMAYA, AMILCAR	800,000	4
5467	HUNGRY FARMERS BARBEQUE # 2	806,190	5
10221	JAEGER, RUTH	900,000	4
5209	AFS GROUP-BALABAN APARTMENTS	965,300	5
6874	AYALA, TOMAS	1,000,000	2
7920	UDELSON REALTY INVESTORS	1,000,000	5
6449	UNITED EQUIPMENT RENTAL GULF	1,000,000	4
5132	SOUTHWEST UTILITES, INC	1,103,000	4
4619	WKND CORPORATION	1,104,250	4
4631	WKND CORPORATION	1,104,250	4
5363	COLE INC., ROBERT	1,114,000	4
7545	DOAN, DAVID	1,188,401	5
6930	8900 NORTH FREEWAY, LC	1,200,000	4
4964	8520 SWEETWATER BUSINESS PARK	1,204,000	4
4212	BLUE BELL PLACE BUILDERS	1,359,100	4
6155	FLEETWOOD INC.	1,500,000	4
7639	NGUYEN, NHAT VU	1,548,700	4
5603	LONE STAR FORD	1,783,800	6
2195	MCGEE, JOHNNY B. & MELINDA	1,943,110	4
8771	MCGEE, JOHNNY B. & MELINDA	1,943,110	5
5452	ALDINE COMMUNITY CARE CENTER, INC.	2,341,000	5
4527	HARTZOG, LINDA D.	2,500,000	5
4582	SHARAFI, SHAWN & FARZANH MOZAFRIAN	2,666,350	4
3129	HARTZOG, WILLIAM E.	2,883,300	4
9960	AIRLINE WASHATERIA	3,000,000	5
5241	MAREK, ROBERT J	3,000,000	4
6834	SOLHJOU, HOUSHANG	3,113,700	5

TABLE 6  
HARRIS-GALVESTON SUBSIDENCE DISTRICT  
PERMITTED WELLS IN THE AIRLINE ID VICINITY

ID	OWNERS-NAME	USAGE	DIAMETER
4666	AFS GROUP-BALABAN APARTMENTS	3,975,000	4
6055	SOLHJOU, BAHRAM	3,995,200	5
6687	SOLHJOU, BAHRAM	3,995,200	5
5617	MILESTONE METALS, INC	4,000,000	4
7694	WOODLOCH MHP, LLC	4,800,000	5
5197	SANJUAN, BENJAMIN	5,146,000	5
5242	MAREK, ROBERT J	6,000,000	4
8543	KARBALAI, LAURA	7,330,000	5
7239	SOLHJOU, HOUSHANG	7,716,900	6
2702	HOUSTON, CITY OF	15,403,000	6
3765	HOUSTON, CITY OF	15,403,000	6
3039	HOUSTON, CITY OF	20,294,000	6
2372	HOUSTON, CITY OF	26,036,786	8
4189	HOUSTON, CITY OF	26,036,786	8
1771	HOUSTON, CITY OF	26,167,400	6
2512	HOUSTON, CITY OF	34,298,500	6
2040	HOUSTON, CITY OF	37,226,000	8
2041	HOUSTON, CITY OF	37,226,000	8
3606	WOODLOCH MHP, LLC	48,000,000	4
10483	HOUSTON, CITY OF	53,913,979	6
1872	HOUSTON, CITY OF	53,913,979	8
2238	HOUSTON, CITY OF	53,913,979	4
3525	HOUSTON, CITY OF	53,913,979	12
1524	HOUSTON, CITY OF	72,486,000	16
4048	HOUSTON, CITY OF	72,486,000	20
3038	HOUSTON, CITY OF	96,027,627	4

TABLE 7

SANITARY SEWER SYSTEM DESIGN CALCULATIONS

SERVICE ZONE 1

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)	
01001	01002	82.1	76.10	6.0	81.7	75.06	1.04	6.6	6.3	12	0.2600	400	15.51	15.51	5,000	77,550	77,550	5.87	2,348	
01002	01003	81.7	75.06	6.6	81.3	74.02	1.04	7.3	7.0	12	0.2600	400	14.50	30.01	5,000	72,500	150,050	5.87	2,348	
01003	01004	81.3	74.02	7.3	80.9	73.11	0.91	7.8	7.5	12	0.2600	350	13.13	43.14	5,000	65,650	215,700	5.87	2,055	
01004	01005	80.9	73.07	7.8	80.6	72.16	0.91	8.4	8.1	12	0.2600	350	15.03	58.17	5,000	75,150	290,850	5.87	2,055	
01005	01006	80.6	72.12	8.5	80.2	71.21	0.91	9.0	8.7	12	0.2600	350	12.87	71.04	5,000	64,350	355,200	5.87	2,055	
01007	01006	79.9	73.90	6.0	80.2	73.25	0.65	7.0	6.5	8	0.2600	250	5.60	5.60	5,000	28,000	28,000	2.61	653	
01006	01008	80.2	71.21	9.0	80.2	70.34	0.87	9.9	9.4	12	0.2600	333	2.52	79.16	5,000	12,600	395,800	5.87	1,955	
01008	01009	80.2	70.34	9.9	80.3	69.47	0.87	10.8	10.3	12	0.2600	333	2.52	81.68	5,000	12,600	408,400	5.87	1,955	
01009	01011	80.3	69.47	10.8	80.6	68.60	0.87	12.0	11.4	12	0.2600	333	2.52	84.20	5,000	12,600	421,000	5.87	1,955	
01010	01011	80.6	74.60	6.0	80.4	73.94	0.66	6.5	6.2	8	0.4400	150	0.69	84.89	5,000	3,450	424,450	5.87	881	
01011	01012	80.4	68.60	11.8	80.2	68.13	0.47	12.1	11.9	12	0.2600	180	0.92	85.81	5,000	4,600	429,050	5.87	1,057	
01012	01013	80.2	67.74	12.5	80.4	66.76	0.98	13.6	13.1	12	0.2600	375	3.50	89.31	5,000	17,500	446,550	5.87	2,201	
01013	01014	80.4	66.76	13.6	80.8	65.78	0.98	15.0	14.3	12	0.2600	375	4.90	94.21	5,000	24,500	471,050	5.87	2,201	
																			0	
01015	01016	81.8	75.80	6.0	81.9	74.48	1.32	7.4	6.7	8	0.4400	300	19.40	19.40	5,000	97,000	97,000	2.61	783	
01016	01017	81.9	74.48	7.4	81.1	73.38	1.10	7.7	7.6	8	0.4400	250	4.02	23.42	5,000	20,100	117,100	2.61	653	
01018	01019	79.8	73.80	6.0	79.5	72.26	1.54	7.2	6.6	8	0.4400	350	3.21	3.21	5,000	16,050	16,050	2.61	914	
01020	01019	79.3	73.30	6.0	79.5	71.85	1.45	7.7	6.8	8	0.4400	330	11.55	14.76	5,000	57,750	73,800	2.61	861	
01019	01021	79.5	71.85	7.7	79.5	70.20	1.65	9.3	8.5	8	0.4400	375	5.40	20.16	5,000	27,000	100,800	2.61	979	
01021	01022	79.5	70.20	9.3	79.6	68.55	1.65	11.1	10.2	8	0.4400	375	6.00	26.16	5,000	30,000	130,800	2.61	979	
01022	01023	79.6	68.55	11.1	79.7	66.90	1.65	12.8	11.9	8	0.4400	375	4.82	30.98	5,000	24,100	154,900	2.61	979	
01023	01024	79.7	66.90	12.8	79.8	65.25	1.65	14.6	13.7	8	0.4400	375	3.95	34.93	5,000	19,750	174,650	2.61	979	
01024	01025	78.9	65.25	13.7	79.9	64.59	0.66	15.3	14.5	8	0.4400	150	3.95	38.88	5,000	19,750	194,400	2.61	392	
01025	01026	79.9	64.59	15.3	79.9	63.93	0.66	16.0	15.6	8	0.4400	150	1.73	40.61	5,000	8,650	203,050	2.61	392	
																			0	
01027	01028	78.8	72.80	6.0	79.3	71.04	1.76	8.3	7.2	8	0.4400	400	3.19	3.19	5,000	15,950	15,950	2.61	1,044	
01028	01029	79.3	71.04	8.3	79.2	69.83	1.21	10.0	9.2	8	0.4400	275	1.65	4.84	5,000	8,250	24,200	2.61	718	
01029	01030	79.2	69.83	10.0	79.2	68.62	1.21	10.6	10.3	8	0.4400	275	1.15	5.99	5,000	5,750	29,950	2.61	718	
01030	01031	79.2	68.62	10.6	79.2	67.96	0.66	11.2	10.9	8	0.4400	150	0.00	5.99	5,000	0	29,950	2.61	392	
01031	01032	79.2	67.96	11.2	79.1	66.49	1.47	12.6	11.9	8	0.4400	333	0.96	6.95	5,000	4,800	34,750	2.61	869	
01032	01033	79.1	66.49	12.6	79.2	65.02	1.47	14.2	13.4	8	0.4400	333	0.96	7.91	5,000	4,800	39,550	2.61	869	
01033	01034	79.2	65.02	14.2	79.3	63.55	1.47	15.8	15.0	8	0.4400	333	0.96	8.87	5,000	4,800	44,350	2.61	869	
01034	01035	79.3	63.55	15.8	79.3	63.29	0.26	16.0	15.9	8	0.4400	60	0.00	8.87	5,000	0	44,350	2.61	157	
01035	01036	79.3	63.29	16.0	79.3	62.04	1.25	17.3	16.6	8	0.4400	285	2.07	10.94	5,000	10,350	54,700	2.61	744	
01036	01037	79.3	62.04	17.3	79.4	60.79	1.25	18.6	18.0	8	0.4400	285	2.07	13.01	5,000	10,350	65,050	2.61	744	

TABLE 7

SANITARY SEWER SYSTEM DESIGN CALCULATIONS

SERVICE ZONE 1

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)	
				0.0				0.0	0.0											
01038	01039	78.6	72.60	6.0	78.6	70.84	1.76	7.8	6.9	8	0.4400	400	1.38	1.38	5,000	6,900	6,900	2.61	1,044	
01039	01040	78.6	70.84	7.8	78.7	69.08	1.76	9.6	8.7	8	0.4400	400	1.38	2.76	5,000	13,800	13,800	2.61	1,044	
01040	01041	78.7	69.08	9.6	78.7	67.32	1.76	11.4	10.5	8	0.4400	400	1.38	4.14	5,000	20,700	20,700	2.61	1,044	
01041	01042	78.7	67.32	11.4	78.7	65.56	1.76	13.1	12.3	8	0.4400	400	1.38	5.52	5,000	27,600	27,600	2.61	1,044	
01042	01043	78.7	65.56	13.1	78.8	64.24	1.32	14.6	13.9	8	0.4400	400	1.72	7.24	5,000	36,200	36,200	2.61	1,044	
01043	01044	78.8	64.24	14.6	78.8	62.92	1.32	15.9	15.2	8	0.4400	400	2.30	9.54	5,000	47,700	47,700	2.61	1,044	
																	0			
01045	0220	78.4	72.40	6.0	78.4	71.19	1.21	7.2	6.6	8	0.4400	275	2.84	2.84	5,000	14,200	14,200	2.61	718	
01046	01047	78.4	71.19	7.2	78.4	69.98	1.21	8.4	7.8	8	0.4400	275	2.84	5.68	5,000	28,400	28,400	2.61	718	
																	0			
01048	01049	77.8	71.80	6.0	77.9	70.04	1.76	7.9	6.9	8	0.4400	400	3.21	3.21	5,000	16,050	16,050	2.61	1,044	
01049	01050	77.9	70.04	7.9	77.8	68.28	1.76	9.5	8.7	8	0.4400	400	3.21	6.42	5,000	16,050	32,100	2.61	1,044	
01050	01051	77.8	68.28	9.5	77.8	66.52	1.76	11.3	10.4	8	0.4400	400	3.21	9.63	5,000	16,050	48,150	2.61	1,044	
01051	01052	77.8	66.52	11.3	77.8	64.76	1.76	13.0	12.2	8	0.4400	400	3.21	12.84	5,000	16,050	64,200	2.61	1,044	
01052	01053	77.8	64.76	13.0	77.8	63.00	1.76	14.8	13.9	8	0.4400	400	8.70	21.54	5,000	43,500	107,700	2.61	1,044	
01053	01054	77.8	63.00	14.8	77.7	61.24	1.76	16.5	15.6	8	0.4400	400	3.21	24.75	5,000	16,050	123,750	2.61	1,044	
																	0			
01055	01056	77.3	71.30	6.0	77.3	70.09	1.21	7.2	6.6	8	0.4400	275	2.84	2.84	5,000	14,200	14,200	2.61	718	
01056	01057	77.3	70.09	7.2	77.2	68.88	1.21	8.3	7.8	8	0.4400	275	2.84	5.68	5,000	14,200	28,400	2.61	718	
																	0			
01058	01059	76.8	70.80	6.0	76.8	69.35	1.45	7.5	6.7	8	0.4400	330	5.43	5.43	5,000	27,150	27,150	2.61	861	
<b>TOTAL</b>												<b>16168</b>	<b>222.33</b>			<b>1,111,650</b>				

TABLE 7

SANITARY SEWER DESIGN SYSTEM CALCULATIONS

SERVICE ZONE 2

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)
0201	0204	74.9	68.90	6.0	74.7	68.24	0.66	6.5	6.3	10	0.3300	200	4.36	4.36	5,000	21,800	9,200	2.61	522
0202	0203	73.9	68.24	5.7	74.4	67.08	1.16	7.3	9.5	10	0.3300	350	8.03	8.03	5,000	40,150	49,350	2.61	914
0203	0204	74.4	67.08	7.3	74.7	66.25	0.83	8.5	7.9	10	0.3300	250	3.36	11.39	5,000	16,800	66,150	2.61	653
0204	0205	74.7	66.25	8.5	74.7	65.66	0.59	9.0	8.7	12	0.2600	225	1.35	17.07	5,000	6,750	72,900	5.87	1,321
0205	0206	74.7	65.66	9.0	74.6	64.62	1.04	10.0	9.5	12	0.2600	400	4.65	21.72	5,000	23,250	96,150	5.87	2,348
0206	0207	74.6	64.62	10.0	74.5	63.58	1.04	10.9	10.5	12	0.2600	400	7.01	28.73	5,000	35,050	131,200	5.87	2,348
0207	0208	74.5	63.58	10.9	74.4	62.54	1.04	11.9	11.4	12	0.2600	400	10.10	38.83	5,000	50,500	181,700	5.87	2,348
0208	0212	74.4	62.54	11.9	74.4	61.76	0.78	12.6	12.3	12	0.2600	300	5.02	43.85	5,000	25,100	206,800	5.87	1,761
0209	0210	73.3	67.30	6.0	73.7	65.98	1.32	7.7	6.9	8	0.4400	300	2.34	2.34	5,000	11,700	11,700	2.61	783
0210	0211	73.7	65.98	7.7	74.0	64.66	1.32	9.3	8.5	8	0.4400	300	2.34	4.68	5,000	11,700	23,400	2.61	783
0211	0212	74.0	64.66	9.3	74.4	62.90	1.76	11.5	10.4	8	0.4400	400	2.92	7.6	5,000	14,600	38,000	2.61	1,044
0212	0213	74.4	61.76	12.6	74.3	60.72	1.04	13.6	13.1	12	0.2600	400	8.34	51.45	5,000	41,700	79,700	5.87	2,348
0213	0214	74.3	60.72	13.6	74.1	59.68	1.04	14.4	14.0	12	0.2600	400	14.58	66.03	5,000	72,900	152,600	5.87	2,348
0214	0218	74.1	59.68	14.4	74.0	59.09	0.59	14.9	14.7	12	0.2600	225	7.11	73.14	5,000	35,550	188,150	5.87	1,321
0215	0216	72.7	66.70	6.0	73.1	64.94	1.76	8.2	7.1	8	0.4400	400	2.75	2.75	5,000	13,750	13,750	2.61	1,044
0216	0217	73.1	64.94	8.2	73.5	63.18	1.76	10.3	9.2	8	0.4400	400	2.75	5.5	5,000	13,750	27,500	2.61	1,044
0217	0218	73.5	63.18	10.3	74.0	61.42	1.76	12.6	11.5	8	0.4400	400	2.30	7.8	5,000	11,500	39,000	2.61	1,044
0218	0219	74.0	59.09	14.9	73.8	58.05	1.04	15.8	15.3	12	0.2600	400	14.26	95.2	5,000	71,300	71,300	2.61	1,044
0219	0220	73.8	58.05	15.8	73.5	57.01	1.04	16.5	16.1	12	0.2600	400	14.23	109.43	5,000	547,150	618,450	2.61	1,044
0221	0222	68.9	60.90	8.0	69.3	60.14	0.76	9.2	8.6	15	0.1900	400	20.14	20.14	5,000	100,700	100,700	9.18	3,672
0222	0223	69.3	60.14	9.2	69.8	59.38	0.76	10.4	8.4	15	0.1900	400	14.14	34.28	5,000	70,700	171,400	9.18	3,672
0223	0224	69.8	59.38	10.4	70.2	58.62	0.76	11.6	10.2	15	0.1900	400	10.44	44.72	5,000	52,200	223,600	9.18	3,672
0224	0225	70.2	58.62	11.6	70.6	57.86	0.76	12.7	7.6	15	0.1900	400	10.10	54.82	5,000	50,500	274,100	9.18	3,672
0225	0226	70.6	57.86	12.7	71.1	57.10	0.76	14.0	10.9	15	0.1900	400	10.10	64.92	5,000	50,500	324,600	9.18	3,672
0226	0227	71.1	57.10	14.0	71.5	56.34	0.76	15.2	11.0	15	0.1900	400	10.10	75.02	5,000	50,500	375,100	9.18	3,672
0227	0231	71.5	56.34	15.2	72.3	55.58	0.76	16.7	13.8	15	0.1900	200	0.69	75.71	5,000	3,450	378,550	9.18	1,836
0228	0229	72.3	66.30	6.0	72.2	65.42	0.88	6.8	5.9	8	0.4400	200	2.37	2.37	5,000	11,850	11,850	2.61	522
0229	0230	72.2	65.42	6.8	72.1	63.66	1.76	8.4	16.0	8	0.4400	400	4.05	6.42	5,000	20,250	32,100	2.61	1,044
0230	0231	72.1	63.66	8.4	71.8	61.90	1.76	9.9	17.1	8	0.4400	400	3.08	9.5	5,000	15,400	47,500	2.61	1,044

SERVICE ZONE 2



**TABLE 7**

**SANITARY SEWER DESIGN SYSTEM CALCULATIONS**

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)
0231	0232	71.8	61.90	9.9	71.9	60.14	1.76	11.8	7.0	15	0.1900	200	0.43	85.64	5,000	2,150	2,150	9.18	1,836
0232	0233	71.9	60.14	11.8	72.3	58.38	1.76	13.9	8.9	15	0.1900	400	10.10	95.74	5,000	50,500	52,650	9.18	3,672
0233	0234	72.3	58.38	13.9	72.6	56.62	1.76	16.0	10.9	15	0.1900	400	10.47	106.21	5,000	52,350	105,000	9.18	3,672
0234	0235	72.6	56.62	16.0	72.9	54.86	1.76	18.0	12.7	15	0.1900	400	14.14	120.35	5,000	70,700	175,700	9.18	1,044
0235	0238	72.9	54.96	17.9	73.2	53.64	1.32	19.6	14.5	15	0.1900	400	13.83	134.18	5,000	69,150	244,850	9.18	1,632
0236	0237	80.7	64.18	6.0	72.8	63.19	0.99	9.6	7.8	8	0.4400	300	3.21	3.21	5,000	16,050	16,050	2.61	783
0237	0238	72.8	63.19	9.6	73.2	61.43	1.76	11.8	10.7	8	0.4400	400	2.61	5.82	5,000	13,050	29,100	2.61	1,044
0238	0220	73.2	53.64	19.6	73.5	53.16	0.48	20.3	20.0	15	0.1900	250	7.13	147.13	5,000	<b>735,650</b>	764,750	9.18	2,295
<b>Hill Road Lift Station</b>															<b>1,282,800</b>				
<b>12900</b>															<b>264.93</b>				

TABLE 7

SANITARY SEWER DESIGN SYSTEM CALCULATIONS

SERVICE ZONE 2

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)
02040	02041	71.2	66.00	5.2	71.6	65.22	0.78	6.4	5.8	12	0.2600	300	23.54	23.54	5,000	117,700	117,700	5.87	1,761
02041	02042	71.6	65.22	6.4	71.8	64.18	1.04	7.6	7.0	12	0.2600	400	17.18	40.72	5,000	85,900	203,600	5.87	2,348
02042	02046	71.8	64.18	7.6	72.2	63.14	1.04	9.1	8.3	12	0.2600	400	11.91	52.63	5,000	59,550	263,150	5.87	2,348
02043	02044	71.7	65.70	6.0	71.9	64.66	1.04	7.2	6.6	12	0.2600	400	4.79	4.79	5,000	23,950	287,100	5.87	2,348
02044	02045	71.9	64.66	7.2	72.1	63.62	1.04	8.5	7.9	12	0.2600	400	3.21	8	5,000	16,050	303,150	5.87	2,348
02045	02046	72.1	63.62	8.5	72.2	62.58	1.04	9.6	9.1	12	0.2600	400	3.21	11.21	5,000	16,050	319,200	5.87	2,348
02046	02047	72.2	63.14	9.1	72.6	62.23	0.91	10.4	9.7	12	0.2600	350	9.33	73.17	5,000	46,650	365,850	5.87	2,055
02047	02048	72.6	62.23	10.4	72.9	61.38	0.85	11.5	10.9	12	0.2600	250	9.41	82.58	5,000	47,050	412,900	5.87	1,468
02048	02049	72.9	61.38	11.5	73.1	60.47	0.91	12.6	12.1	12	0.2600	350	13.18	95.76	5,000	65,900	478,800	5.87	2,055
02049	02050	73.1	60.47	12.6	73.5	59.56	0.91	13.9	13.3	12	0.2600	350	13.18	108.94	5,000	65,900	544,700	5.87	2,055
02050	02051	73.5	59.56	13.9	73.8	58.71	0.85	15.1	14.5	12	0.2600	300	11.29	120.23	5,000	56,450	601,150	5.87	1,761
02051	02052	73.8	58.71	15.1	74.0	58.14	0.57	15.9	15.5	15	0.1900	300	10.72	130.95	5,000	53,600	654,750	5.87	1,761
02052	02053	74.0	58.14	15.9	74.4	57.38	0.76	17.0	16.4	15	0.1900	400	15.06	146.01	5,000	75,300	730,050	5.87	2,348
02053	02054	74.4	57.38	17.0	74.8	56.62	0.76	18.2	17.6	15	0.1900	400	19.40	165.41	5,000	97,000	827,050	5.87	2,348
02055	02056	74.4	68.40	6.0	74.7	67.08	1.32	7.6	6.8	10	0.3300	400	4.02	4.02	5,000	20,100	847,150	4.08	1,632
02056	02057	74.7	67.08	7.6	75.0	65.76	1.32	9.2	8.4	10	0.3300	400	3.21	7.23	5,000	16,050	863,200	4.08	1,632
02057	02058	75.0	65.76	9.2	75.2	64.44	1.32	10.8	10.0	10	0.3300	400	3.21	10.44	5,000	16,050	879,250	4.08	1,632
02054	02058	74.4	56.62	17.8	75.2	55.86	0.76	19.3	18.6	15	0.1900	400	11.55	187.4	5,000	57,750	937,000	9.18	3,672
02058	02059	75.2	55.86	19.3	75.5	55.19	0.67	20.3	19.8	15	0.1900	350	5.40	192.8	5,000	27,000	964,000	9.18	3,213
02059	02063	75.5	55.19	20.3	75.9	54.52	0.67	21.4	20.8	15	0.1900	350	6.00	198.8	5,000	30,000	994,000	9.18	3,213
02060	02061	74.8	68.80	6.0	75.0	67.48	1.32	7.5	6.8	10	0.3300	400	4.82	4.82	5,000	24,100	24,100	4.08	1,632
02061	02062	75.0	67.48	7.5	75.3	66.16	1.32	9.1	8.3	10	0.3300	400	3.95	8.77	5,000	19,750	43,850	4.08	1,632
02062	02063	75.3	66.16	9.1	75.7	64.84	1.32	10.9	10.0	10	0.3300	400	3.95	12.72	5,000	19,750	63,600	4.08	1,632
02063	02064	75.7	54.52	21.2	75.9	53.66	0.86	22.2	21.7	15	0.1900	450	1.73	213.3	5,000	8,650	<b>1,066,250</b>	9.18	4,131
02066	02067	78.7	72.70	6.0	78.4	71.53	1.17	6.9	6.4	12	0.2600	450	11.49	11.49	5,000	57,450	57,450	5.87	2,642
02067	02068	78.4	71.53	6.9	77.8	70.36	1.17	7.4	7.2	12	0.2600	450	14.20	198.8	5,000	71,000	128,450	5.87	2,642
02068	02069	77.8	70.36	7.4	78.0	69.84	0.52	8.2	7.8	12	0.2600	200	1.14	198.8	5,000	5,700	134,150	5.87	1,174
02069	02070	78.0	69.84	8.2	77.9	68.80	1.04	9.1	8.6	12	0.2600	400	1.35	198.8	5,000	6,750	140,900	5.87	2,348
02070	02071	78.0	68.80	9.2	77.9	67.76	1.04	10.1	9.7	12	0.2600	400	3.86	198.8	5,000	19,300	160,200	5.87	2,348
02071	02072	77.9	67.76	10.1	77.8	66.72	1.04	11.1	10.6	12	0.2600	400	3.86	198.8	5,000	19,300	179,500	5.87	2,348
02072	02073	77.8	66.72	11.1	77.7	65.68	1.04	12.0	11.6	12	0.2600	400	3.86	198.8	5,000	19,300	198,800	5.87	2,348
02073	02074	77.7	65.68	12.0	77.5	64.64	1.04	12.9	12.4	12	0.2600	400	3.86	198.8	5,000	19,300	218,100	5.87	2,348
02074	02075	77.5	64.64	12.9	77.0	63.60	1.04	13.4	13.1	12	0.2600	400	3.86	198.8	5,000	19,300	237,400	5.87	2,348
02075	02076	77.0	63.60	13.4	76.6	62.56	1.04	14.0	13.7	12	0.2600	400	5.67	227.97	5,000	28,350	265,750	5.87	2,348
02076	02066	76.6	62.56	14.0	76.3	61.52	1.04	14.8	14.4	12	0.2600	400	3.79	231.76	5,000	18,950	1,158,800	5.87	2,348

