

# CITY OF HOUSTON

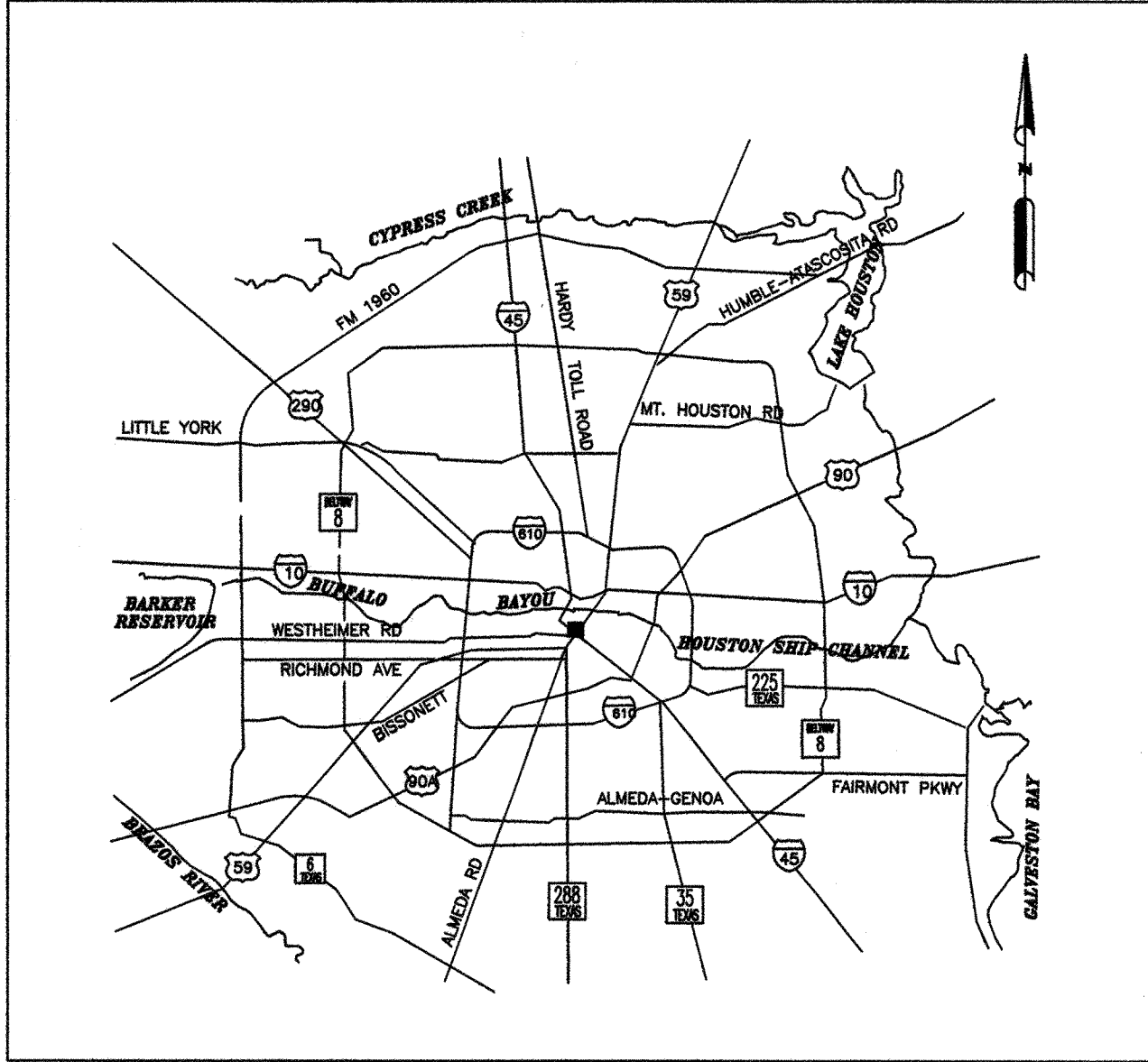
## DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

### ENGINEERING AND CONSTRUCTION DIVISION

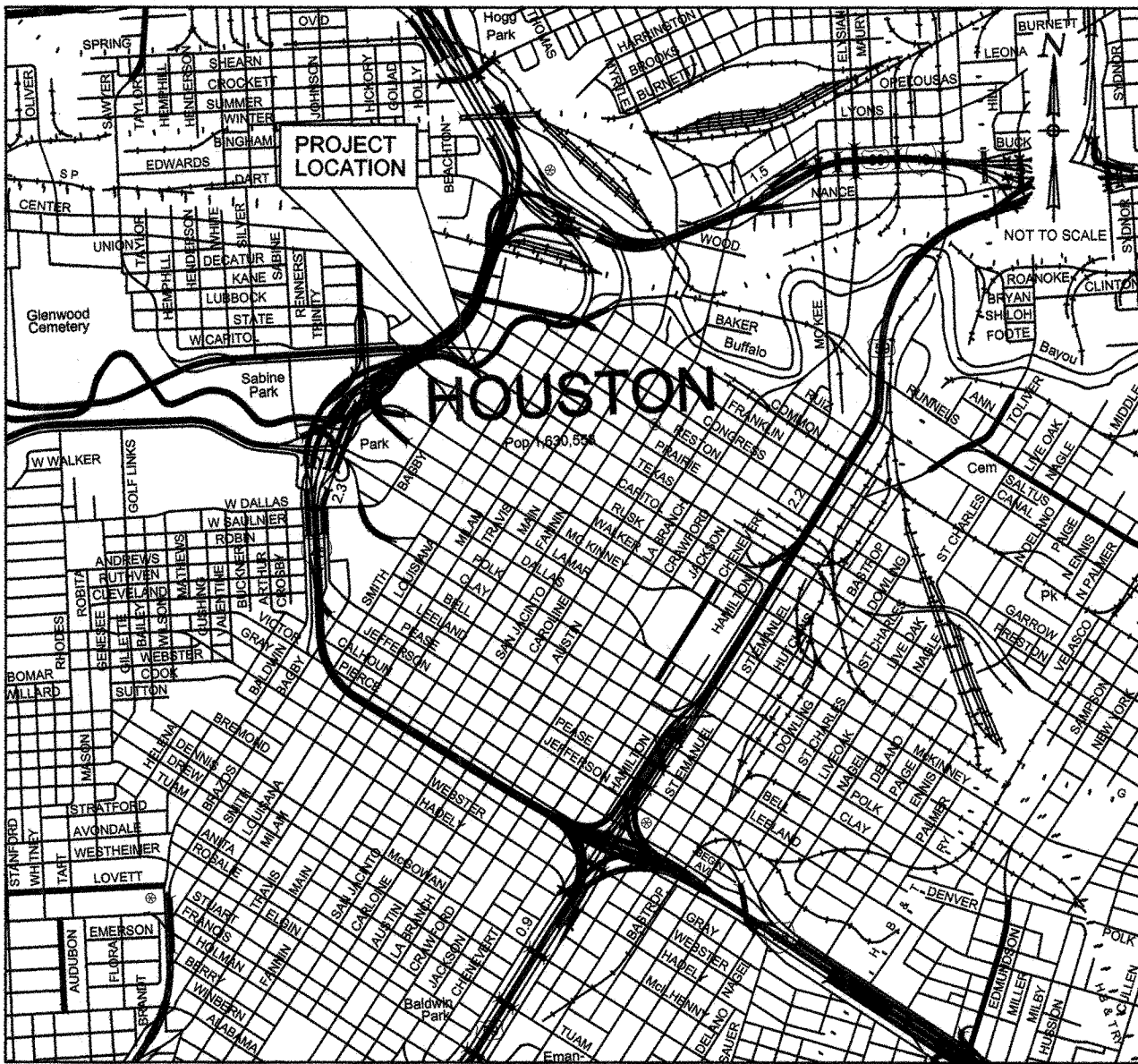
### DOWNTOWN CENTERLINE REFERENCE ROD SYSTEM

### 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



MAYOR  
BILL WHITE  
CONTROLLER  
ANNISE D. PARKER

DISTRICT  
COUNCIL MEMBERS

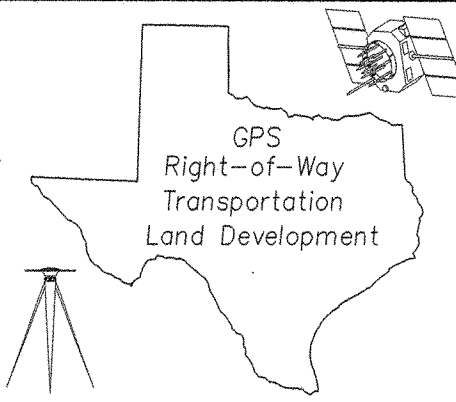
TONI LAWRENCE DISTRICT A	JARVIS JOHNSON DISTRICT B	ANNE CLUTTERBUCK DISTRICT C
WANDA ADAMS DISTRICT D	MIKE SULLIVAN DISTRICT E	M. J. KHAN, P.E. DISTRICT F
PAM HOLM DISTRICT G	ADRIAN GARCIA DISTRICT H	JAMES G. RODRIGUEZ DISTRICT I

COUNCIL MEMBERS  
AT-LARGE

PETER BROWN POSITION 1	SUE LOVELL POSITION 2
MELISSA NORIEGA POSITION 3	RONALD GREEN POSITION 4
JOLANDA "JO" JONES POSITION 5	

