

# CITY OF HOUSTON

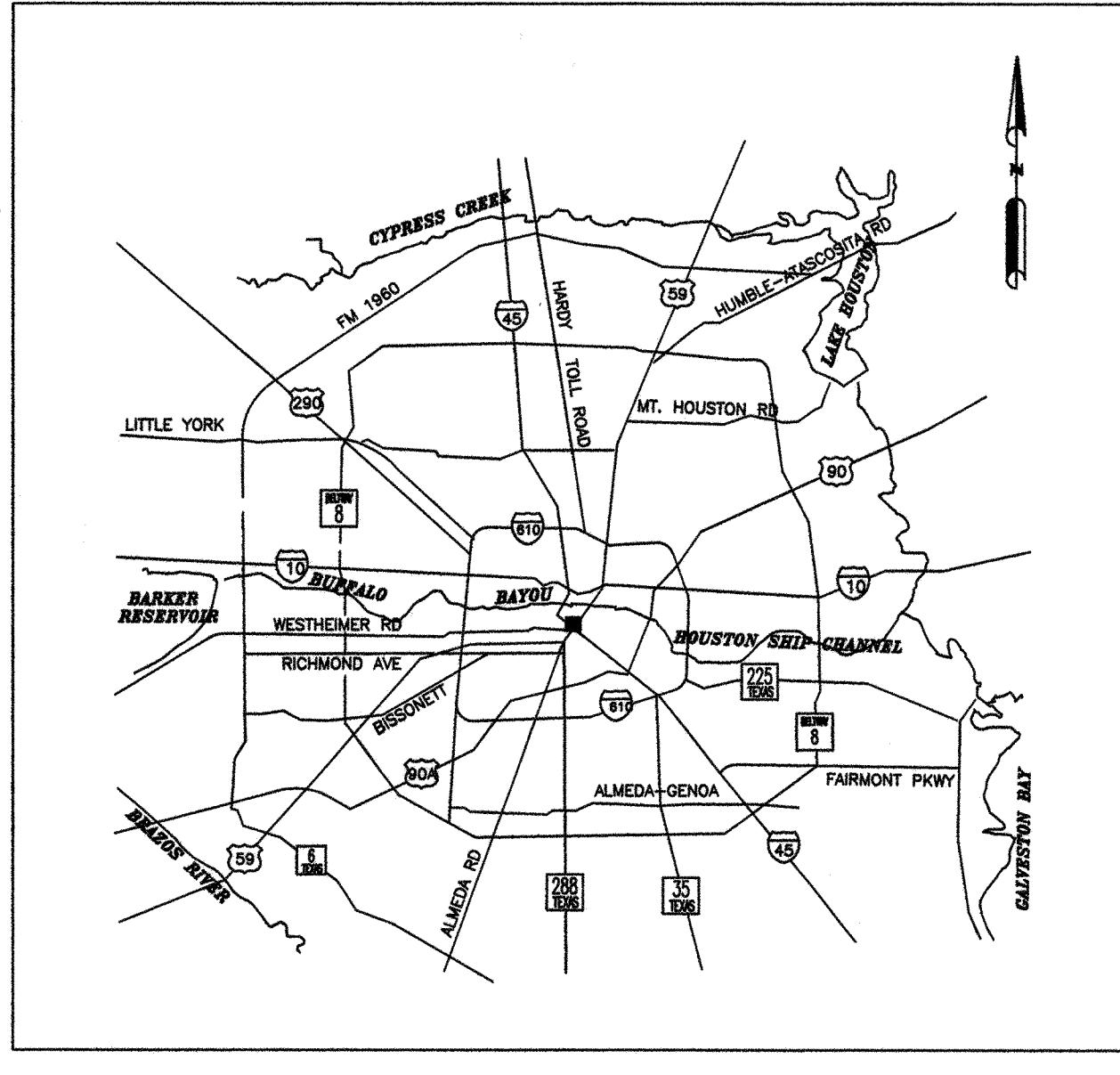
## DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

### ENGINEERING AND CONSTRUCTION DIVISION

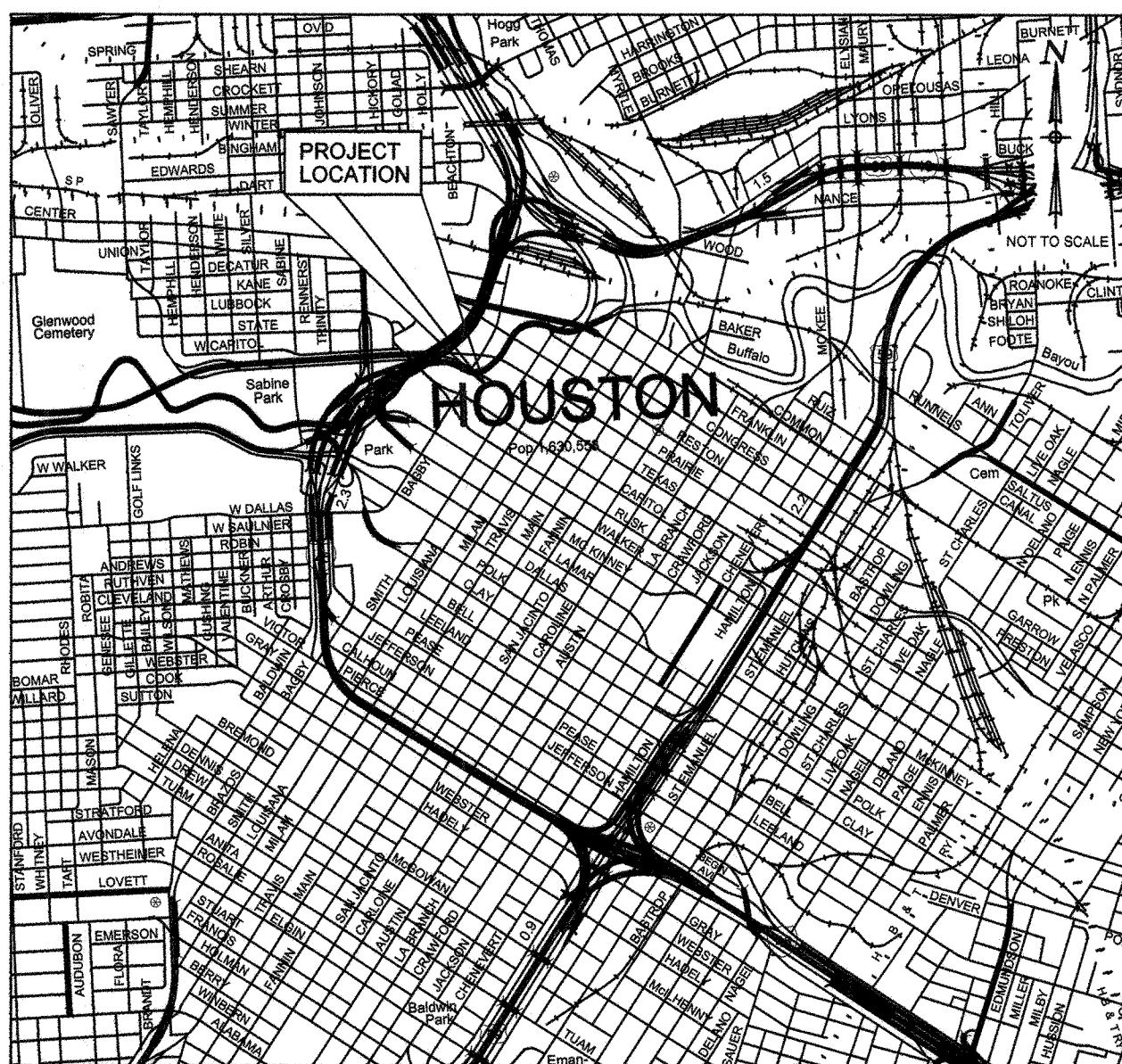
### DOWNTOWN CENTERLINE REFERENCE ROD SYSTEM