TABLE 7

SANITARY SEWER DESIGN SYSTEM CALCULATIONS

SERVICE ZONE 2

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)			
02077	02079	77.6	71.60	6.0	77.4	71.10	0.50	6.3	6.2	10	0.3300	150	1.14	1.14	5,000	5,700	5,700	4.08	612			
02078	02079	77.1	71.10	6.0	77.4	70.11	0.99	7.3	6.6	10	0.3300	300	7.74	8.88	5,000	44,400	50,100	4.08	1,224			
02079	02080	77.4	70.11	7.3	72.6	68.94	1.17	3.7	5.5	10	0.3300	400	1.41	10.29	5,000	51,450	101,550	4.08	1,632			
02080	02081	77.4	68.79	8.6	77.4	67.62	1.17	9.8	9.2	10	0.3300	400	3.86	14.15	5,000	70,750	172,300	4.08	1,044			
02081	02082	77.3	67.47	9.8	77.1	66.30	1.17	10.8	10.3	10	0.3300	400	3.86	18.01	5,000	90,050	262,350	4.08	1,632			
02082	02083	77.1	66.15	11.0	76.9	64.98	1.17	11.9	11.4	10	0.3300	400	3.86	21.87	5,000	109,350	371,700	4.08	1,632			
02083	02084	76.9	64.83	12.1	76.8	63.66	1.17	13.1	12.6	10	0.3300	400	3.86	25.73	5,000	128,650	500,350	4.08	1,632			
02084	02085	76.8	63.51	13.3	76.6	62.34	1.17	14.3	13.8	10	0.3300	250	2.41	28.14	5,000	140,700	641,050	4.08	1,020			
02085	02075	76.6	62.68	13.9	77.0	61.51	1.17	15.5	14.7	10	0.3300	300	1.03	29.17	5,000	145,850	786,900	4.08	1,224			
													<b>16250</b>	<b>299.36</b>								
													<b>Aldine Mail Road</b>	<b>Lift Station</b>			<b>2,137,850</b>					

TABLE 7

SANITARY SEWER DESIGN SYSTEM CALCULATIONS

SERVICE ZONE 2

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)
02098	02099	76.6	66.00	6.0	76.6	65.22	0.78	11.4	8.7	12	0.2600	300	5.79	5.79	5,000	28,950	28,950	5.87	1,761
02099	02100	76.6	65.22	11.4	76.6	64.18	1.04	12.4	11.9	12	0.2600	400	5.14	10.93	5,000	25,700	54,650	5.87	2,348
02100	02101	76.6	64.18	12.4	76.5	63.14	1.04	13.4	12.9	12	0.2600	400	5.14	16.07	5,000	25,700	80,350	5.87	2,348
02101	02102	76.5	65.70	10.8	76.4	64.66	1.04	11.7	11.3	12	0.2600	400	5.14	21.21	5,000	25,700	106,050	5.87	2,348
02102	02103	76.4	64.66	11.7	76.4	63.62	1.04	12.8	12.3	12	0.2600	400	5.14	26.35	5,000	25,700	131,750	5.87	2,348
02103	02105	76.4	63.62	12.8	76.3	62.84	0.78	13.5	13.1	12	0.2600	300	1.83	28.18	5,000	9,150	140,900	5.87	1,761
02104	02105	76.9	70.90	6.0	76.3	69.65	1.25	6.6	6.3	12	0.2600	480	5.75	5.75	5,000	28,750	28,750	5.87	2,818
02105	02116	76.3	62.84	13.5	76.0	62.19	0.65	13.8	13.7	12	0.2600	250	1.06	29.24	5,000	5,300	5,300	5.87	1,468
02106	02107	76.1	70.10	6.0	76.1	69.25	0.85	6.8	6.4	12	0.2600	300	2.07	2.07	5,000	10,350	10,350	5.87	1,761
02107	02108	76.1	69.25	6.8	76.0	68.34	0.91	7.7	7.3	12	0.2600	400	1.84	3.91	5,000	9,200	19,550	5.87	2,348
02108	02109	76.0	68.34	7.7	76.0	67.43	0.91	8.6	8.1	12	0.2600	400	2.82	6.73	5,000	14,100	33,650	5.87	2,348
02109	02110	76.0	67.43	8.6	75.9	66.58	0.85	9.3	8.9	12	0.2600	400	3.40	10.13	5,000	17,000	50,650	5.87	2,348
02110	02111	75.9	66.58	9.3	75.8	66.01	0.57	9.8	9.6	12	0.1900	400	2.71	12.84	5,000	13,550	64,200	5.87	2,348
02111	02116	75.8	66.01	9.8	76.0	65.25	0.76	10.8	10.3	12	0.1900	170	0.00	12.84	5,000	0	64,200	5.87	998
02112	02113	75.2	69.20	6.0	75.2	67.88	1.32	7.3	6.7	10	0.3300	350	4.24	4.24	5,000	21,200	21,200	4.08	1,428
02113	02115	75.2	67.88	7.3	75.2	66.56	1.32	8.6	8.0	10	0.3300	350	0.26	4.50	5,000	1,300	22,500	4.08	1,428
02114	02115	75.0	66.56	8.4	75.2	65.24	1.32	10.0	9.2	10	0.3300	150	1.19	5.69	5,000	5,950	28,450	4.08	612
02115	02111	75.2	65.24	10.0	75.8	63.75	1.49	12.1	11.0	10	0.3300	450	6.88	12.57	5,000	34,400	62,850	5.87	2,642
02111	02116	75.8	63.58	12.2	76.0	63.11	0.47	12.9	12.6	12	0.2600	180	0.00	12.57	5,000	0	62,850	9.18	1,652
02116	02117	76.0	62.86	13.1	75.9	62.10	0.76	13.8	13.5	15	0.1900	400	2.09	44.17	5,000	10,450	73,300	9.18	3,672
02117	02118	75.9	62.10	13.8	75.8	61.34	0.76	14.5	14.1	15	0.1900	400	3.95	48.12	5,000	19,750	24,100	9.18	3,672
02118	02119	75.8	61.34	14.5	75.6	60.58	0.76	15.0	14.7	15	0.1900	400	4.77	52.89	5,000	23,850	47,950	9.18	3,672
02119	02120	75.6	60.58	15.0	75.5	59.82	0.76	15.7	15.4	15	0.1900	400	7.62	60.51	5,000	38,100	86,050	9.18	3,672
02120	02121	75.5	58.92	16.6	75.4	58.35	0.57	17.1	16.8	15	0.1900	300	5.72	66.23	5,000	28,600	114,650	9.18	2,754
02121	02122	75.4	58.35	17.1	75.2	57.68	0.67	17.5	17.3	15	0.1900	350	5.14	71.37	5,000	25,700	140,350	9.18	3,213
02122	02123	75.2	57.68	17.5	75.0	57.01	0.67	18.0	17.8	15	0.1900	350	8.03	79.40	5,000	40,150	180,500	9.18	3,213
02123	02124	75.0	57.01	18.0	75.4	56.34	0.67	19.1	18.5	15	0.1900	350	6.99	86.39	5,000	34,950	215,450	9.18	3,213
02124	02125	75.4	56.34	19.1	75.6	55.67	0.67	19.9	19.5	15	0.1900	350	6.99	93.38	5,000	34,950	250,400	9.18	3,213
02125	02126	75.6	55.67	19.9	75.9	55.00	0.67	20.9	20.4	15	0.1900	350	6.99	100.37	5,000	34,950	285,350	9.18	3,213
02126	02066	75.9	55.00	20.9	76.3	54.33	0.67	22.0	21.4	15	0.1900	350	6.99	107.36	5,000	34,950	320,300	9.18	3,213

TABLE 7

SANITARY SEWER DESIGN SYSTEM CALCULATIONS

SERVICE ZONE 2

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)	
02086	02087	76.9	70.90	6.0	76.8	70.02	0.88	6.8	6.4	8	0.4400	200	2.98	2.98	5,000	14,900	14,900	2.61		
02087	02088	76.8	70.02	6.8	76.7	68.26	1.76	8.4	7.6	8	0.4400	400	3.86	6.84	5,000	19,300	34,200	2.61		
02088	02089	76.7	68.26	8.4	76.5	66.50	1.76	10.0	9.2	8	0.4400	400	3.86	10.70	5,000	19,300	53,500	2.61		
02089	02090	76.5	66.50	10.0	76.3	64.74	1.76	11.6	10.8	8	0.4400	400	3.86	14.56	5,000	19,300	72,800	2.61		
02090	02091	76.3	64.74	11.6	76.0	62.98	1.76	13.0	12.3	8	0.4400	400	3.86	18.42	5,000	19,300	92,100	2.61		
02091	02097	76.0	62.98	13.0	76.7	61.59	1.39	15.1	14.1	10	0.3300	420	0.00	18.42	5,000	0	92,100	4.08		
02092	02093	77.3	71.30	6.0	77.2	69.80	1.50	7.4	6.7	8	0.4400	340	3.51	3.51	5,000	17,550	17,550	2.61		
02093	02094	77.2	69.80	7.4	77.1	68.30	1.50	8.8	8.1	8	0.4400	340	3.51	7.02	5,000	17,550	35,100	2.61		
02094	02095	77.1	68.30	8.8	76.9	66.80	1.50	10.1	9.5	8	0.4400	340	3.51	10.53	5,000	17,550	52,650	2.61		
02095	02096	76.9	66.80	10.1	76.8	65.30	1.50	11.5	10.8	8	0.4400	340	3.51	14.04	5,000	17,550	70,200	2.61		
02096	02097	76.8	65.30	11.5	76.7	63.80	1.50	12.9	12.2	8	0.4400	340	3.51	17.55	5,000	17,550	87,750	2.61		
02097	02121	76.7	63.80	12.9	75.4	62.81	0.99	12.6	12.7	10	0.3300	300	0.00	17.55	5,000	0	87,750	4.08		
												<b>14700</b>	<b>161.65</b>			<b>808,250</b>				

TABLE 7

SANITARY SEWER DESIGN SYSTEM CALCULATIONS

SERVICE ZONE 3

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)
0101	0102	78.2	72.20	6.0	78.9	70.44	1.76	8.5	7.3	8	0.4400	400	1.84	1.84	5,000	9,200	9,200	2.61	1,044
0102	0103	78.9	70.44	8.5	79.2	68.68	1.76	10.5	9.5	8	0.4400	400	1.84	3.68	5,000	9,200	18,400	2.61	1,044
0103	0104	79.2	68.68	10.5	79.3	66.92	1.76	12.4	11.5	8	0.4400	400	1.84	5.62	5,000	9,200	<b>28,100</b>	2.61	1,044
0105	0106	79.0	73.00	6.0	79.2	71.24	1.76	8.0	7.0	8	0.4400	400	3.03	3.03	5,000	15,150	15,150	2.61	1,044
0106	0107	79.2	71.24	8.0	79.5	69.48	1.76	9.1	8.6	8	0.4400	400	3.03	6.06	5,000	15,150	30,300	2.61	1,044
0107	0108	79.5	69.48	10.0	79.7	67.72	1.76	12.0	11.0	8	0.4400	400	3.03	9.09	5,000	15,150	<b>45,450</b>	2.61	1,044
0109	0110	79.2	73.20	6.0	79.4	71.44	1.76	8.0	7.0	8	0.4400	400	2.75	2.75	5,000	13,750	13,750	2.61	1,044
0110	0111	79.4	71.44	8.0	79.7	69.68	1.76	10.0	9.0	8	0.4400	400	2.75	5.5	5,000	13,750	27,500	2.61	1,044
0111	0112	79.7	69.68	10.0	80.0	67.92	1.76	12.1	11.0	8	0.4400	400	2.75	8.25	5,000	13,750	<b>41,250</b>	2.61	1,044
0113	0114	79.4	73.40	6.0	79.7	71.64	1.76	8.1	7.1	8	0.4400	400	2.75	2.75	5,000	13,750	13,750	2.61	1,044
0114	0115	79.7	71.64	8.1	80.0	69.88	1.76	10.1	9.1	8	0.4400	400	2.75	5.5	5,000	13,750	27,500	2.61	1,044
0115	0116	80.0	69.88	10.1	80.3	68.12	1.76	12.2	11.1	8	0.4400	400	2.75	8.25	5,000	13,750	<b>41,250</b>	2.61	1,044
0117	0118	79.2	73.20	6.0	79.1	71.44	1.76	7.7	6.4	8	0.4400	400	1.60	1.60	5,000	8,000	8,000	2.61	1,044
0118	0119	79.1	71.44	7.7	78.8	69.68	1.76	9.1	6.5	8	0.4400	400	3.20	4.80	5,000	16,000	24,000	2.61	1,044
0119	0122	78.8	69.68	9.1	79.2	67.70	1.98	11.5	10.3	8	0.4400	450	0.00	4.80	5,000	16,000	24,000	2.61	1,175
0120	0121	79.6	73.60	6.0	79.4	71.84	1.76	9.3	8.6	8	0.4400	400	4.90	9.70	5,000	24,500	48,500	2.61	1,044
0121	0122	79.4	71.84	7.6	79.2	70.08	1.76	9.1	8.4	8	0.4400	400	4.90	14.60	5,000	29,000	73,000	2.61	1,044
0122	0125	79.2	70.08	9.1	79.5	68.32	1.76	11.2	10.2	8	0.4400	400	0.00	14.60	5,000	45,000	73,000	2.61	1,044
0123	0124	80.0	70.36	6.0	79.7	69.58	0.78	10.5	7.6	8	0.4400	400	3.20	17.80	5,000	16,000	89,000	2.61	1,044
0124	0125	79.7	69.58	10.1	79.5	67.82	1.76	11.7	10.9	8	0.4400	400	3.20	21.00	5,000	16,000	105,000	2.61	1,044
0125	0127	79.5	67.65	11.8	79.7	66.48	1.17	11.6	11.0	10	0.3300	350	0.00	21.00	5,000	0	105,000	4.08	1,428
0127	0128	79.7	66.48	13.2	79.9	65.65	0.83	14.3	13.8	10	0.3300	250	1.95	22.95	5,000	9,750	114,750	4.08	1,020
0128	0129	79.9	65.65	14.3	80.2	64.82	0.83	15.4	14.8	10	0.3300	250	1.95	24.90	5,000	9,750	124,500	4.08	1,020
0126	0129	80.3	74.30	6.0	80.2	72.54	1.76	5.7	5.9	8	0.4400	400	3.10	28.00	5,000	15,500	140,000	2.61	1,044
0129	0130	80.2	64.82	15.4	80.3	63.83	0.99	16.5	16.0	10	0.3300	300	0.57	28.57	5,000	2,850	142,850	4.08	1,224
0130	0131	80.3	63.83	16.5	80.5	62.84	0.99	17.7	17.1	10	0.3300	300	1.58	30.15	5,000	7,900	150,750	4.08	1,224
0131	0132	80.5	62.84	17.7	80.8	61.85	0.99	19.0	18.4	10	0.3300	300	0.00	30.15	5,000	0	<b>150,750</b>	4.08	1,224

TABLE 7

## SANITARY SEWER DESIGN SYSTEM CALCULATIONS

## SERVICE ZONE 3

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)			
0201	0202	79.7	73.70	6.0	79.9	71.94	1.76	8.0	7.0	8	0.4400	400	4.87	4.87	5,000	24,350	24,350	2.61	1,044			
0202	0203	79.9	71.94	8.0	80.1	70.18	1.76	9.9	8.9	8	0.4400	400	4.87	9.74	5,000	24,350	48,700	2.61	1,044			
0203	0204	80.1	70.18	9.9	80.2	68.42	1.76	11.8	10.9	8	0.4400	400	4.87	14.61	5,000	24,350	73,050	2.61	1,044			
0204	0205	80.2	68.42	11.8	80.3	66.66	1.76	13.6	12.7	8	0.4400	400	4.87	19.48	5,000	24,350	97,400	2.61	1,044			
0205	0206	80.3	66.49	13.8	80.4	65.17	1.32	15.2	14.5	10	0.3300	400	4.87	24.35	5,000	24,350	121,750	4.08	1,632			
0206	0207	80.4	65.17	15.2	80.7	64.18	0.99	16.5	15.9	10	0.3300	300	1.03	25.38	5,000	5,150	126,900	4.08	1,224			
0207	0221	80.7	64.18	16.5	80.9	63.19	0.99	17.7	17.1	10	0.3300	300	2.75	28.13	5,000	13,750	140,650	4.08	1,224			
0208	0209	80.0	74.00	6.0	80.2	72.53	1.47	7.7	6.9	8	0.4400	333	3.21	3.21	5,000	16,050	16,050	2.61	869			
0209	0210	80.2	72.53	7.7	80.4	71.06	1.47	9.3	8.5	8	0.4400	333	3.21	6.42	5,000	16,050	32,100	2.61	869			
0210	0211	80.4	71.06	9.3	80.5	69.59	1.47	10.9	10.1	8	0.4400	333	3.21	9.63	5,000	16,050	48,150	2.61	869			
0211	0212	80.5	69.59	10.9	80.6	68.12	1.47	12.5	11.7	8	0.4400	333	3.21	12.84	5,000	16,050	64,200	2.61	869			
0212	0213	80.6	68.12	12.5	80.8	67.42	0.70	13.4	13.0	8	0.4400	160	1.55	14.39	5,000	7,750	71,950	2.61	418			
0213	0219	80.8	67.25	13.5	81.0	66.72	0.53	14.3	13.9	10	0.3300	160	1.15	15.54	5,000	5,750	77,700	4.08	653			
0214	0215	80.4	73.40	6.0	80.6	71.64	1.76	8.1	7.1	8	0.4400	400	3.21	3.21	5,000	16,050	16,050	2.61	1,044			
0215	0216	80.6	71.64	8.1	80.8	69.88	1.76	10.1	9.1	8	0.4400	400	3.21	6.42	5,000	16,050	32,100	2.61	1,044			
0216	0217	80.8	69.88	10.1	80.9	68.12	1.76	12.2	11.2	8	0.4400	400	3.21	9.63	5,000	16,050	48,150	2.61	1,044			
0217	0218	80.9	68.12	12.2	81.0	67.15	0.97	13.9	13.1	8	0.4400	220	1.93	11.56	5,000	9,650	57,800	2.61	574			
0218	0219	81.0	67.15	13.9	81.0	66.49	0.66	14.5	14.2	8	0.4400	150	1.03	12.59	5,000	5,150	62,950	2.61	392			
0219	0221	81.0	66.32	14.7	80.9	65.67	0.65	15.2	15.0	12	0.2600	250	0.12	12.71	5,000	600	63,550	5.87	1,468			
0220	0221	81.2	75.20	6.0	80.9	73.79	1.41	7.2	6.6	8	0.4400	320	2.85	2.85	5,000	14,250	14,250	2.61	835			
0221	0222	80.9	65.67	15.2	81.0	64.82	0.85	16.2	15.7	12	0.2600	326	1.63	60.86	5,000	29,000	304,300	5.87	1,914			
0222	0223	81.0	64.82	16.2	81.1	63.97	0.85	17.1	16.7	12	0.2600	326	5.35	66.21	5,000	45,000	331,050	5.87	1,914			
0223	0224	81.1	63.97	17.1	81.1	63.12	0.85	18.0	17.6	12	0.2600	326	3.43	69.64	5,000	17,150	<b>348,200</b>	5.87	1,914			
														<b>130.9</b>			<b>655,000</b>					