**RODS**  
Surveying, Inc.

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

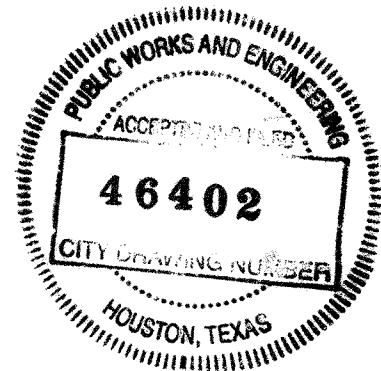


SURVEYED BY: L.A.  
FB NO. P-5428

CITY ENGINEER \_\_\_\_\_ DATE \_\_\_\_\_

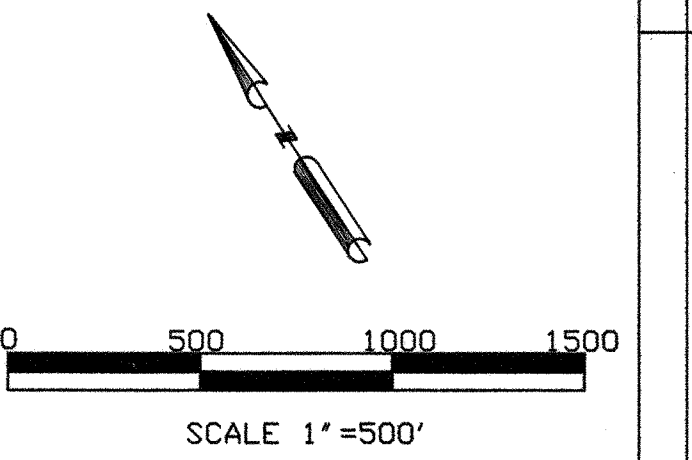
CITY SURVEYOR \_\_\_\_\_ DATE \_\_\_\_\_

DIRECTOR OF PUBLIC WORKS AND ENGINEERING \_\_\_\_\_ DATE \_\_\_\_\_



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





- NOTES:
1. ALL COORDINATES SHOWN HEREON ARE EXPRESSED IN U.S. SURVEY FEET.
  2. ALL POINTS SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983, CORRS 96 (EPOCH 2002.00).
  3. THE PRIMARY CONTROL POINTS USED FOR THIS PROJECT ARE CITY OF HOUSTON COOPERATIVE CORRS MONUMENTS AS FOLLOWS:  
COH2, NGS PID# DF8773 N=13,793,560.96 E=3,108,315.43  
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 0.999981800.
  5. THESE POINTS WERE SET AS ADDITIONAL CONTROL POINTS FOR THIS PROJECT.

LEGEND

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

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



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Right-of-Way  
Transportation  
Land Development

PRIVATE UTILITY LINES SHOWN

RELIANT ENERGY ENTEX, INC.
SWBT CO. VALID FOR ONE YEAR APPROVED ONLY FOR UNDERGROUND CONDUIT FACILITIES UNLESS NOTED.
RELIANT ENERGY HOUSTON LIGHTING & POWER CO. APPROVED ONLY FOR CROSSING UNDERGROUND DUCTLINES UNLESS NOTED. VALID AT TIME OF REVIEW ONLY.
CABLE COMPANY

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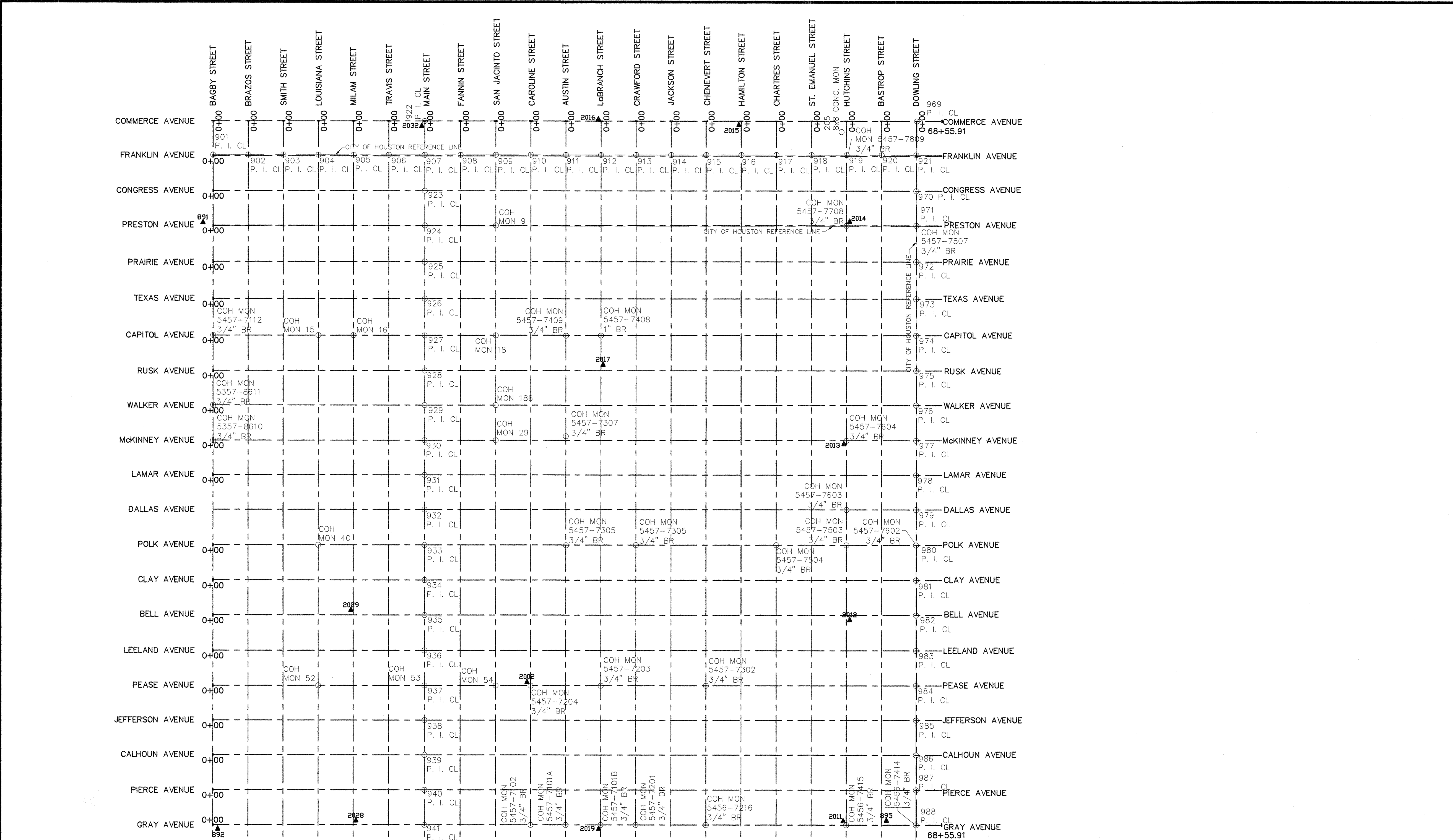
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FB NO. P-5428

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

**DOWNTOWN CENTERLINE  
REFERENCE ROD SYSTEM  
REVITALIZATION**

SHEET NO. 1

GFS NUMBER	N-0645-04-3
DRAWING SCALE	N.T.S.
CITY OF HOUSTON PM	46402
SHEET NO. 2 OF 9	



CONTROL POINTS

ORIG. COH-MON	NO.	Northings	Eastings	Description
4	5457-7610	13841870.988	3124810.289	COH MON 4 3/4" BR
5	5457-7809	13840796.740	3126473.479	COH MON 5 3/4" BR
9		13842023.733	3123337.159	COH MON 9
11		13841307.828	3124445.475	COH MON 11
12	5457-7708	13840233.460	3126108.874	COH MON 12 3/4" BR
13	5457-7807	13839877.930	3126659.708	COH MON 13 3/4" BR
15		13842069.236	3121379.460	COH MON 15
16		13841890.121	3121656.791	COH MON 16
18		13841163.808	3122448.449	COH MON 18
19	5457-7409	13840802.984	3123335.696	COH MON 19 3/4" BR
20		13840331.780	3122243.570	COH MON 20
29	5457-7307	13840007.292	3122819.837	COH MON 30 3/4" BR
34	5457-7604	13838541.110	3123501.729	COH MON 34 3/4" BR
37	5457-7703	13837824.782	3126124.930	COH MON 37 1" BR
38	5457-7802	13837466.590	3126679.327	COH MON 38 3/4" BR
39	5457-7902	13837108.430	3127233.634	COH MON 39 1" BR
40		13840405.934	3120304.436	COH MON 40
43	5457-7305	13839139.450	3122261.674	COH MON 43 3/4" BR
45	5457-7503	13837709.371	3124478.449	COH MON 45 3/4" BR
46	5457-7602	13837353.980	3125028.696	COH MON 46 3/4" BR
48	5457-7702	13836992.980	3125587.497	COH MON 48 3/4" BR
49	5457-7701	13836635.020	3126141.979	COH MON 49 3/4" BR
52		13838293.622	3119888.138	COH MON 52
53		13838754.896	3120428.127	COH MON 53
54		13838991.671	3120990.054	COH MON 54 3/4" BR
56	5457-7302	13837317.020	3122653.125	COH MON 56 3/4" BR
66	5457-7101A	13836924.903	3120587.849	COH MON 66 3/4" BR
67	5456-7216	13836208.215	3121936.718	COH MON 67 3/4" BR
68	5456-7415	13835491.685	3123045.344	COH MON 68 3/4" BR
69	5456-7414	13835036.239	3123580.428	COH MON 69 3/4" BR
70		13836397.432	3121890.422	COH MON 70
72	5356-8615	13835684.590	3120006.753	COH MON 72 3/4" BR
73	5456-7111A	13835066.219	3120580.428	COH MON 73 3/4" BR
74	5356-8611	13834968.609	3121135.433	COH MON 74 3/4" BR
82	5356-8611	13835202.765	3120233.635	COH MON 82 3/4" BR
87	5356-8603	13835043.128	3119638.997	COH MON 87 3/4" BR
186		13840609.123	3122422.855	COH MON 186
197	5457-7201	13835656.568	3121382.120	COH MON 197 3/4" BR