#### REVITALIZATION

GFS NO. N-0645-04-3



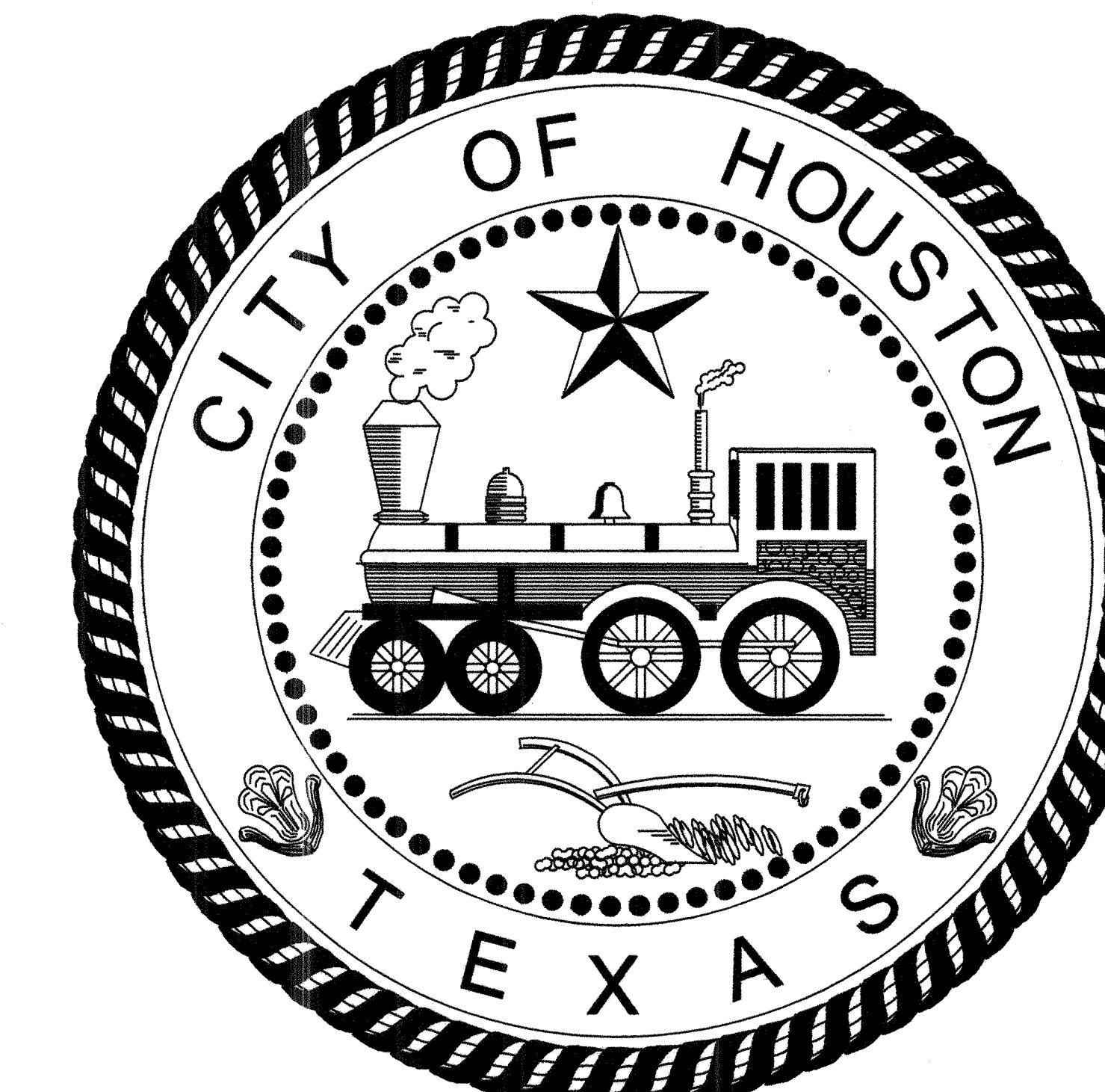
LOCATION MAP



VICINITY MAP

KEY MAP NO(s). 493 L, M, Q, R  
GIMS MAP NO(s). 5357 B  
5457 A  
5357 D  
5457 C  
5358 B  
5458 A

TDLR EABPR \_\_\_\_\_



MAYOR  
BILL WHITE  
CONTROLLER  
ANNISE D. PARKER

#### DISTRICT COUNCIL MEMBERS

TONI LAWRENCE  
DISTRICT A  
  
WANDA ADAMS  
DISTRICT D  
  
PAM HOLM  
DISTRICT G

JARVIS JOHNSON  
DISTRICT B  
  
MIKE SULLIVAN  
DISTRICT E  
  
ADRIAN GARCIA  
DISTRICT H

ANNE CLUTTERBUCK  
DISTRICT C  
  
M. J. KHAN, P.E.  
DISTRICT F  
  
JAMES G. RODRIGUEZ  
DISTRICT I

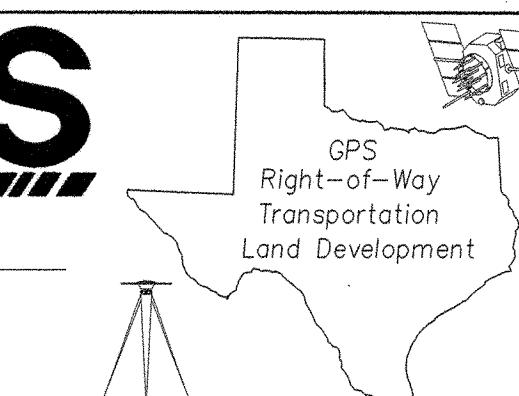
#### COUNCIL MEMBERS AT-LARGE

PETER BROWN  
POSITION 1  
  
MELISSA NORIEGA  
POSITION 3  
  
JOLANDA "JO" JONES  
POSITION 5

SUE LOVELL  
POSITION 2  
  
RONALD GREEN  
POSITION 4

**RODS**  
Surveying, Inc.

6810 LEE ROAD  
SPRING, TEXAS 77379  
TEL (281) 257-4020  
FAX (281) 257-4021



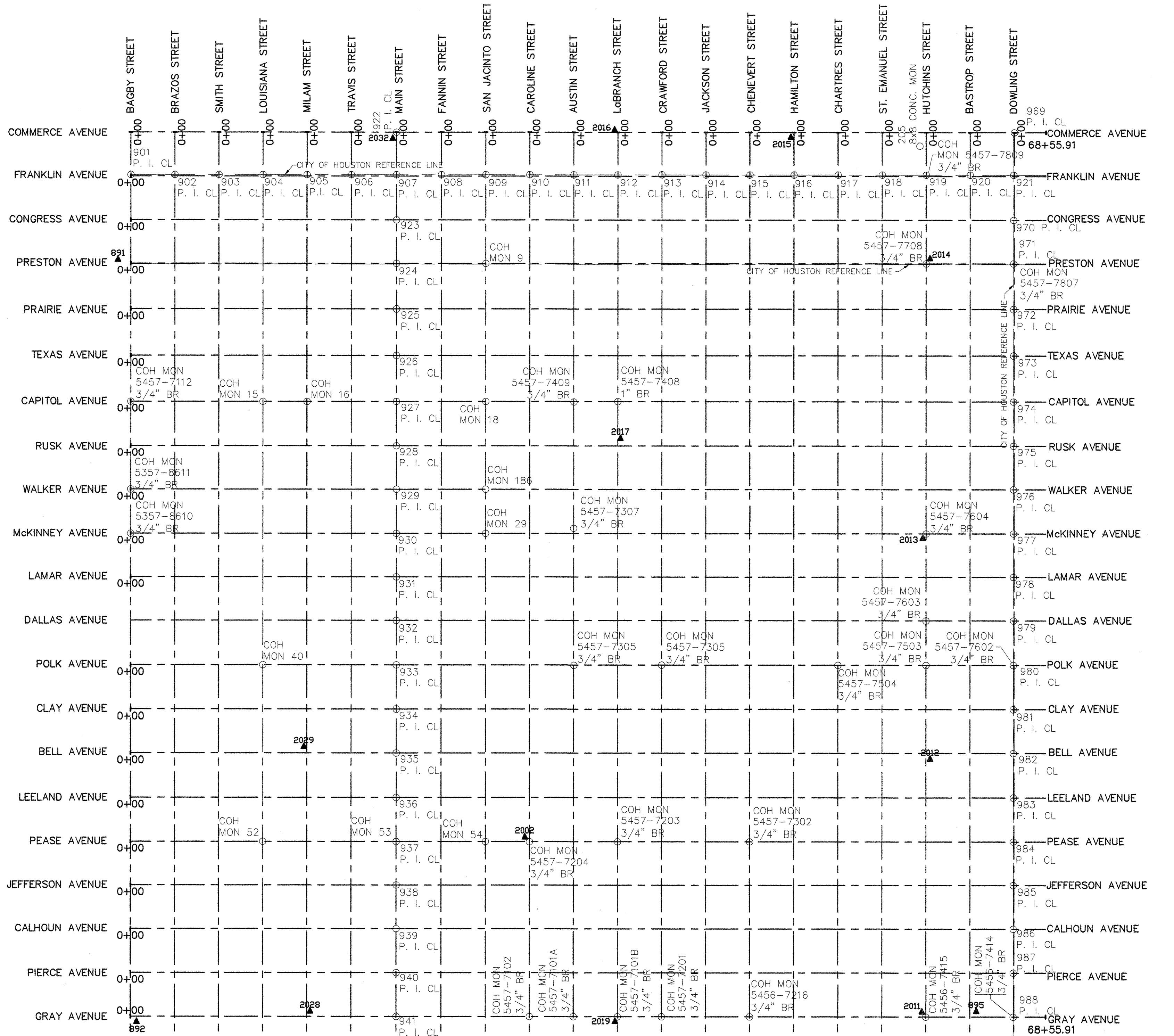
SURVEYED BY: L.A.  
FB NO. P-5428

CITY ENGINEER DATE

CITY SURVEYOR DATE

DIRECTOR OF PUBLIC WORKS AND ENGINEERING DATE





MATCHLINE

CONTROL POINTS

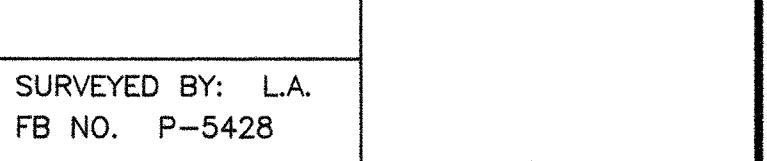
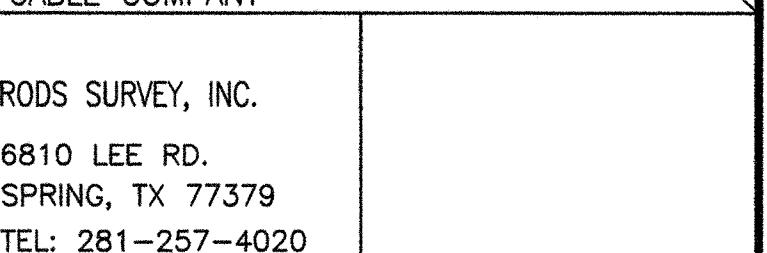
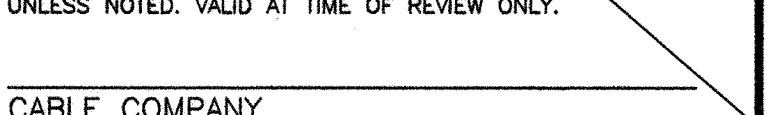
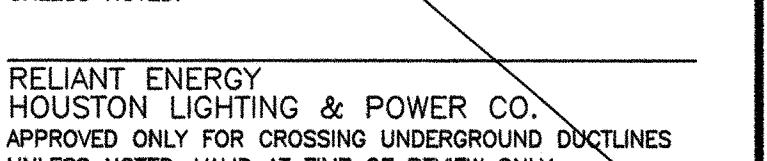
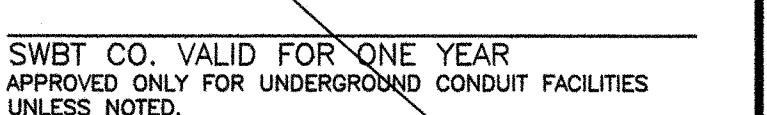
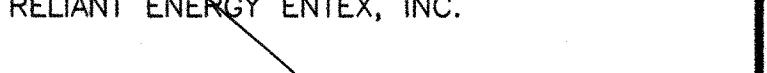
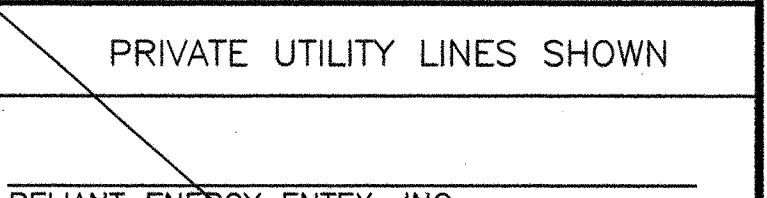
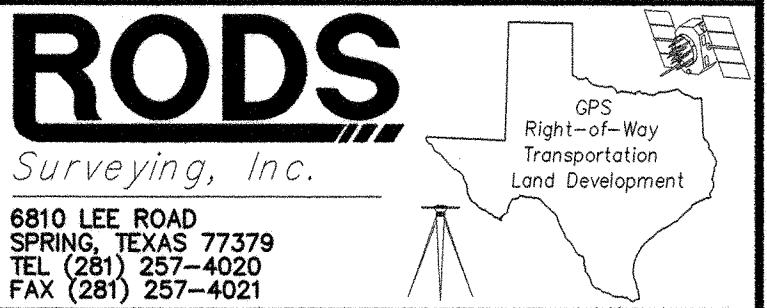
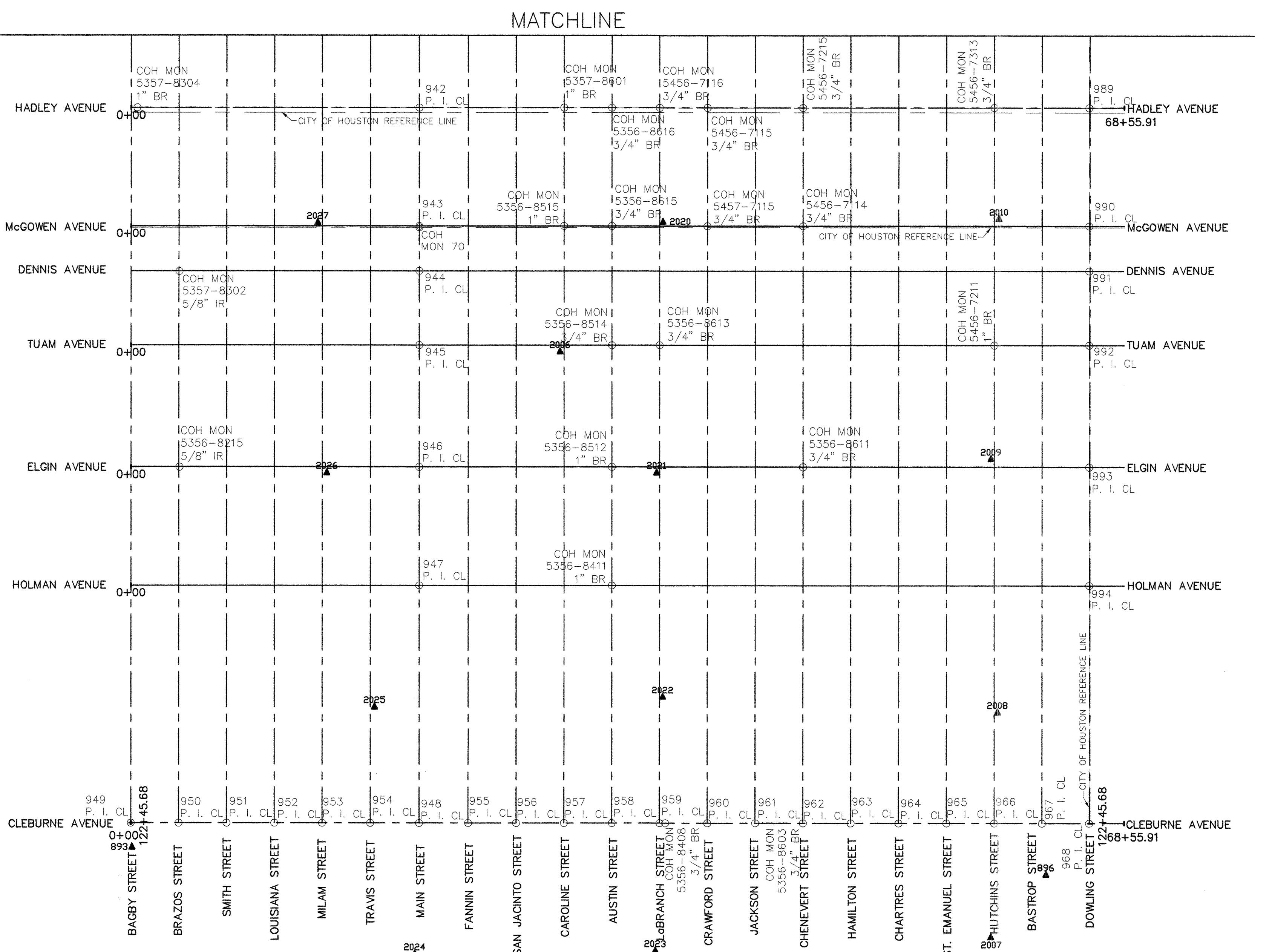
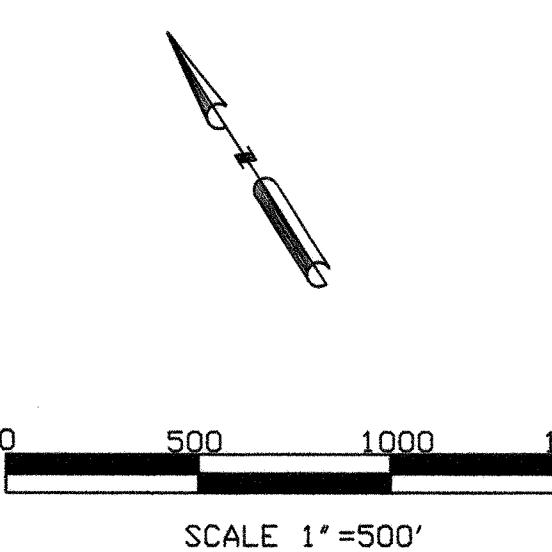
DRIG	COH-MON NO	Northing	Easting	Description
4	5457-7610	13841870.988	3124810.289	CDH MDN 4 *
	5457-7809	13840796.740	3126473.479	CDH MDN 5 3/4'' BR
5	*	13842023.733	3123337.159	CDH MDN 6 *
11	*	13841301.928	3124426.475	CDH MDN 11 *
12	5457-7708	13840243.224	3123103.474	CDH MDN 12 3/4'' BR
13	5457-7807	13839567.930	3126659.708	CDH MDN 13 3/4'' BR
15	*	13840269.236	3121379.460	CDH MDN 15 *
16	*	13841894.121	3121656.791	CDH MDN 16 *
18	*	13841634.808	3121781.500	CDH MDN 18 *
19	5457-7409	13840203.556	3123103.595	CDH MDN 19 3/4'' BR
29	*	13840331.780	3122243.570	CDH MDN 20 *
30	5457-7307	13840007.292	3122819.837	CDH MDN 30 3/4'' BR
34	5457-7604	13838541.110	3125015.729	CDH MDN 31 3/4'' BR
37	5457-7802	13838542.014	3118094.070	CDH MDN 32 3/4'' BR
38	5457-7907	13837466.590	3126273.327	CDH MDN 38 3/4'' BR
39	5457-7902	13838281.634	3122261.630	CDH MDN 39 1' BR
40	*	13840405.834	3120304.436	CDH MDN 40 *
43	5457-7305	13839139.450	3122261.674	CDH MDN 43 3/4'' BR
45	*	13838544.024	3121936.561	CDH MDN 45 *
46	5457-7402	13837353.980	3125028.696	CDH MDN 46 3/4'' BR
48	5457-7702	13836992.980	3125587.497	CDH MDN 48 3/4'' BR
49	5457-7701	13836633.020	3126141.979	CDH MDN 49 3/4'' BR
52	*	13839297.222	3119588.138	CDH MDN 52 *
53	*	13838428.127	3120428.527	CDH MDN 53 *
54	*	13838281.671	3120204.524	CDH MDN 54 3/4'' BR
58	5457-7302	13837317.020	3122653.125	CDH MDN 56 3/4'' BR
66	5457-7101A	13836924.903	3120287.849	CDH MDN 66 3/4'' BR
67	5456-7216	13836203.215	3121936.718	CDH MDN 67 3/4'' BR
68	5456-7415	13836429.157	3121945.377	CDH MDN 68 3/4'' BR
69	5456-7414	13836216.220	3122304.517	CDH MDN 69 3/4'' BR
70	*	13836397.432	3118904.822	CDH MDN 70 *
72	5356-8615	13835684.590	3120262.734	CDH MDN 72 3/4'' BR
73	5457-7114	13834968.609	3120580.428	CDH MDN 73 3/4'' BR
74	5456-7114	13834968.609	3120580.433	CDH MDN 74 3/4'' BR
82	*	13838428.127	3120428.527	SEE NOTE 5 FOR MONUMENTS 691-896
87	5356-8603	13829040.128	3119638.397	CDH MDN 87 3/4'' BR
186	*	13821422.855	3121382.120	CDH MDN 186 *
197	5457-7201	13836566.568	3121382.120	CDH MDN 197 3/4'' BR