TABLE 7

SANITARY SEWER DESIGN SYSTEM CALCULATIONS

SERVICE ZONE 4

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)
0401	0402	75.8	69.80	6.0	76.4	68.04	1.76	8.4	7.2	8	0.4400	400	3.86	3.86	5,000	19,300	19,300	2.61	1,044
0402	0403	76.4	68.04	8.4	77.0	66.28	1.76	10.7	9.6	8	0.4400	400	2.75	6.61	5,000	13,750	33,050	2.61	1,044
0403	0406	77.0	66.11	10.9	76.6	65.12	0.99	11.5	11.2	10	0.3300	300	4.42	11.03	5,000	22,100	55,150	4.08	1,224
0404	0405	75.3	69.30	6.0	76.0	67.54	1.76	8.5	7.3	8	0.4400	400	3.79	3.79	5,000	18,950	18,950	2.61	1,632
0405	0406	76.0	67.54	8.5	76.6	65.78	1.76	9.1	8.8	8	0.4400	400	2.41	6.20	5,000	12,050	31,000	2.61	1,632
0406	0407	76.6	65.12	11.5	76.0	63.80	1.32	12.2	11.9	10	0.3300	400	4.42	10.62	5,000	22,100	53,100	4.08	1,632
0407	0408	76.0	63.80	12.2	75.2	62.48	1.32	12.7	12.5	10	0.3300	400	3.91	14.53	5,000	19,550	72,650	4.08	1,632
0408	0461	75.2	62.45	12.7	74.3	61.16	1.32	13.1	12.9	10	0.3300	400	2.94	17.47	5,000	14,700	87,350	4.08	1,632
0409	0410	74.9	68.90	6.0	74.3	67.58	1.32	6.7	6.4	8	0.4400	300	1.40	1.40	5,000	7,000	7,000	2.61	783
0410	0458	74.3	67.58	6.7	73.9	66.26	1.32	7.6	7.2	8	0.4400	300	1.20	2.60	5,000	6,000	13,000	2.61	783
0411	0412	73.0	67.00	6.0	73.2	65.68	1.32	7.5	6.8	8	0.4400	300	1.61	1.61	5,000	8,050	8,050	2.61	783
0412	0413	73.2	65.68	7.5	73.4	63.92	1.76	9.5	8.5	8	0.4400	400	1.84	3.45	5,000	9,200	17,250	2.61	1,044
0413	0414	73.4	63.92	9.5	73.7	62.16	1.76	11.5	10.5	8	0.4400	400	2.85	6.30	5,000	14,250	31,500	2.61	1,044
0414	0459	73.7	62.16	11.5	73.9	60.40	1.76	13.5	12.5	8	0.4400	400	3.21	9.51	5,000	16,050	47,550	2.61	1,044
0415	0416	71.9	65.90	6.0	72.3	64.14	1.76	8.2	7.1	8	0.4400	400	4.85	4.85	5,000	24,250	24,250	2.61	1,044
0416	0417	72.3	64.14	8.2	72.8	62.38	1.76	10.4	9.3	8	0.4400	400	5.74	10.59	5,000	28,700	52,950	2.61	1,044
0417	0418	72.8	62.38	10.4	73.2	61.06	1.32	12.1	11.3	10	0.3300	400	6.43	17.02	5,000	32,150	85,100	4.08	1,632
0418	0419	73.2	61.06	12.1	73.5	59.74	1.32	13.8	13.0	10	0.3300	400	7.07	24.09	5,000	35,350	120,450	4.08	1,632
0419	0420	73.5	59.74	13.8	73.8	58.42	1.32	15.4	14.6	10	0.3300	400	4.13	28.22	5,000	20,650	141,100	4.08	1,632
0420	0461	73.8	58.42	15.4	74.3	57.10	1.32	17.2	16.3	10	0.3300	400	0.00	28.22	5,000	0	141,100	4.08	1,632



TABLE 7

SANITARY SEWER DESIGN SYSTEM CALCULATIONS

SERVICE ZONE 4

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)
0421	0422	71.4	65.40	6.0	71.7	63.64	1.76	8.4	7.2	8	0.4400	400	1.22	1.22	5,000	6,100	6,100	2.61	1,044
0422	0423	71.7	63.64	8.4	72.0	61.88	1.76	10.7	9.6	8	0.4400	400	3.90	5.12	5,000	19,500	25,600	2.61	1,044
0423	0424	72.0	61.88	10.9	72.7	60.56	1.32	12.1	11.5	10	0.3300	400	3.90	9.02	5,000	19,500	45,100	4.08	1,632
0424	0425	72.7	60.56	12.1	73.4	59.24	1.32	14.2	13.2	10	0.3300	400	1.84	10.86	5,000	9,200	54,300	4.08	1,632
0425	0426	73.4	59.24	14.2	74.0	57.92	1.32	16.1	15.2	10	0.3300	400	1.84	12.70	5,000	9,200	63,500	4.08	1,632
0426	0465	74.0	57.92	16.1	74.9	56.60	1.32	18.3	17.2	10	0.3300	400	1.84	14.54	5,000	9,200	72,700	4.08	1,632
																	0		
0427	0428	70.6	64.60	6.0	70.8	63.56	1.04	7.2	6.6	12	0.2600	400	8.10	8.10	5,000	40,500	40,500	5.87	2,348
0428	0429	70.8	63.56	7.2	71.1	62.52	1.04	8.6	7.9	12	0.2600	400	12.86	20.96	5,000	64,300	104,800	5.87	2,348
0429	0430	71.1	62.52	8.6	71.4	61.48	1.04	9.9	9.3	12	0.2600	400	11.46	32.42	5,000	57,300	162,100	5.87	2,348
0430	0431	71.4	61.48	9.9	71.5	61.15	0.33	10.3	10.1	12	0.2600	125	2.58	35.00	5,000	12,900	175,000	5.87	734
0431	0432	71.5	61.15	10.3	71.7	60.37	0.78	11.3	10.8	12	0.2600	300	4.13	39.13	5,000	20,650	195,650	5.87	1,761
0432	0433	71.7	60.37	11.3	71.9	59.65	0.72	12.2	11.8	12	0.2600	275	12.86	51.99	5,000	64,300	259,950	5.87	1,614
0433	0434	71.9	59.65	12.2	72.6	58.61	1.04	14.0	13.1	12	0.2600	400	8.26	60.25	5,000	41,300	301,250	5.87	2,348
0434	0435	72.6	58.61	14.0	73.4	57.57	1.04	15.8	14.9	12	0.2600	400	8.72	68.97	5,000	43,600	344,850	5.87	2,348
0435	0436	73.4	57.57	15.8	74.3	56.53	1.04	17.8	16.8	12	0.2600	400	8.72	77.69	5,000	43,600	388,450	5.87	2,348
0436	0468	74.3	56.53	17.8	75.0	55.49	1.04	19.5	18.7	12	0.2600	400	0.00	77.69	5,000	0	388,450	5.87	2,348
																	0		
0437	0438	71.2	65.20	6.0	71.3	63.44	1.76	7.9	7.0	8	0.4400	400	4.13	4.13	5,000	20,650	20,650	2.61	1,044
0438	0431	71.3	63.44	7.9	71.5	61.68	1.76	8.2	8.1	8	0.4400	400	4.13	8.26	5,000	20,650	41,300	2.61	1,044
0439	0440	74.0	68.00	6.0	73.6	66.24	1.76	7.4	6.7	8	0.4400	400	7.07	7.07	5,000	35,350	35,350	2.61	1,044
0440	0441	73.6	66.24	7.4	74.3	64.48	1.76	9.8	8.6	8	0.4400	400	4.13	11.20	5,000	20,650	141,100	2.61	1,044
0441	0470	74.3	64.48	9.8	75.0	62.72	1.76	12.3	11.1	8	0.4400	400	0.00	11.20	5,000	0	141,100	2.61	1,044

TABLE 7

SANITARY SEWER DESIGN SYSTEM CALCULATIONS

SERVICE ZONE 4

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)
0442	0443	71.4	65.40	6.0	71.7	63.64	1.10	8.4	7.2	8	0.4400	250	0.72	0.72	5,000	3,600	3,600	2.61	653
0443	0444	71.7	63.64	8.4	72.0	61.88	1.47	10.7	9.6	8	0.4400	333	2.29	3.01	5,000	11,450	15,050	2.61	869
0444	0445	72.0	61.88	10.9	72.7	60.56	1.47	12.1	11.5	8	0.4400	333	2.29	5.30	5,000	11,450	26,500	2.81	936
0445	0471	72.7	60.56	12.1	73.4	59.24	1.47	14.2	13.2	8	0.4400	333	2.00	7.30	5,000	10,000	36,500	2.81	936
																	0		
0446	0447	72.0	66.00	6.0	72.2	65.35	0.65	6.9	6.5	12	0.2600	250	2.91	2.91	5,000	14,550	14,550	5.87	1,468
0447	0448	72.2	63.35	6.0	71.9	64.31	1.04	7.2	6.6	12	0.2600	400	8.26	11.17	5,000	41,300	55,850	5.87	2,348
0448	0449	71.9	61.34	7.2	72.0	63.27	1.04	8.6	7.9	12	0.2600	400	8.26	19.43	5,000	41,300	97,150	5.87	2,348
0449	0450	72.0	63.27	8.6	72.3	62.23	1.04	9.9	9.3	12	0.2600	400	8.26	27.69	5,000	41,300	138,450	5.87	2,348
0450	0451	72.3	62.23	9.9	72.9	61.19	1.04	10.3	10.1	12	0.2600	400	8.26	35.95	5,000	41,300	179,750	5.87	2,348
0451	0452	72.9	61.19	10.3	73.5	60.15	1.04	11.3	10.8	12	0.2600	400	8.26	44.21	5,000	41,300	221,050	5.87	2,348
0452	0453	73.5	60.15	11.3	74.1	59.11	1.04	12.2	11.8	12	0.2600	400	8.26	52.47	5,000	41,300	262,350	5.87	2,348
0453	0454	74.1	59.11	12.2	74.2	58.07	1.04	14.0	13.1	12	0.2600	400	8.26	60.73	5,000	41,300	303,650	5.87	2,348
0454	0455	74.2	58.07	14.0	74.5	57.03	1.04	15.8	14.9	12	0.2600	400	4.75	65.48	5,000	23,750	327,400	5.87	2,348
0455	0456	74.5	57.03	15.8	74.8	55.99	1.04	17.8	16.8	12	0.2600	400	2.11	67.59	5,000	10,550	337,950	5.87	2,348
0456	0474	74.8	55.99	17.8	75.1	54.95	1.04	19.5	18.7	12	0.2600	400	2.11	69.70	5,000	10,550	348,500	5.87	2,348

TABLE 7

SANITARY SEWER DESIGN SYSTEM CALCULATIONS

SERVICE ZONE 4

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)	
0457	0458	73.8	67.80	6.0	73.9	67.02	0.78	6.9	6.5	12	0.2600	300	4.06	4.06	5,000	20,300	6,100	5.87	1,761	
0458	0459	73.9	67.02	6.9	73.9	66.85	0.17	7.0	7.0	12	0.2600	65	2.60	6.66	5,000	13,000	25,600	5.87	382	
0459	0460	73.9	66.85	7.0	74.0	65.94	0.91	8.1	7.6	12	0.2600	350	9.51	16.17	5,000	47,550	45,100	5.87	2,055	
0460	0461	74.0	65.94	8.1	74.2	65.03	0.91	9.2	8.7	12	0.2600	350	10.35	26.52	5,000	51,750	54,300	5.87	2,055	
0461	0462	74.2	65.03	9.2	74.5	63.99	1.04	10.5	9.9	12	0.2600	400	1.84	28.36	5,000	9,200	63,500	5.87	1,632	
0462	0463	74.5	63.99	10.5	74.6	62.95	1.04	11.6	11.1	12	0.2600	400	23.82	52.18	5,000	119,100	72,700	5.87	1,632	
0463	0464	74.6	62.95	11.6	74.8	61.91	1.04	12.9	12.3	12	0.2600	400	11.24	63.42	5,000	56,200		5.87		
0464	0465	74.8	61.91	12.9	74.9	61.00	0.91	13.9	13.4	12	0.2600	350	9.07	72.49	5,000	45,350	40,500	5.87	2,055	
0465	0466	74.9	61.00	13.9	75.0	60.09	0.91	14.9	14.4	12	0.2600	330	6.18	78.67	5,000	30,900	104,800	5.87	1,937	
0466	0467	75.0	60.09	14.9	75.0	59.23	0.86	15.8	15.4	12	0.2600	330	5.85	84.52	5,000	29,250	162,100	5.87	1,937	
0467	0468	75.0	59.23	15.8	75.0	58.90	0.33	16.1	16.0	12	0.2600	125	5.69	90.21	5,000	28,450	175,000	5.87	734	
0468	0469	75.0	58.90	16.1	75.0	58.04	0.86	17.0	16.6	12	0.2600	330	2.30	92.51	5,000	11,500	195,650	5.87	1,937	
0469	0470	75.0	58.04	17.0	75.0	57.29	0.75	17.7	17.4	12	0.2600	290	8.32	100.83	5,000	41,600	259,950	5.87	1,702	
0470	0471	75.0	57.29	17.7	75.0	56.35	0.94	18.7	18.2	12	0.2600	360	8.26	109.09	5,000	41,300	301,250	5.87	2,113	
0471	0472	75.0	56.35	18.7	75.1	55.44	0.91	19.7	19.2	12	0.2600	350	7.65	116.74	5,000	38,250	344,850	5.87	2,055	
0477	0476	75.3	69.30	6.0	75.2	68.43	0.87	6.8	6.4	12	0.2600	333	4.13	4.13	5,000	20,650	20,650	5.87	1,955	
0476	0475	75.2	68.43	6.8	75.2	67.56	0.87	7.6	7.2	12	0.2600	333	5.51	9.64	5,000	27,550	48,200	5.87	1,955	
0475	0474	75.2	67.56	7.6	75.2	66.69	0.87	8.5	8.1	12	0.2600	333	5.16	14.80	5,000	25,800	74,000	5.87	1,955	
0474	0473	75.2	66.69	8.5	75.2	65.65	1.04	9.6	9.1	12	0.2600	400	1.72	16.52	5,000	8,600	82,600	5.87	2,348	
0473	0472	75.1	65.65	9.6	75.1	64.61	1.04	10.5	10.1	12	0.2600	400	4.25	20.77	5,000	21,250	103,850	5.87	2,348	
<b>Total</b>												<b>27128</b>	<b>395.03</b>	<b>5,000</b>	<b>1,975,150</b>					

TABLE 7

SANITARY SEWER DESIGN SYSTEM CALCULATIONS

SERVICE ZONE 5

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)
0501	0502	71.3	65.30	6.0	71.0	63.98	1.32	7.0	6.5	10	0.3300	400	2.30	2.3	5,000	11,500	11,500	4.08	1,632
0502	0503	71.0	63.98	7.0	70.7	62.66	1.32	8.0	7.5	10	0.3300	400	4.88	7.18	5,000	24,400	35,900	4.08	1,632
0503	0503A	70.7	62.66	8.0	70.5	60.51	2.15	10.0	9.0	10	0.3300	175	11.48	13.15	5,000	57,400	65,750	4.08	714
0503A	0504	70.5	60.51	10.0	70.4	59.77	0.74	10.6	10.3	10	0.3300	225	7.74	20.89	5,000	38,700	104,450	4.08	918
0504	0504A	70.4	59.77	10.6	70.2	58.86	0.91	11.3	11.0	10	0.3300	275	4.88	25.77	5,000	24,400	128,850	4.08	1,122
0504A	0505	70.2	58.86	11.3	70.1	58.44	0.42	11.7	11.5	10	0.3300	125	7.74	33.51	5,000	38,700	167,550	4.08	510
0505	0506	70.1	58.44	10.1	69.6	57.12	1.32	12.5	11.3	10	0.3300	400	5.97	39.48	5,000	29,850	197,400	4.08	1,632
0506	0507	69.6	57.12	10.9	69.2	55.80	1.32	13.4	12.2	10	0.3300	400	5.97	45.45	5,000	29,850	227,250	4.08	1,632
0507	0508	69.2	55.80	11.8	68.8	54.48	1.32	14.3	13.1	10	0.3300	400	7.34	52.79	5,000	36,700	263,950	4.08	1,632
0508	0509	68.8	54.48	12.7	68.4	53.16	1.32	15.2	14.0	10	0.3300	400	6.89	59.68	5,000	34,450	298,400	4.08	1,632
0509	0510	68.4	53.16	13.7	68.1	51.86	1.30	16.2	15.0	12	0.2600	500	1.93	61.61	5,000	9,650	308,050	5.87	2,935
0510	0511	68.1	51.86	14.7	67.9	50.82	1.04	17.1	15.9	12	0.2600	400	5.04	66.65	5,000	25,200	333,250	5.87	2,348
0511	0512	67.9	50.82	15.5	68.0	49.78	1.04	18.2	16.9	12	0.2600	400	2.39	69.04	5,000	11,950	345,200	5.87	2,348
0512	0513	68.0	49.78	16.6	68.1	48.74	1.04	19.4	18.0	12	0.2600	400	3.03	72.07	5,000	15,150	360,350	5.87	2,348
0513	0514	68.1	48.74	17.8	68.2	47.70	1.04	20.5	19.2	12	0.2600	400	3.03	75.10	5,000	15,150	375,500	5.87	2,348
0514	0515	68.2	47.70	18.9	68.3	47.31	0.39	21.0	19.9	12	0.2600	150	1.14	76.24	5,000	5,700	381,200	5.87	881
0516	0517	67.9	61.90	6.0	68.0	60.14	1.76	7.9	7.0	8	0.4400	400	3.31	3.31	5,000	16,550	16,550	2.61	1,044
0517	0510	68.0	60.14	7.9	68.1	58.38	1.76	9.7	8.8	8	0.4400	400	1.73	5.04	5,000	8,650	25,200	2.61	1,044
																	0		

TABLE 7

SANITARY SEWER DESIGN SYSTEM CALCULATIONS

SERVICE ZONE 5

Start Node	End Node	Gr. El. Start	Inv. El. Start	Depth Start (ft)	Gr. El. End	Inv. El. End	Change Invert (ft)	Depth End (ft)	Avg. Depth (ft)	Pipe Size (in)	Slope (%)	Length (ft)	Area Served (AC)	Accum Acres	Gal / Acre / Day	Gal/Day	Accum Gal / Day	Pipe Vol/ft (gal/ft)	Pipe Vol (gal)		
0520	0519	70.5	64.50	6.0	70.5	63.17	1.33	7.3	6.7	10	0.3300	400	2.58	2.58	5,000	12,900	12,900	4.08	1,632		
0519	0518	70.5	63.17	7.3	70.5	61.84	1.33	8.7	8.0	10	0.3300	400	2.58	5.16	5,000	12,900	25,800	4.08	1,632		
0518	0503A	70.5	61.84	8.7	70.6	60.51	1.33	10.1	9.4	10	0.3300	400	2.58	7.74	5,000	12,900	38,700	4.08	1,632		
0523	0522	70.2	64.20	6.0	70.1	62.87	1.33	7.2	6.6	10	0.3300	400	2.58	2.58	5,000	12,900	12,900	4.08	1,632		
0522	0521	70.1	62.87	7.2	70.1	61.54	1.33	8.6	7.9	10	0.3300	400	2.58	5.16	5,000	12,900	25,800	4.08	1,632		
0521	0504A	70.1	61.54	8.6	70.4	60.21	1.33	10.2	9.4	10	0.3300	400	2.58	7.74	5,000	12,900	38,700	4.08	1,632		
0533	0534	70.5	64.50	6.0	70.3	63.18	1.32	7.1	6.6	10	0.3300	400	6.46	6.46	5,000	32,300	32,300	4.08	1,632		
0534	0535	70.3	63.18	7.1	70.0	61.86	1.32	8.1	7.6	10	0.3300	400	9.73	16.19	5,000	48,650	80,950	4.08	1,632		
0535	0536	70.0	61.86	8.1	69.9	60.67	1.19	9.2	8.7	10	0.3300	360	3.67	19.86	5,000	18,350	100,300	4.08	1,469		
0536	0537	69.9	60.67	9.2	69.8	59.48	1.19	10.3	9.8	10	0.3300	360	0.00	19.86	5,000	0	100,300	4.08	1,469		
0537	0538	69.8	59.48	10.3	69.7	58.29	1.19	11.4	10.9	10	0.3300	360	0.00	19.86	5,000	0	100,300	4.08	1,469		
													<b>10530</b>	<b>122.13</b>	<b>5,000</b>	<b>610,650</b>					

TABLE 8.1  
PRELIMINARY COST ESTIMATE  
SANITARY SEWER SYSTEM & WATER SYSTEM TO SERVE SERVICE ZONE 1  
AIRLINE IMPROVEMENT DISTRICT, HARRIS COUNTY, TEXAS

ITEM DESCRIPTION	Sweetwater	Midland Dr	Northville Dr	Berwyn Dr	Hambric Dr	Blue Bell Rd	Mading Ln	Memory Ln	Shane Dr	Raymac St	Turney Dr	Frazer Ln	Airline Dr	West Helms Rd	Westbrook				
																Quantity	Unit	Unit Cost	Item Cost
<b>SANITARY SEWER SYSTEM</b>																			
8-inch SDR 26PVC Gravity Sewer		545		150		2000	2180	2175	525	2400	550	330	1080	0	0	11,935	LF	\$ 70.00	\$ 835,450.00
10-inch SDR 26PVC Gravity Sewer	1650													0	0	0	LF	\$ 80.00	\$ -
12-inch SDR 26PVC Gravity Sewer			750	180	1000								1900	0	0	3,830	LF	\$ 100.00	\$ 383,000.00
15-inch SDR 26PVC Gravity Sewer														0	0	0	LF	\$ 120.00	\$ -
18-inch SDR 26PVC Gravity Sewer														0	0	0	LF	\$ 150.00	\$ -
Bore & Jack 8-inch sewer	300	100				100	200	170	50	70	200	100	200	0	0	1,190	LF	\$ 200.00	\$ 238,000.00
Bore & Jack 12-inch sewer	150		100	50	200								100	0	0	450	LF	\$ 300.00	\$ 135,000.00
Manholes	6	2	2	2	3	6	9	6	2	6	2	2	9	0	0	51	EA	\$ 3,500.00	\$ 178,500.00
6-inch service lines (short side)	8	4	6	0	10	13	0	27	8	33	6	3	19	0	0	129	EA	\$ 800.00	\$ 103,200.00
6-inch service lines (long side)	2	7	5	4	7	21	22	26	6	20	6	7	19	0	0	150	EA	\$ 1,000.00	\$ 150,000.00
Pavement Repairs (All Types, All Thicknesses)	550	180	250	75	330	660	720	720	175	800	180	110	990	0	0	5,190	SY	\$ 70.00	\$ 363,300.00
Driveway Repairs	10	11	11	4	17	34	22	53	14	53	12	10	19	0	0	260	EA	\$ 750.00	\$ 195,000.00
Connect Service Lines to Customer Lines	10	11	11	4	17	34	22	53	14	53	12	10	38	0	0	279	LF	\$ 800.00	\$ 223,200.00
Drain & Demolish Septic Tanks	10	11	11	4	17	34	22	53	14	53	12	10	38	0	0	279	EA	\$ 950.00	\$ 265,050.00
<b>Subtotal</b>																			\$ 3,069,700.00
<b>Lift Station &amp; Force Main (Upgrade Blue Bell)</b>																			
Force Main																3,000	LF	\$ 70.00	\$ 210,000.00
Concrete wet well, valve box, pumps, controls & accessories																1	LS	\$ 300,000.00	\$ 300,000.00
<b>Subtotal</b>																			\$ 510,000.00
Reconstruction of Street Paving	0	1133	1333	778	2333	4333	5067	5000	1111	5111	1111	1444	0	0	0	28,754	SY	\$ 80.00	\$ 2,300,320.00
<b>Subtotal Sanitary Sewer System</b>																0			\$ 5,880,020.00
<b>WATER DISTRIBUTION SYSTEM</b>																			
8-inch water line		550	700	350	1050	2000	2400	2330	500	2600	550	770	3850	650	0	18,300	LF	\$ 50.00	\$ 915,000.00
12-inch water line																0	LF	\$ 65.00	\$ -
Bore & Jack 8-inch water line		100	200	150	180	250	200	200	50	150	200	50	300	200		2,230	LF	\$ 150.00	\$ 334,500.00
Bore & Jack 12-inch water line																0	LF	\$ 200.00	\$ -
6-inch isolation valves																0	EA	\$ 800.00	\$ -
8-inch isolation valves		1	1	2	1	2	2	2	1	3	1	1		1		18	EA	\$ 1,000.00	\$ 18,000.00
12-inch isolation valves													4			4	EA	\$ 1,200.00	\$ 4,800.00
Fire Hydrants			2	1	3	6	7	7	1	8	2	2	11	2		52	EA	\$ 2,500.00	\$ 130,000.00
Short Side Service w/Meters		7	5	4	7	21	22	26	6	20	6	7	19	3		153	EA	\$ 500.00	\$ 76,500.00
Long Side Service w/Meters		4	6	0	10	13	0	27	8	33	6	3	19			129	EA	\$ 900.00	\$ 116,100.00
Driveway Repairs		7	5	4	7	21	22	26	6	20	6	7	19			150	EA	\$ 750.00	\$ 112,500.00
Decommissioning & Cementing Private Wells		13	11	4	17	34	22	53	14	53	12	10	38			281	EA	\$ 900.00	\$ 252,900.00
<b>Subtotal</b>																			\$ 1,960,300.00
Water Transmission Line																0	LS		\$ -
Pro-Rata Cost of Aldine Water Transmission System																0	LS		\$ -
<b>Subtotal Water Transmission System Construction Cost</b>																			\$ -
<b>Subtotal</b>																			\$ 7,840,320.00
Contingency @15%																			\$ 1,176,048.00
<b>SUBTOTAL TOTAL CONSTRUCTION COSTS</b>																			\$ 9,016,368.00
Engineering, Inspection & Testing @ 12%																			\$ 1,081,964.16
Geotechnical																15,765	LF	\$ 1.50	\$ 23,647.50
Surveying																15,765	LF	\$ 5.50	\$ 86,707.50
<b>SUBTOTAL TOTAL CAPITAL COSTS</b>																			\$ 1,192,319.16
<b>Additional Costs</b>																			\$ -
Lift Station Site Acquisition																0	SF	\$ 10.00	\$ -
<b>Subtotal</b>																			\$ -
<b>TOTAL ESTIMATED PROJECT COSTS</b>																			\$ 10,208,687.16