CONTROL POINTS

ORIG. COH-MON	NO.	Northings	Eastings	Description
205	5457-7809	13841007.095	3126552.496	COH MON 205 8" x 8" CONC MKR
242	5457-7112	13842656.810	3120547.746	COH MON 242 3/4" BR
247	5357-8610	13841774.400	3120010.105	COH MON 247 3/4" BR
266	5357-8302	13837037.900	3117346.828	COH MON 266 5/8" IR
267	5356-8215	13835907.623	3116617.640	COH MON 267 5/8" IR
277	5356-8603	13831497.390	3118893.049	COH MON 277 3/4" BR
281	5457-8010	13841737.860	3128458.294	COH MON 281 5/8" IR
298	5457-7603	13837996.620	3124657.518	COH MON 298 3/4" BR
301	5456-7115	13836016.460	3121026.714	COH MON 301 3/4" BR
302	5456-7215	13835658.168	3121581.121	COH MON 302 3/4" BR
305	5356-8514	13834996.184	3119575.820	COH MON 305 3/4" BR
308	5456-7311	13834506.070	3122984.037	COH MON 308 3/4" BR
311	5457-7305	13838783.950	3122815.014	COH MON 311 3/4" BR
404		13841133.606	3122567.348	COH MON 404
409	5356-8512	13834289.700	3119125.630	COH MON 409 1" BR
422	5356-8411	13833600.460	3118680.415	COH MON 422 1" BR
600	5456-7211	13833554.540	3121793.614	COH MON 600 1" BR
601	5457-7504	13833067.616	3123984.037	COH MON 601 3/4" BR
608	5456-7409	13832201.558	3123735.910	COH MON 608 1" BR
614	5356-8408	13832013.530	3118095.295	COH MON 614 3/4" BR BENT
634	5457-7408	13834066.580	3123613.108	COH MON 634 1" BR
715	5357-8611	13842051.752	3120189.411	COH MON 715 3/4" BR
769	5357-8304	13838152.788	3117720.587	COH MON 769 1" BR
816	5356-8515	13833864.204	3119749.677	COH MON 816 3/4" BR
817	5357-8405	13835533.767	3120195.227	COH MON 817 1" BR
818	5457-7102	13837103.620	3120550.611	COH MON 818 3/4" BR
819	5457-7204	13836212.410	3121267.431	COH MON 819 3/4" BR
820	5457-7203	13835854.150	3121860.688	COH MON 820 3/4" BR
824	5457-7101B	13836745.650	3121104.802	COH MON 824 3/4" BR
825	5456-7116	13836195.514	3121049.338	COH MON 825 3/4" BR
846	5356-8613	13834808.330	3119853.262	COH MON 846 3/4" BR

SEE NOTE 5 FOR MONUMENTS 891-896

891	5457-7114	13843542.430	3121037.020	GPS 1 SET BRASS DISK
892	5357-8405	13835657.360	3120189.411	GPS 2 SET BRASS DISK
893	5357-8011	13833873.030	3114913.400	GPS 3 SET BRASS DISK
894	5457-7715	13844548.560	3120569.910	GPS 4 SET BRASS DISK
895	5456-7414	13835322.780	3123384.830	GPS 5 SET BRASS DISK
896	5456-8605	13830294.490	3120112.820	GPS 6 SET BRASS DISK

CONTROL POINTS

CALC PT'S	Northings	Eastings	Description
901	13844030.215	3121467.573	CENTERLINE
902	13843851.173	3121744.754	CENTERLINE
903	13843676.131	3122021.934	CENTERLINE
904	13843493.090	3122299.114	CENTERLINE
905	13843313.971	3122576.414	CENTERLINE
906	13843133.787	3122853.364	CENTERLINE
907	13842950.615	3123138.998	CENTERLINE
908	13842767.585	3123422.293	CENTERLINE
909	13842584.538	3123701.029	CENTERLINE
910	13842408.574	3123978.265	CENTERLINE
911	13842229.558	3124255.539	CENTERLINE
912	13842050.492	3124532.448	CENTERLINE
913	13841876.807	3124809.630	CENTERLINE
914	13841692.388	3125086.840	CENTERLINE
915	13841513.330	3125364.047	CENTERLINE
916	13841334.159	3125641.427	CENTERLINE
917	13841154.989	3125918.807	CENTERLINE
918	13840975.937	3126196.003	CENTERLINE
919	13840796.885	3126473.199	CENTERLINE
920	13840617.795	3126750.454	CENTERLINE
921	13840438.711	3127027.509	CENTERLINE
922	13840259.626	3127304.564	CENTERLINE
923	13840080.542	3127581.619	CENTERLINE
924	13839901.457	3127858.674	CENTERLINE
925	13839722.373	3128135.729	CENTERLINE
926	13839543.288	3128412.784	CENTERLINE
927	13839364.203	3128689.839	CENTERLINE
928	13839185.118	3128966.894	CENTERLINE
929	13839006.033	3129243.949	CENTERLINE
930	13838826.948	3129520.004	CENTERLINE
931	13838647.863	3129797.059	CENTERLINE
932	13838468.778	3130074.114	CENTERLINE
933	13838289.693	3130351.169	CENTERLINE
934	13838110.608	3130628.224	CENTERLINE
935	13837931.523	3130905.279	CENTERLINE
936	13837752.438	3131182.334	CENTERLINE
937	13837573.353	3131459.389	CENTERLINE
938	13837394.268	3131736.444	CENTERLINE
939	13837215.183	3132013.499	CENTERLINE
940	13837036.098	3132290.554	CENTERLINE
941	13836857.013	3132567.609	CENTERLINE
942	13836677.928	3132844.664	CENTERLINE

CONTROL POINTS

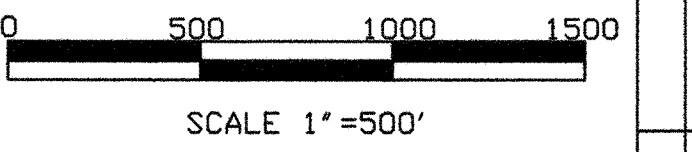
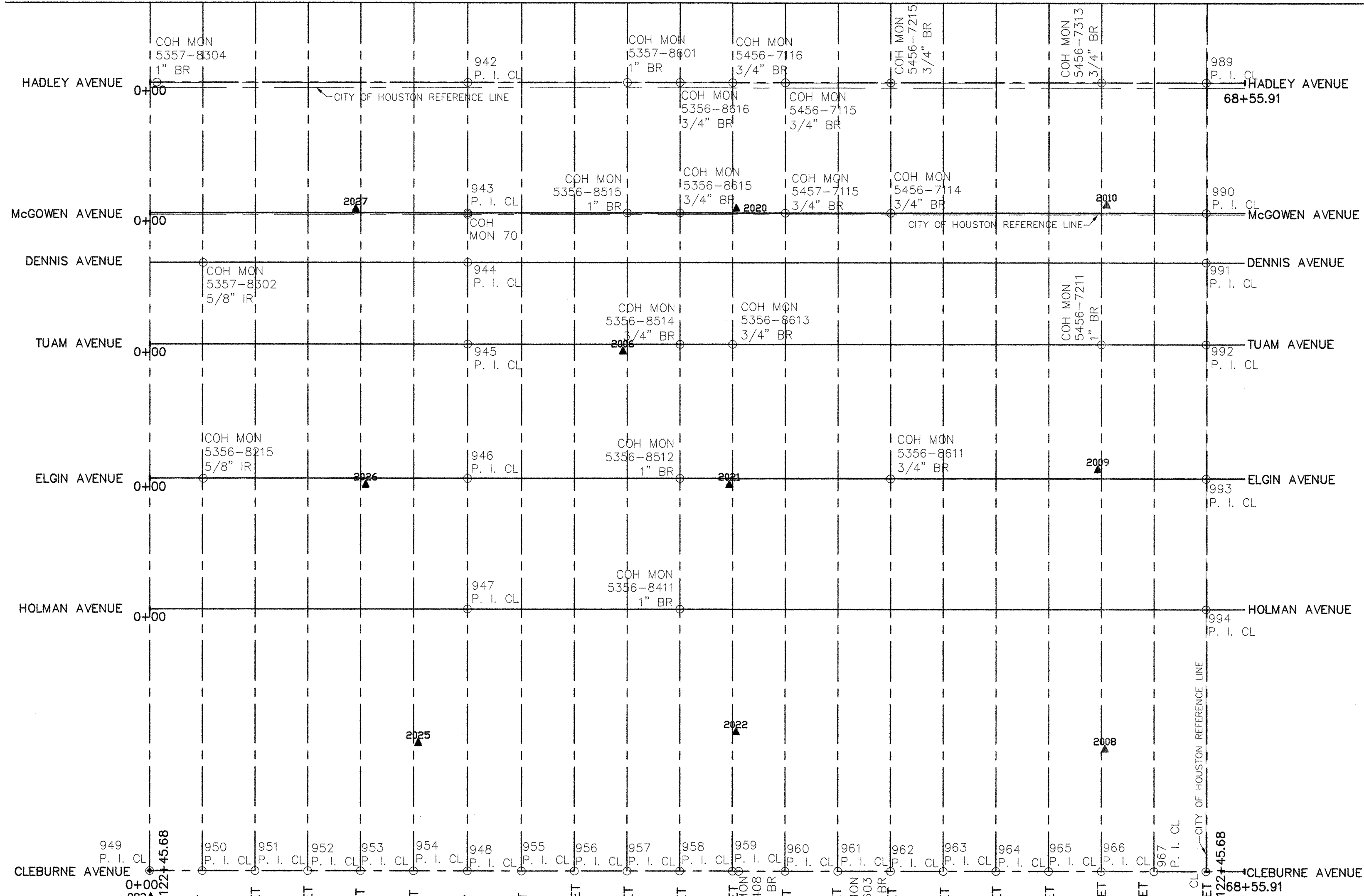
CALC PT'S	Northings	Eastings	Description
943	13836498.763	3133121.719	CENTERLINE
944	13836319.678	3133398.774	CENTERLINE
945	13836140.593	3133675.829	CENTERLINE
946	13835961.508	3133952.884	CENTERLINE
947	13835782.423	3134229.939	CENTERLINE
948	13835603.338	3134506.994	CENTERLINE
949	13835424.253	3134784.049	CENTERLINE
950	13835245.168	3135061.104	CENTERLINE
951	13835066.083	3135338.159	CENTERLINE
952	13834887.000	3135615.214	CENTERLINE
953	13834707.915	3135892.269	CENTERLINE
954	13834528.830	3136169.324	CENTERLINE
955	13834349.745	3136446.379	CENTERLINE
956	13834170.660	3136723.434	CENTERLINE
957	13833991.575	3136999.489	CENTERLINE
958	13833812.490	3137276.544	CENTERLINE
959	13833633.405	3137553.599	CENTERLINE
960	13833454.320	3137830.654	CENTERLINE
961	13833275.235	3138107.709	CENTERLINE
962	13833096.150	3138384.764	CENTERLINE
963	13832917.065	3138661.819	CENTERLINE
964	13832737.980	3138938.874	CENTERLINE
965	13832558.895	3139215.929	CENTERLINE
966	13832379.810	3139492.984	CENTERLINE
967	13832200.725	3139770.039	CENTERLINE
968	13832021.640	3140047.094	CENTERLINE
969	13831842.555	3140324.149	CENTERLINE
970	13831663.470	3140601.204	CENTERLINE
971	13831484.385	3140878.259	CENTERLINE
972	13831305.300	3141155.314	CENTERLINE
973	13831126.215	3141432.369	CENTERLINE
974	13830947.130	3141709.424	CENTERLINE
975	13830768.045	3141986.479	CENTERLINE
976	13830588.960	3142263.534	CENTERLINE
977	13830409.875	3142540.589	CENTERLINE
978	13830230.790	3142817.644	CENTERLINE
979	13830051.705	3143094.699	CENTERLINE
980	13829872.620	3143371.754	CENTERLINE
981	13829693.535	3143648.809	CENTERLINE
982	13829514.450	3143925.864	CENTERLINE
983	13829335.365	3144202.919	CENTERLINE
984	13829156.280	3144480.000	CENTERLINE
985	13828977.195	3144757.055	CENTERLINE