CONTROL POINTS

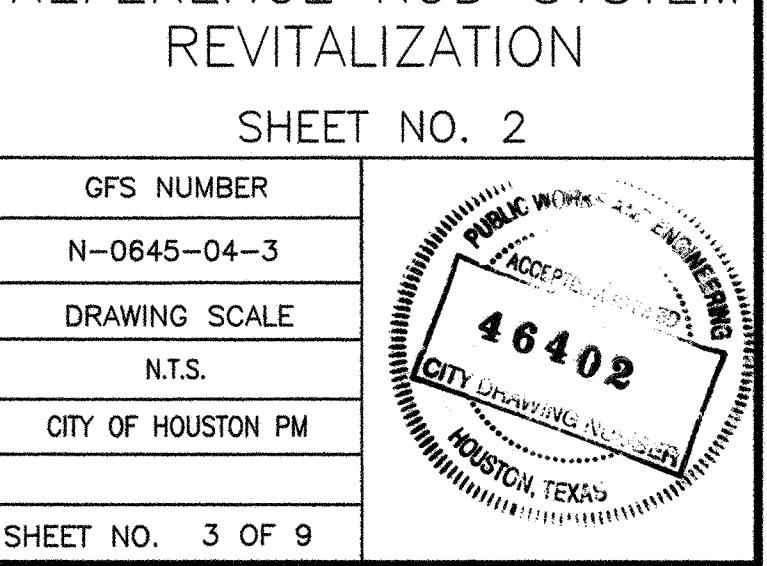
DRIG	COH-MON NO	Northing	Easting	Description
4	5457-7809	13840796.740	3126473.479	CDH-MON 205 5457-7809
5	*	13842023.733	3123337.159	CDH-MON 242 5457-7809
11	*	13841301.928	3124426.475	CDH-MON 247 5457-7809
12	5457-7708	13840243.224	3123103.474	CDH-MON 266 5457-7809
13	5457-7807	13839567.930	3126659.708	CDH-MON 271 5457-7809
15	*	13840269.236	3121379.460	CDH-MON 277 5457-7809
16	*	13841894.121	3121656.791	CDH-MON 281 5457-7809
18	*	13841634.808	3121781.500	CDH-MON 298 5457-7809
19	5457-7409	13840203.556	3123103.595	CDH-MON 300 5457-7809
29	*	13840331.780	3122243.570	CDH-MON 301 5457-7809
30	5457-7307	13840007.292	3122819.837	CDH-MON 308 5457-7809
34	5457-7604	13838541.110	3125015.729	CDH-MON 309 5457-7809
37	5457-7802	13838542.014	3118094.070	CDH-MON 310 5457-7809
38	5457-7907	13837466.590	3126273.327	CDH-MON 311 5457-7809
39	5457-7902	13838281.634	3122261.630	CDH-MON 312 5457-7809
40	*	13840405.834	3120304.436	CDH-MON 313 5457-7809
43	5457-7305	13839139.450	3122261.674	CDH-MON 314 5457-7809
45	*	13838544.024	3121936.561	CDH-MON 315 5457-7809
46	5457-7402	13837353.980	3125028.696	CDH-MON 316 5457-7809
48	5457-7702	13836992.980	3125587.497	CDH-MON 317 5457-7809
49	5457-7701	13836633.020	3126141.979	CDH-MON 318 5457-7809
52	*	13839297.222	3119588.138	CDH-MON 319 5457-7809
53	*	13838428.127	3120428.527	CDH-MON 320 5457-7809
54	*	13838281.671	3120204.524	CDH-MON 321 5457-7809
58	5457-7302	13837317.020	3122653.125	CDH-MON 322 5457-7809
66	5457-7101A	13836924.903	3120287.849	CDH-MON 323 5457-7809
67	5456-7216	13836203.215	3121936.718	CDH-MON 324 5457-7809
68	5456-7415	13836429.157	3121945.377	CDH-MON 325 5457-7809
69	5456-7414	13836216.220	3122304.517	CDH-MON 326 5457-7809
70	*	13836397.432	3118904.822	CDH-MON 327 5457-7809
72	5356-8615	13835684.590	3120262.734	CDH-MON 328 5457-7809
73	5457-7114	13834968.609	3120580.428	CDH-MON 329 5457-7809
74	5456-7114	13834968.609	3120580.433	CDH-MON 330 5457-7809
82	*	13838428.127	3120428.527	SEE NOTE 5 FOR MONUMENTS 691-896
87	5356-8603	13829040.128	3119638.397	CDH-MON 331 5457-7809
186	*	13821422.855	3121382.120	CDH-MON 332 5457-7809
197	5457-7201	13836566.568	3121382.120	CDH-MON 333 5457-7809

CONTROL POINTS

DRIG	COH-MON NO	Northing	Easting	Description
4	5457-7809	13840796.740	3126473.479	CDH-MON 334 5457-7809
5	*	13842023.733	3123337.159	CDH-MON 341 5457-7809
11	*	13841301.928	3124426.475	CDH-MON 342 5457-7809
12	5457-7708	13840243.224	3123103.474	CDH-MON 343 5457-7809
13	5457-7807	13839567.930	3126659.708	CDH-MON 344 5457-7809
15	*	13840269.236	3121379.460	CDH-MON 345 5457-7809
16	*	13841894.121	3121656.791	CDH-MON 346 5457-7809
18	*	13841634.808	3121781.500	CDH-MON 347 5457-7809
19	5457-7409	13840203.556	3123103.595	CDH-MON 348 5457-7809
29	*	13840331.780	3122243.570	CDH-MON 349 5457-7809
30	5457-7307	13840007.292	3122819.837	CDH-MON 350 5457-7809
34	5457-7604	13838541.110	3125015.729	CDH-MON 351 5457-7809
37	5457-7802	13838542.014	3118094.070	CDH-MON 352 5457-7809
38	5457-7907	13837466.590	3126273.327	CDH-MON