TABLE 8.2  
PRELIMINARY COST ESTIMATE  
SANITARY SEWER SYSTEM & WATER SYSTEM TO SERVE SERVICE ZONE 2  
AIRLINE IMPROVEMENT DISTRICT, HARRIS COUNTY, TEXAS

ITEM DESCRIPTION	W.Lorino	Helms	Mount-Houston	Airline	Aldine Mail	Hawkins	Ditch	Nicar	Lillja	Amsler	Kershaw	Stoneshire	Faber	Quantity	Unit	Unit Cost	Item Cost
<b>SANITARY SEWER SYSTEM</b>																	
8-inch SDR 26PVC Gravity Sewer (All Depths)	1700			800				1900		0	1250		1250	6,900	LF	\$ 70.00	\$ 483,000.00
10-inch SDR 26PVC Gravity Sewer (All Depths)			700	1100		2250	1000							5,050	LF	\$ 80.00	\$ 404,000.00
12-inch SDR 26PVC Gravity Sewer (All Depths)	2300	4500		1950	5900				130					14,780	LF	\$ 100.00	\$ 1,478,000.00
15-inch SDR 26PVC Gravity Sewer (All Depths)					2650							1200		3,850	LF	\$ 120.00	\$ 462,000.00
18-inch SDR 26PVC Gravity Sewer (All Depths)														0	LF	\$ 150.00	\$ -
Bore & Jack 8-inch sewer	50	50	50	50				50			50		50	350	LF	\$ 150.00	\$ -
Bore & Jack 10-inch sewer				50		50								100	LF	\$ 200.00	\$ 20,000.00
Bore & Jack 12-inch sewer				200	450				50			50		750	LF	\$ 300.00	\$ 225,000.00
Manholes(All Depths)	11	11	2	18	8	6	3	5	4		3		3	74	EA	\$ 3,500.00	\$ 259,000.00
6-inch service lines (short side)	49	23	1	21	53	23		24	11		12	16	11	244	EA	\$ 800.00	\$ 195,200.00
6-inch service lines (long side)	39	18	7	25	54	25		20	7		11	17	11	234	EA	\$ 1,000.00	\$ 234,000.00
Pavement Repairs (All Types, All Thicknesses)	1500	1690	270	1550	2900	750	480	700	430	215	730	790	430	12,435	EA	\$ 70.00	\$ 870,450.00
Driveway Repairs (All Types, All Thicknesses)	49	23	1	21	53	23		24	11		12	16	11	244	EA	\$ 750.00	\$ 183,000.00
Connect Service Lines to Customer Lines	88	41	8	46	107	48		44	18		23	33	22	478	LF	\$ 800.00	\$ 382,400.00
Drain & Demolish Septic Tanks (All Types)	88	41	8	46	107	48		44	18		23	33	22	478	EA	\$ 950.00	\$ 454,100.00
<b>Subtotal</b>														0			\$ -
<b>Lift Station &amp; Force Main (Aldine Mail)</b>														0			\$ -
Force Main														9,850	LF	\$ 80.00	\$ 788,000.00
Concrete wet well, valve box, pumps, controls & accessories														1	LS	\$ 600,000.00	\$ 600,000.00
<b>Subtotal</b>														0			\$ -
Reconstruction of Street Paving	5111	4222	0	0	0	5000		4667	2956	1000	2778	2889	2889	31,512	SY	\$ 80.00	\$ 2,520,960.00
<b>Subtotal Sanitary Sewer System</b>														0			\$ 9,559,110.00
<b>WATER DISTRIBUTION SYSTEM</b>																	
8-inch water line	4400	6200	800			2250	1450	2100	1300	650	1300	1350	1300	23,100	LF	\$ 50.00	\$ 1,155,000.00
12-inch water line				4650	8700									13,350	LF	\$ 65.00	\$ 867,750.00
Bore & Jack 8-inch water line	50	50	50						50		50	50	50	350	LF	\$ 150.00	\$ 52,500.00
Bore & Jack 12-inch water line				350	450									800	LF	\$ 200.00	\$ 160,000.00
6-inch isolation valves														0	EA	\$ 800.00	\$ -
8-inch isolation valves	5	8	1	5	9	2	1	2	1	1	1	2	1	39	EA	\$ 1,000.00	\$ 39,000.00
12-inch isolation valves														0	EA	\$ 1,200.00	\$ -
Fire Hydrants w/ Valve and Box	12	7	2	14	13	6	0	6	4	2	4	4	4	78	EA	\$ 2,500.00	\$ 195,000.00
Short Side Service w/Meters	39	18	7	25	54	25		20	7		11	17	11	234	EA	\$ 500.00	\$ 117,000.00
Long Side Service w/Meters	49	23	1	21	53	23		24	11		12	16	11	244	EA	\$ 900.00	\$ 219,600.00
Driveway Repairs	39	18	7	25	54	25		20	7		11	17	11	234	EA	\$ 750.00	\$ 175,500.00
Decommissioning & Cementing Private Wells	88	41	8	46	107	48		44	18		23	33	22	478	EA	\$ 900.00	\$ 430,200.00
<b>Subtotal Water Distribution System</b>																	\$ 3,411,550.00
Water Transmission Line to City of Houston														0	LS		\$ -
Groundwater Storage and Pumping Plant														0	LS		\$ -
<b>Subtotal Water System Construction Cost</b>																	\$ 3,403,550.00
<b>Subtotal</b>																	\$ 12,962,660.00
Contingency @15%																	\$ 1,944,399.00
<b>SUBTOTAL TOTAL CONSTRUCTION COSTS</b>																	\$ 14,907,059.00
Engineering, Inspection & Testing @ 12%																	\$ 1,788,847.08
Geotechnical														30,580	LF	\$ 1.50	\$ 45,870.00
Surveying														30,580	LF	\$ 5.50	\$ 168,190.00
<b>Subtotal</b>																	\$ 2,002,907.08
<b>SUBTOTAL TOTAL CAPITAL COSTS</b>																	\$ 16,909,966.08
<b>Additional Costs</b>																	\$ -
Lift Station Site Acquisition														50,000	SF	\$ 10.00	\$ 500,000.00
<b>Subtotal</b>																	\$ 500,000.00
<b>SUB-TOTAL ESTIMATED CONSTRUCTION COSTS-(SH.1)</b>																	\$ 17,409,966.08

TABLE 8.2  
PRELIMINARY COST ESTIMATE  
SANITARY SEWER SYSTEM & WATER SYSTEM TO SERVE SERVICE ZONE 2  
AIRLINE IMPROVEMENT DISTRICT, HARRIS COUNTY, TEXAS

ITEM DESCRIPTION	Hill	Robertsvale	Courrege	Woodmoss	Jaycrest	Scoregga	Hardy				
<b>SANITARY SEWER SYSTEM</b>								<b>Quantity</b>	<b>Unit</b>	<b>Unit Cost</b>	<b>Item Cost</b>
8-inch SDR 26PVC Gravity Sewer (All Depths)		1200	1100	700	0	1000		4,000	LF	\$ 70.00	\$ 280,000.00
10-inch SDR 26PVC Gravity Sewer (All Depths)								0	LF	\$ 80.00	\$ -
12-inch SDR 26PVC Gravity Sewer (All Depths)	3550							3,550	LF	\$ 100.00	\$ 355,000.00
15-inch SDR 26PVC Gravity Sewer (All Depths)	4650							4,650	LF	\$ 120.00	\$ 558,000.00
18-inch SDR 26PVC Gravity Sewer r(All Depths)								0	LF	\$ 150.00	\$ -
Bore & Jack 8-inch sewer		100	200	100	0	250		650			
Bore & Jack 10-inch sewer								0	LF	\$ 200.00	\$ -
Bore & Jack 12-inch sewer	150							150	LF	\$ 300.00	\$ 45,000.00
Manholes(All Depths)	23	4	3	2		3		35	EA	\$ 3,500.00	\$ 122,500.00
6-inch service lines (short side)	64	11	14	1	0	8		98	EA	\$ 800.00	\$ 78,400.00
6-inch service lines (long side)	51	10	10	5	0	5		81	EA	\$ 1,000.00	\$ 81,000.00
Pavement Repairs (All Types, All Thicknesses)	1180	400	360	230	0	330	500	3,000	SY	\$ 70.00	\$ 210,000.00
Driveway Repairs (All Types, All Thicknesses)	64	11						75	EA	\$ 750.00	\$ 56,250.00
Connect Service Lines to Customer Lines	115	21	24	6	0	13		179	LF	\$ 800.00	\$ 143,200.00
Drain & Demolish Septic Tanks (All Types)								0	EA	\$ 950.00	\$ -
<b>Subtotal</b>								0			\$ -
<b>Lift Station &amp; Force Main (Hill)</b>											\$ -
Force Main								1,150	LF	\$ 65.00	\$ 74,750.00
Concrete wet well, valve box, pumps, controls & accessories								1	LS	\$ 450,000.00	\$ 450,000.00
<b>Subtotal</b>											\$ -
Reconstruction of Street Paving	20170	2667	2444	1556	0	2222	0	29,059	SY	\$ 80.00	\$ 2,324,720.00
<b>Subtotal Sanitary Sewer System</b>								0			\$ 4,778,820.00
<b>WATER DISTRIBUTION SYSTEM</b>											\$ -
8-inch water line		120	1100	700	0	1000		2,920	LF	\$ 50.00	\$ 146,000.00
12-inch water line	8200						3600	11,800	LF	\$ 65.00	\$ 767,000.00
Bore & Jack 8-inch water line		100	250	100	0	200		650	LF	\$ 150.00	\$ 97,500.00
Bore & Jack 12-inch water line	200							200	LF	\$ 200.00	\$ 40,000.00
6-inch isolation valves								0	EA	\$ 800.00	\$ -
8-inch isolation valves		1	1	1		1		4	EA	\$ 1,000.00	\$ 4,000.00
12-inch isolation valves	12						4	16	EA	\$ 1,200.00	\$ 19,200.00
Fire Hydrants w/ Valve and Box	23	3	3	2		3	11	45	EA	\$ 2,500.00	\$ 112,500.00
Short Side Service w/Meters	51	10	10	5	0	5		81	EA	\$ 500.00	\$ 40,500.00
Long Side Service w/Meters	64	11	14	1	0	8		98	EA	\$ 900.00	\$ 88,200.00
Driveway Repairs	115	10	10	5	0	5		145	EA	\$ 750.00	\$ 108,750.00
Decommissioning & Cementing Private Wells	115	21	24	6	0	13		179	EA	\$ 900.00	\$ 161,100.00
<b>Subtotal Water Distribution System</b>								0			\$ 1,584,750.00
Water Transmission Line to City of Houston								0	LF	\$ 280.00	\$ -
Groundwater Storage and Pumping Plant								0	LS	\$ 50,000.00	\$ -
<b>Subtotal Water System Construction Cost</b>								0			\$ 1,584,750.00
<b>Subtotal</b>								0			\$ 6,363,570.00
Contingency @15%								0			\$ 954,535.50
<b>SUBTOTAL TOTAL CONSTRUCTION COSTS</b>								0			\$ 7,318,105.50
Engineering, Inspection & Testing @ 12%								0			\$ 878,172.66
Geotechnical								12,200	LF	\$ 1.50	\$ 18,300.00
Surveying								12,200	LF	\$ 5.50	\$ 67,100.00
<b>Subtotal</b>								0			\$ 963,572.66
<b>SUBTOTAL TOTAL CAPITAL COSTS</b>								0			\$ 9,245,250.82
<b>Additional Costs</b>								0			\$ -
Lift Station Site Acquisition								50,000	SF	\$ 10.00	\$ 500,000.00
Force Main Easement								23,000	SF	\$ 10.00	\$ 230,000.00
<b>Subtotal</b>								0			\$ 730,000.00
<b>SUB-TOTAL ESTIMATED CONSTRUCTION COSTS(SH 2)</b>											\$ 9,975,250.82
<b>TOTAL ESTIMATED CONSTRUCTION COSTS(SH 1&amp;SH 2)</b>											\$ 27,385,216.90



TABLE 8.3  
PRELIMINARY COST ESTIMATE  
SANITARY SEWER SYSTEM & WATER SYSTEM TO SERVE SERVICE ZONE 3  
AIRLINE IMPROVEMENT DISTRICT, HARRIS COUNTY, TEXAS

ITEM DESCRIPTION	Gulf Bank	Nelda	Mierianne	Bertrand	Smart	Louis	Havner	Yale	Cheswick	Berwyn	Carby	Mitchell				
													Quantity	Unit	Unit Cost	Item Cost
<b>SANITARY SEWER SYSTEM</b>																
8-inch SDR 26PVC Gravity Sewer (All Depth)	1250	1150	1150	1150	920	850	800	2200	2250	1650	300		13,670	LF	\$ 70.00	\$ 956,900.00
10-inch SDR 26PVC Gravity Sewer (All Depth)						350		400	200		600		1,550	LF	\$ 80.00	\$ 124,000.00
12-inch SDR 26PVC Gravity Sewer (All Depth)										1250			1,250	LF	\$ 100.00	\$ 125,000.00
15-inch SDR 26PVC Gravity Sewer (All Depths)													0	LF	\$ 120.00	\$ -
18-inch SDR 26PVC Gravity Sewer (All Depth)													0	LF	\$ 150.00	\$ -
Bore & Jack 8-inch sewer	30	60	60	60	60	120	60	60	120	60	60		750			
Bore & Jack 10-inch sewer						60		60	60	120	60		360	LF	\$ 200.00	\$ 72,000.00
Bore & Jack 12-inch sewer													0	LF	\$ 300.00	\$ -
Manholes(All Depths)	3	3	3	3	2	4	2	7	8	12	4		51	EA	\$ 3,500.00	\$ 178,500.00
6-inch service lines (short side)	12	10	10	12	3	0	4	26	35	37	11		160	EA	\$ 800.00	\$ 128,000.00
6-inch service lines (long side)	0	12	10	12	1	0	6	25	30	38	7		141	EA	\$ 1,000.00	\$ 141,000.00
Pavement Repairs(All Types, All Thicknesses)	415	380	380	380	305	400	265	860	810	1000	300		5,495	SY	\$ 70.00	\$ 384,650.00
Driveway Repairs (All Types, All Thicknesses)	12	10	10	12	3	0	4	26	35	37	11		160	EA	\$ 750.00	\$ 120,000.00
Connect Service Lines to Customer Lines	12	22	20	24	4	0	10	51	65	75	18		301	LF	\$ 800.00	\$ 240,800.00
Drain & Demolish Septic Tanks (All Types)	12	22	20	24	4	0	10	51	65	75	18		301	EA	\$ 950.00	\$ 285,950.00
<b>Subtotal</b>																\$ -
<b>Lift Station &amp; Force Main (Upgrade Mitchell)</b>																
Force Main													0	LF	\$ 65.00	\$ -
Concrete wet well, valve box, pumps, controls & accessories													1	LS	\$ 300,000.00	\$ 300,000.00
<b>Subtotal</b>																\$ -
Reconstruction of Street Paving	0	2667	2667	2667	2000	0	2000	6222	5889	6667	2222		33,001	SY	\$ 80.00	\$ 2,640,080.00
<b>Subtotal Sanitary Sewer System</b>													0			\$ 5,696,880.00
<b>WATER DISTRIBUTION SYSTEM</b>																
8-inch water line	1260	1160	1160	1160	920	1200	1000	3750	2650	4700	950	1300	21,210	LF	\$ 50.00	\$ 1,060,500.00
12-inch water line													0	LF	\$ 65.00	\$ -
Bore & Jack 8-inch water line	30	60	60	60	60	180	60	120	180	280	120	80	1,290	LF	\$ 150.00	\$ 193,500.00
Bore & Jack 12-inch water line													0	LF	\$ 200.00	\$ -
6-inch isolation valves													0	EA	\$ 800.00	\$ -
8-inch isolation valves	2	2	2	2	2	2	1	4	3	7	1	4	32	EA	\$ 1,000.00	\$ 32,000.00
12-inch isolation valves													0	EA	\$ 1,200.00	\$ -
Fire Hydrants	4	3	3	3	3	3	2	8	8	11	3		51	EA	\$ 2,500.00	\$ 127,500.00
Short Side Service w/Meters	0	12	10	12	1	0	6	25	30	38	7		141	EA	\$ 500.00	\$ 70,500.00
Long Side Service w/Meters	12	10	10	12	3	0	4	26	35	37	11		160	EA	\$ 900.00	\$ 144,000.00
Driveway Repairs	0	12	10	12	1	0	6	25	30	38	7		141	EA	\$ 750.00	\$ 105,750.00
Decommissioning & Cementing Private Wells	12	22	20	24	4	0	10	51	65	75	18		301	EA	\$ 900.00	\$ 270,900.00
<b>Subtotal Water Distribution System</b>																\$ 2,004,650.00
Water Transmission Line to City of Houston													0	LF	\$ 200.00	\$ -
Groundwater Storage and Pumping Plant													0	LS	\$ 650,000.00	\$ -
<b>Subtotal Water System Construction Cost</b>																\$ 2,004,650.00
<b>Subtotal</b>																\$ 7,701,530.00
Contingency @15%																\$ 1,155,229.50
<b>SUBTOTAL TOTAL CONSTRUCTION COSTS</b>																\$ 8,856,759.50
Engineering, Inspection & Testing @ 12%																\$ 1,062,811.14
Geotechnical													16,470	LF	\$ 1.50	\$ 24,705.00
Surveying													16,470	LF	\$ 5.50	\$ 90,585.00
<b>Subtotal</b>																\$ 1,178,101.14
<b>SUBTOTAL TOTAL CAPITAL COSTS</b>																\$ 10,034,860.64
<b>Additional Costs</b>																\$ -
Lift Station Site Acquisition													0	SF	\$ 10.00	\$ -
<b>Subtotal</b>																\$ -
<b>TOTAL ESTIMATED CONSTRUCTION COSTS</b>																\$ 10,034,860.64

TABLE 8.4  
 PRELIMINARY COST ESTIMATE  
 SANITARY SEWER SYSTEM & WATER SYSTEM TO SERVE SERVICE ZONE 4  
 AIRLINE IMPROVEMENT DISTRICT, HARRIS COUNTY, TEXAS