CONTROL POINTS

CALC PT'S	Northings	Eastings	Description
986	13828798.110	3145034.110	CENTERLINE
987	13828619.025	3145311.165	CENTERLINE
988	13828439.940	3145588.220	CENTERLINE
989	13828260.855	3145865.275	CENTERLINE
990	13828081.770	3146142.330	CENTERLINE
991	13827902		



MATCHLINE



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



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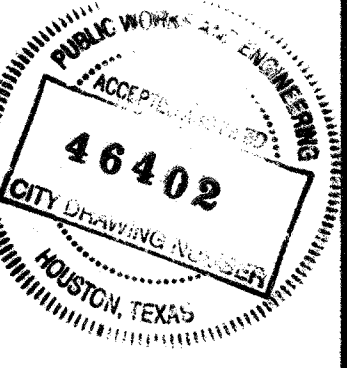
**DOWNTOWN CENTERLINE  
 REFERENCE ROD SYSTEM  
 REVITALIZATION**  
 SHEET NO. 2

GPS NUMBER  
 N-0645-04-3

DRAWING SCALE  
 N.T.S.

CITY OF HOUSTON PW

SHEET NO. 3 OF 9



ORIG. COH-MON NO.	Northing	Easting	Description
4	5457-7610	13841870.988	3124473.479
5	5457-7809	13842023.733	3123337.159
9	13841307.828	3124445.475	CDH MON 11 5/8" IR
11	5457-7708	13840233.460	3126108.874
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34	5457-7604	13838541.110	3125515.729
37	5457-7703	13837824.722	3126124.930
38	5457-7802	13837466.590	3126679.327
39	5457-7902	13837108.430	3127233.634
40	13840405.834	3120304.436	CDH MON 40 3/4" BR
43	5457-7305	13839139.450	3122261.674
45	5457-7503	13837709.371	3124478.449
46	5457-7602	13837353.980	3125028.696
48	5457-7702	13836992.980	3125087.497
49	5457-7701	13836635.020	3126141.979
52	13839397.222	3119888.138	CDH MON 52 3/4" BR
53	13838754.826	3120428.127	CDH MON 53 3/4" BR
54	13838391.671	3120990.054	CDH MON 54 3/4" BR
55	5457-7302	13837317.020	3122633.125
56	5457-7101A	13836924.903	3120827.819
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69	5456-7414	13835136.220	3123395.617
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73	5457-7115	13835052.239	3120563.428
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87	5356-8603	13833040.128	3119636.927
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197	5457-7201	13832656.568	3121382.120

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266	5357-8302	13837037.900	3117346.828
267	5356-8215	13835907.623	3116617.640
277	5356-8603	13831497.930	3118893.049
281	5457-8010	13841737.860	3128458.294
298	5457-7603	13837996.620	3124627.293
300	5356-8616	13836574.581	3120472.391
301	5456-7115	13836016.460	3121056.714
302	5456-7215	13835658.168	3121581.121
305	5356-8514	13834996.184	3119575.802
308	5456-7113	13834942.070	3122690.401
309	5457-7305	13837893.950	3122815.014
404	5456-8512	13834689.700	3119125.630
409	5356-8411	13833600.460	3118680.415
600	5456-7211	13833554.540	3121793.614
601	5457-7504	13833067.616	3123924.037
608	5456-7409	13832201.558	3123735.910
614	5356-8408	13832013.580	3118095.295
634	5457-7408	13834066.580	3123613.108
715	5357-8611	13842051.732	3120189.415
769	5357-8304	13838152.788	3117720.587
816	5356-8515	13835864.204	3119749.677
817	5357-8601	13835553.767	3120195.227
818	5457-7102	13838213.620	3120550.611
819	5457-7204	13838212.410	3121267.431
823	5457-7203	13837954.150	3121821.337
824	5456-7101B	1383745.630	3121104.802
825	5456-7116	13836195.514	3121074.338
846	5356-8613	13834808.330	3119853.262

SEE NOTE 5 FOR MONUMENTS 891-896  
 891 5457-7114 13843542.430 3121037.020 GPS 1 SET BRASS DISK  
 892 5357-8405 13838667.360 3118056.630 GPS 2 SET BRASS DISK  
 893 13837874.711 3124573.039 GPS 3 SET BRASS DISK  
 894 5457-7715 13844548.560 3125669.910 GPS 4 SET BRASS DISK  
 895 5456-7414 13835322.780 3123384.830 GPS 5 SET BRASS DISK  
 896 5356-8605 13830294.490 3120112.820 GPS 6 SET BRASS DISK

CALC PT'S	Northing	Easting	Description
901	13844030.215	3121467.573	CENTERLINE
902	13843851.173	3121744.754	CENTERLINE
903	13843672.131	3122021.934	CENTERLINE
904	13843493.090	3122299.114	CENTERLINE
905	13843313.971	3122576.414	CENTERLINE
906	13843133.787	3122853.644	CENTERLINE
907	13842950.615	3123131.938	CENTERLINE
908	13842767.585	3123409.232	CENTERLINE
909	13842587.538	3123686.526	CENTERLINE
910	13842408.574	3123963.820	CENTERLINE
911	13842229.558	3124241.114	CENTERLINE
912	13842050.492	3124518.408	CENTERLINE
913	13841871.447	3124795.702	CENTERLINE
914	13841692.388	3125073.040	CENTERLINE
915	13841513.330	3125350.334	CENTERLINE
916	13841334.159	3125627.628	CENTERLINE
917	13841154.989	3125904.922	CENTERLINE
918	13840975.937	3126182.216	CENTERLINE
919	13840796.885	3126459.510	CENTERLINE
920	13840617.795	3126736.804	CENTERLINE
921	13840438.711	3127014.098	CENTERLINE
922	13840259.626	3127288.392	CENTERLINE
923	13840080.542	3127562.686	CENTERLINE
924	13839901.458	3127837.980	CENTERLINE
925	13839722.374	3128112.274	CENTERLINE
926	13839543.289	3128387.568	CENTERLINE
927	13839364.204	3128662.862	CENTERLINE
928	13839185.119	3128938.156	CENTERLINE
929	13839006.034	3129213.450	CENTERLINE
930	13838826.949	3129488.744	CENTERLINE
931	13838647.864	3129764.038	CENTERLINE
932	13838468.779	3130039.332	CENTERLINE
933	13838289.694	3130314.626	CENTERLINE
934	13838110.609	3130589.920	CENTERLINE
935	13837931.524	3130865.214	CENTERLINE
936	13837752.439	3131140.508	CENTERLINE
937	13837573.354	3131415.802	CENTERLINE
938	13837394.269	3131691.096	CENTERLINE
939	13837215.184	3131966.390	CENTERLINE
940	13837036.099	3132241.684	CENTERLINE
941	13836857.014	3132516.978	CENTERLINE
942	13836677.929	3132792.272	CENTERLINE