SHEET NO. 2



## CONTROL POINTS

DRG.	COH-MON NO.	Northing	Easting	Description
4	5457-7610	1384180.988	3124810.289	CDH MDN 4 *
5	5457-7809	13840796.740	3126473.479	CDH MDN 5 3/4" BR
9	*	13842023.733	3123337.159	CDH MDN 6 *
11	*	13841301.473	3124456.473	CDH MDN 7 *
12	5457-7708	13840423.463	3121108.274	CDH MDN 8 3/4" BR
13	5457-7807	13839877.930	3126659.708	CDH MDN 9 3/4" BR
15	*	13840696.236	3121379.460	CDH MDN 10 *
16	*	13841894.121	3121656.791	CDH MDN 11 *
18	*	1384163.808	3122781.292	CDH MDN 12 *
29	5457-7409	13840402.777	3122243.570	CDH MDN 13 3/4" BR
30	5457-7307	13840007.292	3122819.837	CDH MDN 14 3/4" BR
37	5457-7703	13837824.782	3126124.930	CDH MDN 15 1/2" BR
38	5457-7704	13837824.782	3126124.930	CDH MDN 16 1/2" BR
39	5457-7902	13837108.430	3127233.634	CDH MDN 17 1/2" BR
40	*	13840405.834	3120304.436	CDH MDN 18 *
43	5457-7305	13839139.450	3122261.674	CDH MDN 19 3/4" BR
45	5457-7706	13836992.980	3125587.497	CDH MDN 20 3/4" BR
46	5457-7602	13837053.980	3125028.696	CDH MDN 21 3/4" BR
48	5457-7702	13836992.980	3125587.497	CDH MDN 22 3/4" BR
49	5457-7701	13836633.020	3126141.979	CDH MDN 23 3/4" BR
52	*	13839297.222	3119588.138	CDH MDN 24 3/4" BR
53	*	13838754.896	3120428.127	CDH MDN 25 *
54	*	13838754.896	3120428.127	CDH MDN 26 *
56	5457-7302	13837317.020	3122653.125	CDH MDN 27 3/4" BR
66	5457-7101	13836924.903	3120827.849	CDH MDN 28 3/4" BR
67	5456-7216	13836209.215	3121936.718	CDH MDN 29 3/4" BR
68	5456-7415	13835491.685	3123045.344	CDH MDN 30 3/4" BR
69	5456-7414	13835491.685	3123045.344	CDH MDN 31 3/4" BR
70	*	13836397.432	3118904.822	CDH MDN 32 3/4" BR
72	5356-8615	13835684.590	3120266.753	CDH MDN 33 3/4" BR
73	5457-7115	13835326.239	3120580.482	CDH MDN 34 3/4" BR
74	5456-7114	13834965.609	3121135.433	CDH MDN 35 3/4" BR
75	*	13834965.609	3121135.433	CDH MDN 36 *
76	5356-8611	13835326.239	3120580.482	CDH MDN 37 3/4" BR
77	*	13834965.609	3121135.433	CDH MDN 38 *
78	5356-8603	13829040.128	3119638.397	CDH MDN 39 3/4" BR
79	*	13836566.568	3121382.120	CDH MDN 40 *
87	5356-8603	13829040.128	3119638.397	CDH MDN 41 3/4" BR
186	*	13836566.568	3121382.120	CDH MDN 42 *
197	5457-7201	13836566.568	3121382.120	CDH MDN 43 3/4" BR

## CONTROL POINTS

DRG.	COH-MON NO.	Northing	Easting	Description
205	5457-7809	13841007.093	3126552.496	CDH MON 4 * CONC MKR
242	5457-7112	13842606.810	3120547.746	CDH MON 5 3/4" BR
247	5357-8610	13841774.400	3120010.105	CDH MON 6 *
256	5357-8205	13837037.900	3117743.828	CDH MON 7 3/4" BR
257	5356-8613	13837037.900	3117743.828	CDH MON 8 3/4" BR
277	5356-8603	13831497.930	3118893.049	CDH MON 9 3/4" BR
281	5457-8010	13841737.860	3124657.518	CDH MON 10 *
300	5356-8616	13836374.581	3120472.391	CDH MON 11 3/4" BR
301	5356-8617	13836374.581	3120472.391	CDH MON 12 3/4" BR
302	5356-8514	13834942.510	3121561.121	CDH MON 13 3/4" BR
303	5356-8514	13834942.510	3121561.121	CDH MON 14 3/4" BR
305	5356-8514	13834942.510	3121561.121	CDH MON 15 3/4" BR
306	5356-8514	13834942.510	3121561.121	CDH MON 16 3/4" BR
307	5356-8514	13834942.510	3121561.121	CDH MON 17 3/4" BR
308	5356-8514	13834942.510	3121561.121	CDH MON 18 3/4" BR
309	5356-8514	13834942.510	3121561.121	CDH MON 19 3/4" BR
310	5356-8514	13834942.510	3121561.121	CDH MON 20 3/4" BR
311	5356-8514	13834942.510	3121561.121	CDH MON 21 3/4" BR
312	5356-8514	13834942.510	3121561.121	CDH MON 22 3/4" BR
313	5356-8514	13834942.510	3121561.121	CDH MON 23 3/4" BR
314	5356-8514	13834942.510	3121561.121	CDH MON 24 3/4" BR
315	5356-8514	13834942.510	3121561.121	CDH MON 25 3/4" BR
316	5356-8514	13834942.510	3121561.121	CDH MON 26 3/4" BR
317	5356-8514	13834942.510	3121561.121	CDH MON 27 3/4" BR
318	5356-8514	13834942.510	3121561.121	CDH MON 28 3/4" BR
319	5356-8514	13834942.510	3121561.121	CDH MON 29 3/4" BR
320	5356-8514	13834942.510	3121561.121	CDH MON 30 3/4" BR
321	5356-8514	13834942.510	3121561.121	CDH MON 31 3/4" BR
322	5356-8514	13834942.510	3121561.121	CDH MON 32 3/4" BR
323	5356-8514	13834942.510	3121561.121	CDH MON 33 3/4" BR
324	5356-8514	13834942.510	3121561.121	CDH MON 34 3/4" BR
325	5356-8514	13834942.510	3121561.121	CDH MON 35 3/4" BR
326	5356-8514	13834942.510	3121561.121	CDH MON 36 3/4" BR
327	5356-8514	13834942.510	3121561.121	CDH MON 37 3/4" BR
328	5356-8514	13834942.510	3121561.121	CDH MON 38 3/4" BR
329	5356-8514	13834942.510	3121561.121	CDH MON 39 3/4" BR
330	5356-8514	13834942.510	3	

## CENTERLINE / BASELINE INFORMATION

## CONTROL POINT LIST W/STREET NAMES NORTH AND SOUTH

## BAGBY STREET

Pt#	Station	Offset	Description	Northing	Eastng
5457-7112	20+16.66	RO. 13	CDH MON 242 3/4'	13842606.810	3120547.746
5357-8611	26+77.34	LO. 12	CDH MON 715 3/4'	13842051.752	3120189.415
5357-8610	30+07.61	LO. 02	CDH MON 247 3/4'	13841774.400	3120010.105
5357-8304	72+92.02	L42.38	CDH MON 769 1'	13838152.788	3117720.587

## BRAZOS STREET

Pt#	Station	Offset	Description	Northing	Eastng
902	3+21.92	LO. 00	CENTERLINE	13843851.173	3121744.754
5357-8302	84+31.32	L3.50	CDH MON 266 5/8'	13837037.900	3117346.828
5356-8215	97+76.40	L4.42	CDH MON 267 5/8'	13835907.623	3116617.640
950	122+45.91	LO. 00	CENTERLINE	13833835.991	3115273.884

## LOUISIANA STREET

Pt#	Station	Offset	Description	Northing	Eastng
904	3+21.92	LO. 00	CENTERLINE	13843493.090	3122299.114
15	20+16.95	LO. 26	CDH MON 15	13842069.236	3121739.460
40	39+97.50	LO. 01	CDH MON 40	13840405.834	3120304.436
52	53+17.39	LO. 00	CDH MON 52	13839297.222	3119588.138
952	122+45.92	LO. 00	CENTERLINE	13833477.908	3115828.244

## MILAM STREET

Pt#	Station	Offset	Description	Northing	Eastng
905	3+21.92	LO. 00	CENTERLINE	13843313.971	3122576.414
7	94+93.00	LO. 00	CDH MON 7	13842750.303	3122212.225
16	20+16.93	LO. 28	CDH MON 16	13841890.121	3121656.791
953	122+45.92	RO. 00	CENTERLINE	13833298.788	3116105.544

## MAIN STREET

Pt#	Station	Offset	Description	Northing	Eastng
922	0.00	RO. 00	CENTERLINE	13843221.006	3123313.639
907	3+21.92	LO. 00	CENTERLINE	13842950.615	3123138.938
923	6+65.40	LO. 00	CENTERLINE	13842662.112	3122952.534
924	9+92.95	RO. 00	CENTERLINE	13842386.996	3122774.780
925	13+30.93	RO. 00	CENTERLINE	13842103.105	3122591.359
926	16+75.33	LO. 00	CENTERLINE	13841813.836	3122404.458
927	20+16.90	RO. 00	CENTERLINE	13841526.941	3122219.093
928	23+47.11	LO. 00	CENTERLINE	13841249.584	3120239.891
929	26+77.33	LO. 00	CENTERLINE	13840972.225	3121860.688
930	30+07.55	RO. 00	CENTERLINE	13840694.861	3121681.482
931	33+37.63	RO. 00	CENTERLINE	13840417.617	3121502.352
932	36+67.71	RO. 00	CENTERLINE	13840140.372	3121323.222
933	39+97.71	RO. 00	CENTERLINE	13839863.187	3121144.132
934	43+27.64	RO. 00	CENTERLINE	13839586.068	3120965.084
935	46+57.57	RO. 00	CENTERLINE	13839308.949	3120786.035
936	49+87.50	RO. 00	CENTERLINE	13839031.831	3120606.987
53	53+17.17	LO. 06	CDH MON 53	13838754.896	3120428.127
937	53+17.43	LO. 00	CENTERLINE	13838754.896	3120428.127
938	56+47.52	RO. 00	CENTERLINE	13838477.456	3120248.804
939	59+77.61	RO. 00	CENTERLINE	13838200.200	3120069.670
940	63+07.69	RO. 02	CENTERLINE	13837922.954	3119890.536
941	66+37.78	RO. 00	CENTERLINE	13837645.702	3119711.401
942	72+94.68	RO. 00	CENTERLINE	13837095.661	3119356.017
943	81+13.99	RO. 00	CENTERLINE	13836405.769	3118910.273
70	81+23.97	RO. 05	CDH MON 70	13836397.432	3118904.822
944	84+31.33	RO. 00	CENTERLINE	13836141.010	3118739.211
945	89+44.19	RO. 00	CENTERLINE	13835708.462	3118459.738
946	97+44.65	RO. 00	CENTERLINE	13835010.067	3118008.501
947	105+95.17	RO. 00	CENTERLINE	13834321.744	3117563.772
948	122+45.92	RO. 00	CENTERLINE	13832935.932	3116668.067