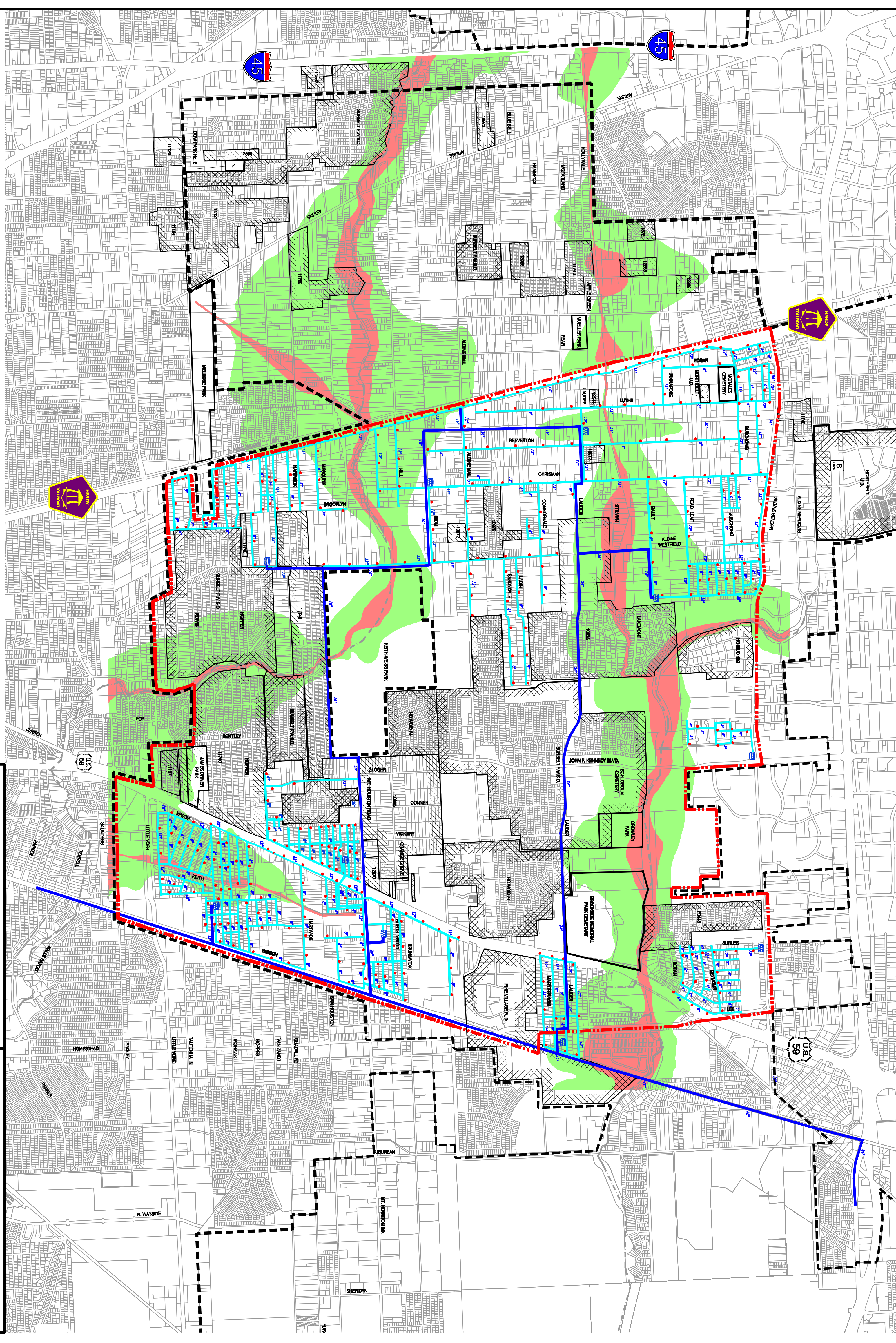
ITEM DESCRIPTION	Airway St	Gulf Bank Rd	Meadowview	Meadowshire	Airline	Louise	Mitchell	Tina	Margie	Marie Edna	Carby	Turner Place	Quantity	Unit	Unit Cost	Item Cost
<b>SANITARY SEWER SYSTEM</b>																
8-inch SDR 26PVC Gravity Sewer (All Depths)	2150	800	600	600		800		1100	1000	250		800	8,100	LF	\$ 70.00	\$ 567,000.00
10-inch SDR 26PVC Gravity Sewer (All Depths)		3100				1600							4,700	LF	\$ 80.00	\$ 376,000.00
12-inch SDR 26PVC Gravity Sewer (All Depths)					6650		3550				4250		14,450	LF	\$ 100.00	\$ 1,445,000.00
15-inch SDR 26PVC Gravity Sewer (All Depths)													0	LF	\$ 120.00	\$ -
18-inch SDR 26PVC Gravity Sewer r(All Depths)													0	LF	\$ 150.00	\$ -
Bore & Jack 8-inch sewer	100	100	50	50		50		100	50	50		100	650	LF	\$ 200.00	
Bore & Jack 10-inch sewer						100							100	LF	\$ 250.00	\$ 25,000.00
Bore & Jack 12-inch sewer					500		200				150		850	LF	\$ 300.00	\$ 255,000.00
Manholes(All Depths)	6	10	2	2	21	6	10	3	3	1	11	3	78	EA	\$ 3,500.00	\$ 273,000.00
6-inch service lines (short side)	22	22	11	5	22	7	0	13	10	0	22	9	143	EA	\$ 800.00	\$ 114,400.00
6-inch service lines (long side)	13	14	9	7	17	0	15	0	9	5	2	1	92	EA	\$ 1,000.00	\$ 92,000.00
Pavement Repairs (All Types, All Thicknesses)	710	1290	200	200	2200	800	1170	360	330	85	1420	260	9,025	SY	\$ 70.00	\$ 631,750.00
Driveway Repairs (All Types, All Thicknesses)	22	22	11	15	22	7	0	15	10	0	22	9	155	EA	\$ 750.00	\$ 116,250.00
Connect Service Lines to Customer Lines	35	36	20	12	39	7	15	13	19	5	24	10	235	LF	\$ 800.00	\$ 188,000.00
Drain & Demolish Septic Tanks (All Types)	35	36	20	12	39	7	15	13	19	5	24	10	235	EA	\$ 950.00	\$ 223,250.00
<b>Subtotal</b>																\$ -
<b>Lift Station &amp; Force Main</b>																
Force Main													7,500	LF	\$ 70.00	\$ 525,000.00
Concrete wet well, valve box, pumps, controls & accessories													1	LS	\$ 500,000.00	\$ 500,000.00
<b>Subtotal</b>																\$ -
Reconstruction of Street Paving	4556	0	1778	2000	0	3333	7778	2556	2111	889	9444	2000	36,445	SY	\$ 80.00	\$ 2,915,600.00
<b>Subtotal Sanitary Sewer System</b>													0			\$ 8,247,250.00
<b>WATER DISTRIBUTION SYSTEM</b>																
8-inch water line	2150	2300	850	850		2300	3800	1200	1000	450	4250	800	19,950	LF	\$ 50.00	\$ 997,500.00
12-inch water line					7100								7,100	LF	\$ 65.00	\$ 461,500.00
Bore & Jack 8-inch water line	200	200	100	50		100	200	50	50	50	250	50	1,300	LF	\$ 150.00	\$ 195,000.00
Bore & Jack 12-inch water line					250								250	LF	\$ 200.00	\$ 50,000.00
6-inch isolation valves													0	EA	\$ 800.00	\$ -
8-inch isolation valves	2	4	1	1		3	4	1	1	1	4	1	23	EA	\$ 1,000.00	\$ 23,000.00
12-inch isolation valves					9								9	EA	\$ 1,200.00	\$ 10,800.00
Fire Hydrants	6	7	2	2	20	6	11	3	3	1	12	3	76	EA	\$ 2,500.00	\$ 190,000.00
Short Side Service w/Meters	13	14	9	7	17	4	15	0	9	5	2	1	96	EA	\$ 500.00	\$ 48,000.00
Long Side Service w/Meters	22	22	11	5	22	2	0	13	10	0	22	9	138	EA	\$ 900.00	\$ 124,200.00
Driveway Repairs	13	14	9	7	17	0	15	0	9	5	2	1	92	EA	\$ 750.00	\$ 69,000.00
Decommissioning & Cementing Private Wells	35	36	20	12	39	6	15	13	19	5	24	10	234	EA	\$ 900.00	\$ 210,600.00
<b>Subtotal Water Distribution System</b>																\$ 2,379,600.00
Water Transmission Line to City of Houston													0	LF	\$ 280.00	\$ -
Groundwater Storage and Pumping Plant													0	LS	\$ 50,000.00	\$ -
<b>Subtotal Water System Construction Cost</b>																\$ 4,759,200.00
<b>Subtotal</b>																\$ 13,006,450.00
Contingency @15%																\$ 1,950,967.50
<b>SUBTOTAL TOTAL CONSTRUCTION COSTS</b>																\$ 14,957,417.50
Engineering, Inspection & Testing @ 12%																\$ 1,794,890.10
Geotechnical													27,250	LF	\$ 1.50	\$ 40,875.00
Surveying													27,250	LF	\$ 5.50	\$ 149,875.00
<b>Subtotal</b>																\$ 1,985,640.10
<b>SUBTOTAL TOTAL CAPITAL COSTS</b>																\$ 16,943,057.60
<b>Additional Costs</b>																\$ -
Lift Station Site Acquisition													50,000	SF	\$ 5.00	\$ 250,000.00
<b>Subtotal</b>																\$ 250,000.00
<b>TOTAL ESTIMATED CONSTRUCTION COSTS</b>																\$ 17,193,057.60



TABLE 9

**PRELIMINARY COST ESTIMATE SUMMARY  
OFF SITE SURFACE WATER TRANSMISSION LINE  
TO SERVE  
AIRLINE IMPROVEMENT DISTRICT  
HARRIS COUNTY, TEXAS**

Item Description	Quantity	Unit	Unit Cost	Item Cost
1. Pro-Rated Share of Aldine I.D. Surface Water Transmission System	1	LS	\$7,780,000.00	\$7,780,000.00
2. 24 Inch Transmission Line, Bore and Tunnel, w/ 36 Inch Steel Pipe Casing @ Aldine Mail Rd	400	LF	\$500.00	\$ 200,000.00
3. 18 Inch Transmission Line, Bore and Tunnel, w/ 30 Inch Steel Pipe Casing @ Warwick Rd	400	LF	\$450.00	\$ 180,000.00
4. 18 Inch Transmission Line, Open Cut	9,100	LF	\$300.00	\$ 2,730,000.00
<b>SUBTOTAL</b>				\$ 10,890,000.00
Contingency (15%)				\$ 1,633,500.00
<b>SUBTOTAL CONSTRUCTION COSTS</b>				\$ 12,523,500.00
Items Below Apply to Items 2, 3, 4 Only				
Engineering, Testing, Inspection (12%)				\$ 429,180.00
Geotechnical	9,900	LF	\$1.50	\$ 14,850.00
Surveying	9,900	LF	\$5.50	\$ 54,450.00
<b>SUBTOTAL</b>				\$ 498,480.00
<b>SUBTOTAL CAPITAL COSTS</b>				<b>\$ 13,021,980.00</b>



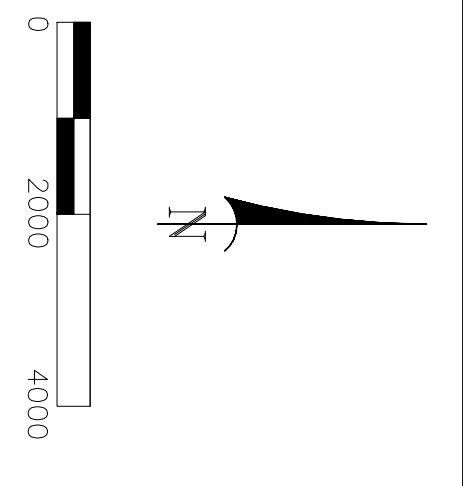
EXISTING WATER CONNS

WATER CCN 10736 - GALLOO UTILITIES  
 WATER CCN 10833 - SUBURBAN UTILTY COMPANY  
 WATER CCN 10835 - SUBURBAN UTILTY COMPANY  
 WATER CCN 10972 - CHAURS WATER COMPANY, INC.  
 WATER CCN 1124 - NITSCHE & SON UTILTY COMPANY, INC.  
 WATER CCN 1127 - AQUASOURCE UTILTY, INC.  
 WATER CCN 1128 - AQUASOURCE UTILTY, INC.  
 WATER CCN 11746 - SOUTHWEST UTILITIES, INC.  
 WATER CCN 11775 - WESTFIELD M.H.P., INC.

WATER CCN 11872 - SWEA GARDENS ESTATES  
 WATER CCN 12082 - C&F UTILITIES, INC.  
 WATER CCN 12544 - GREENWOOD PLACE CIVIC CLUB, INC.  
 WATER CCN 12590 - COUNTRY LIVING APARTMENTS  
 WATER CCN 12870 - MOUNT HOUSTON UTILITIES  
 WATER CCN 18445 - SQUOIA I.D.  
 WATER CCN 10895 - ORANGE GROVE  
 WATER CCN 11746 - SOUTHWEST UTILITIES, INC.  
 WATER CCN 11775 - WESTFIELD M.H.P., INC.

FLOOD PLAIN INFORMATION		LEGEND	
	Base Flood Elevations Determined		Aldine Improvement District Boundary
	Floodway Areas in Zone AE		City of Houston Boundary
	Public Utility District Service Areas		Proposed Water Storage Plant
	Investor Owned Utility Service Areas		Proposed Water Transmission Line
			Proposed Fire Hydrant

Flood Plain Data based on 1996 FEMA Maps



**Water Engineers, Inc.**  
 Water & Wastewater Treatment Consultants



HARRIS COUNTY  
 PUBLIC INFRASTRUCTURE DEPARTMENT  
 ENGINEERING DIVISION

ALDINE

IMPROVEMENT DISTRICT

ALDINE I.D. WATER & WASTEWATER PLANNING STUDY	
PROPOSED WATER TRANSMISSION AND DISTRIBUTION PLAN	
JULY 2005	EXHIBIT 5

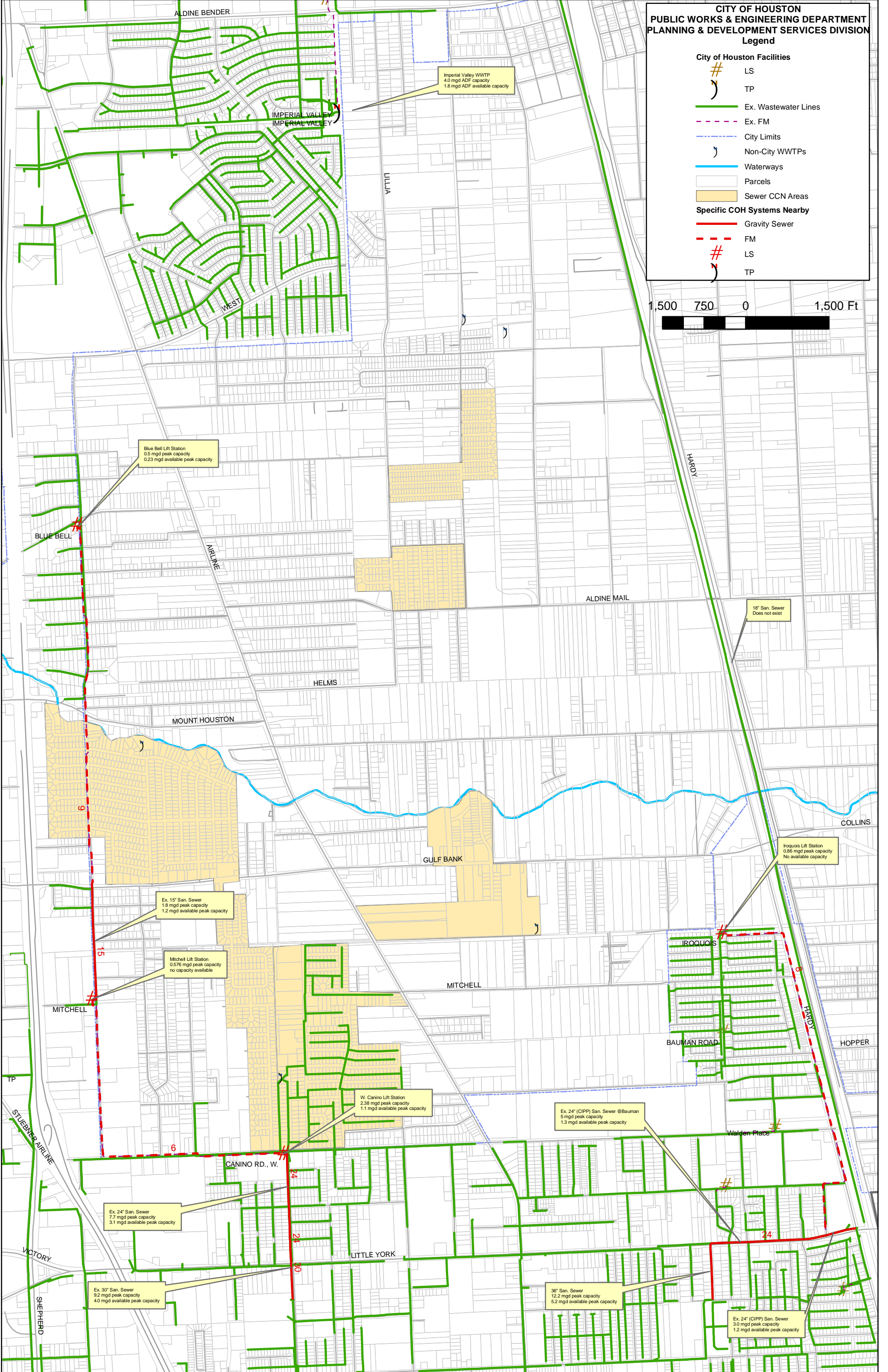
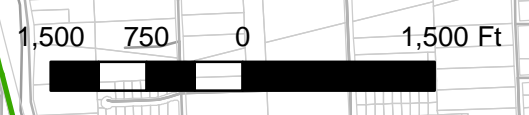
**CITY OF HOUSTON  
PUBLIC WORKS & ENGINEERING DEPARTMENT  
PLANNING & DEVELOPMENT SERVICES DIVISION  
Legend**

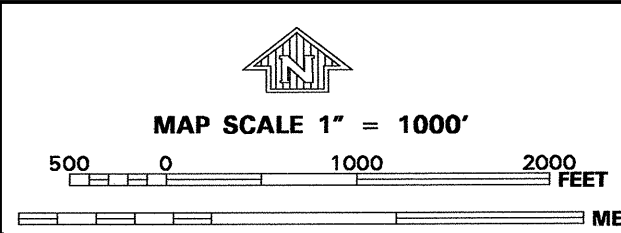
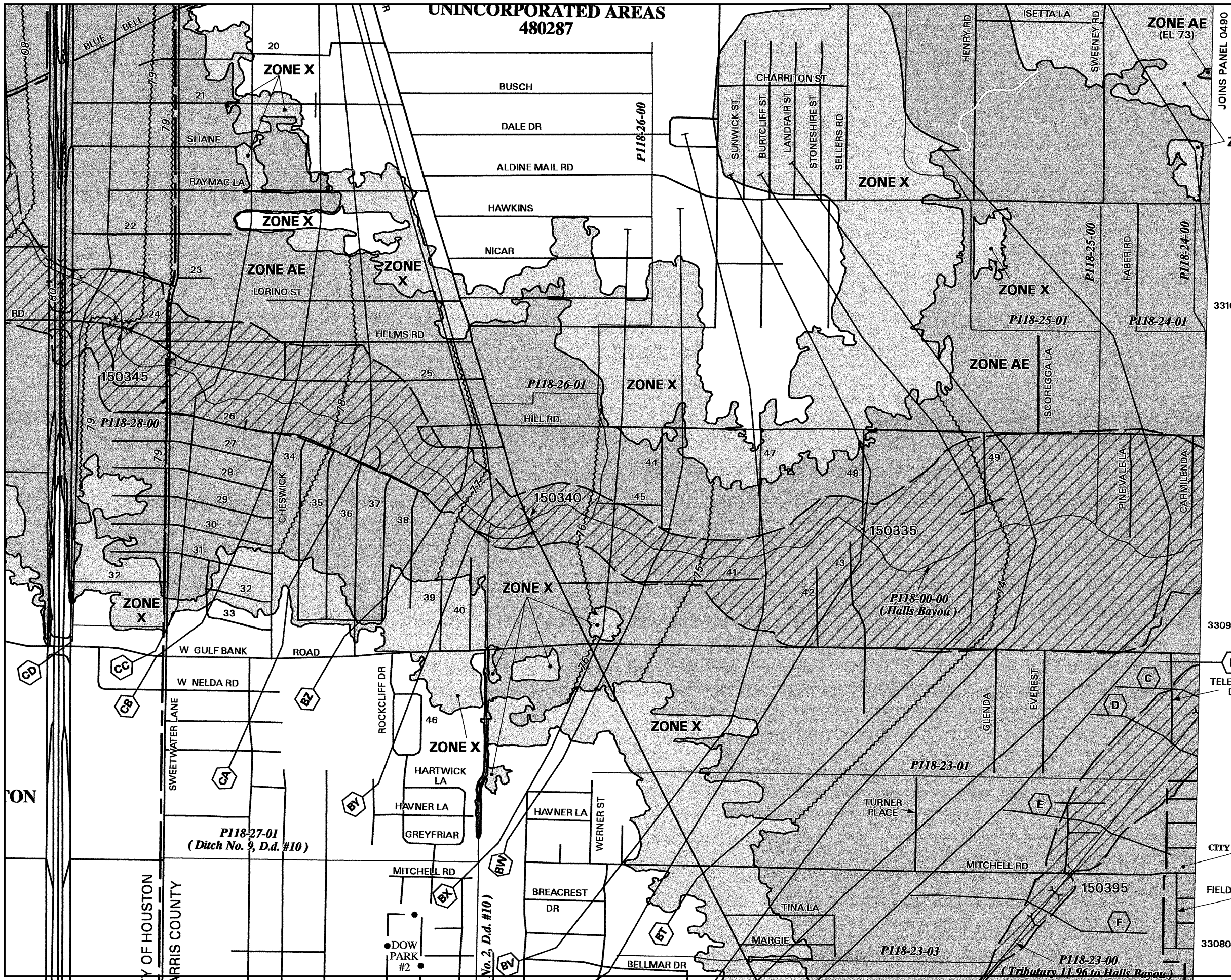
**City of Houston Facilities**

- # LS
- ) TP
- Ex. Wastewater Lines
- - - Ex. FM
- - - City Limits
- ) Non-City WWTPs
- Waterways
- Parcels
- Sewer CCN Areas

**Specific COH Systems Nearby**

- Gravity Sewer
- - - FM
- # LS
- ) TP





NATIONAL FLOOD INSURANCE PROGRAM  
 FEDERAL EMERGENCY MANAGEMENT AGENCY

PANEL 0470L

**FIRM**  
**FLOOD INSURANCE RATE MAP**  
 HARRIS COUNTY,  
 TEXAS  
 AND INCORPORATED AREAS

**PANEL 470 OF 1150**  
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HARRIS COUNTY, UNINCORPORATED AREAS	480287	0470	L
HOUSTON, CITY OF	480288	0470	L

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



**MAP NUMBER**  
 48201C0470L  
**MAP REVISED:**  
 JUNE 18, 2007

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)

**HARRIS COUNTY**  
**PUBLIC INFRASTRUCTURE DEPARTMENT**

1001 Preston, 5<sup>th</sup> Floor  
Houston, Texas 77002  
(713) 755-4400

April 2, 2008

Commissioners Court  
Administration Building  
Houston, Texas 77002

Vote of the Court:

	Yes	No	Abstain
Judge Emmett	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comm. Lee	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comm. Garcia	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comm. Radack	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comm. Eversole	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

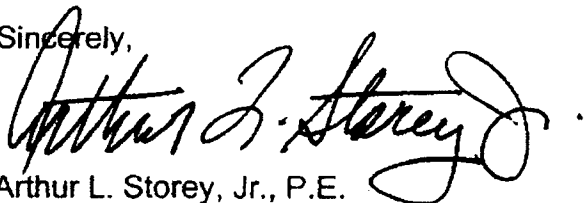
**SUBJECT: Recommendation that Commissioners Court adopt the "Water & Wastewater Regionalization Policy for Harris County and Harris County Flood Control District" effective May 1, 2008.**

Dear Court Members:

It is recommended that Commissioners Court adopt the "Water & Wastewater Regionalization Policy for Harris County and Harris County Flood Control District" effective May 1, 2008. As authorized by Commissioners Court on November 6, 2007, a task group was formed to create the policy with representatives from Public Infrastructure, Management Services, Community Services Department, and Public Health & Environmental Services. The resulting policy is attached.

The policy was developed to affirm and clarify Harris County and Harris County Flood Control District's position on the issue of water and wastewater regionalization. Through this policy, the County and the District anticipate a reduction in the number of water and wastewater treatment plants and a reduction in pollutant loads to waterways. This policy also falls within guidance provided by the Environmental Protection Agency for compliance with the County and the District's National Pollutant Discharge Elimination System storm water permit.

Sincerely,



Arthur L. Storey, Jr., P.E.  
Executive Director

08 APR -2 AM 8:26  
HARRIS COUNTY  
MANAGEMENT SERVICES

Attachment

- cc: Dr. Richard Raycraft- Management Services
- David Turkel- Community Services Department
- Dr. Herminia Palacio, M.D., M.P.H.- Public Health & Environmental Services
- Bud Karachiwalla- PHES Environmental Public Health
- John Blount, P.E.- PID Planning & Operations
- Mike Talbott, P.E.- PID Flood Control District
- Deborah Vaughn, P.E.- PID Architecture & Engineering
- Alisa Max, P.E.- PID Planning & Operations WPG

Presented to Commissioner's Court

APR 08 2008

APPROVE \_\_\_\_\_

Recorded Vol \_\_\_\_\_ Page \_\_\_\_\_



# WATER & WASTEWATER REGIONALIZATION POLICY FOR HARRIS COUNTY AND HARRIS COUNTY FLOOD CONTROL DISTRICT

Purpose - Harris County and Harris County Flood Control District (HCFCD) have developed this policy to affirm their position on the issue of water and wastewater regionalization and to establish guidelines for achieving regionalization. With this policy the County and HCFCD anticipate a reduction in the number of water treatment plants and wastewater treatment plants and a reduction in pollutant loads to waterways by planning or participating in larger and/ or more efficient wastewater systems.

Scope - This policy applies to water systems and wastewater systems 1) owned or operated by Harris County and/or HCFCD and 2) funded in full or in part by Harris County, HCFCD, or other grant funds administered by or received by Harris County or HCFCD.

## Overview -

Harris County and HCFCD recognize that water and wastewater regionalization, when properly applied, have the following advantages:

- improved treatment efficiency;
- improved unit cost for treatment;
- reduced number of wastewater discharges;
- reduced groundwater extraction;
- reduced liability from regulatory oversight, permitting, fines;
- improved water quality resulting from improved treatment; and
- reduced overall maintenance costs.