CALC PT'S	Northing	Easting	Description
943	13836495.769	3133067.566	CENTERLINE
944	13836316.684	3133342.860	CENTERLINE
945	13836137.600	3133618.154	CENTERLINE
946	13835958.515	3133893.448	CENTERLINE
947	13835779.430	3134168.742	CENTERLINE
948	13835600.345	3134444.036	CENTERLINE
949	13835421.260	3134719.330	CENTERLINE
950	13835242.175	3134994.624	CENTERLINE
951	13835063.090	3135269.918	CENTERLINE
952	13834884.005	3135545.212	CENTERLINE
953	13834704.920	3135820.506	CENTERLINE
954	13834525.835	3136095.800	CENTERLINE
955	13834346.750	3136371.094	CENTERLINE
956	13834167.665	3136646.388	CENTERLINE
957	13833988.580	3136921.682	CENTERLINE
958	13833809.495	3137196.976	CENTERLINE
959	13833630.410	3137472.270	CENTERLINE
960	13833451.325	3137747.564	CENTERLINE
961	13833272.240	3138022.858	CENTERLINE
962	13833093.155	3138298.152	CENTERLINE
963	13832914.070	3138573.446	CENTERLINE
964	13832734.985	3138848.740	CENTERLINE
965	13832555.900	3139124.034	CENTERLINE
966	13832376.815	3139399.328	CENTERLINE
967	13832197.730	3139674.622	CENTERLINE
968	13832018.645	3139949.916	CENTERLINE
969	13831839.560	3140225.210	CENTERLINE
970	13831660.475	3140500.504	CENTERLINE
971	13831481.390	3140775.798	CENTERLINE
972	13831302.305	3141051.092	CENTERLINE
973	13831123.220	3141326.386	CENTERLINE
974	13830944.135	3141601.680	CENTERLINE
975	13830765.050	3141876.974	CENTERLINE
976	13830585.965	3142152.268	CENTERLINE
977	13830406.880	3142427.562	CENTERLINE
978	13830227.795	3142702.856	CENTERLINE
979	13830048.710	3142978.150	CENTERLINE
980	13829869.625	3143253.444	CENTERLINE
981	13829690.540	3143528.738	CENTERLINE
982	13829511.455	3143804.032	CENTERLINE
983	13829332.370	3144079.326	CENTERLINE
984	13829153.285	3144354.620	CENTERLINE
985	13828974.200	3144629.914	CENTERLINE

CALC PT'S	Northing	Easting	Description
986	13828795.115	3144905.208	CENTERLINE
987	13828616.030	3145180.502	CENTERLINE
988	13828436.945	3145455.796	CENTERLINE
989	13828257.860	3145731.090	CENTERLINE
990	13828078.775	3145996.384	CENTERLINE
991	13827899.690	3146271.678	CENTERLINE
992	13827720.605	3146546.972	CENTERLINE
993	13827541.520	3146822.266	CENTERLINE
994	13827362.435	3147097.560	CENTERLINE
2002	13827183.350	3147372.854	TRV 2
2006	13827004.265	3147648.148	TRV 6
2007	5356-8505	13830139.925	3119559.683 TRV 7 SET BRASS DISC
2008	5356-8607	13831410.646	3120434.380 TRV 8 SET BRASS DISC
2009	5456-7210	13832916.322	3121353.534 TRV 9 SET BRASS DISC
2010	5456-7312	13834278.104	3122297.440 TRV 10 SET BRASS DISC
2011	5456-7415	13835599.756	3123241.684 TRV 11 SET BRASS DISC
2012	5457-7502	13837102.426	3124182.305 TRV 12 SET BRASS DISC
2013	5457-7604	13838526.171	3124976.260 TRV 13 SET BRASS DISC
2014	5457-7708	13840250.103	3125915.852 TRV 14 SET BRASS DISC
2015	5457-7810	13841984.478	3126855.444 TRV



CENTERLINE / BASELINE INFORMATION

CONTROL POINT LIST W/STREET NAMES NORTH AND SOUTH

BAGBY STREET

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Bagby Street control points.

BRAZOS STREET

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Brazos Street control points.

LOUISIANA STREET

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Louisiana Street control points.

MILAM STREET

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Milam Street control points.

MAIN STREET

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Main Street control points.

SAN JACINTO STREET

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for San Jacinto Street control points.

CAROLINE STREET

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Caroline Street control points.

AUSTIN STREET

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Austin Street control points.

LA BRANCH STREET

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for La Branch Street control points.

CRAWFORD STREET

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Crawford Street control points.

CONTROL POINT LIST W/STREET NAMES NORTH AND SOUTH

CHENEVERT STREET

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Chenevert Street control points.

HUTCHINS STREET

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Hutchins Street control points.

DOWLING STREET

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Dowling Street control points.

CONTROL POINT LIST W/STREET NAMES PARALLEL TO MCKINNEY AVE.

FRANKLIN AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Franklin Avenue control points.

PRESTON AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Preston Avenue control points.

CAPITOL AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Capitol Avenue control points.

WALKER AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Walker Avenue control points.

CONTROL POINT LIST W/STREET NAMES PARALLEL TO MCKINNEY AVE.

Mc KINNEY AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for McKinney Avenue control points.

DALLAS AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Dallas Avenue control points.

POLK AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Polk Avenue control points.

PEASE AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Pease Avenue control points.

GRAY AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Gray Avenue control points.

HADLEY AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Hadley Avenue control points.

Mc GOWEN AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for McGowen Avenue control points.

DENNIS AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Dennis Avenue control points.

TUAM AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Tuam Avenue control points.

ELGIN AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Elgin Avenue control points.

CONTROL POINT LIST W/STREET NAMES PARALLEL TO MCKINNEY AVE.

HOLMAN AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Holman Avenue control points.

CLEBURNE AVENUE

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Cleburne Avenue control points.

ANN AVENUE & ST CHARLES ST

Table with columns: Pt#, Station, Offset, Description, Northing, Easting. Data for Ann Avenue & St Charles St control points.

- NOTES: 1. ALL COORDINATES SHOWN HEREON ARE EXPRESSED IN U.S. SURVEY FEET. 2. ALL POINTS SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM...

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

RODS Surveying, Inc. logo and contact information.

PRIVATE UTILITY LINES SHOWN

RELIANT ENERGY ENTEX, INC.

SWBT CO. VALID FOR ONE YEAR APPROVED ONLY FOR UNDERGROUND CONDUIT FACILITIES UNLESS NOTED.

RELIANT ENERGY HOUSTON LIGHTING & POWER CO. APPROVED ONLY FOR CROSSING UNDERGROUND DUCTILES UNLESS NOTED. VALID AT TIME OF REVIEW ONLY.

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. 3

GFS NUMBER N-0645-04-3

DRAWING SCALE N.T.S.

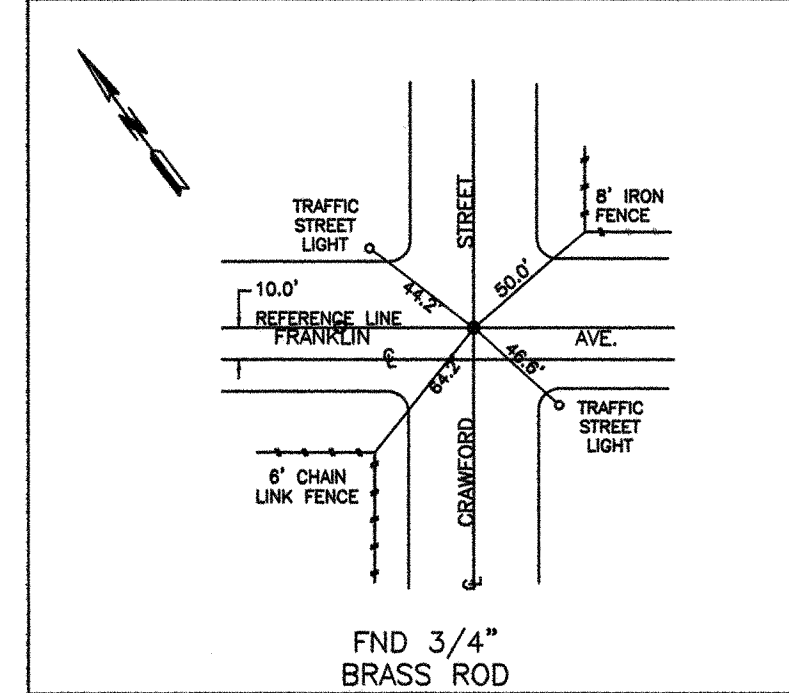
CITY OF HOUSTON PM

SHEET NO. 4 OF 9

Professional seal for Jack R. Chiles, Registered Professional Land Surveyor, No. 4778.