## SAN JACINTO STREET

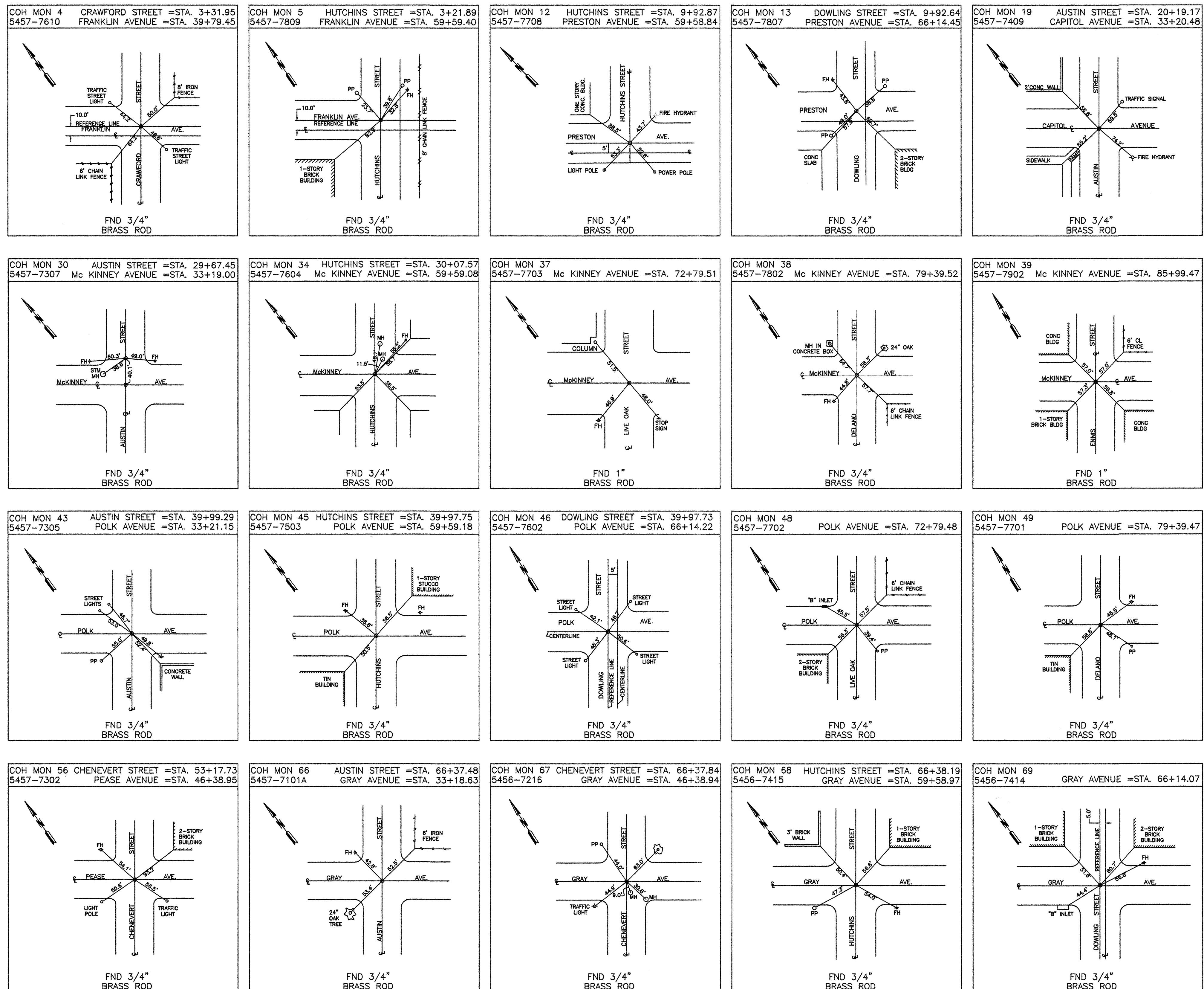
Pt#	Station	Offset	Description	Northing	Eastng
909	3+21.92	RO. 00	CENTERLINE	13842587.538	3123701.029
9	9+92.95	LO. 34	CDH MON 9	13842023.733	3123337.159
18	20+16.89	LO. 12	CDH MON 18	13841163.808	3122871.292
29	30+07.55	LO. 00	CDH MON 29	13840331.780	3122242.570
54	53+17.39	LO. 00	CDH MON 54	13838391.671	3120990.054
956	122+45.92	LO. 00	CENTERLINE	13832572.355	3117230.159

## CAROLINE STREET

Pt#	Station	Offset	Description	Northing	Eastng
910	3+21.92	LO. 00	CENTERLINE	13842408.574	3123978.090
5457-7204	53+17.46	LO. 43	CDH MON 819 3/4'	13838212.410	3121267.431
5457-7102	66+37.78	LO. 07	CDH MON 818 3/4'	13837103.620	3120500.611
5357-8601	72+92.49	RO. 03	CDH MON 817 1'	13836553.767	3120195.227
5356-8515	81+13.47	RO. 05	CDH MON 816 3/4'	13835864.204	3119749.677
957	122+45.92	LO. 00	CENTERLINE	13832393.319	3117507.220

## AUSTIN STREET

Pt#	Station	Offset	Description	Northing	Eastng
911	3+21.92	RO. 00	CENTERLINE	13842229.358	3124255.539
5457-7409	20+19.17	L1.47	CDH MON 19 3/4'	13840802.984	3123335.696
5457-7307	29+67.45	RO. 01	CDH MON 30 3/4'	13840072.292	3122819.837
5457-7101A	39+99.25	L2.14	CDH MON 43 3/4'	13839139.450	3122261.674
5457-7102	66+37.48				



NOTES:

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- ALL POINTS SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983, CORS 98 (EPOCH 2002.00).
- THE PRIMARY CONTROL POINTS USED FOR THIS PROJECT ARE CITY OF HOUSTON COOPERATIVE CORS MONUMENTS AS FOLLOWS:  
 COH2 NGS PID# DF773 N=13,793,560.9 E=3,108,315.43  
 COH3 NGS PID# DF775 N=13,800,460.33 E=3,155,320.54  
 COH4 NGS PID# DF777 N=13,851,729.27 E=3,168,870.88
- ALL MEASUREMENTS MADE WITH CONVENTIONAL SURVEYING EQUIPMENT WERE REDUCED TO GRID EMPLOYING A COMBINED SCALE FACTOR OF 0.999891800.

LEGEND

\*=MONUMENT NOT RECOVERED IN FIELD. POSITION CALCULATED FROM RECOVERED COH REFERENCE POINTS.



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CABLE COMPANY

RODS SURVEY, INC.  
6810 LEE RD.  
SPRING, TX 77379  
TEL: 281-257-4020

SURVEYED BY: L.A.  
FB NO. P-5428

CITY OF HOUSTON

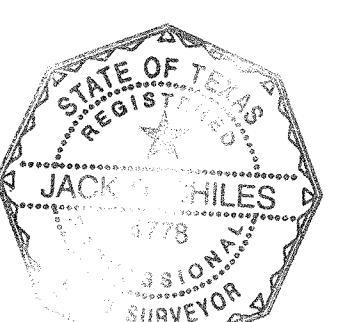
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

DOWNTOWN CENTERLINE  
REFERENCE ROD SYSTEM  
REVITALIZATION

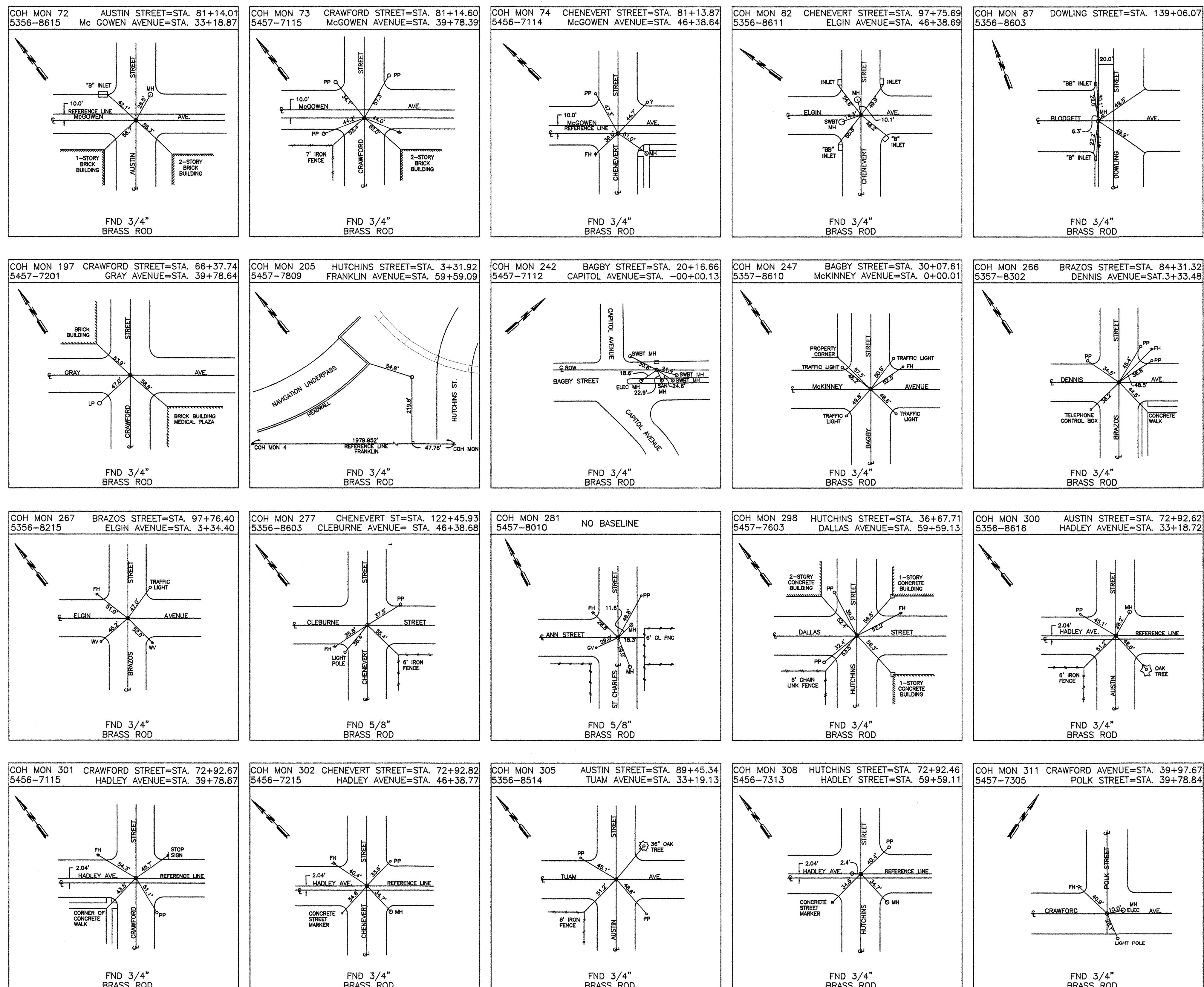
SHEET NO. 1

I, JACK CHILES, HEREBY CERTIFY THAT THIS DRAWING  
CORRECTLY REPRESENTS A SURVEY MADE ON THE GROUND  
BY ME, OR UNDER MY SUPERVISION.

*Jack Chiles*  
JACK CHILES  
R.P.L.S. #4778



GFS NUMBER	N-0645-04-3
DRAWING SCALE	N.T.S.
	CITY OF HOUSTON PM
	CITY OWNERSHIP NUMBER
	46402
SHEET NO.	5 OF 9



## NOTES:

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  - THE PRIMARY CONTROL POINTS USED FOR THIS PROJECT ARE CITY OF HOUSTON COOPERATIVE CORS MONUMENTS AS FOLLOWS:
- COH2, NGS PID# DF8773 N=13,793,560.98 E=3,108,315.43  
COH3, NGS PID# DF8774 N=13,800,460.33 E=3,155,320.54  
COH4, NGS PID# DF8777 N=13,851,29.27 E=3,168,870.88

- ALL MEASUREMENTS MADE WITH CONVENTIONAL SURVEYING EQUIPMENT WERE REDUCED TO GRID EMPLOYING A COMBINED SCALE FACTOR OF 0.999891800.

## LEGEND

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FB NO. P-5428

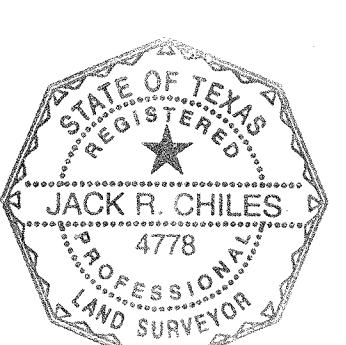
**CITY OF HOUSTON**  
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