As owners of several water and wastewater systems, as a regulatory oversight agency for public and private water and wastewater systems, and as environmental stewards of the county's natural environment, Harris County and HCFCD recognize the manifold benefits to regionalization of water and wastewater systems and hereby affirm their commitment to the concept of water and wastewater regionalization.

## Definitions -

1. Consolidation of Water and/ or Wastewater Systems- the merger of two or more previously independent water and/ or wastewater systems into one system resulting in one treatment plant.
2. County Engineer - the holder of the statutory office of the County Engineer for Harris County or the employee designated by the County Engineer to perform a task required by this policy.
3. Regionalization of Water and/ or Wastewater - the consolidation of water and/or wastewater systems such that the resulting treatment facilities are regional.
4. Regionalization Planning - the concept of planning of water and/or wastewater systems to meet regionalization thresholds for the receiving treatment plants.

5. Regional Wastewater Treatment Plant – a wastewater treatment plant that serves a region requiring a minimum of 3 mgd capacity.
6. Wastewater – waterborne human waste, or waste from domestic activities, such as washing, bathing, and food preparation.
7. Wastewater System – the infrastructure used for the collection, treatment, and disposal of wastewater.
8. Water System – the infrastructure used for the development, treatment, and distribution of potable water.

Policy –

**A. Water Systems**

Harris County and HCFCD support and pledge to follow *District Regulatory Plan 1999* adopted by the Harris-Galveston Coastal Subsidence District on April 14, 1999, amended September 12, 2001, and as will from time to time be subsequently amended.

**B. Wastewater Systems**

**1. Existing Wastewater systems owned or operated by Harris County and/or HCFCD- Regionalization**

Within 18 months of the adoption of this policy by Harris County Commissioners Court, the County Engineer will perform a review of Harris County and HCFCD's existing wastewater systems in order to determine the feasibility of regionalization planning. Consolidation of two systems or conversion to an on-site system, even if it does not meet regionalization thresholds, will be considered as a step towards regionalization and is encouraged. If the County Engineer determines that regionalization of any Harris County or HCFCD owned or operated wastewater systems is feasible, the County Engineer will begin the process to regionalize those systems in a systematic and cost-effective manner. Feasibility will be determined by:

- a. Cost of conveyance to the nearest available system. If the cost of laying new wastewater lines to convey the wastewater to the nearest available system is determined to be greater than 150% of construction and lifecycle costs, then regionalization in this instance shall be considered not feasible.
- b. Impact to areas of historical/cultural significance, environmentally-sensitive areas, or highly-developed areas. If laying wastewater lines to divert wastewater from an existing system into a consolidated or regional system will cause undue disruption in any of these areas, regionalization in this instance may be considered not feasible at the discretion of the County Engineer.

**2. Existing Wastewater Systems owned or operated by Harris County and/or HCFCD- On-Site Considerations**

As part of the County Engineer's review of existing County or HCFCD owned or operated wastewater systems, the County Engineer will further analyze any existing wastewater systems that are not candidates for regionalization or

consolidation to determine the applicability of transitioning all or part of the wastewater system to a decentralized, on-site wastewater facility. The proposal to change all or part of a system to a decentralized, on-site wastewater facility should be based on both economics and environmental stewardship.

**3. *Future County or HCFCD Owned or Operated Wastewater Systems***

Any project developed in the future by Harris County or by HCFCD which is anticipated to generate more wastewater than can be effectively treated with on-site sewage facilities will be required to analyze the feasibility of regionalization, or at a minimum, consolidation, of the discharge. Feasibility will be determined using the criteria established in Items 1a- 1b above.

**4. *Harris County and/or HCFCD Grant Funded Projects***

Any proposal for significant work related to a wastewater system modification funded in full or in part by Harris County or HCFCD or other grant funds administered by or received by Harris County or HCFCD must provide evidence of due deliberation for regionalization of the wastewater system. If regionalization is not feasible using the criteria stated in Items 1a- 1b above, consolidation of the wastewater system and change to on-site treatment must also be considered. In instances where Harris County or HCFCD is involved in the grant applicant scoring process, the scoring will be strongly dependent on the applicant's deliberation for wastewater regionalization, wastewater consolidation, and/ or decentralized on-site wastewater treatment.

In instances where Harris County or HCFCD is involved in the grant applicant scoring process, grant proposals which give consideration within the scope of the project to future upgrades that will allow for regionalization of nearby non-regional systems will receive extra scoring consideration, assuming the grant allows for such planning and the project conditions are applicable.

**5. *Non-Regional Wastewater Treatment Plants***

If the County Engineer determines that, for one or more of the reasons listed above, the project is not a candidate for regionalization, the following additional wastewater effluent limitations and provisions shall apply to the system within three years of adoption of this policy or within three years following the subsequent renewal of the wastewater treatment plant Texas Pollutant Discharge Elimination System (TPDES) permit, whichever is later.

- a. Tertiary wastewater treatment for solids removal (e.g., sand filter, membrane filter) must be added to the treatment train;
- b. A bacteria effluent monitoring program approved by the County Engineer must be developed and administered;
- c. Any facility accepting restaurant waste must have grease trap(s) constructed in accordance with a plan approved by the County Engineer and maintain the grease trap(s) in accordance with a plan approved by the County Engineer; and

- d. The non-regional wastewater treatment plant must include a SCADA system installed and utilized in a manner approved by the County Engineer.

# HARRIS COUNTY

Public Infrastructure Department  
Planning & Operations Division

10555 Northwest Frwy., Suite 220  
Houston, Texas 77092  
(713) 316-4877

June 23, 2008

Texas Water Development Board  
P.O. Box 13231  
Austin TX 78711

Attention: Connie Townsend, P.E.

**SUBJECT: Airline Improvement District Onsite Sewage Facility and Private Water Well Status**

Dear Ms. Townsend:


Pursuant to our conversation on Friday I offer the following information concerning onsite sewage facilities and private water wells in the Airline Improvement District.

The Airline Improvement District is made up of three separate yet similar soil profiles. They are Clodine-Urban Land Complex, Addicks-Urban Land Complex, and Gessner-Urban Land Complex. The soil survey of Harris County, Texas prepared by the United States Department of Agriculture Soil Conservation Service under Table 9 Sanitary Facilities rates these soils as severe due to wetness for use of septic tank and soil absorption fields. (See attached).

Additionally, Table 18 Soil and Water Features indicates that all three of these soil types suffer from a high water table throughout winter months. The relationship between high water tables and failing conventional soil absorption systems is significant. If the soil is saturated, there is no place for the septic effluent to go except to the surface or back-up in the home. If water wells are improperly completed, i.e., no sealing pad or no pressure cementing then septic tank effluent can flow overland or through a saturated soil layer and travel down the well casing to the well head. This will cause a contamination of the well until such time as bacteria is pulled through the well discharging into the home water system. Harris County's experience is that in these soils listed above, the vast majority of onsite sewage facilities exhibit one or more signs of failure during the wet times of the year, resulting in significant public health hazard and threat to adjoining private water wells.

Should you need any additional information please feel free to call.

Sincerely,



John Blount, P.E.  
Director, Planning & Operations

cc: Melissa Hamous

TABLE 9.--SANITARY FACILITIES

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil or mapping unit was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Addicks: Ad-----	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
<sup>1</sup> Ak: Addicks part-----  Urban land part.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Aldine: Am-----	Severe: wetness, percs slowly.	Slight-----	Severe: wetness.	Severe: wetness.	Poor: thin layer.
<sup>1</sup> An: Aldine part-----  Urban land part.	Severe: wetness, percs slowly.	Slight-----	Severe: wetness.	Severe: wetness.	Poor: thin layer.
Aris: Ap-----	Severe: percs slowly, wetness.	Slight-----	Severe: wetness.	Severe: wetness.	Poor: wetness.
<sup>1</sup> Ar: Aris part-----  Gessner part-----	Severe: percs slowly, wetness.	Slight-----	Severe: wetness.	Severe: wetness.	Poor: wetness.
<sup>1</sup> As: Aris part-----  Urban land part.	Severe: percs slowly, wetness.	Slight-----	Severe: wetness.	Severe: wetness.	Poor: wetness.
Atasco: AtB-----	Severe: percs slowly, wetness.	Moderate: slope.	Slight-----	Slight-----	Good.
Beaumont: Ba-----	Severe: percs slowly, wetness.	Moderate: excess humus.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
<sup>1</sup> Bc: Beaumont part-----  Urban land part.	Severe: percs slowly, wetness.	Moderate: excess humus.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
Bernard: Bd-----	Severe: wetness, percs slowly.	Moderate: excess humus.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Bernard: 1Be: Bernard part-----	Severe: wetness, percs slowly.	Moderate: excess humus.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
Edna part-----	Severe: percs slowly, wetness.	Slight-----	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
1Bg: Bernard part-----  Urban land part.	Severe: wetness, percs slowly.	Moderate: excess humus.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
Bissonnet: Bn-----	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Boy: Bo-----	Severe: percs slowly, wetness.	Severe: seepage, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too sandy.
Clodine: Cd-----	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
1Cr ne part-----  Urban land part.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Edna: Ed-----	Severe: percs slowly, wetness.	Slight-----	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
Gessner: Ge, 1Gs-----	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
1Gu: Gessner part-----  Urban land part.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Harris: Ha-----	Severe: percs slowly, wetness, floods.	Severe: floods, excess humus, wetness.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: too clayey, wetness.
Hatliff: Hf-----	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Fair: too sandy.
Lockley: HoA, HoB-----	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Good.

Use footnotes at end of table.



## SOIL SURVEY

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ijam: Is-----	Severe: percs slowly, wetness.	Slight-----	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
Kaman: Ka-----	Severe: floods, wetness, percs slowly.	Moderate: excess humus.	Severe: floods, too clayey, wetness.	Severe: floods, wetness.	Poor: too clayey, wetness.
Katy: Kf-----	Severe: percs slowly, wetness.	Slight-----	Moderate: wetness.	Moderate: wetness.	Fair: thin layer.
Kenney: Kn-----	Slight-----	Severe: seepage.	Moderate: too sandy.	Severe: seepage.	Fair: too sandy.
<sup>1</sup> Ku: Kenney part-----  Urban land part:	Slight-----	Severe: seepage.	Moderate: too sandy.	Severe: seepage.	Fair: too sandy.
Lake Charles: LcA-----	Severe: percs slowly, wetness.	Slight-----	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
LcB-----	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
<sup>1</sup> Lu: Lake Charles part-----  Urban land part.	Severe: percs slowly, wetness.	Slight-----	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
Midland: Md-----	Severe: percs slowly, wetness.	Slight-----	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey, wetness.
<sup>1</sup> Mu: Midland part-----  Urban land part.	Severe: percs slowly, wetness.	Slight-----	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey, wetness.
Nahatche: Na-----	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Fair: wetness.
Ozan: Oa-----	Severe: wetness, percs slowly.	Slight-----	Severe: wetness.	Severe: wetness.	Poor: wetness.
<sup>1</sup> On: Ozan part-----  Urban land part.	Severe: wetness, percs slowly.	Slight-----	Severe: wetness.	Severe: wetness.	Poor: wetness.

See footnotes at end of table.

TABLE 18.--SOIL AND WATER FEATURES

[ Absence of an entry indicates the feature is not a concern. The symbol < means less than; > means greater than]

Soil name and map symbol	Hydro-logic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
Addicks:					Ft		
Ad-----	D	None-----	---	---	1.0-2.5	Apparent	Jan-Feb
<sup>1</sup> Ak:							
Addicks part----	D	None-----	---	---	1.0-2.5	Apparent	Jan-Feb
Urban land part.							
Aldine:							
Am-----	D	None-----	---	---	1.5-2.5	Perched	Nov-May
<sup>1</sup> An:							
Aldine part----	D	None-----	---	---	1.5-2.5	Perched	Nov-May
Urban land part.							
Aris:							
Ap-----	D	None-----	---	---	0-2.0	Perched	Nov-Mar
<sup>1</sup> Ar:							
Aris part-----	D	None-----	---	---	0-2.0	Perched	Nov-Mar
Gessner part----	B/D	None-----	---	---	0-2.0	Apparent	Nov-May
<sup>1</sup> As:							
Aris part-----	D	None-----	---	---	0-2.0	Perched	Nov-Mar
Urban land part.							
o:							
-----	C	None-----	---	---	1.5-2.5	Perched	Nov-Feb
Beaumont:							
Ba-----	D	Rare-----	---	---	0-2.0	Apparent	Nov-Mar
<sup>1</sup> Bc:							
Beaumont part----	D	Rare-----	---	---	0-2.0	Apparent	Nov-Mar
Urban land part.							
Bernard:							
Bd-----	D	None-----	---	---	0-3.0	Apparent	Dec-Feb
<sup>1</sup> Be:							
Bernard part----	D	None-----	---	---	0-3.0	Apparent	Dec-Feb
Edna part-----	D	None-----	---	---	0-1.5	Perched	Dec-Mar
<sup>1</sup> Bg:							
Bernard part----	D	None-----	---	---	0-3.0	Apparent	Dec-Feb
Urban land part.							
Bissonnet:							
Bn-----	D	None-----	---	---	2.0-3.5	Perched	Nov-Feb
Boy:							
Bo-----	B	None-----	---	---	3.5-5.5	Perched	Nov-Feb
Clodine:							
Cd-----	D	None-----	---	---	0-2.5	Apparent	Dec-Mar
<sup>1</sup> Ce:							
Clodine part----	D	None-----	---	---	0-2.5	Apparent	Dec-Mar
Urban land part.							

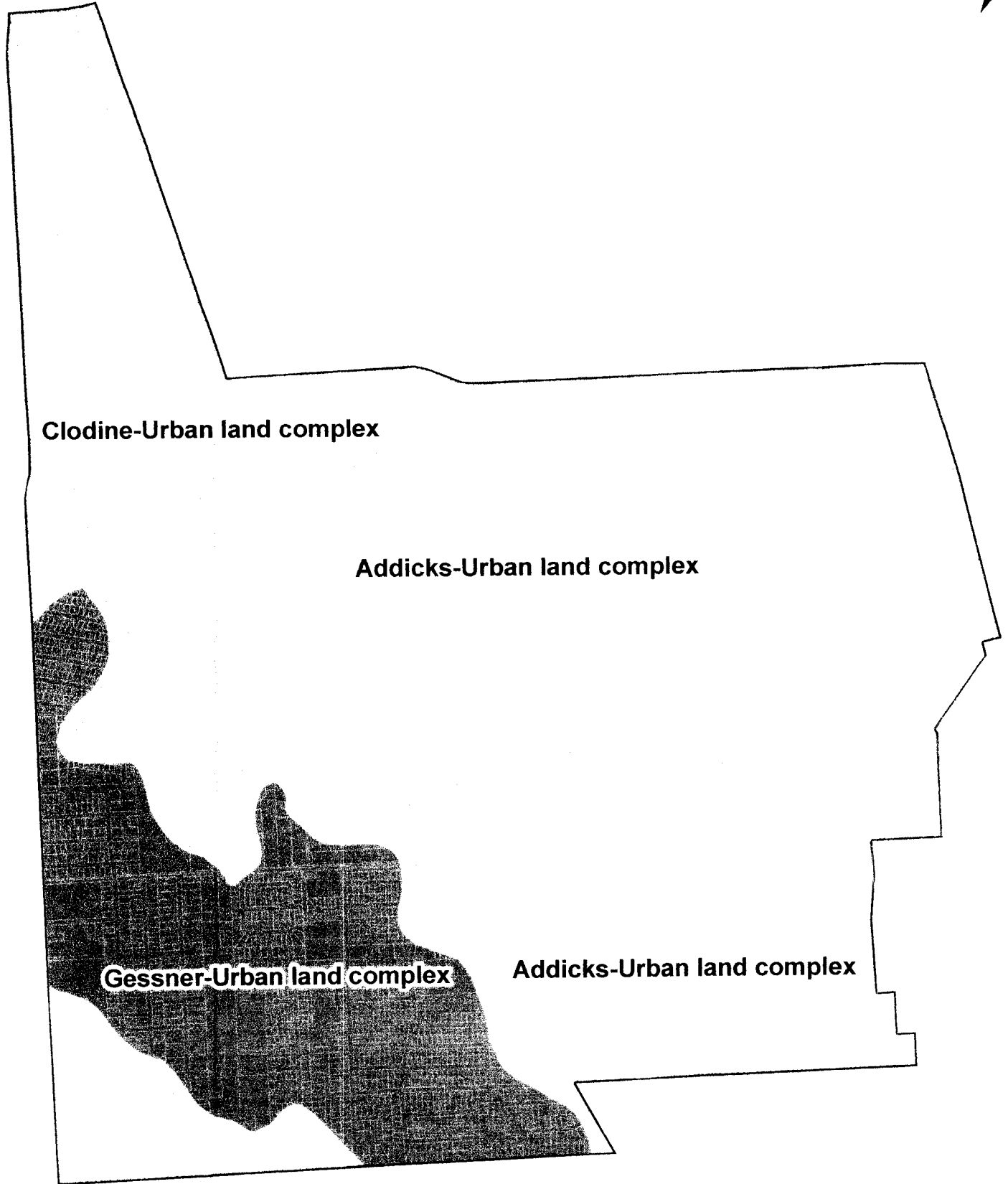
See footnotes at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
Edna: Ed-----	D	None-----	---	---	<u>Ft</u> 0-1.5	Perched	Dec-Mar
Gessner: Ge, <sup>1</sup> Gs-----	B/D	Common-----	Long-----	Sep-Jun	0-2.0	Apparent	Nov-May
<sup>1</sup> Gu: Gessner part-----	B/D	Common-----	Long-----	Sep-Jun	0-2.0	Apparent	Nov-May
Urban land part.							
Harris: Ha-----	D	Common-----	Long-----	Sep-Jun	0-4.0	Apparent	Sep-Jun
Hatliff: Hf-----	C	Frequent-----	Brief-----	Nov-May	0-2.0	Apparent	Nov-Mar
Hockley: HoA, HoB-----	C	None-----	---	---	3.5-5.0	Perched	Dec-Mar
Ijam: Is-----	D	Rare-----	Very brief-----	Apr-Oct	0-3.0	Apparent	Sep-May
Kaman: Ka-----	D	Common-----	Long-----	Nov-Jun	0-2.5	Apparent	Sep-Jul
Katy: Kf-----	D	None-----	---	---	0-2.5	Perched	Dec-Jan
Kenney: Kn-----	A	None-----	---	---	>6.0	---	---
<sup>1</sup> Ku: Kenney part-----	A	None-----	---	---	>6.0	---	---
Urban land part.							
Lake Charles: LcA, LcB-----	D	None-----	---	---	0-2.0	Apparent	Dec-Feb
<sup>1</sup> Lu: Lake Charles part-----	D	None-----	---	---	0-2.0	Apparent	Dec-Feb
Urban land part.							
Midland: Md-----	D	None-----	---	---	0.5-3.0	Apparent	Dec-Apr
<sup>1</sup> Mu: Midland part-----	D	None-----	---	---	0.5-3.0	Apparent	Dec-Apr
Urban land part.							
Nahatche: Na-----	C	Frequent-----	Brief to long	Nov-May	0-1.5	Apparent	Nov-May
Ozan: Oa-----	D	Common-----	Long-----	Sep-Jun	1.0-2.5	Perched	Dec-May
<sup>1</sup> On: Ozan part-----	D	Common-----	Long-----	Sep-Jun	1.0-2.5	Perched	Dec-May
Urban land part.							
Segno: SeA, SeB-----	C	None-----	---	---	2.0-3.0	Perched	Dec-Apr
Urban land: Ur.							

See footnotes at end of table.

# Airline I.D. Soil Map





**Airline**  
Improvement District

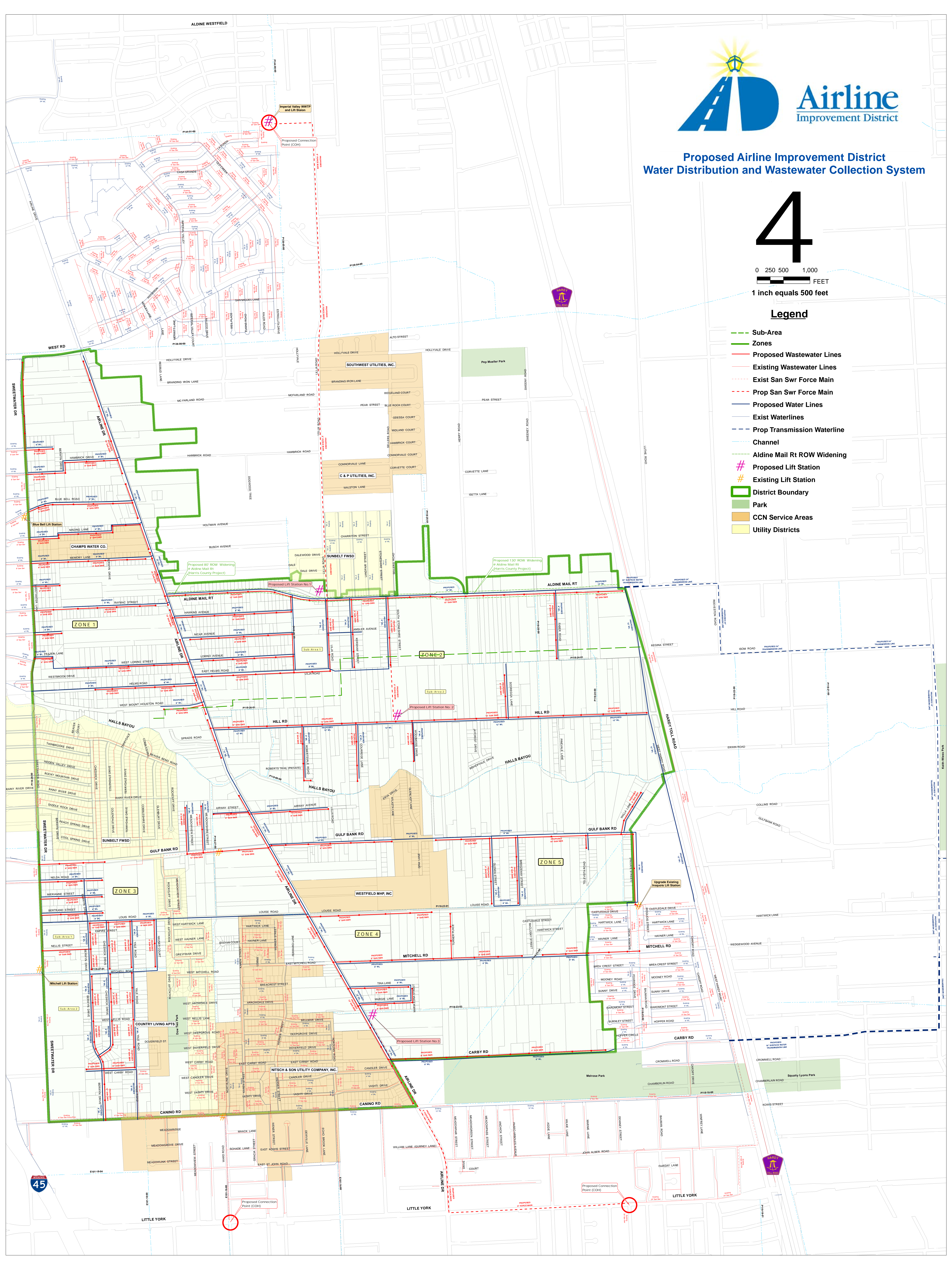
### Proposed Airline Improvement District Water Distribution and Wastewater Collection System

# 4

0 250 500 1,000  
FEET  
1 inch equals 500 feet

#### Legend

- Sub-Area
- Zones
- Proposed Wastewater Lines
- Existing Wastewater Lines
- Exist San Swr Force Main
- Prop San Swr Force Main
- Proposed Water Lines
- Exist Waterlines
- Prop Transmission Waterline
- Channel
- Aldine Mail Rt ROW Widening
- Proposed Lift Station
- Existing Lift Station
- District Boundary
- Park
- CCN Service Areas
- Utility Districts



**THE AIRLINE IMPROVEMENT DISTRICT'S**  
**TRANSCRIPT FROM ITS FIRST PUBLIC MEETING AT**  
**CARROLL ACADEMY, 423 WEST GULF BANK,**  
**FROM 7:00 TO 8:30 P.M., JUNE 28, 2007**

Airline Improvement District Board Members in attendance:

John Martin, Board President

Randy Sim, Board Vice-President

Glenn Nitsch, Board Member

Zera Presley, Board Member

Brian Rego, Board Member

Ken Sifford, Board Member

1. Welcome by Teri Koerth

On behalf of the Airline Improvement District, I would like to welcome you to the first of three meetings we will have regarding a water and wastewater needs assessment and feasibility study.

