Utility Analysis Water Availability

A Superior Water System

Fun Facts

• Sufficient water through 2050.

- Over 1,200 mgd surface water rights
- Over 150 mgd groundwater permits
- 2.1m residents plus wholesale customers
- \$6M in gross revenue
- Over 7,000 miles of pipe
- Groundwater wells are an average of 750 ft deep

What is provided must be taken away!

- Drinking Water acquisition, storage, treatment, distribution, payments
- Wastewater gathered, treated, sold or released
- What is not used must be managed to minimize flooding
- A storm water letter will be issued along with the water and wastewater capacity reservations

Water Sources

- Groundwater
- Surface Water

Surface Water Untreated Water Facilities

- Raw Water Storage in Reservoirs
 - Lake Houston
 - Lake Conroe
 - Lake Livingston
 - Allen's Creek Reservoir



Raw Water Distribution

- Main Canal
- Luce Canal
- Other canals and piping
- Lynchburg Pumping Station

Groundwater Facilities

• Groundwater Wells

- Groundwater Surface Storage Tanks
- Groundwater Elevated Tanks

Treated Water Facilities

- Northeast Water Purification Plant (80 MGD)
- East Water Purification Plant (350 MGD)
- Southeast Water Purification Plant (200 MGD)
- Groundwater Storage Tanks
- Re-pressurization Tanks

Distribution Facilities

Transmission Piping System
Distribution Piping System
Meters
SCADA

Wastewater Facilities

- 40 wastewater treatment plants
- 385 lift stations
- 225 MGD of wastewater
- 590 square mile region
- 6700 miles of sewer pipelines 6"-144"
- 126,000 manholes
- 2'-80' deep

How do make sure it is safe?

- Laws
- Codes
- Regulations
- Standards

Regulating Agencies

- Environmental Protection Agency
- Texas Commission on Environmental Quality
- Harris Galveston Subsidence District
- Fort Bend Subsidence District
- Lone Star Groundwater Conservation District (Montgomery County)

Some Laws and Regulations

- Clean Water Act
- State of Texas Local Government Code
- State of Texas Health and Safety Code
- Texas Administrative Code
- City of Houston Charter
- City of Houston Code of Ordinances

Water Well Permits

- Water Wells have two permits
 - Texas Commission on Environmental Quality
 - Depending on location one of the three agencies
 - Harris Galveston Subsidence District
 - Fort Bend Subsidence District
 - Lone Star Groundwater Conservation District
- Surface Water Rights given by the State

Surface Water Rights

- Given by the state
- Most are on Certificates of Adjudication
- Can be for municipal, industrial, irrigation or multiple use

Purpose of Regulations and Standards

- Protects Reservoirs and groundwater wells
 Protect infrastructure
 Minimize maintenance costs
- Minimize maintenance costs

System Standards

- All Available On-Line
- Design Manuals
- Standard Specifications
- Standard Products
- Standard Details

How is it paid for?

- City of Houston Enterprise Fund
- Capital Investments paid by issuance of bonds
- Operations and Maintenance paid by revenue
- Bond debt paid from revenue and impact fees
- Rate payers provide the revenue

Municipal Utility District Financing

 MUDS finance Capital by property tax
 MUDS finance Operations and Maintenance by revenue

Developer Financing

- Developers build most new pipe in the City
- Developer Incentives
 - Cost Sharing Agreements
 - Developer Participation Contracts
 - Chapter 380 (Mayor's Office)
 - Brownfields
 - Municipal Settings Designations
 - MUDS and Improvement Districts

Proposed Development

- Residential or Commercial
 - Must be platted through the Planning Commission
 - Must have water and wastewater service
 - Must meet 2012 International Building Code
 As supplemented by City of Houston
- New Public Pipe
 - Must meet Design Manual, Standard Specifications, Standard Products, and Standard Details

WCR Application Now Online

- The "long form" application is now on-line
- Applications can be walk-in for a short form or electronic submittal
- Short form is for residential single family home with existing adequate pipe
- Applications must include proof of ownership, map of location, agent authorization form, property tax assessment, and survey or site plan



System Analysis Tools

- Discharge Criteria Sheet also known as the Impact Fee Service Unit Equivalent Table
- Derived from billing records of types of development
- Based on a single family residential unit of under 3,000 square feet
- With required Code water saving fixtures the amount has diminished from 315 gpd to 250 gpd

Discharge Criteria Sheet

City of Houston Planning & Development Services Division Impact Fee Service Unit Equivalent Table Recommended SUs are based on 1.0 SU = 250 gpd.