DOWNTOWN CENTERLINE  
REFERENCE ROD SYSTEM  
REVITALIZATION

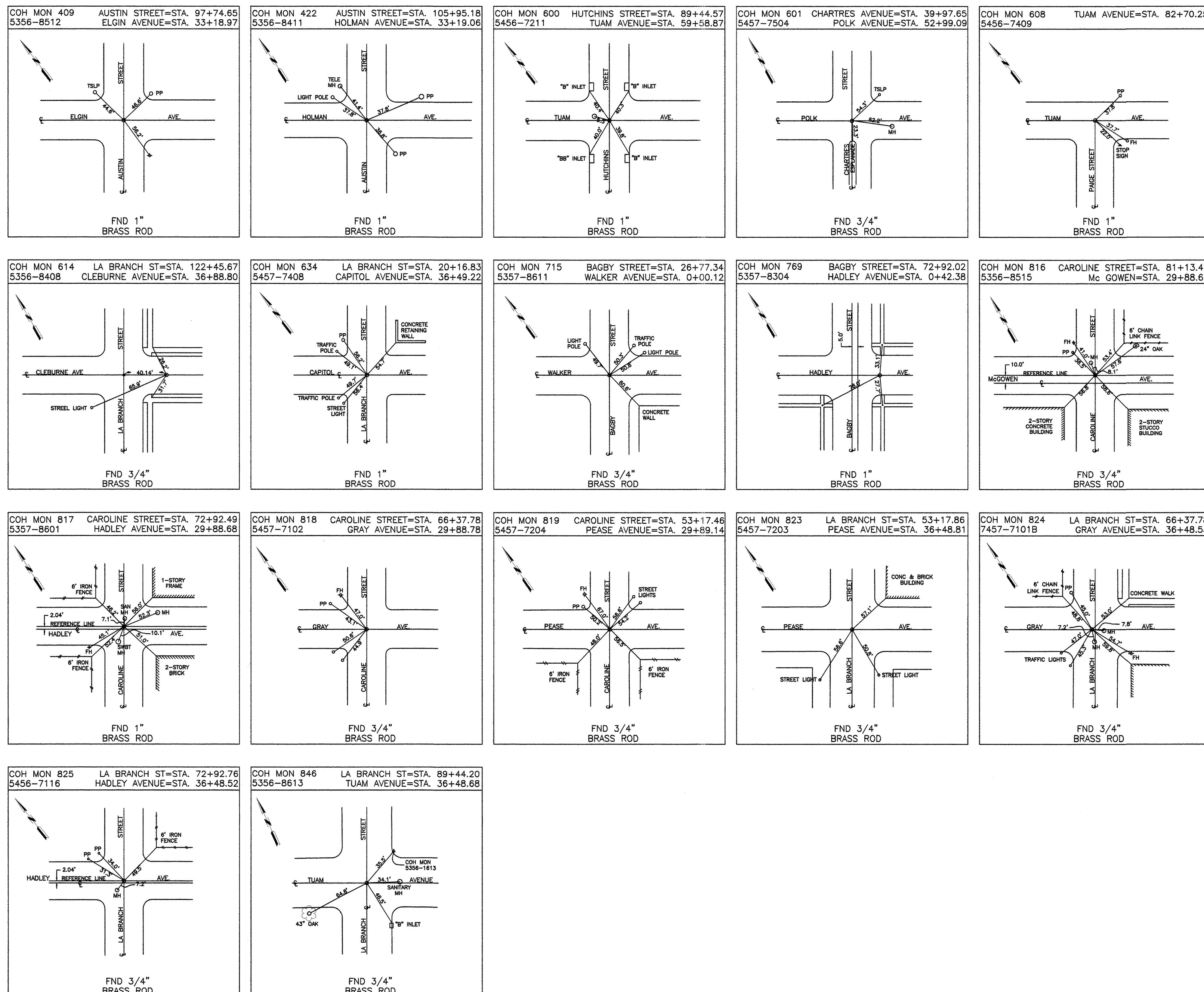
SHEET NO. 2

I, JACK CHILES, HEREBY CERTIFY THAT THIS DRAWING  
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BY ME, OR UNDER MY SUPERVISION.

*Jack Chiles*  
JACK CHILES  
R.P.L.S. #4778



GFS NUMBER	N-0645-04-3
DRAWING SCALE	N.T.S.
CITY OF HOUSTON PM	
SHEET NO.	6 OF 9



NOTES:

1. ALL COORDINATES SHOWN HEREON ARE EXPRESSED IN U.S. SURVEY FEET.

2. ALL POINTS SHOWN HERON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983, CORS 96 (EPOCH 2002.00).

3. THE PRIMARY CONTROL POINTS USED FOR THIS PROJECT ARE CITY OF HOUSTON COOPERATIVE CORN MONUMENTS AS FOLLOWS:

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COH3, NGS PID# DF8775 N=13,800,460.33 E=3,155,320.54  
COH4, NGS PID# DF8777 N=13,851,729.27 E=3,168,870.88

4. ALL MEASUREMENTS MADE WITH CONVENTIONAL SURVEYING EQUIPMENT WERE REDUCED TO GRID EMPLOYING A COMBINED SCALE FACTOR OF 0.999891800.

LEGEND

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CITY OF HOUSTON  
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

DOWNTOWN CENTERLINE  
REFERENCE ROD SYSTEM  
REVITALIZATION

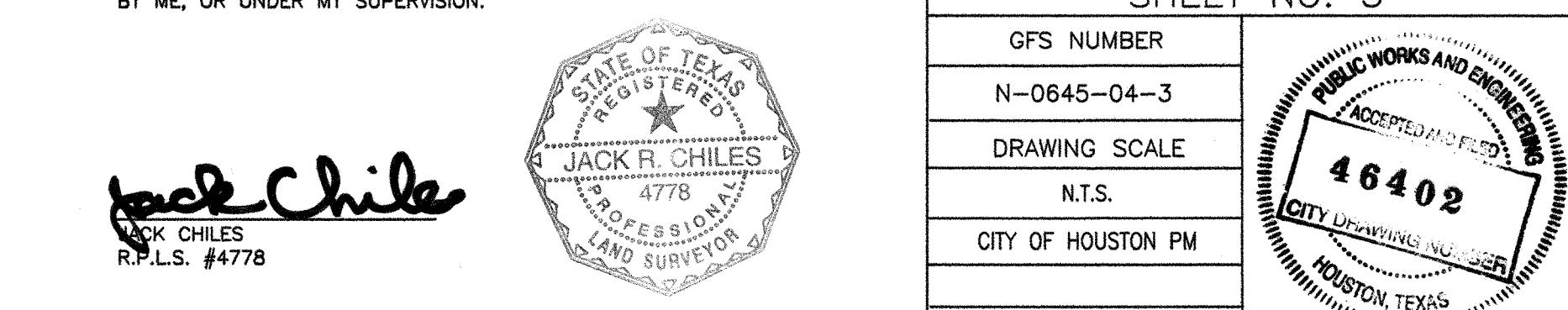
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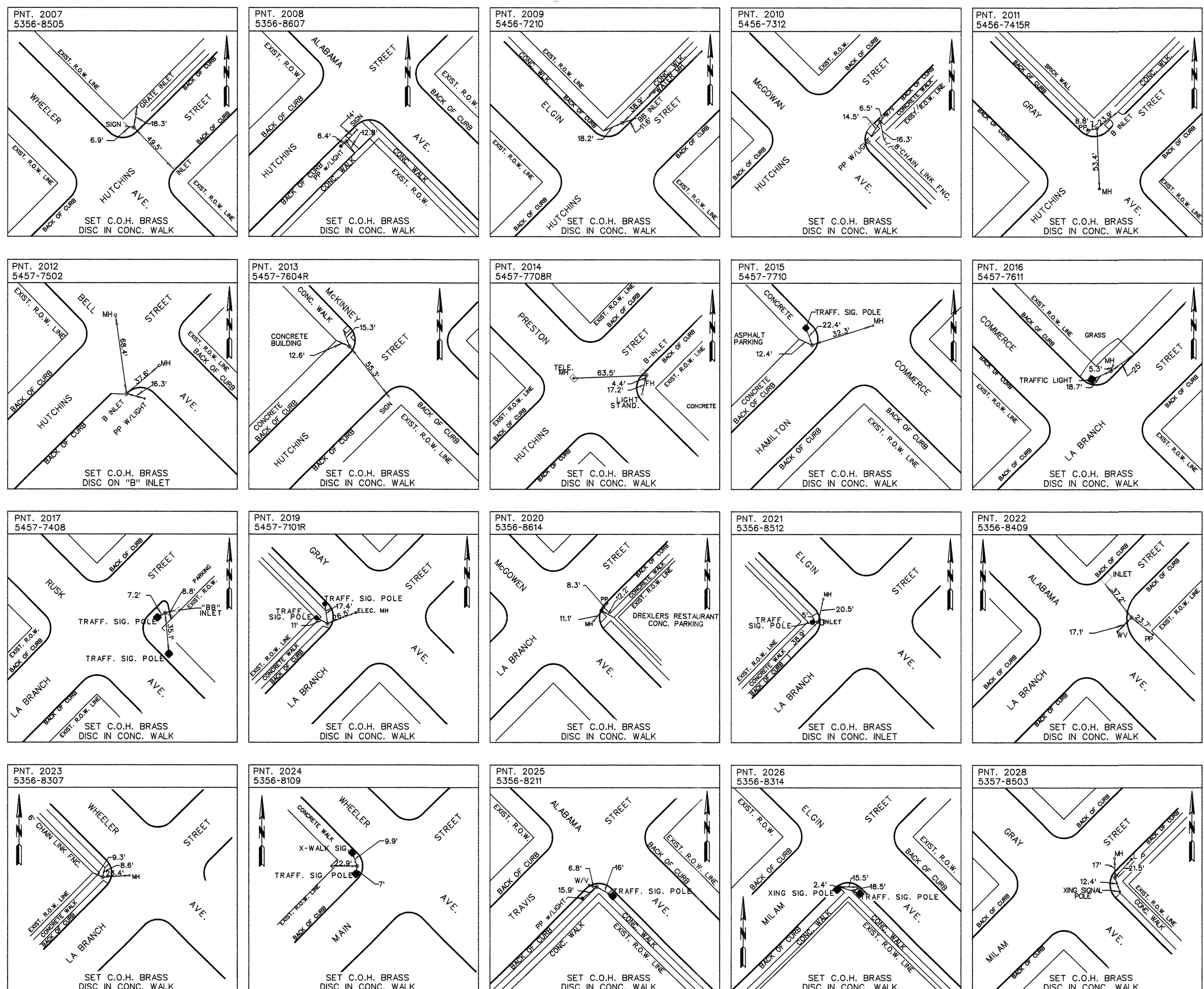
DRAWING SCALE  
N.T.S.

CITY OF HOUSTON PM

SHEET NO. 7 OF 9



*Jack Chiles*  
JACK CHILES  
R.P.L.S. #4778



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 COH3, NGS PID# DF8775 N=13,800,460.33 E=3,155,320.54  
 COH4, NGS PID# DF8777 N=13,851,729.27 E=3,168,870.88
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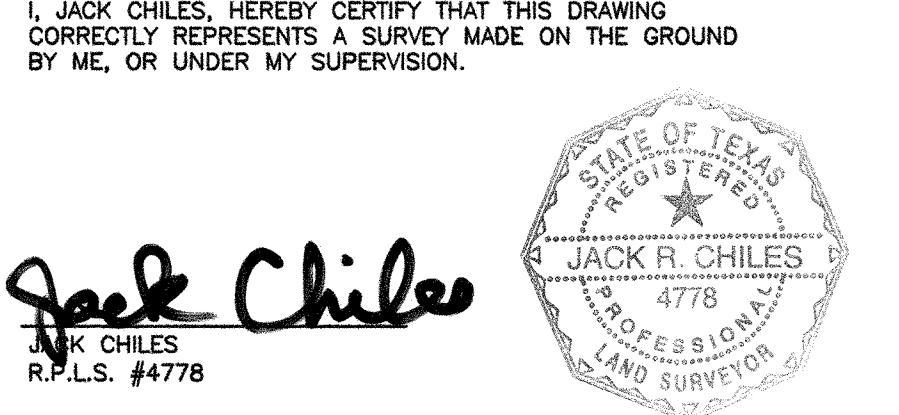
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FB NO. P-5428