This study has been made possible through funding provided by:

The Airline Improvement District

The Texas Water Development Board

In kind services from Harris County and from the law firm of Bracewell & Giuliani, and assistance from State Representative Kevin Bailey's Office.

The engineering firm that will be conducting the study is McDonough Engineering Corporation.

If you would, please sign-in on one of the sheets provided.

I would first like to introduce you to some of the Airline Improvement District Board Members and other members of the panel and tell you a little about the District. Introductions were given.

The Airline Improvement District was created by House Bill #1458 authored by State Representative Kevin Bailey and took effect June 17, 2005.

The District was a culmination of volunteer hours by residents as well as time from State Representatives Kevin Bailey and his office and help from the Harris County Economic Development Department.

Since its inception, the District has been busy with many different projects, the bulk of which relate to public safety, recreation and economic development.

The Airline Improvement District in conjunction with its partners wanted to complete this study to obtain a clear picture of the state of water and sanitary sewer in the District.

Again, this is the first of three meetings regarding the study.

I would like to introduce you to Melissa Hamous with the Harris County Public Infrastructure Department.

1. Overview of the study by Melissa Hamous.
  - a. Purpose of the study.
    - i. Gather hard evidence to determine if there is a problem. If there is a problem, what is the exact nature of the problem and where are the problem areas.
    - ii. Identify possible solutions.
  - b. What information the study will gather.
    - i. Record data
    - ii. Field data
    - iii. Information and feedback from potential service providers
  - c. What the results might show.
    - i. Unserved areas which have issues that may be candidates for public systems
    - ii. Unserved areas which have issues that may be addressed with water conservation and proper OSSF maintenance
    - iii. Unserved areas which have lots large enough to support private systems
    - iv. Unserved areas which have no issues
  - d. What the study will be used for.
    - i. Create a comprehensive plan of action for correcting problems  
Supporting documentation for grant applications
2. Open the floor for public comment, directed by Teri Koerth.
  - a. Public comments need to be limited to three minutes in length and need to be relevant to the study or to drinking water and sanitary sewer services within the Airline Improvement District area only.
3.
  - a. **Question:** What areas are included within the Airline Improvement District's boundaries?

**Answer:** M. Hamous: Points the borders out on the map.

- b. **Question:** Are the Airline Improvement District's boundaries on both sides of Aldine Mail?

**Answer:** M. Hamous: The District includes everything addressed on Aldine Mail.

- c. **Question:** What is the cost to hook up to they system?

**Answer:** M. Hamous: The rates will be affordable for the community. If the study shows that a sewer and waste water system is needed in the area, AID will apply for grant funds. If grant funds are used the money doesn't have to be paid back.

- d. **Question:** Would there be a tax increase?

**Answer:** J Martin: No tax increase.

- e. **Question:** What is the process to hook up to the system?

**Answer:** M Hamous: We would use the grant funds to hook residents up to the system at no cost. Only those residents who want to be hooked up will be hooked up. You don't have to hook up to the system if you don't want to. Residents who hook up to the system will have to pay a monthly fee and may require an initial deposit for service.

- f. **Question:** Will it be costly for the elderly and fixed budget residents to hook up to the system?

**Answer:** M Hamous: No. The hook up costs will be paid.

- g. **Question:** How much will the sewer bill be?

**Answer:** M Hamous: Sewer, right now, is about \$15.96 per month. Water might be \$20-39 per month. Note there will be no annexation by the City of Houston. We will work with the City to obtain water and sewer connections.

- h. **Question:** Where is the water going to come from?

**Answer:** M Hamous: This is the reason for the study. We don't know yet.

- i. **Question:** There are some folks who are re-doing their septic systems right now and are being forced to improve their systems. What will happen to there systems?

**Answer:** M Hamous: You will not need to run two systems once you are hooked up to the system. Private systems will be abandoned.

- j. **Question:** Will fire hydrants be hooked up to the system?

**Answer:** M Hamous: Yes.

- k. **Question:** Will commercial businesses be able to hook up to the system?

**Answer:** M Hamous: Yes. Commercial businesses will have to pay to hook up the system. Certain funding sources limit the use of the funds to residential only.



1. **Question:** Are there other granting sources that allow for commercial hook ups?  
**Answer:** M Hamous: Typically, the way it is done, it is only for residential.
  - m. **Question:** Our business is residential— mobile home park—can we hook in for free?  
**Answer:** M Hamous: We can work with that.
  - n. **Question:** What is Harris County looking for in the study?  
**Answer:** M Hamous: Failing septic tanks, raw sewage, ponding, plants that are associated with raw sewage.
  - o. **Question:** What would qualify or disqualify you from the study?  
**Answer:** M Hamous: We are looking to see if the Airline area is ripe for a public system. There are no qualifying or disqualifying criteria.
3. Closing by Teri Koerth.
- a. Reiterated thanks to those who attended
  - b. Mentioned again that this is the first of three meetings regarding the study and invited them to attend the other two, and to encourage their neighbors to attend.
  - c. Reviewed that other topics relating to the District could be addressed by calling the District or by reviewing its website at [www.AirlineDistrict.org](http://www.AirlineDistrict.org). Invited those that would like to hear more about projects the District is working on to attend the next Airline Improvement District Board meeting which would be held on Thursday, July 26<sup>th</sup> at 11:30 at the Holy Trinity Lutheran Church located at 7822 Northline Drive, Houston, Texas 77037.

We appreciate you coming out to hear about this study and welcome you to attend the following meetings to hear updates as they are scheduled.

The Airline Improvement District's  
Transcript from its second public meeting  
at Carroll Academy, 423 W. Gulf Bank  
From 6:30 PM to 8:00 PM, January 10, 2008

Welcome by Teri Koerth – Executive Director of the Airline Improvement District

Good evening everyone, I see many familiar faces around the room, but I also see some who I have not met. My name is Teri Koerth and I am Executive Director of the Airline Improvement District.

On behalf of the District and all of the entities involved in this project, I would like to welcome you to the second of three meetings we will have regarding the water and wastewater feasibility study that is currently being conducted in our area.

We really appreciate everybody taking the time out of their busy schedules to come out and hear more about this process.

If you would, please make sure that you have signed-in on one of the sheets that have been provided.

This water and sewer feasibility study has been made possible because of funding provided by:

- The Texas Water Development Board
- The Airline Improvement District
- In kind services from Harris County as well as in kind services from the law firm of Bracewell & Giuliani
- And last but not least, from assistance through State Representative Kevin Bailey and his office.
- Representative Bailey is the author of the bill that created our District and was one of the key components that helped us obtain a grant from the Texas Water Development Board who is funding a substantial portion of this study. Representative Bailey has had a long standing mission to bring water and sewer to North Houston.
- With that being said, I would like to introduce you to Representative Bailey.

Thank you for coming out tonight, I am State Representative Kevin Bailey. I have been the Representative for this area for a lot of years. One of the reasons I continue is because of the water and sewer issues. I got started on water and sewer issues back in 1991 when we had 119 neighborhoods in the City of Houston that had been annexed but had no water and sewer. We got a bill passed to force the City to build water and sewer in those neighborhoods. Then some people came to me and said what about the county? We have the same problem in the county. We have today, at least 50,000 homes in Harris County without public water and sewer. Sometimes it is not a bad deal, but some areas as you know where you have a lot of congestion, have septic tanks that leak and water wells which are shallow and polluted. The health department has said in some areas the people are literally drinking their own sewage if they drink their own water. We began trying to find a way to solve this problem in the County. I passed a couple of bills that created the East Aldine Management District east of Hardy and then we did the Airline Improvement District, both of those were

passed by the state legislature to try to make improvements in the community. We have contract deputies, street lights on Airline, all kinds of things can be funded by these Improvement Districts. We are trying to find a way to bring clean water and workable septic systems to those areas that need it. We have had a lot of success. We did a feasibility study several years ago east of Hardy in the East Aldine District and we have had tremendous cooperation from Harris County. They have started doing planning and actually have started construction in a neighborhood called Taskfield and North Houston Heights has all of the design work done and is going to be moving forward. Now we are doing a feasibility study on this side to try and find a way to bring water and sewer to those areas that need it. Hopefully this is just the beginning. We want to hear from those areas that have the most need. We are going to keep working to get funding for these neighborhoods that need water and sewer service. This is something that has been a top priority of mine since I have been in office and will continue to be a priority.

Thank you Representative Bailey, we appreciate you coming out to be a part of our meeting.

Next, I would like to introduce you to some of the Airline Improvement District Board Members as well as other members of the panel that are present.

Mr. John Martin, Airline Improvement District Board President

Mr. Randy Sim, Airline Improvement District Board Vice-President

Mr. Glenn Nitsch, Airline Improvement District Board Member

Ms. Zera Presley, Airline Improvement District Board Member

Mr. Brian Rego, Airline Improvement District Board Member

Ms. Alicia Solis, Airline Improvement District Board Member

Ms. Arlene Nichols, District Director - State Representative Kevin Bailey

Mr. Ranney McDonough, Principal - McDonough Engineering Corporation

Mr. Francis Chin - Bracewell & Giuliani, LLP

Ms. Chavonne Slovak - Engineering Coordinator - Harris County Precinct One

Ms. Marilyn Christian, Water, Solid Waste/Indoor Program, Administrator - Harris County Environmental Public Health Division

Lastly I would like to introduce Ms. Melissa Hamous, Sr. Project Coordinator, with Harris County Public Infrastructure Department, Planning and Operations Division.

Melissa is going to give you an overview of the study.

1. Overview of the study by Melissa Hamous.

- a. Purpose of the study – This is a needs assessment and feasibility study to determine scientifically exactly what the needs for water and sewer are in the Airline Community. Also, to see how we can meet that need and get some money to get some infrastructure in the ground.
- b. What information the study will gather -Who is in the community? What kind of property is in the community? Is it residential, is it commercial? Are there a lot of vacant lots? How large are the tracts? Are they small, which would not properly support a private septic system and water well? What areas do we have that are

already served? To see if we have areas that may have some issues with the existing septic systems, like raw sewage ponding or going into ditches. Then we will come up with a conceptual design, were there will be a layout of water and sewer lines that could be put in the ground in the future.

2. Overview of what has been done so far by Melissa Hamous

- a. Collected data from Harris County, TCEQ, City of Houston, Census, Houston – Galveston Area Council
- b. Performed initial field survey – Harris County Permits drove the entire area and did a windshield survey of every since property in the District.

About 12% of the properties that have private sewer systems of some kind have potential problems. Which is about 1 in every 8 homes that have private sewer system.

We have reviewed historic violations. Between 1991-2007, 477 individual violations within the Airline Improvement District boundaries have been noted by Harris County, which means that about ¼ of the properties that have a private system have had an issue.

3. Next steps by Melissa Hamous

- a. Study initial field survey data and select comprehensive study properties/areas
- b. Perform comprehensive surveys
- c. Study comp survey data, refine all data, make corrections to data
- d. Determine areas of need, prioritize, create 10, 20 & 30 year service plans
- e. Hold final meeting to review final draft of study

4. Open the floor for Q&A by Melissa Hamous.

- a. **Question:** You reported that 12% of properties during the windshield survey had issues. Aren't failure rates closer to 50% when it rains?

**Answer:** M. Hamous - When we do these types of surveys we like to do them in dry weather, simply because it is difficult to tell if you have a problem when everything is wet.

- b. **Question:** You gave an amount that you surveyed or checked on, what was that?

**Answer:** M. Hamous – we have a database where we keep information on violations that have been issued from the County starting from 1991-2007, there were 477.

- c. **Question:** I have noticed that they are surveying Aldine Mail Route, are they going to widen that in the next few years?

**Answer:** T. Koerth – The widening of Aldine Mail is currently scheduled for September 2009 by Harris County.

- d. **Question:** Where are the lines typically laid? Under the pavement?

**Answer:** M. Hamous – The lines are typically put in the right of way. It is a last report, to put lines under the roadway because they are difficult to maintain. Typically the sewer line is one side of the road and the water is on the other side in the right of way.

e. **Question:** What is the cost to hook-up to new systems?

**Answer:** M. Hamous - Most of the grants that we work with allow us to pay all of the costs associated with hooking your house up to the new water and/or sewer line. It also typically includes abandoning the septic tank and water well. The service itself is not free but the connection which might normally cost between \$1,000-\$3,000 would be free because you would be included in the project itself.

f. **Question:** What would the monthly rate be?

**Answer:** M. Hamous – It would depend on who was providing the service because different companies have different rates. We have quite a few areas that could potentially get serviced from the City of Houston. The City's water and sewer rate (based on usage) for an average 3 bedroom 2 bath house which uses 9,000 gallons per month for water is approximately \$60.00 a month.

g. **Question:** Will we be in a MUD District?

**Answer:** M. Hamous - There is not going to be a MUD District established.

h. **Question:** Will the city annex us when we get water lines in?

**Answer:** A. Nichols – In order for the City of Houston to annex the area, they would have to work out an agreement with the Improvement District. They are not currently annexing residential communities but they are working out strategic partnership with commercial properties along major corridors. Unless you have home values in excess of \$250,000 it is not going to profit the City.

i. **Question:** Was the 12% based on soil conditions?

**Answer:** M. Hamous – We have a lot of clay in these soils so it does not allow for liquids to absorb in the ground like they need to when you have a septic tank. That is one of the reasons why we have such a high failure rate and we know that.

j. **Question:** Why is it a bad idea for the City to annex?

**Answer:** M. Hamous – that is something which your community would have to decide.

k. **Question:** What is the realistic timeframe to ever put water and sewer in the ground?

**Answer:** M. Hamous - Harris County does not pay for water and sewer systems. We have to go get grant money to pay for infrastructure and it will depend on our ability to receive those grants. As an example, the District to the East prepared a similar study that was finalized in 2003 and they just finished up their first sewer project in December 2007.

l. **Question:** Will any improvements include fire hydrants?

**Answer:** M. Hamous – Yes, whenever we design for water systems nowadays we design for fire protection as well.

- m. **Question**: Will trash be a part of this service?  
**Answer**: M. Hamous – No.
- n. **Question**: Is drainage for the area being studied?  
**Answer**: M. Hamous – That is not a part of this feasibility study.
- o. **Question**: Where will the water come from?  
**Answer**: M. Hamous - It will depend on what entity will provide the water.

Thank you Melissa for taking us through the details of the project.

We really appreciate the community coming out to hear about this study and welcome you to attend the next meetings to hear updates as they are scheduled.

Other topics relating to the District can be addressed by calling the District at 281 757-1788 or by reviewing its website at [www.AirlineDistrict.org](http://www.AirlineDistrict.org). Those that would like to hear more about projects the District is working on are welcome to attend the next Board Meeting which will be held on Thursday, January 31st, at 11:30 at the Little York Fire Department located at 10410 Airline Drive.

Again, thank you for coming out and we look forward to seeing you at the next meeting.

The Airline Improvement District's TWDB Funded Water  
And Wastewater Needs Assessment and Feasibility Study  
Transcript from its third public meeting  
At Carroll Academy, 423 W. Gulf Bank  
From 6:30 PM to 8:00 PM, May 8, 2008

**Reps:** Airline Improvement District

Ms. Teri Koerth, Executive Director

Ms. Alicia Solis, Board Member

State Representative Kevin Bailey

Ms. Arlene Nichols, District Director

McDonough Engineering Corporation

Mr. Ranney McDonough, Principal

Mr. David Evans, Sr. Project Manager

Bracewell & Giuliani, LLP

Mr. Francis Chin, Attorney

Harris County

Ms. Chavonne Slovak, Engineering Coordinator, Precinct One

Mr. Asdrubal Gutierrez, Precinct One assisting us with Spanish/English translation

Ms. Melissa Hamous, Sr. Project Coordinator, Public Infrastructure Department, Planning and Operations Division

Ms. Marilyn Christian, Water, Solid Waste/Indoor Prog, Administrator, Environmental Public Health Division

1. Welcome by Teri Koerth.
2. Overview of the study by Melissa Hamous.
  - a. Purpose of the study & what it will be used for.
    - i. To give us a vehicle to try and obtain funding for infrastructure projects from the federal, state and local side
    - ii. Even though this is a 30 year plan, funds will be sought immediately
    - iii. We are currently looking for funding as we speak
  - b. What information the study gathered.
    - i. Research: Paper information such as historical violations from septic tanks, demographic information such as how large are the properties, what kind of properties do we have out here, are they residential, commercial, vacant, and improved?

- ii. Inspections: We took a look at all of the properties in the district, primarily looking for septic tank problems. We did this during dry weather conditions. Septic tanks do not operate well when they are inundated with water. The soils in Houston are not very good for on site sewer facilities.
- 3. Review of what has been done so far by Melissa Hamous
  - a. Collected data from HC, TCEQ, COH, Census
    - i. Initial research of historic violation records from 1991 thru 2007 indicate 477 reported private sewer violations in study area
  - b. Performed initial field survey
    - i. 3345 of 3421 properties surveyed. Those not surveyed vacant or not located.
    - ii. 1496 OSSFs, 1306 water wells
    - iii. Violation overview
      - 1. Panhandle: 13% current, 29% cumulative (current plus past violations), Bounds: West, Sweetwater, Airline, Halls Bayou
      - 2. Northeast: 10% current, 26% cumulative, Bounds: Halls Bayou, east district boundary, north district boundary, east side of Airline
      - 3. Southwest: 8% current, 20% cumulative, Bounds: Sweetwater, Canino, Sunbelt service areas
      - 4. Southeast: 2% current, 18% cumulative, Bounds: Halls Bayou, east district boundary, south district boundary, east side of Airline
  - c. Performed comprehensive surveys
    - i. 15 properties all over district were done. We probed the ground and found out exactly where the onsite sewer facility was. Where the field lines were. We measured the distance between the system and the closest water well both on the property and on neighboring properties. We did a review to see if the system that is currently on the property is accurately sized and operating well. The vast majority were way too close to a water well somewhere.
    - ii. Four out of 15 showed problem OSSF
    - iii. 11 of 13 which also had wells showed too close to OSSF
  - d. Tested residential water well water
    - i. Out of 21 samples pulled there was no E. coli, a common coliform bacteria in human and animal waste



- ii. Very low nitrates, another marker for human/animal waste
  - iii. We did not test for chemical or heavy metal contaminants as this was outside the scope of the study
- e. Prioritized areas based on
- i. On site septic site problems, both historic and current
  - ii. Lot size, type and use of the property. The size of the property is relevant because the smaller the property the less chance there is of having enough room between the septic tank and the water well.
  - iii. Panhandle and residential area at southeast corner Airline and Aldine Mail probably 1<sup>st</sup> priority
  - iv. SW corner of district 2<sup>nd</sup> priority
  - v. Both the 1<sup>st</sup> and 2<sup>nd</sup> priority areas have predominately smaller lots and are also very close to the City of Houston water and sewer lines
- f. Discussed service provision with City of Houston and Sunbelt
- i. Sunbelt willing to be considered, but less overall ability to serve due to smaller treatment capacities
  - ii. City of Houston surrounds the District on 2 ½ sides. They are willing and have a larger capacity. The District will be pursuing an inter-local agreement with the City of Houston which sets forth some guidelines where service might be provided to the entire unserved area of the District. The City of Houston's current rates are posted on the wall. Melissa explained that water wells and septic systems also have costs associated with them for service and electricity.
- g. We are well underway preparing a conceptual layout for providing water and sewer service. Melissa discussed how they may be laid out in order to serve the area. There is a map on the wall showing the conceptual layout as well as maps that are magnified for each service zone.
- i. Ranney McDonough, McDonough Engineering Corporation (civil engineer in charge of the project) – step one was research - we have enlisted the help of various agencies to get various maps together, some of them were electronic, some of them were hand drawn. We put all of these together to form the base map that you see here. Step two –design phase. What drives design? Topography, soils. The main thing that has driven this design in this study is points of service that are available for connection.
  - ii. Zone 1 - has direct access to City of Houston wastewater collection lines

- iii. Zone 2 – nearest connection point is North of the Airline Improvement District
- iv. Zone 3 - has direct access to City of Houston wastewater collection lines
- v. Zone 4 – connection point is south of Canino and the Airline Improvement District
- vi. Zone 5 – connection point is south of Canino and the Airline Improvement District

**Question:** There was a Municipal Utility District that was defeated by public vote. My question is that some of the homes in the area are so far apart that to put sewer systems in there is going to be one gigantic financial mess. When houses are 2000 – 3000 feet apart to run a sewer line in there is not going to be cost efficient.

**Answer** – M. Hamous – that will actually be addressed in the study. In some cases we do have to put lines going across larger lots.

- 4. Next steps by Melissa Hamous
  - a. Finalize first draft of study and present to TWDB May 31, 2008
  - b. Receive TWDB comment and revise study accordingly
  - c. Submit final to TWDB by July 31, 2008
  - d. First, though, we need your input, comments, suggestions and recommendations.

**\*At this point the tape became inaudible due to equipment failure and no back-up notes are available, therefore the remainder of the meeting could not be transcribed.**

## **PUBLIC MEETING NOTICE**

**Where:** Carroll Academy 423 West Gulfbank, Houston, Texas 77037  
(located between Berwyn Drive and Cheswick Drive)

**Date:** Thursday, June 28, 2007

**Time:** 7 p.m. to 8:30 p.m.

**Subject:** The Airline Improvement District is having a public meeting to inform the Airline community of the commencement of a water and wastewater needs assessment and feasibility planning study regarding the possible development and operation of public water and sanitary sewer systems to serve presently un-served areas of the Airline Improvement District.