Line No.	Type of Development	Equivalent	Per		
1	Bakery	0.0019	Square Foot		
2	Banquet Hall (No cooking, warming kitchen only)	0.0200	Occupant		
3	Barber Shop	0.6048	Bowl		
4	Beauty Shop or Beauty Salon	0.6048	Bowl		
5	Bowling Alley (Dining Additional Charge)	0.8000	Lane		
6	Car Repair (Office Additional Charge)	0.00020	Square Foot		
7	Carwash, Tunnel, Self-Service	8.00	Carwash		
8	Carwash, Tunnel, with Attendant	39.60	Carwash		
9	Carwash, Wand Type, Self Serve	1.54	Carwash Bay		
10	Church or Fellowship Hall	0.0037	Occupant		
11	Club, Tavern, or Lounge	0.0399	Occupant		
12	Concert Hall	0.0399	Occupant		
12	Courston Club	0.4032	Member		
13	Lountry Club	0.1008	Guest		
14	Dance School or Dance Studio	0.0399	Occupant		
15	Day Care Center	0.0399	Occupant		
16	Dormitory (Dining Additional Charge)	0.3604	Bed		
17	Fire Station (Dining Additional Charge)	0.3604	Capita		
18	Fitness Center/Club - Freestanding	0.0015	Square Foot		
19	Fitness Club - within shopping center	0.0399	Occupant		
20	Funeral Home (Services Per Week)	0.39	Service		
21	Gas Station with Carwash	11.78	Station		
22	Gas Station without Carwash	2.21	Station		
23	Grocery Store, 5,000-28,999 Sq Ft	0.00033	Square Foot		
24	Grocery Store, 29,000+ Sq Ft	0.0009	Square Foot		
25	Hameless Shelter (No cooking or dining)	0.1323	Bed		
26	Hospital (Dining Additional Charge)	0.8001	Bed		
27	Hotel or Motel, with or w/o kitchenettes	0.7554	Room		
28	Manufacturing	0.00020	Square Foot		
29	Mobile Home Park	1.00	Space		
30	Movie Theater	0.0200	Seat		
	Nall Cales (Maximus es Redisuse)	0.0004	Square Foot		
31	Hall saloh (Manicure or Pedicure)	0.3024	Bowl		
32	Nursing Home (Salon & Dining Additional Charge)	0.3604	Bed		
33	Office (includes studio, therapy & massage)	0.000237	Square Foot		
34	Park	0.0200	Occupant		
35	Post Office, Excluding Dock	0.000320	Square Foot		
36	Prison	0.3654	Capita		
37	Racquetball Court	0.6426	Court		
38	Recreational Vehicle Park	0.3000	Vehicle		
39	Residence, Apartment with washer/dryer	0.4762	Unit		
40	Residence, Apartment without washer/dryer	0.4046	Unit		
41	Residence, Condominium	0.4762	Unit		
42	Residence, Single Family or Townhouse, up to 3000 Sq Ft (Additional charge of 0.0002 SU per Sq Ft over 3000 Sq Ft)	1.0000	Unit		
43	Restaurant, Fast Food	0.0021	Square Foot		
44	Restaurant, Full Service/Dining/Bar Area	0.0033	Square Foot		
45	Retail	0.000281	Square Foot		
46	School (College, High, Middle, Elementary)	0.0198	Seat		
47	Skating Rink	0.0200	Capita		
48	Stadium	0.0126	Seat		
49	Swimming Pool	0.0200	Swimmer		
50	Toilet (Park Amenity)	0.1640	Toilet		
51	Transportation Terminal (Dining Additional Charge)	0.0200	Passenger		
52	Warehouse	0.000121	Square Foot		
53	Washateria	0.5639	Machine		
14	Marker Discovering Helt, Constanting	4 5 6 3 0	1 Inclu		