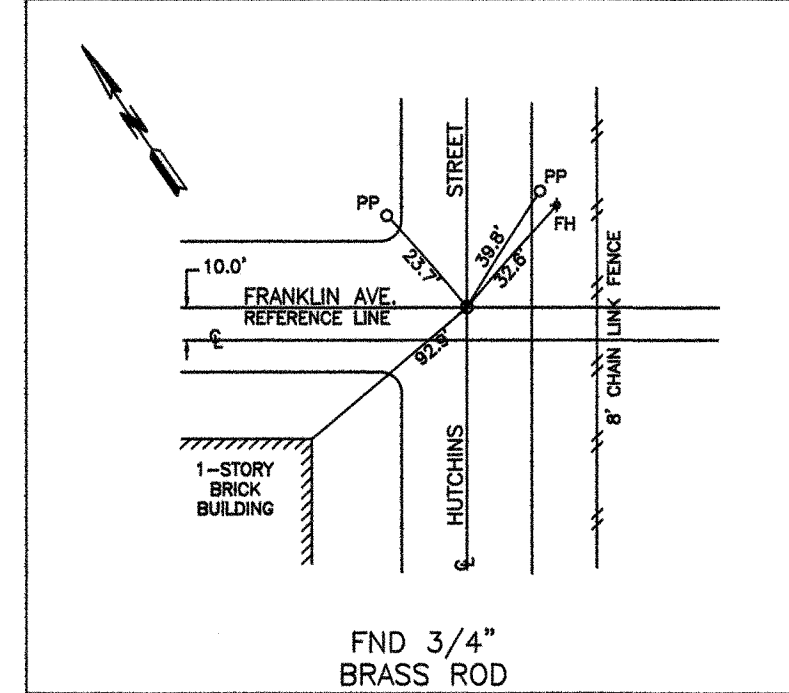


COH MON 4 CRAWFORD STREET =STA. 3+31.95  
5457-7610 FRANKLIN AVENUE =STA. 39+79.45



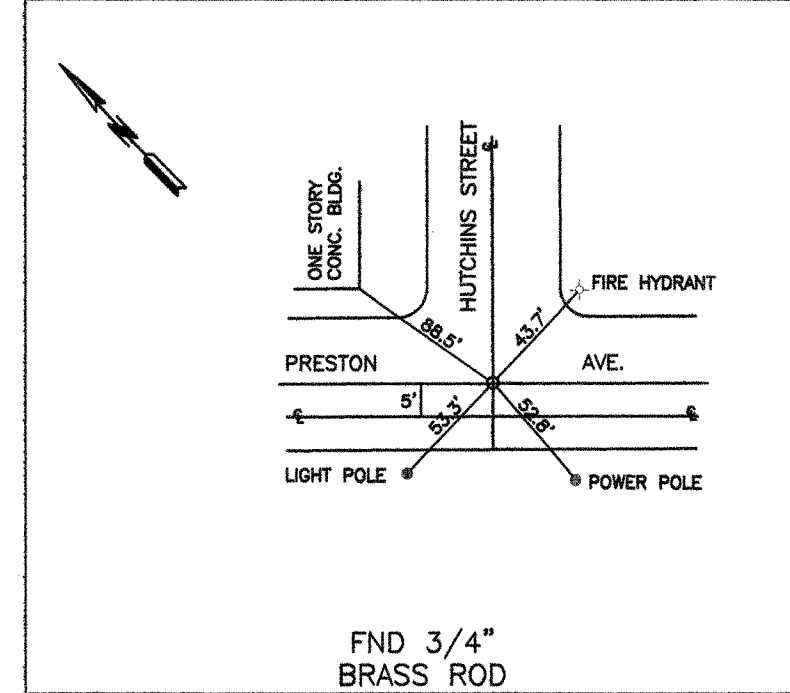
FND 3/4" BRASS ROD

COH MON 5 HUTCHINS STREET =STA. 3+21.89  
5457-7809 FRANKLIN AVENUE =STA. 59+59.40



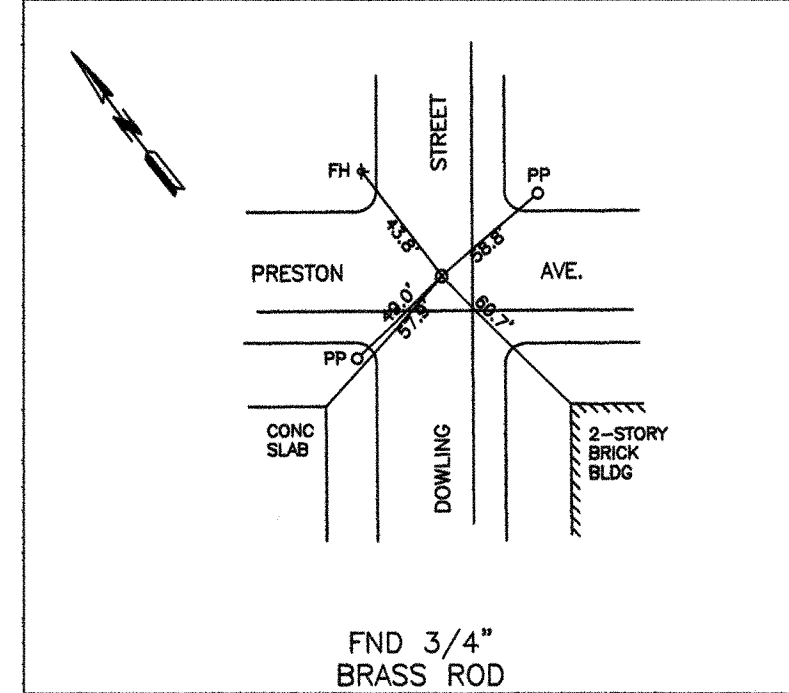
FND 3/4" BRASS ROD

COH MON 12 HUTCHINS STREET =STA. 9+92.87  
5457-7708 PRESTON AVENUE =STA. 59+58.84



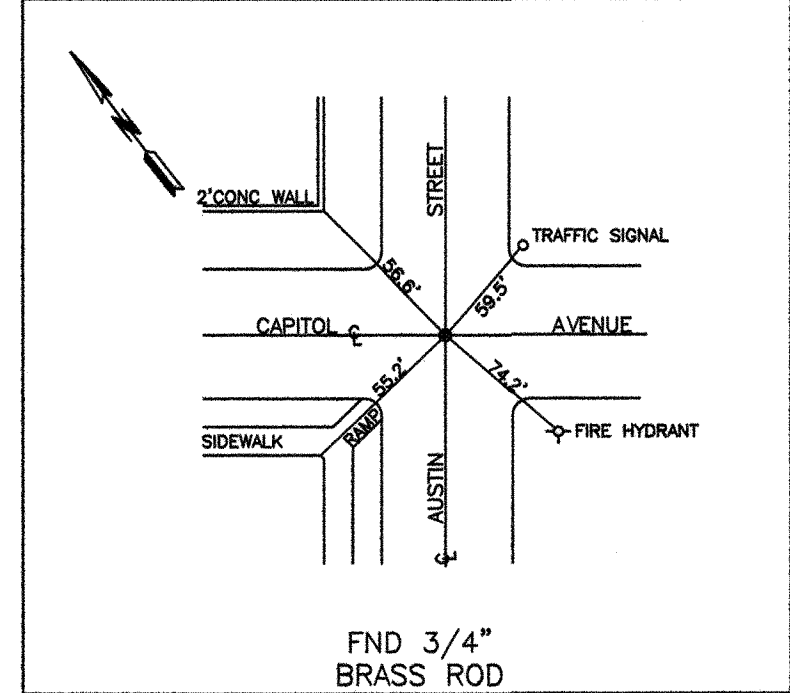
FND 3/4" BRASS ROD

COH MON 13 DOWLING STREET =STA. 9+92.64  
5457-7807 PRESTON AVENUE =STA. 86+14.45



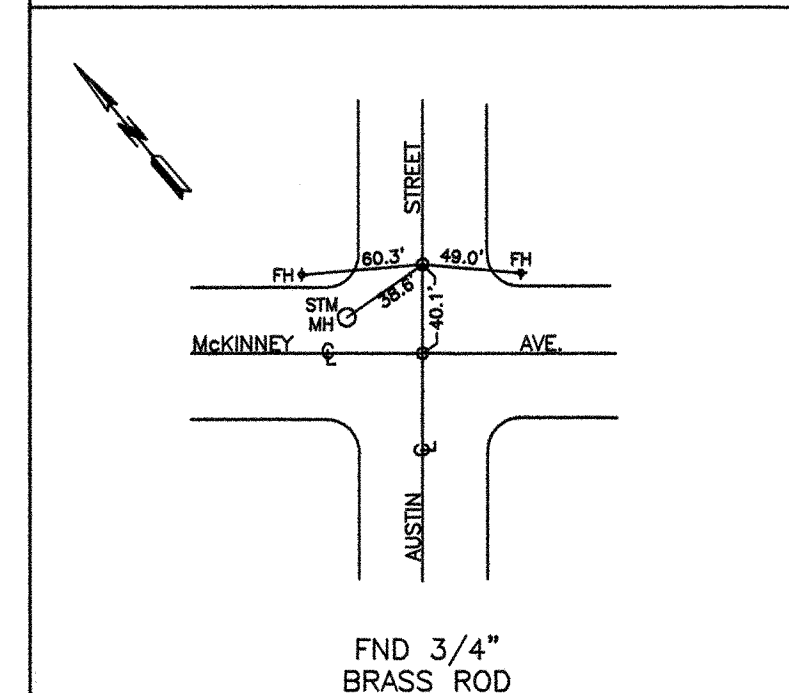
FND 3/4" BRASS ROD

COH MON 19 AUSTIN STREET =STA. 20+19.17  
5457-7409 CAPITOL AVENUE =STA. 33+20.48



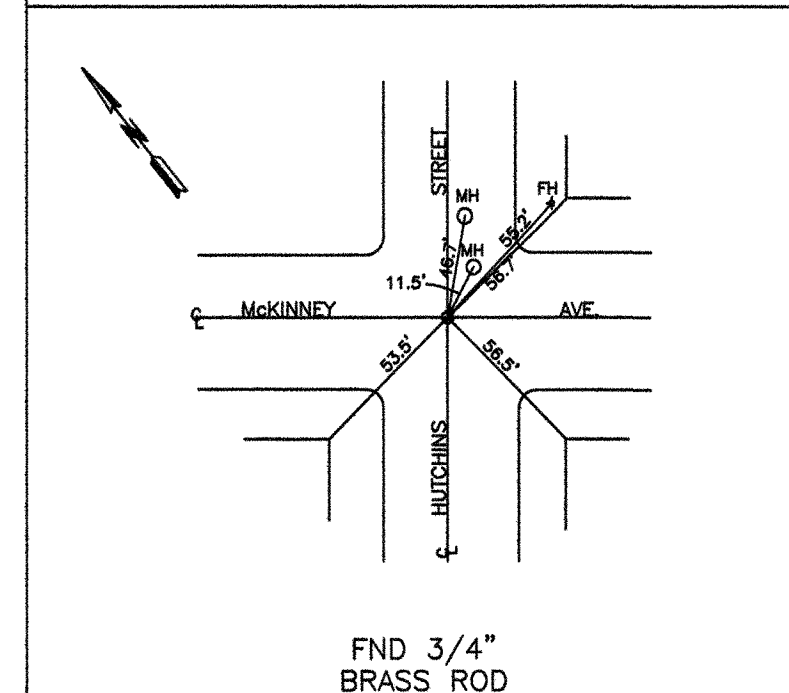
FND 3/4" BRASS ROD