## **AVISO DE REUNIÓN PÚBLICO**

**Donde:** Carroll Academy 423 West Gulfbank, Houston, Texas 77037  
(localizado entre Berwyn Drive y Cheswick Drive)

**Fecha:** Jueves, 28 de Junio 2007

**Hora:** 7 p.m. – 8:30 p.m.

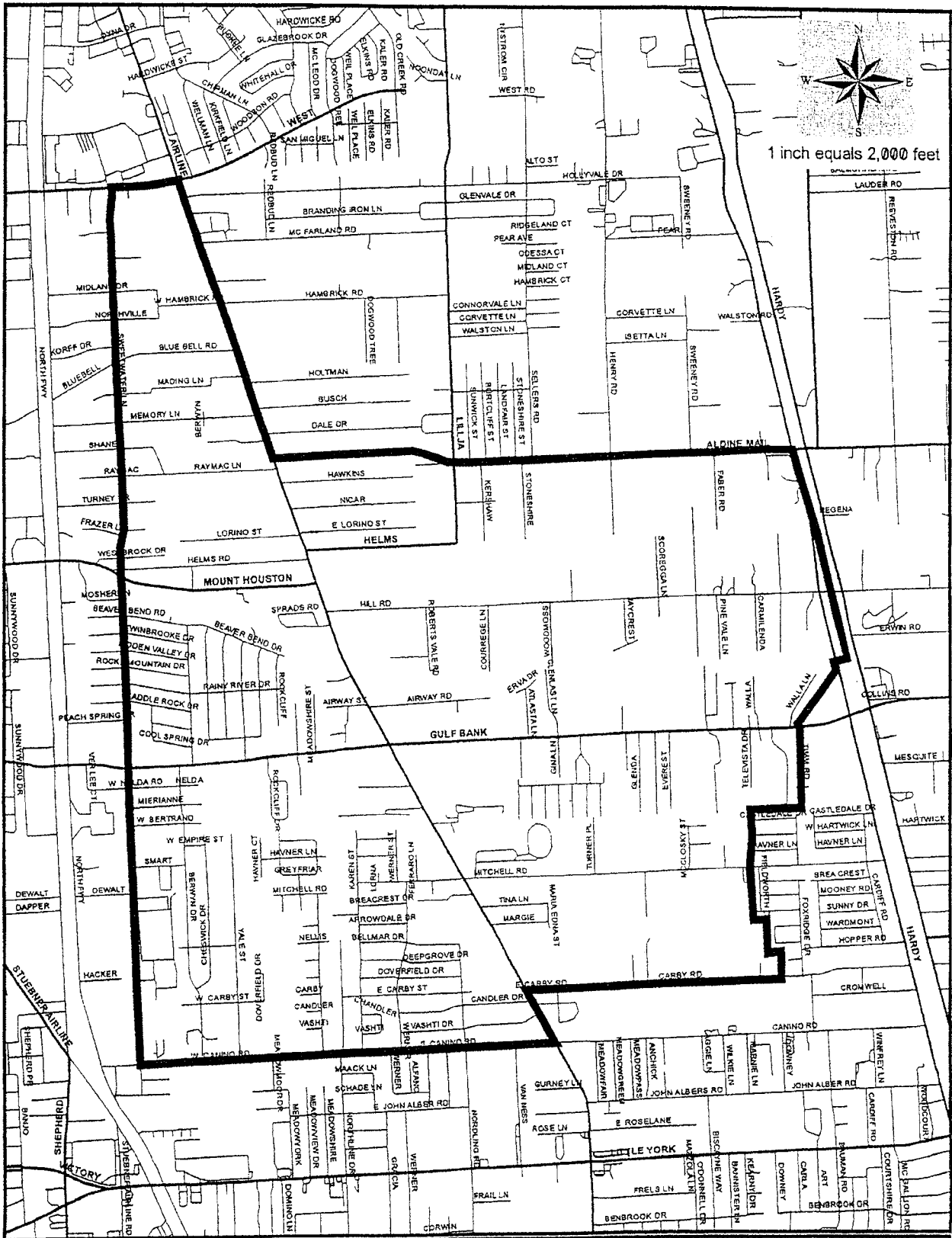
**Tema:** El distrito de la mejora de la línea aérea está teniendo una reunión pública para informar a la comunidad de la línea aérea del comienzo de un estudio de las necesidades de agua y aguas residuales y un estudio de viabilidad con respecto al posible desarrollo y operación de las sistemas de agua pública y de alcantarilla sanitario que servirá a las áreas del distrito de la mejora de la línea aérea que de momento no tienen servicio.



# Airline Improvement District

For Additional Information Contact:  
Para mas informacion, por favor llama:

P.O. Box 38460  
Houston, TX 77238-8460  
(281) 757-1788  
airlinedistrict.org



Proposed Airline Improvement District  
Regional Water Supply and Wastewater Facilities Planning Study Area

## **PUBLIC MEETING NOTICE**

**Where:** Carroll Academy, 423 West Gulfbank, Houston, Texas 77037 (located between Sweetwater Lane and Airline Drive)

**Date:** Thursday, January 10, 2008

**Time:** 6:30 p.m. - 8:00 p.m.

**Subject:** Airline Improvement District Water and Sewer Study Meeting

The Airline Improvement District is having its second public meeting to inform the Airline community of the progress on its Water and Wastewater Needs Assessment and Feasibility Study. This study concerns the possible development and operation of public water and sanitary sewer systems in un-served areas of the Airline Improvement District. See the map on the back of this notice to see if your home or business is within the study area.

## **AVISO DE REUNIÓN PÚBLICO**

**Donde:** Carroll Academy, 423 West Gulfbank, Houston, Texas 77037 (localizado entre Sweetwater Lane y Airline Drive)

**Fecha:** Jueves, 10 de Enero 2008

**Hora:** 6:30 p.m. – 8:00 p.m.

**Tema:** Agua de Distrito de Mejora de Línea aérea y Reunión de Estudio de Alcantarilla

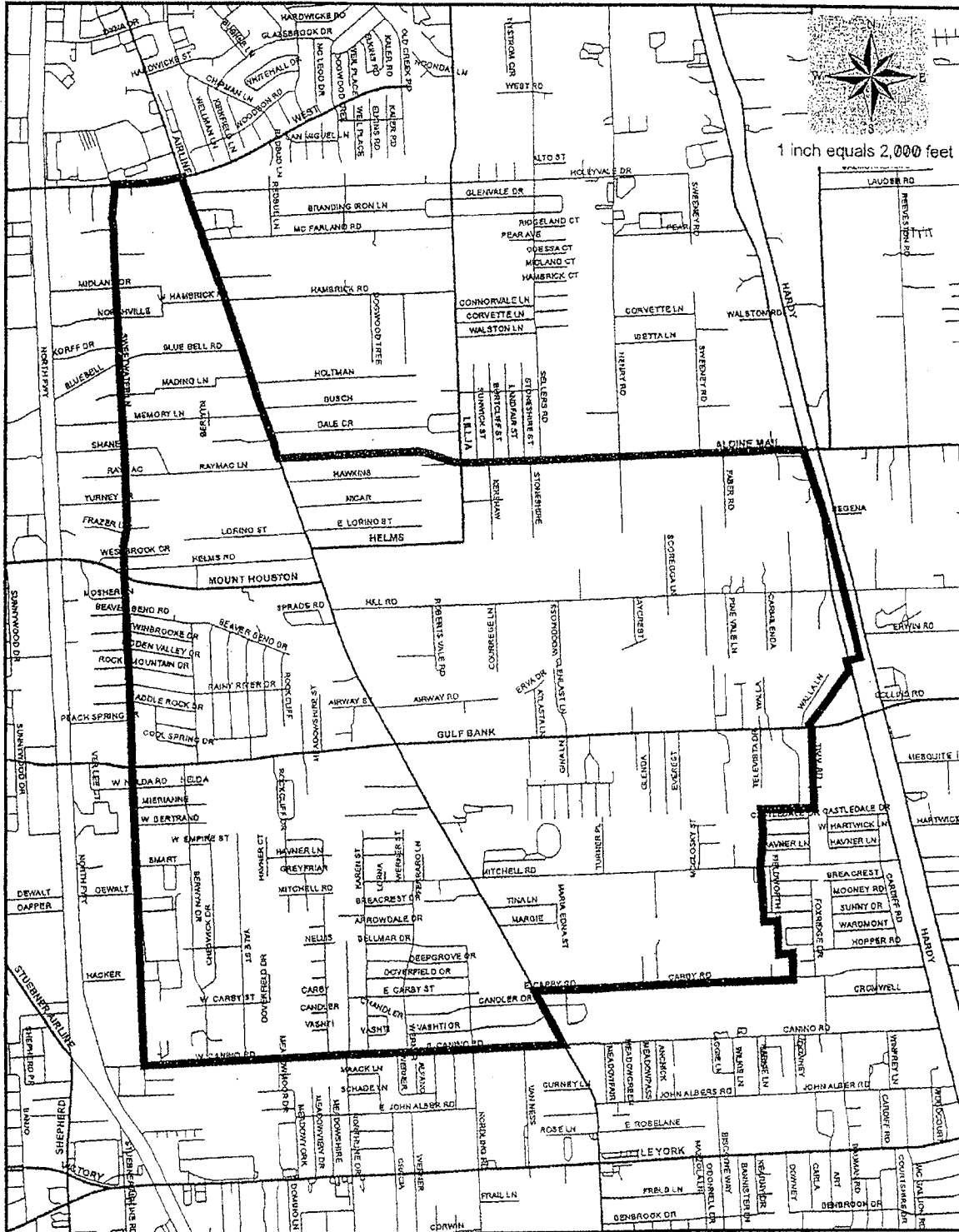
El distrito de la mejora de la línea aérea está teniendo una reunión pública para informar a la comunidad de la línea aérea del comienzo de un estudio de las necesidades de agua y aguas residuales y un estudio de viabilidad con respecto al posible desarrollo y operación de las sistemas de agua pública y de alcantarilla sanitario que servirá a las áreas del distrito de la mejora de la línea aérea que de momento no tienen servicio. Ver el mapa atrás de este aviso para ver si su casa o negocio está dentro del estudio de esta área.



**Airline**  
Improvement District

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Para mas informacion, por favor llama:

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Houston, TX 77238-8460  
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Proposed Airline Improvement District  
Regional Water Supply and Wastewater Facilities Planning Study Area

## **PUBLIC MEETING NOTICE**

**Where:** Carroll Academy, 423 West Gulfbank, Houston, Texas 77037 (located between Sweetwater Lane and Airline Drive)

**Date:** Thursday, May 8, 2008

**Time:** 6:30 p.m. - 8:00 p.m.

**Subject:** Airline Improvement District Water and Sewer Study Meeting

The Airline Improvement District is having its third public meeting to inform the Airline community of the progress on its Water and Wastewater Needs Assessment and Feasibility Study. This study concerns the possible development and operation of public water and sanitary sewer systems in un-served areas of the Airline Improvement District. See the map on the back of this notice to see if your home or business is within the study area.

## **AVISO DE REUNIÓN PÚBLICO**

**Donde:** Carroll Academy, 423 West Gulfbank, Houston, Texas 77037 (localizado entre Sweetwater Lane y Airline Drive)

**Fecha:** Jueves, 8 de Mayo 2008

**Hora:** 6:30 p.m. - 8:00 p.m.

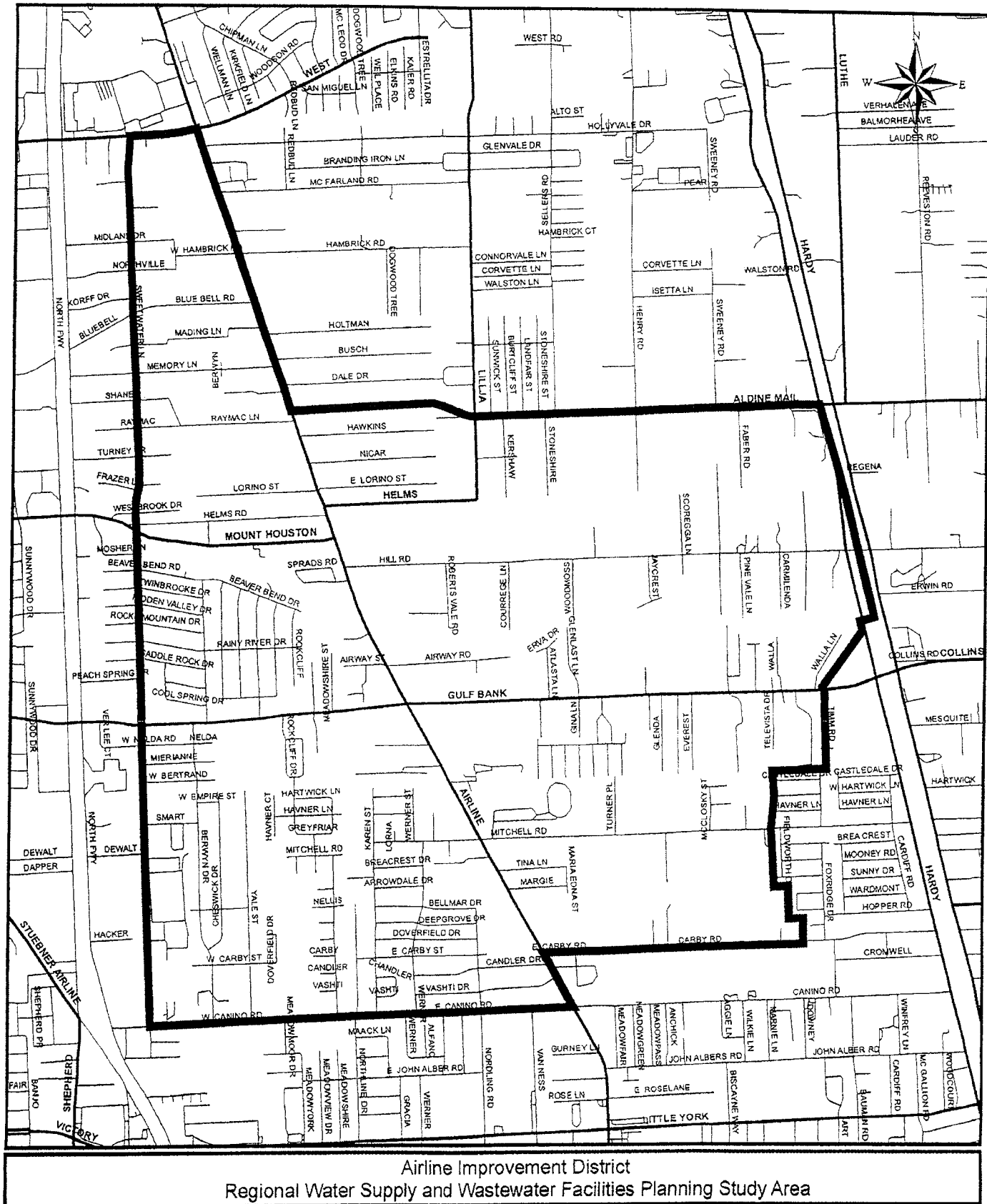
**Tema:** Agua de Distrito de Mejora de Línea aérea y Reunión de Estudio de Alcantarilla

El distrito de la mejora de la línea aérea está teniendo una reunión pública para informar a la comunidad de la línea aérea del comienzo de un estudio de las necesidades de agua y aguas residuales y un estudio de viabilidad con respecto al posible desarrollo y operación de las sistemas de agua pública y de alcantarilla sanitario que servirá a las áreas del distrito de la mejora de la línea aérea que de momento no tienen servicio. Ver el mapa atrás de este aviso para ver si su casa o negocio está dentro del estudio de esta area.



**Airline**  
Improvement District

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(281) 757-1788  
airlinedistrict.org



Airline Improvement District  
Regional Water Supply and Wastewater Facilities Planning Study Area



# Water Well Sampling Report



Consulting Engineers & Scientists

Terracon Consultants, Inc.  
11555 Clay Road, Suite 100  
Houston, Texas 77043  
Phone 713.690.8989  
Fax 713.690.8787  
[www.terracon.com](http://www.terracon.com)

## **WATER WELL SAMPLING**

**AIRLINE IMPROVEMENT DISTRICT  
HOUSTON, HARRIS COUNTY, TEXAS**

**Terracon Project No. 92087191  
April 21, 2008**

*Prepared for:*

**McDonough Engineering Corporation  
5625 Schumacher  
Houston, Texas 77057**

*Prepared by:*

**Terracon**  
Consulting Engineers & Scientists  
**11555 Clay Road, Suite 100  
Houston, Texas 77043**

April 21, 2008

Terracon Consultants, Inc.  
11555 Clay Road, Suite 100  
Houston, Texas 77043  
Phone 713.690.8989  
Fax 713.690.8787  
www.terracon.com

McDonough Engineering Corporation  
5625 Schumacher  
Houston, Texas 77057  
Attn: Mr. Ranney McDonough, P.E.

Telephone: (713) 975-9990  
Fax: (713) 975-0464  
Email: mcdonough@mectx.com

Re: Water Well Sampling  
Airline Improvement District  
Houston, Harris County, Texas  
Terracon Project No. 92087191

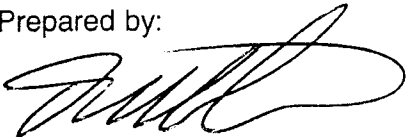
Dear Mr. McDonough:

Terracon is pleased to submit three copies of the Water Well Sampling report for the above referenced site. This investigation was performed in accordance with Terracon's Proposal Number P92-1190E-08 dated March 25, 2008.

We appreciate the opportunity to perform these services for McDonough Engineering Corporation. Please contact either of the undersigned at (713) 690-8989 if you have questions regarding the information provided in the report.

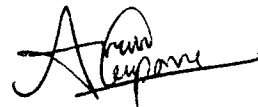
Sincerely,  
**Terracon**

Prepared by:



Thomas R. Martens, P.G.  
Senior Principal

Reviewed by:



Arun Neupane  
Staff Environmental Scientist

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**WATER WELL SAMPLING  
AIRLINE IMPROVEMENT DISTRICT  
HOUSTON, HARRIS COUNTY, TEXAS**

**Terracon Project No. 92087191**

**April 21, 2008**

**1.0 INTRODUCTION**

**1.1 Scope of Work**

Terracon Consultants, Inc. (Terracon) conducted sampling of water wells at selected residences within the Airline Improvement District (AID) in Houston, Harris County, Texas. The sampling was conducted in accordance with Terracon's Proposal No. P92-1190E-08 dated March 25, 2008.

The scope of work for this sampling was based on the request from Harris County. The AID is developed with approximately 3,500 lots or parcels of land, the majority of which have an on-site sewage facility (OSSF) and domestic water well. In several instances, the OSSF and water wells are located within 50 feet of each other, and Harris County is concerned that the water wells have the potential to be impacted from OSSF releases.

The objective of the sampling was to assess the presence of nitrates and Escherichia coli (E. coli) in selected domestic water wells located within the AID.

**1.2 Standard of Care**

Terracon's services were performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time period. Terracon makes no warranties, either express or implied, regarding the findings, conclusions or recommendations. Please note that Terracon does not warrant the work of laboratories, regulatory agencies or other third parties supplying information used in the preparation of the report. These services were performed in accordance with the scope of work agreed with you, our client, as reflected in our proposal.

**1.3 Additional Scope Limitations**

Findings, conclusions and recommendations resulting from these services are based upon information derived from the on-site activities and other services performed under this scope of work; such information is subject to change over time. Certain indicators of the presence of hazardous substances, petroleum products, or other constituents may have been latent, inaccessible, unobservable, nondetectable or not present during these services, and we cannot

represent that the site contains no hazardous substances, toxic materials, petroleum products, or other latent conditions beyond those identified during this sampling.

#### **1.4 Reliance**

This report has been prepared for the exclusive use of McDonough Engineering Corporation and Harris County, and any authorization for use or reliance by any other party (except a governmental entity having jurisdiction over the site) is prohibited without the express written authorization of McDonough Engineering Corporation and Terracon. Any unauthorized distribution or reuse is at the client's sole risk. Notwithstanding the foregoing, reliance by authorized parties will be subject to the terms, conditions and limitations stated in the proposal, report, and Terracon's Agreement for Services. The limitation of liability defined in the terms and conditions is the aggregate limit of Terracon's liability to the client and all relying parties unless otherwise agreed in writing.

## **2.0 FIELD ACTIVITIES**

The sampling event was conducted April 9, 2008. Mr. Arun Neupane of Terracon was present during the field activities to collect samples. Mr. Neupane was escorted by Mr. Nelson L. Durant of Harris County, who communicated with the residents and coordinated access to collect samples.

Harris County provided addresses for 30 residences to be visited for sampling. During the day of the sampling event, Harris County was able to arrange access to 21 of the 30 selected residences. At the 21 accessible residences, Terracon collected water samples from the tap at the wellhead or an exterior tap from a location closest to the wellhead. On average, approximately three to four gallons of water was purged from the tap prior to collecting the sample. The list of sampled water wells is provided on Table 1.

Water samples were collected and placed in laboratory prepared glassware, sealed with custody tape and placed on ice in a cooler which was secured with a custody seal. The sample coolers and completed chain-of-custody forms were relinquished to Accutest's analytical laboratory in Houston, Texas for analyses. The E. Coli samples were subsequently relinquished by Accutest to Envirodyne Laboratories, Inc. analytical laboratory in Houston, Texas for analyses.

## **3.0 LABORATORY ANALYTICAL PROGRAM**

The sampling program consisted of collecting one water sample from each accessible water well for laboratory analyses. The samples were analyzed for total nitrates using EPA method 353.2 and E. coli using method m-ColiBlue 24.

#### 4.0 INVESTIGATION RESULTS AND EVALUATION

The water sample analytical results have been summarized in Table 1. A copy of the analytical reports and chain-of-custody forms are included in Appendix A.

The water samples exhibited nitrates concentrations ranging from below the analytical detection limit (0.10 milligrams per liter, mg/l) to 3.8 mg/l. The EPA has defined the Maximum Contaminant Level (MCL) for nitrates in drinking water at 10 mg/l. Although the presence of nitrates in several of the water samples could possibly be attributed to the proximity of OSSF systems, the analytical results for this sampling event did not identify nitrates concentrations exceeding the MCL.

E. coli was not detected above the laboratory reporting limit in any of the water samples.

## **TABLES**

**Table 1 - Summary of Water Analytical Results**



TABLE 1

## WATER DATA SUMMARY TABLE

Airline Improvement District  
Houston, Harris County, Texas  
Terracon Project No. 92087191

Sample Number	Property Address	Sample Date	Nitrates (EPA 353.2) (mg/l)	E. coli (m-ColiBlue 24) (Positive/Negative)
GW-1	13009 Breezeway St.	9-Apr-08	<0.10	Negative
GW-2	13017 Breezeway St.	9-Apr-08	<0.10	Negative
GW-3	8410 Cheswick Dr.	9-Apr-08	<0.10	Negative
GW-5	13519 Courrege Ln.	9-Apr-08	0.86	Negative
GW-6	13606 Courrege Ln.	9-Apr-08	0.34	Negative
GW-7	309 Hawkins St.	9-Apr-08	0.99	Negative
GW-8	315 Hawkins St.	9-Apr-08	2.8	Negative
GW-9	221 W. Lorino St.	9-Apr-08	<0.10	Negative
GW-10	323 W. Lorino St.	9-Apr-08	0.22	Negative
GW-13	13828 Stoneshire St.	9-Apr-08	3.8	Negative
GW-15	8322 Yale St.	9-Apr-08	0.20	Negative
GW-17	13114 Breezeway St.	9-Apr-08	<0.10	Negative
GW-18	8514 Cheswick Dr.	9-Apr-08	0.15	Negative
GW-22	517 Hawkins St.	9-Apr-08	2.3	Negative
GW-23	208 Hawkins St.	9-Apr-08	2.6	Negative
GW-24	255 W. Lorino St.	9-Apr-08	<0.10	Negative
GW-25	311 W. Lorino St.	9-Apr-08	<0.10	Negative
GW-27	8513 Yale St.	9-Apr-08	0.17	Negative
GW-28	8502 Yale St.	9-Apr-08	3.8	Negative
GW-29	13810 Stoneshire St.	9-Apr-08	0.21	Negative
GW-30	13831 Stoneshire St.	9-Apr-08	0.30	Negative
<b>EPA Maximum Contaminant Level (MCL) for Drinking Water</b>			<b>10</b>	

EPA - Environmental Protection Agency  
mg/l - milligrams per liter  
E. coli - Escherichia coli  
< - not detected at the indicated analytical detection limit