Planning & I Impact Fee Recommen	Development Services Division Service Unit Equivalent Table Ided Sus are based on 1.0 SU = 250 gpd.								
Line 💌	TYPE OF DEVELOPMENT	-							
1	BAKERY		0.0019		Juiro L				
2	BANQUET HALL (NO COOKING WARMING KITCHEN ONLY	0.02							
3	BABBER SHOP	0.6048							
4	BEAUTY SHOP OR BEAUTY SALON	0.6048	500						
5	BOWLING ALLEY (DINIG ADDITIONAL CHARGE)	0.8							
6	CAR REPAIR (OFFICE ADDITIONAL CHARGE)		0.0002						
7	CARWASH, TUNNEL, SELF SERVICE		8	636					
8	CARVASH, TUNNEL, VITH ATTENDANT		39.6						
10	CHURCH OR FELLOWSHIP HALL		0.0037	1990					
11	CLUB. TAVERN OR LOUNGE		0.0399						
12	CONCERT HALL		0.0399	See					
13	COUNTRY CLUB	1EMBER	0.4032	325					
		GUEST	0.1008						
14	DANCE SCHOOL OR DANCE STUDIO		0.0399						
16			0.0393						
17	FIRE STATION (DINING ADITIONAL CHARGE)		0.3604						
18	FITNESS CENTER / CLUB - FREESTANDING		0.0015						
19	FITNESS CLUB - WITHIN SHOPPING CENTER		0.0399						
20	FUNERAL HOME		0.39	0.39					
21	GAS STATION VITH CARWASH	11.78	1011						
22	GAS STATION VITHOUT CARVASH	2.21	1211						
23	GRUCERY STORE, 5,000 - 28,999 SQFT	0.00033							
24	HOMELESS SHELTER (NO COOKING OR DINING)	0.0003	8720						
26	HOSPITAL (DINING ADDITIONAL CHARGE)		0.8001						
27	HOTEL OR MOTEL, WITH OR W/O KITCHENETTES		0.7554						
28	MANUFACTURING		0.0002						
29	MOBILE HOME PARK		1	· 法法					
30	MOVIE THEATER		0.02						
31	NAIL SALON (MANICURE OR PEDICURE)	SQAFT	0.0004	16.20					
32	NURSING HOME (SALON & DIMING ADDITIONAL CHARGE)	BOWL	0.3024						
33	OFFICE (INCLUDES STUDIO THERAPY & MASSAGE)	0.000237							
34	PARK		0.02						
35	POST OFFICE, EXCLUDING DOCK	0.0003							
36	PRISON	0.3654	ALC: Y						
37	RAQUETBALL COURT	0.6426							
38	RECREATIONAL VEHICLE PARK RESIDENCE ARABITMENT WITH WASHER / DRYER	0.3							
40	BESIDENCE, APARTMENT VITHOUT VASHER / DRYER	0.4046							
41	RESIDENCE, CONDOMINIUM	0.4762							
42	RESIDENCE, SINGLE FAMILY OR TOWNHOUSE, UP TO 3,000 SQ (ADDITIONAL CHARGE OF 0.0002 PER SQFT OVER 3,000 SQF	1 0.0002							
43	RESTAURANT, FAST FOOD		0.0021						
44	RESTAURANT, FULL SERVICE / DINING / BAR AREA	0.0033	000						
45	RETAIL	0.000281							
46	SCHOOL (COLLEGE, HIGH, MIDDLE, ELEMENTARY)	0.0198							
47	STATING BINK	0.02							
49	SVIMMING POOL	0.02	1000						
50	TOILET (PARK AMENITY)	0.164							
51	TRANSPORTATION TERMINAL (DINING ADDITIONAL CHAR)	0.02							
52	VAREHOUSE	0.000121							
53	VASHATERIA	0.5639							
54	WATER DISPENSING UNIT - FREESTANDING	4.563							