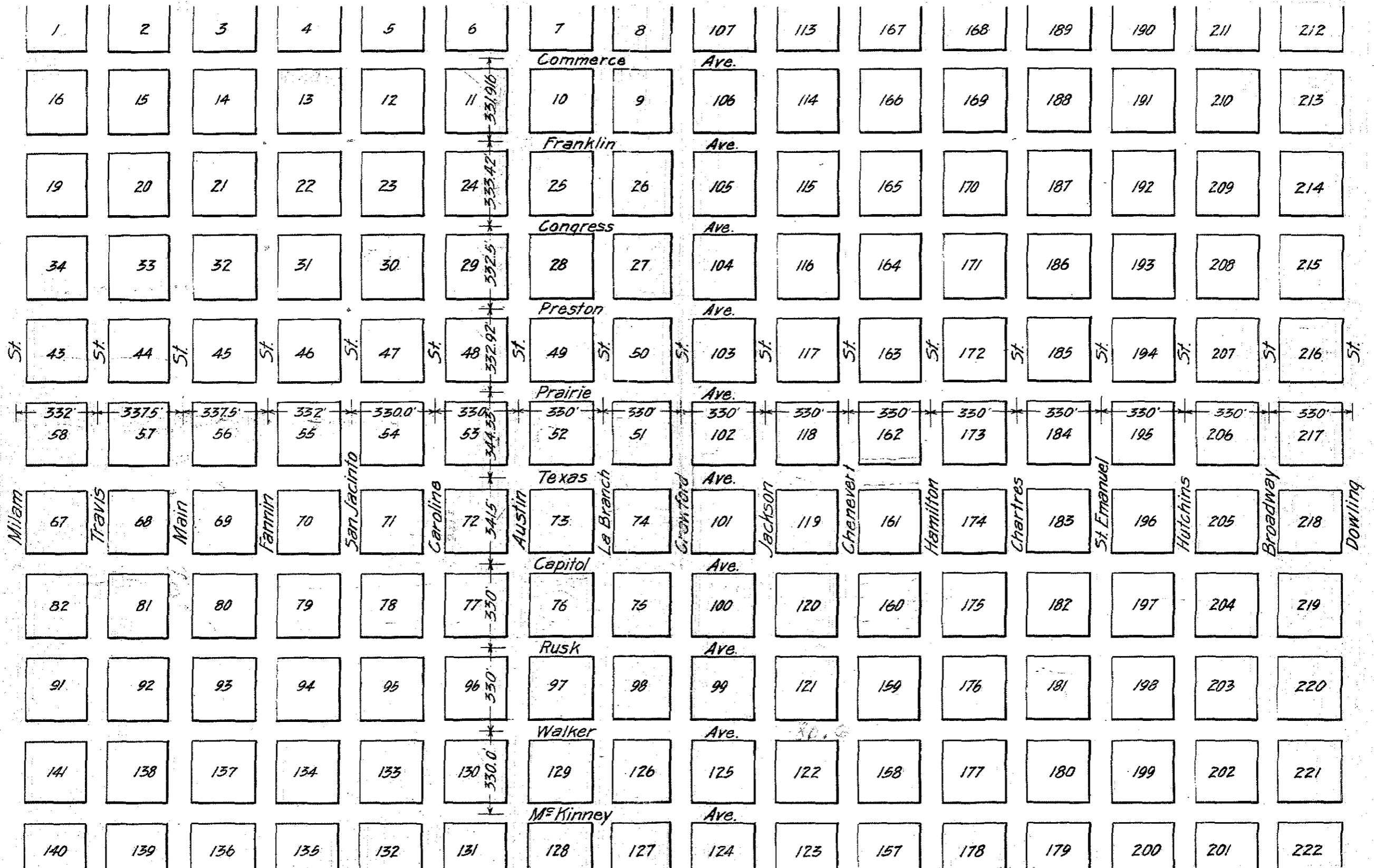
**CITY OF HOUSTON**

DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

DOWNTOWN CENTERLINE  
REFERENCE ROD SYSTEM  
REVITALIZATION

SHEET NO. 4





MAP SHOWING EXCESS IN CITY BLOCKS

Houston, Texas Nov. 21st, 1913

Scale: 1" = 400'

Approved

J. Block  
City Engr.

Traced by W.J. Carlin  
Checked by J. Block

Drawing N 51-130-S.

# RODS

## Surveying, Inc.

### Report on Dependent Resurvey of City of Houston Street Centerlines

Gentlemen—I have the honor to make the following report on the survey of the reestablishment of certain street centerlines within the City of Houston. These street centerlines are bounded by Commerce Avenue on the north, Dowling Street on the east, Cleburne Street on the south and Bagby Street on the west.

This project has been authorized by and through the Houston Department of Public Works and Engineering. The reason for its necessity is due to the inevitable mortality of long-standing monumentation, especially those located in a rapidly changing area such as downtown Houston.

This project, by its nature, is a dependent resurvey of the work performed by William H. Griffin, the City of Houston Engineer and Surveyor, in the early summer of 1868.

In Brown's Boundary Control and Legal Principles, a dependent resurvey is defined as thus, "A dependent resurvey is first a retracement of all recoverable evidence of the original corners and lines and then a reestablishment of lost or obliterated....lines in accordance with the best available evidence and applicable rules of survey." Further, in a legal proceeding in California, the definition of a dependent resurvey was stated as, "A retracement and reestablishment of the lines of the original survey in their true original positions according to the best available evidence of the original corners." (I) Interior Board of Land Appeals, Theodore J. Vickman 132 IBLA 317 (May 8, 1995).

My job is clear: Define where the original monuments were set, by discreetly using existing evidence that accurately places the monuments in their original positions.

There are several guidelines to help the surveyor accurately reestablish original positions. In Texas, the primary guideline for evidentiary procedure is the legal concept of "dignity of calls." Court cases in Texas have been adjudicated, through the doctrine of precedence, by borrowing from other states and even the Federal court systems, decisions which were consistent with previously made verdicts concerning lawsuits related to real estate conflicts.

Texas laws mandate boundary reconstruction according to the Texas Administrative Code, Title 22, Part 29, Chapter 663, Subchapter B, Rule 663.16,

"(a) When delineating a property or boundary line as an integral portion of a survey, *the surveyor shall respect junior/senior property rights, footsteps of the original surveyor, intent of the parties involved, the proper application of the rules of dignity or the priority of calls, and applicable statutory and case law of Texas.* (Italics added)

(b) Appropriate deeds and/or other documents including those for adjoining parcels shall be relied upon for the location of the boundaries of the subject parcel(s).

(c) A land surveyor assuming the responsibility of performing a land survey also assumes the responsibility for such research of adequate thoroughness to support the determination of the location of intended boundaries of the land parcel surveyed. The surveyor may rely on record data related to the determination of boundaries furnished for the registrants' use by a qualified provider, provided the registrant reasonably believes such data to be sufficient and notes, references, or credits the documentation by which it is furnished."

The dignity of calls mentioned above is also defined in a different Chapter of the same Code. According to the Texas Administrative Code, Title 31, Part 1, Chapter 7, Rule 7.5. The order of dignity of calls in a survey is as follows:

- (1) Natural objects (rivers, etc.).
- (2) Artificial objects (marked trees, stone mounds, adjoinder calls, etc.).
- (3) Courses (bearings).
- (4) Distances.
- (5) Acreage.

Similarly, in Stafford vs. King, Supreme Court of Texas, 30 Tex. 257, April 1867, "The general rules as to controlling calls are: 1, natural objects; 2, artificial objects, course and distance".

Let me explain Mr. Griffin's task and why it was necessary at that time. Mr. Griffin had been directed by the City of Houston to resolve problems concerning the street rights-of-way in and near to downtown Houston in 1868. He made a boundary survey of Houston, and then he resolved the boundary conflicts, at least in that part of Houston, by reapportioning Blocks 1-4, 13-16, 19-22, 31-34, 43-46, 55-58, 67-70 of what is now called South Side, Buffalo Bayou (S. S. B. B.), the original map of downtown Houston (Figure 1). The reapportionment clearly explained and defined the excesses and deficiencies that existed among the streets and blocks at that time and then cured them. It also gave us permanent, controlling monumentation for all of the streets in downtown Houston, even unto today.

After I began to understand what Mr. Griffin's goals were, I also learned what he was thinking when he had finished the project. He said, "Without establishing centers, were two different surveyors required to locate two different blocks near, say, Nat Wilson's, and each to use every precaution to insure accuracy in locating from the Ennis Corner, it would not be unreasonable to suppose that they would differ as much as eight or ten feet. With the established centers no error over a few inches ever can arise." He also goes on to say, "Every surveyor in the city except one has agreed to conform to the points established. All should be required to do so. I have driven about one hundred (100) iron centers and two hundred and fifty (250) cedar centers at a cost to the city of about two hundred and five (\$205) dollars in city scrip." He was explaining that if every one used the same nearby control points, there would be few, if any, substantive differences in the location of property lines in those areas.

The City of Houston did adopt his survey and map, passing a resolution on September 4, 1868, mandating the use of his "street centers" for all surveys in the areas where he set them. Another drawing was made at a later date (1913), compiling data from Mr. Griffin's map which showed the dimensions of those blocks that were reapportioned. That drawing is now in the City of Houston File Room and the City of Houston Survey Department under Drawing Number 51-130-S (Figure 2).

The original centers were perpetuated (3/4-inch brass rods were set for all of the cedar centers) through time by the City of Houston Survey department, even to the extent of having cast iron "cans" made for them. These cast iron sleeves were twelve (12) inches in diameter (interior), about three (3) feet long and came with a cast iron lid which had two small holes which allowed removal of the lid when a surveyor needed to occupy the street center while performing his surveying duties. These structures were placed around many of the street centers so as to protect them and allow for easy access through the asphalt paving.

In or around 1995, METRO and the City of Houston came to the decision to place concrete paving on Smith, Louisiana, Milam, Travis, Main, Fannin and San Jacinto Streets from downtown to the Medical Center, which is approximately 4.15 miles to the south. An unfortunate side effect of this project was the destruction of every street center (69 in all) on those seven streets. The City of Houston, aware of the upcoming construction, set reference points for many of the street centers, thereby allowing perpetuation of those street centers. However, the construction entailed removing everything from the face of the building wall on one side of the street to the face of building wall on the other side of the street, thereby destroying the reference marks also. Other significant downtown construction included the new baseball stadium, the racetrack down Austin Street, The George R. Brown Convention Center, the Compaq Center, and the Cotswold Project, which renovated several streets near the north end of downtown Houston. All told, approximately ninety (90) street centers were obliterated, or destroyed to the extent they can no longer be reliably recovered by existing evidence.

I had to decide what type of monumentation would be of use to me in relocating the original street centers. Fortunately, I still had many street centers which were not destroyed, and other existing evidence in the form of City of Houston survey drawings which clearly showed the establishment of property corners and even building corners, using the street centers as control just as Mr. Griffin had envisioned. I labeled extant evidence into four (4) categories:

- 1 – Original, undisturbed monuments.
- 2 – Reference points set by the City in the late 1990's.
- 3 – Property corners set by the City.
- 4- Building corners tied by the City which are referenced directly to the centerlines. (This Category is used only as a check to the centerlines when there are higher levels of monuments used for the construction of said centerlines).

RODS Surveying, Inc. located approximately 76 street centerline monuments. I was only able to recover about two dozen Category 2 and 3 monuments, and only about a dozen Category 4 monuments, at least monuments which I felt were previously established points.

I imagine that hundreds, perhaps thousands of property corners were set by private firms and individuals in this area, using the street centerlines, but since the methodology and actual field notes for those surveys were not available to me, I decided to use only the surveys performed by the City of Houston which had field notes and drawings to accompany them. These surveys were always performed with the greatest of care, using street centerlines in almost every instance, to set or tie monuments. The building corners were tied to the street centerlines by reading the chains as they were swung in arcs crossing the centerline and thus assuring a reading at right angles to the centerline, making for the most accurate of measurements available at that time. In many instances this resulted in distances from the centerlines to the building corners being measured to the nearest hundredth of a foot, or about to the 1/8 of an inch.

Mr. Griffin stated in his report, "Upon consulting with the several engineers and surveyors, it was determined to take the center of Main Street, as agreed upon by all surveyors, as the basis for all streets running parallel thereto, and for the streets perpendicular to Main, the centerline of Commerce Street, as established by order of Council, by Messrs. Powars, Kosse, and Converse in 1863, and the centerline of Galveston Railway as established at the time of its location for the center of McKinney Street". My initial focus was to relocate the centerlines of Main Street and McKinney Street, thereby reestablishing the same two (2) primary centerlines as did Mr. Griffin.

Employing GPS technology, using double occupations for at least one (1) hour periods, control points were set at various points throughout the project. The resulting data was placed into a project file and processed using Trimble software, with all measurements being adjusted using the least squares method to arrive at the final positions for those control points. Densification, if necessary, was employed using both GPS and conventional technology to establish positions for all control points. Elevations were not considered necessary, so after the results for original control points were obtained, elevations were not calculated for any conventional observations. All conventional observations to recovered control were observed turning a set (2 angles) from one backsight and a second set from a different backsight, thereby allowing for two independent positions to be calculated, thus assuring positional accuracy and redundancy.

I decided to work in true grid coordinates, so as to allow any one to apply a more constrained Project Scale Factor to any work within this area. All coordinates and bearings shown herein are referenced to the Texas Coordinate System, North American Datum of 1983, CORS 96 Epoch 2002.00, 2001 Adjustment, South Central Zone. All coordinates are expressed in units of U. S. Survey feet and are true grid coordinates.