COH MON 30 AUSTIN STREET =STA. 29+67.45  
5457-7307 Mc KINNEY AVENUE =STA. 33+19.00



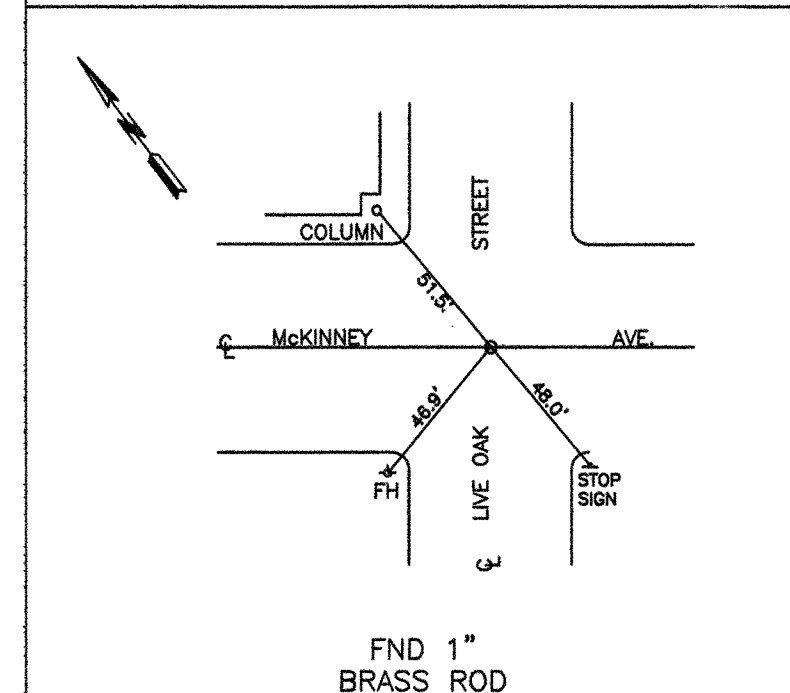
FND 3/4" BRASS ROD

COH MON 34 HUTCHINS STREET =STA. 30+07.57  
5457-7604 Mc KINNEY AVENUE =STA. 59+59.08



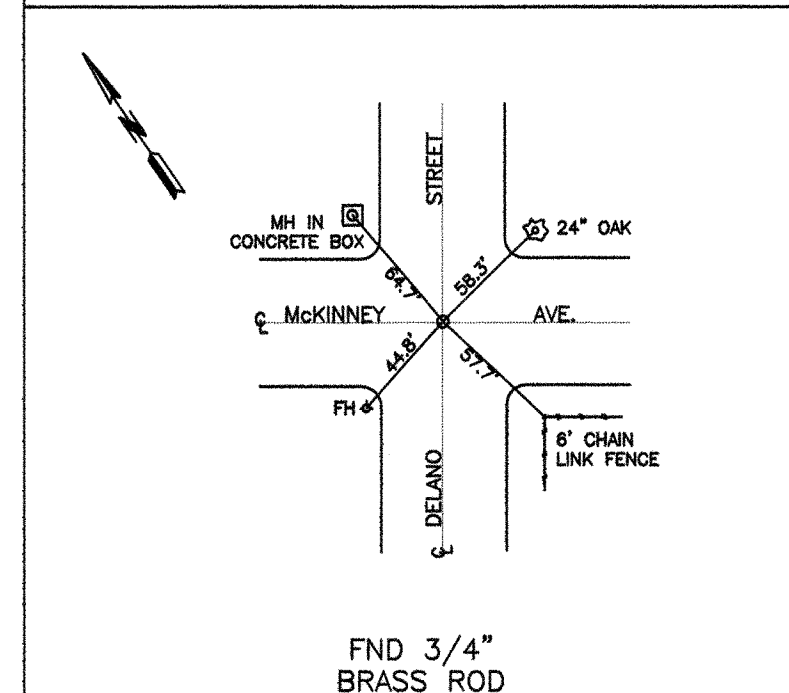
FND 3/4" BRASS ROD

COH MON 37 HUTCHINS STREET =STA. 72+79.51  
5457-7703 Mc KINNEY AVENUE =STA. 72+79.51



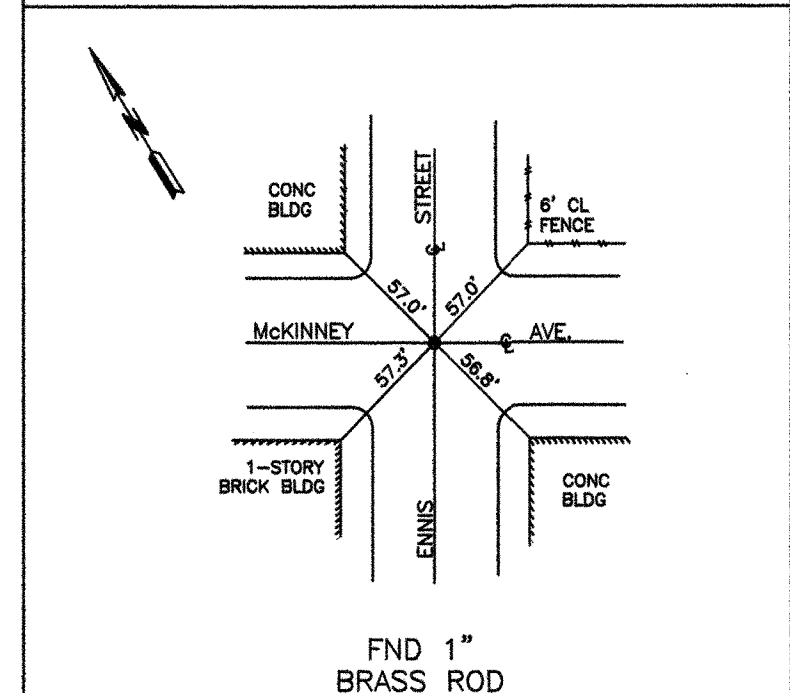
FND 1" BRASS ROD

COH MON 38 HUTCHINS STREET =STA. 79+39.52  
5457-7802 Mc KINNEY AVENUE =STA. 79+39.52



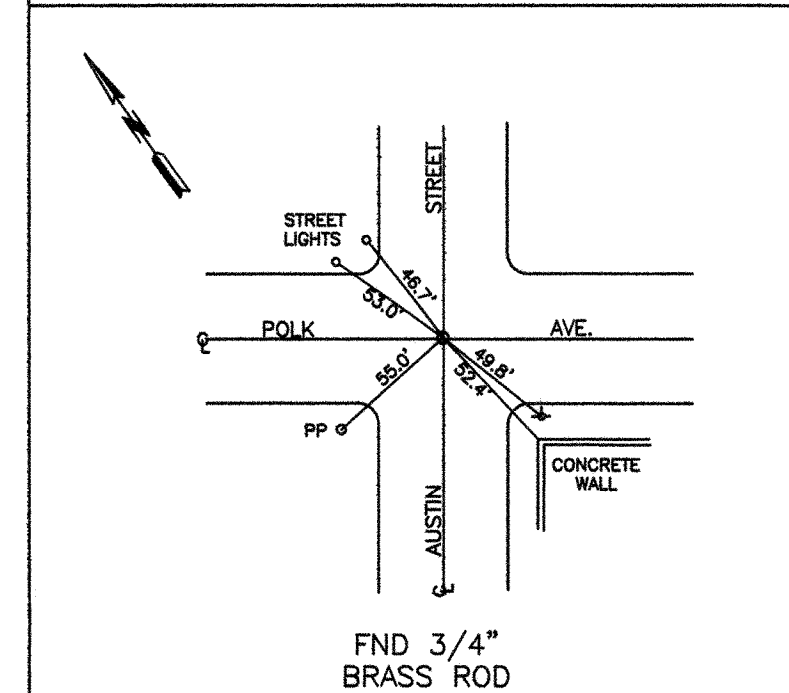
FND 3/4" BRASS ROD

COH MON 39 HUTCHINS STREET =STA. 85+99.47  
5457-7902 Mc KINNEY AVENUE =STA. 85+99.47



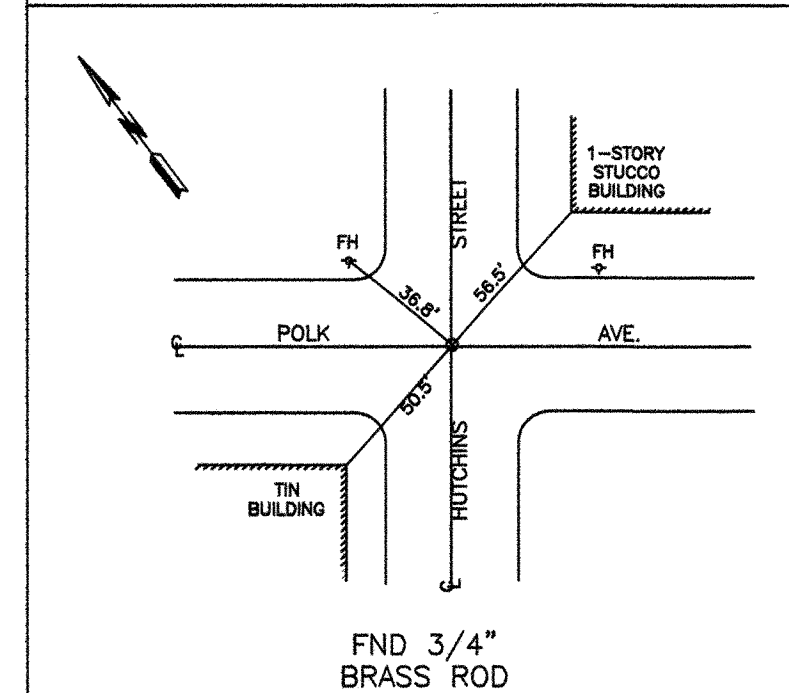
FND 1" BRASS ROD

COH MON 43 AUSTIN STREET =STA. 39+99.29  