Analysis Guidelines

- Flow = Q = Area X Velocity (A X V)
- For wastewater use 4Q
- Undeveloped acreage for wastewater 7500 gpd/acre or 10,000 gpd/acre high density or 13,500 gpd/acre high volume user (includes 4Q) or use area studies
- For water use 0.6 gpm or 0.36 gpm from TCEQ

Additional Analysis

- Evaluate capacity using hydraulic spreadsheets based on standard engineering principles – Hazen Williams, Mannings
- For full flow pipe use the Major Loss Calculator
- For partially full pipe use Q Calc. (4Q has been added)

Major Loss Calculator

			FLO\	N				HEAD LOSS						
Line	7 ft/s	6 ft/s	5 ft/s	4 ft/s	3 ft/s	2 ft/s	1 ft/s	7 ft/s	6 ft/s	5 ft/s	4 ft/s	3 ft/s	2 ft/s	1 ft/s
Size	MGD	ft / kft	ft / kft	ft / kft	ft / kft	ft / kft	ft / kft	ft / kft						
108"	287.8	246.7	205.6	164.5	123.4	82.2	41.1	0.91	0.68	0.49	0.32	0.19	0.09	0.02
102"	256.7	220.1	183.4	146.7	110.0	73.4	36.7	0.97	0.73	0.52	0.34	0.20	0.10	0.03
96"	227.4	194.9	162.4	130.0	97.5	65.0	32.5	1.04	0.78	0.56	0.37	0.22	0.10	0.03
90 "	199.9	171.3	142.8	114.2	85.7	57.1	28.6	1.12	0.84	0.60	0.40	0.23	0.11	0.03
84"	174.1	149.2	124.4	99.5	74.6	49.7	24.9	1.22	0.91	0.65	0.43	0.25	0.12	0.03
78"	150.1	128.7	107.2	85.8	64.3	42.9	21.4	1.33	1.00	0.71	0.47	0.28	0.13	0.04
72"	127.9	109.6	91.4	73.1	54.8	36.5	18.3	1.46	1.09	0.78	0.52	0.30	0.14	0.04
66"	107.5	92.1	76.8	61.4	46.1	30.7	15.4	1.61	1.21	0.86	0.57	0.34	0.16	0.04
60 "	88.8	76.1	63.5	50.8	38.1	25.4	12.7	1.80	1.35	0.97	0.64	0.38	0.18	0.05
54"	72.0	61.7	51.4	41.1	30.8	20.6	10.3	2.04	1.53	1.09	0.72	0.42	0.20	0.06
48"	56.9	48.7	40.6	32.5	24.4	16.2	8.1	2.34	1.76	1.25	0.83	0.49	0.23	0.06
42"	43.5	37.3	31.1	24.9	18.7	12.4	6.2	2.92	2.20	1.57	1.04	0.61	0.29	0.08
36"	32.0	27.4	22.8	18.3	13.7	9.1	4.6	3.75	2.82	2.01	1.33	0.78	0.37	0.10
30 "	22.2	19.0	15.9	12.7	9.5	6.3	3.2	4.64	3.49	2.49	1.65	0.97	0.46	0.13
24 "	14.2	12.2	10.2	8.1	6.1	4.1	2.03	6.98	5.25	3.74	2.48	1.45	0.69	0.19
20"	9.9	8.5	7.1	5.6	4.2	2.8	1.41	9.34	7.02	5.01	3.31	1.95	0.92	0.25
16"	6.3	5.4	4.5	3.61	2.71	1.80	0.90	13.16	9.89	7.06	4.67	2.74	1.29	0.36
12"	3.55	3.05	2.54	2.03	1.52	1.02	0.51	21.96	16.51	11.78	7.79	4.57	2.16	0.60
8 "	1.58	1.35	1.13	0.90	0.68	0.45	0.23	42.84	32.20	22.97	15.20	8.92	4.21	1.17