The Project Control Points used for this Project are City of Houston Cooperative CORS Monuments COH2 NGS PID # DF8773, with published coordinates of Northing = 13,793,560.96, Easting = 3,108,315.43; COH3, NGS PID # DF8775, Northing = 13,800,460.33, Easting = 3,155,320.54; COH4, NGS PID # DF8777, Northing = 13,851,729.27, Easting = 3,168,870.88.

McKinney Street had twelve (12) original monuments set from Louisiana Street to Ennis Street and two (2) more were set at some time later due to proximity factors. Seven (7) monuments are still extant. These monuments are still in remarkably close alignment to each other. From Bagby Street (Monument #247) to Ennis Street, a distance of 8,600 feet, there is a total variance of only 0.17 feet. This made the determination of the center alignment of McKinney very simple.

Friday, March 28, 2008

Applying linear regression mathematics to the McKinney monuments, I determined the centerline to have a bearing of South 57° 08' 24.0" East.

Main Street was more difficult to resolve. The METRO construction had destroyed all of the eighteen (18) original monuments within its right-of-way, along with almost all of the recovery points set by the City of Houston. Fortunately, recovery points which had been set outside the right-of-way on Main Street at two (2) locations were recovered and I was able to reestablish the original positions of their respective monuments. However, I felt more evidence was necessary to reestablish the centerline of Main Street with a high degree of certainty. I located and tied five (5) historical buildings which were tied to the centerline of Main Street and shown in City of Houston drawings 51-63D-s, 51-63C-S, 51-63A-S, 51-307A-S and 29-5B-S. I held the building as shown in drawing #51-63A-S in Lot 4, Block 33 (S. S. B. B.), as being 45.00 feet from the centerline of Main Street and checked to the southeast corner of the Rice Hotel (Block 57, Drawing # 51-307A-S) within 0.05 feet, and when I extended this line to the south I checked to the two easterly corners of the building as shown in drawing # 29-5B-S within 0.02 feet. I believe this alignment to be as close as possible to the original centerline of Main Street. When I applied the same baseline to San Jacinto, Caroline and Austin Streets, the existing centerlines fit very well.

I now had baselines for all streets parallel to Main and McKinney. I used both linear regression and linear offset software applications in my attempt to resolve the original location of each centerline. Where there were no undisturbed monuments, reliable reference monuments or buildings, I felt compelled to use the rule of proration to reset the centerlines to their present location.

One of the most important factors I had to consider was which of the monuments to use as a basis for that street's centerline. Normally, if a surveyor finds a monument he believes to be undisturbed, he is bound, by law, to use it, no matter if it is in a different location than that reported on a plat or a metes and bounds description. However, this survey has an element which is not present in most surveys. Most surveys have a metes and bounds description and a plat. They do not discuss accuracy or precision with regard to the monuments after they were set, except with the statement concerning minimum standard accuracies. This survey has a statement made by the original surveyor *after* he had completed setting all of his street centers. Mr. Griffin states, "Every pains was taken to insure accuracy in my measurements, and in closing the several squares no error over two inches ever occurred." Now I also have a maximum error to consider when examining the merits of each monument. Using two inches as a rule, I can eliminate those monuments that differ by more than that amount from the group.

For example, if a total of five monuments were found along a centerline, and four match within a spread of four inches (0.33 feet) and a fifth is found to be ten inches (0.83 feet) from that theoretical alignment, there could be no conceivable alignment which would allow said monument to fit, therefore, it must be considered to be disturbed. This makes for a more disciplined and accurate arrangement to the street centerlines.

I also obtained information from long-time City of Houston employees concerning monuments which are obviously out of alignment. They informed me that, at times, when construction was in the area, that construction contractors would sometimes remove the monuments prior to the pouring of concrete or the re-laying of asphalt and then reset the monuments using less-than-

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accurate methods. This, obviously, would lead to considerable confusion as to the actual whereabouts of the original monument, due to the fact that the monuments were in place, appearing undisturbed (vertical and to a similar depth as others) and even, sometimes in its "can".

Please note that in the following paragraphs, I continually reference original street centers by using a number. The City of Houston assigned a unique number to every street center and showed the locations of said centers on a set of index maps. Copies of said index maps can be obtained from the City of Houston Survey Department.

## STREET-BY-STREET EXAMINATION

### Main Street and Those Parallel to Main

**Bagby Street** has three monuments defining its centerline. Numbers 242, 247 and 715 were all located and Number 247 was held.

**Brazos Street** has two monuments recovered (Numbers 266 and 267), but they were so divergent as to be unusable for the purpose of defining its' right-of-way. I believe this condition arises from construction in the area having disturbed both of them. Proration was used to reestablish its centerline.

**Smith Street** has no found original monumentation and proration was used to reestablish its centerline.

**Louisiana Street** has no original monuments still extant, but I was able to recover the COH reference points for three monuments. Two monuments (# 7 and # 40) align perfectly with the baseline. Number 15 is 0.26 feet to the east, therefore, I only referenced it.

**Milam Street** has no original monuments still extant. However, two sets of reference points (for monuments #7 and #16) were discovered and employed to reestablish the centerline. There was 0.28 feet of spread between the two, so I held the monument closest to the prorated distance between Louisiana and Travis.

**Main Street** has no extant original monumentation. However, two sets of reference markers were recovered for two monuments (# 5 and # 70). Moreover, checks were made to several tertiary monuments so as to satisfy any questions as to accurate reestablishment.

**Fannin Street** has no extant monumentation. No primary reference marks were recovered. However, the centerline was reestablished using a combination of tertiary monumentation (see COH Drawings # 51-14E-S and #51-44B-S and a check to the correct proration distance).

**San Jacinto Street** has no extant primary monumentation. However, five sets of reference markers (# 9, # 18, #186, #29, # 54) were recovered and the centerline was reestablished using these.

**Caroline Street** has four monuments still extant, with three (# 818, # 817 and # 816) of them being used to reestablish the centerline.

**Austin Street** has nine monuments still extant, with Numbers 30, 72, 305, 409 and 422 being used to reestablish the centerline.

**LaBranch Street** has six monuments still extant, with Numbers 823, 824, 825, 846 and 614 being used to reestablish the centerline.

**Crawford Street** has four monuments still extant (# 311, # 197, # 301, # 73) and number 197 was held.

**Chenevert Street** has seven monuments still extant (#56, # 67, # 302, # 74, # 82, # 860 and # 277) with numbers 74 and 277 being held for the centerline reestablishment.

**Hamilton, Chartres and St. Emanuel Streets** had no extant monuments. Therefore all were reestablished using proration.

**Hutchins Street** has eight extant monuments (# 5, # 12, # 34, # 298, # 45, # 68, # 308 and # 600). Number 34 was held for the centerline reestablishment.

**Broadway (Bastrop) Street** has no extant monuments. The centerline was reestablished by proration.

**Dowling Street** has four extant monuments (# 13, # 46, # 69 and # 87). Number 46 was held for the centerline reestablishment.

#### **McKinney Avenue And Those Parallel to McKinney**

**Franklin Avenue** has one extant monument (# 5) and one set of reference points for # 4. Both centerline points were held to reestablish the centerline.

**Congress Avenue** has no extant primary monuments and was reestablished by a combination of proration and ties to 4<sup>th</sup> order reference points.

**Preston Avenue** has four primary monuments extant (# 7, # 9, # 12 and # 13). Numbers 7, 9 and 12 were used to reestablish the centerline.

**Prairie and Texas Avenues** have no extant primary monumentation and their respective centerlines were reestablished using a combination of proration and ties to 4<sup>th</sup> order reference points.

**Capitol Avenue** has three primary monuments and three sets of secondary points (#242, # 15, # 16, # 18, # 19, and # 634). The centerline was reestablished holding Numbers 15, 16, 18 and 634.

**Rusk Avenue** has no extant primary monuments and the centerline was reestablished by proration.

**Walker Avenue** has one original monument (# 715) and one set of reference points (# 186). Both were used to reestablish the centerline. Ties to 4<sup>th</sup> order points fit within 0.06 feet. Please note that Walker has a right-of-way width of 80.60 feet.

**McKinney Avenue** was the basis of all streets running from the southeast to the northwest. The alignment of the six original monuments and the one set of reference points is remarkable. In a distance of more than 8,600 feet, there exists a spread of only 0.17 feet. This is remarkably precise surveying, not just for the 19<sup>th</sup> century, but even for today.

**Dallas Avenue** has one extant original monument (# 298). When checked against a prorated distance, the original monument fit very well, so it was held as the centerline.

**Polk Avenue** has seven extant original monuments (# 43, # 311, #601, # 45, # 46, # 47 and # 49) and one set of reference points (# 40). With the exception of # 43 (1.57 feet off line), the total spread was only 0.26 feet, which is, again, very precise surveying.

**Clay, Bell and Leeland Avenues** had no original extant monuments. They were all reestablished using proration.

**Pease Avenue** has three original extant monuments and three sets of reference points. Numbers 52, 54 and 819 were used to reestablish the centerline.

**Jefferson, Calhoun (St. Joseph Parkway) and Pierce Avenues** have no original extant monuments. These centerlines were reestablished using proration.

**Gray Avenue** has seven original extant monuments (# 818, # 66, # 824, # 197, # 67, # 68 and # 69). Numbers 818, 824, 197, and 67 were used to reestablish the centerline.

**Hadley Avenue** has seven original extant monuments (# 769, # 817, # 300, # 825, # 301, # 302 and # 308). Numbers 300 and 301 were held to reestablish the centerline.

**McGowen Street** has four extant original monuments (# 816, # 72, # 73 and # 74) and one set of reference points (# 70). Numbers 70 and 72 were held to reestablish the centerline.

**Dennis Street** has only one extant monument and it does not fit any existing monumentation or proration, so the centerline was reestablished by proration.

**Tuam Street** has four extant monuments. However, the deviation is so large that the reestablishment was determined through proration and then holding the closest monument to that line. Number 600 was held to reestablish the centerline.

**Elgin Street** has three original extant monuments (# 267, # 409 and # 82). Number 82 was held to reestablish the centerline.

**Holman Street** has only one original extant monument (# 422) and it was held to reestablish the centerline.

**Cleburne Street** has two extant original monuments (# 614 and # 277). Number 614 was held to reestablish the centerline.

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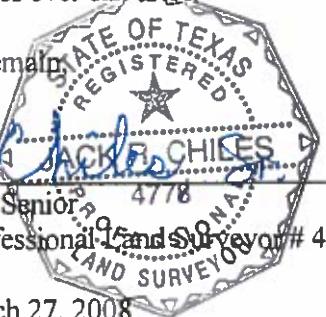
Now that I have calculated the centerlines of the streets listed above, I have also calculated coordinates in two or more locations on each centerline. These coordinates will be expressed in such a way that anyone who has access to the resultant survey maps will be able to rapidly and easily orient themselves to this survey. I have also included the coordinate positions for approximately 30 control points set for this project and all found original street centers and reference points set by the City of Houston. Should the City of Houston adopt this survey, these reestablished centerlines, due to evolving technologies, will be even more permanent in nature than the originals.

Some surveyors may have more information about these centerlines, due to historical data acquired by their companies as a matter of course, which would differ from the results which I have calculated. Unfortunately, I am not able to include that information into this project, due to unknown methodology and equipment by those private companies.

In the final assessment, these centerlines are not located in exactly the same location as those established in the summer of 1868, but I have taken every step to reestablish them as close as possible to their original positions. The resultant problem with regard to improvements that may encroach into the rights-of-way because of the reliance on the original centerlines, or even due to mistakes, could be resolved by allowing them to exist "as is", but everything built after the adoption of any new centerline resolution must adhere to the new alignments.

The result of the City of Houston approving this survey can be restated thusly, "Should it (the survey) not be done (approved), endless difficulties will arise. Should, however, the survey be adopted, a few, at first, who have encroached upon the streets, and some of them honestly, from erroneous surveys would kick against it. But every reasonable man would soon see the importance of it, and would then acknowledge the wisdom of the survey. Without (re)establishing centers, were two different surveyors required to locate two different blocks (and begin from different locations), it would not be unreasonable to suppose that they would differ (greatly). With the (re)established centers, no error over a few inches ever can arise."

I respectfully remain,

  
Jack R. Chiles, Senior  
Registered Professional Land Surveyor # 4778

Thursday, March 27, 2008