Q Calc

Input Values			Calculate												
Diameter (d)	Slope (S)	Flow depth Percenta ge	Roughness Coeff. (n)	Flow Depth (y)	q	Flow Area (A)	Wetted Perimeter (P)	Hydraulic Radius (R)	Velocity (V)	Flow (Q)		Flow Capacity			
inches	%	% full		inches	degree s	ft²	ft	ft	ft/s	ft³/s	gpm	%	G/D	MGD	SU
8	0.44%	10.00%	0.013	0.8	73.74	0.018	0.429	0.042	0.92	0.017	7.52	1.96%	10,836	0.011	11
8	0.44%	20.00%	0.013	1.6	106.26	0.050	0.618	0.080	1.42	0.070	31.56	8.22%	45,449	0.045	45
8	0.44%	25.00%	0.013	2	120	0.068	0.698	0.098	1.61	0.110	49.37	12.85%	71,093	0.071	71
8	0.44%	30.00%	0.013	2.4	132.84	0.088	0.773	0.114	1.79	0.157	70.58	18.37%	101,636	0.102	102
8	0.44%	40.00%	0.013	3.2	156.93	0.130	0.913	0.143	2.08	0.271	121.46	31.62%	174,896	0.175	175
8	0.44%	50.00%	0.013	4	180	0.175	1.047	0.167	2.30	0.402	180.21	46.91%	259,500	0.259	259
8	0.44%	60.00%	0.013	4.8	203.07	0.219	1.181	0.185	2.47	0.540	242.14	63.04%	348,685	0.349	349
8	0.44%	70.00%	0.013	5.6	227.16	0.261	1.322	0.197	2.58	0.673	301.75	78.56%	434,526	0.435	435
8	0.44%	80.00%	0.013	6.4	253.74	0.299	1.476	0.203	2.62	0.786	352.29	91.71%	507,305	0.507	507
8	0.44%	90.00%	0.013	7.2	286.26	0.331	1.665	0.199	2.59	0.857	384.13	100.00%	553,148	0.553	553
8	0.44%	100.00%	0.013	8	360	0.349	2.094	0.167	2.30	0.804	360.42	93.83%	518,999	0.519	519

Additional Investigation and Assistance

- Field investigation for dry flow depth, dye testing, meter locations
- Request support from Long Term Planning, Wastewater Operations, Drinking Water Operations

Additional Investigation and Analysis

- Check other large requests in the area
- If new construction is necessary, check with online tools such as GIMS CIP/CIPMS/Planning to de-conflict new construction
- Write insert for letter in ILMS
- Customer may appeal or request a different response and provide additional information for changes, perform fire flow tests, clean and televise pipe, and provide their own calculations for review

Payment of Impact Fees and Ability to Obtain Permits

- The customer must come to the building to pay impact fees
- Once impact fees are paid, tapping and building permits may be issued

Impact Fee Activity

- Impact Fees from 1990 through October 2015 \$353,252,615.03
- In 2009 we were getting around between 600 and 450 applications per month
- Currently we are getting between 800 and 1100 per month

Taps and Meters

- Plan Review
 - On-line submittal
 - Walk-in
- Large Job Permitting
- Meter Easements
- Transient Meter Permitting
- Small Meter Permits
- Sewer Permits

Plan Reviews

Utility Analysis – Developer Services Plans Reviewed

FY16 Plans Reviewed for Water/Wastewater Approval



Large Job Permitting

- May require
- Fee
- Letter
- Bonds
- Plans
- Plan & Profile
- Easement

Meter Easements

Easement documents on a 584 form
11"X17" Mylar
Metes and bounds

Approved Contractor's List

- Master Plumber License
- Bonds
- Insurance
- Acknowledgement of receipt of certain standard specifications

Questions?