5457-7305 POLK AVENUE =STA. 33+21.15



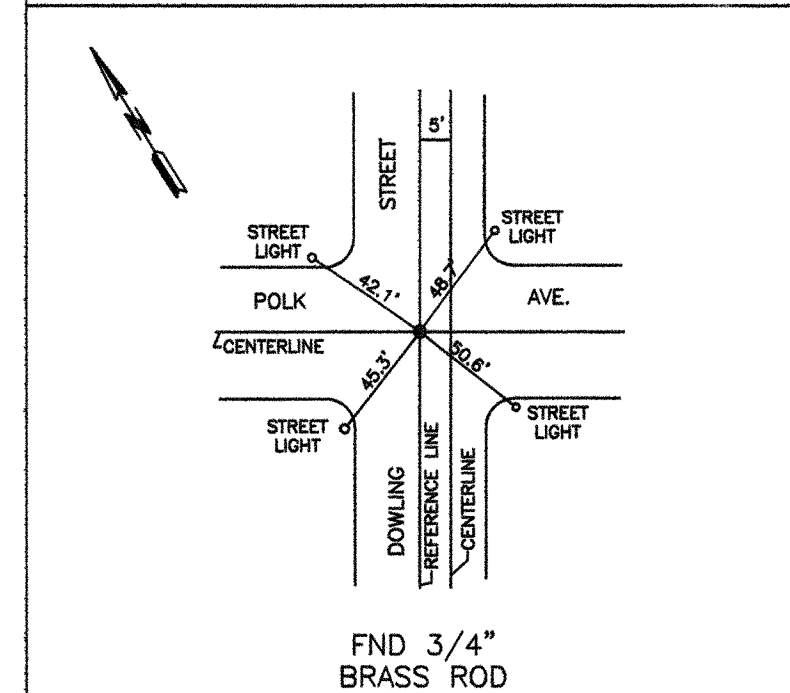
FND 3/4" BRASS ROD

COH MON 45 HUTCHINS STREET =STA. 39+97.75  
5457-7503 POLK AVENUE =STA. 59+59.18



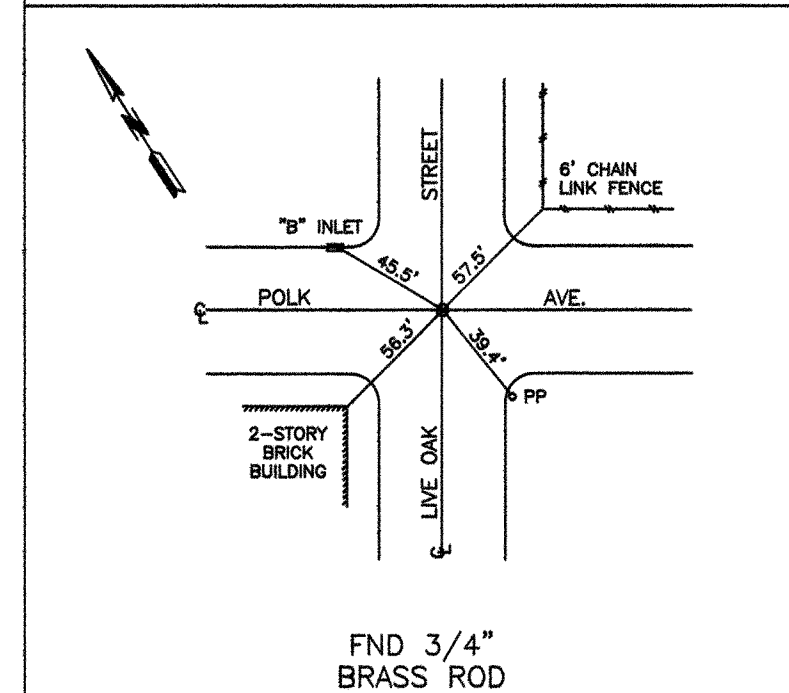
FND 3/4" BRASS ROD

COH MON 46 DOWLING STREET =STA. 39+97.73  
5457-7602 POLK AVENUE =STA. 66+14.22



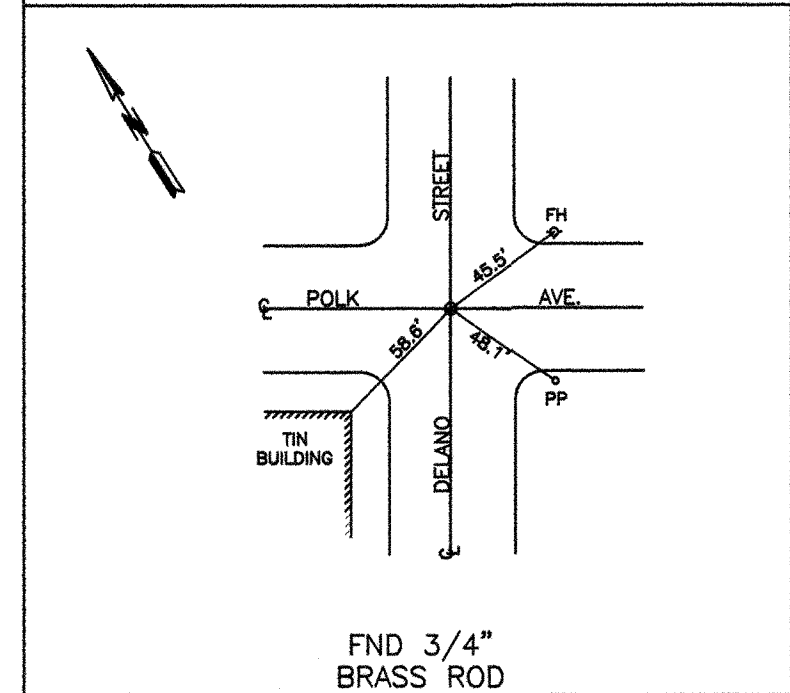
FND 3/4" BRASS ROD

COH MON 48 POLK AVENUE =STA. 72+79.48  
5457-7702 POLK AVENUE =STA. 72+79.48



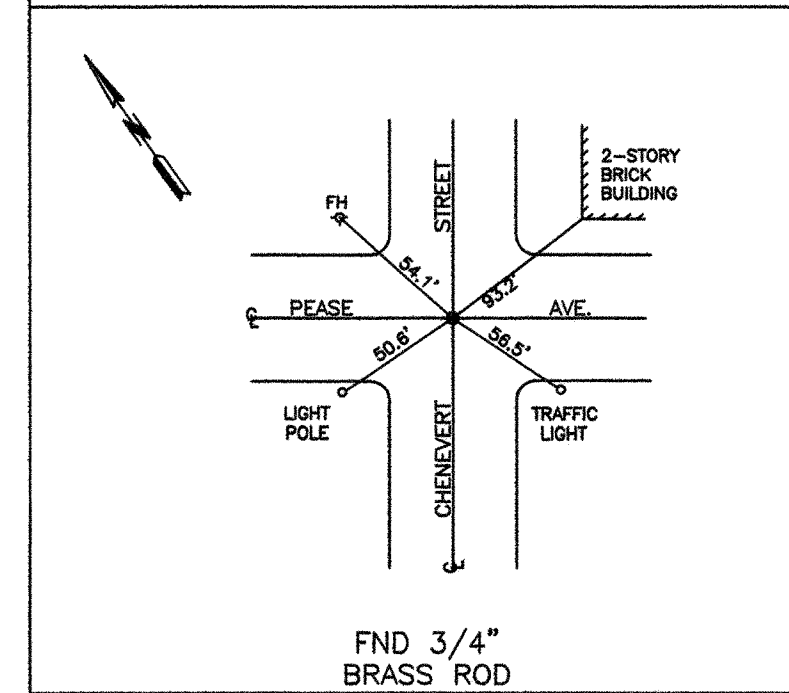
FND 3/4" BRASS ROD

COH MON 49 POLK AVENUE =STA. 79+39.47  
5457-7701 POLK AVENUE =STA. 79+39.47



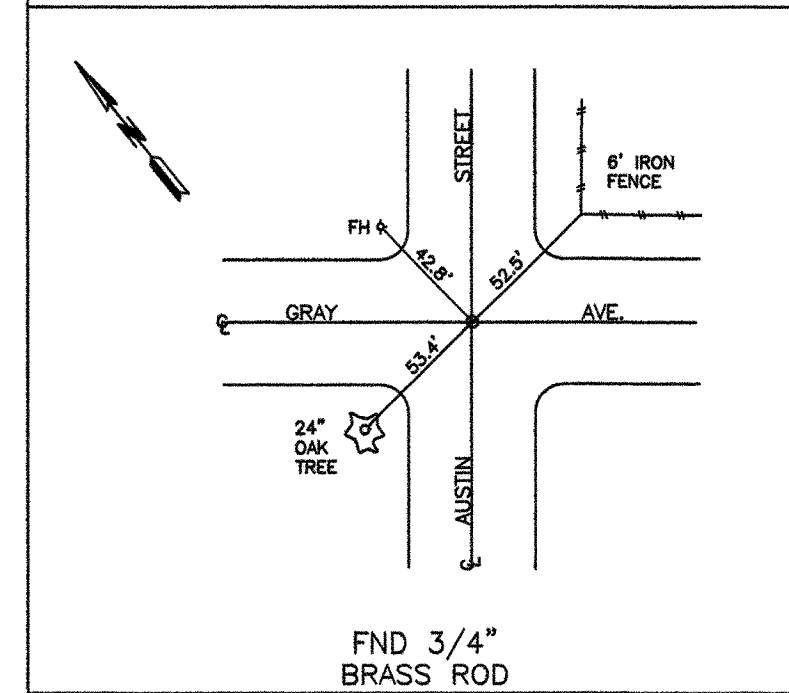
FND 3/4" BRASS ROD

COH MON 56 CHENEVERT STREET =STA. 53+17.73  
5457-7302 PEASE AVENUE =STA. 46+38.95



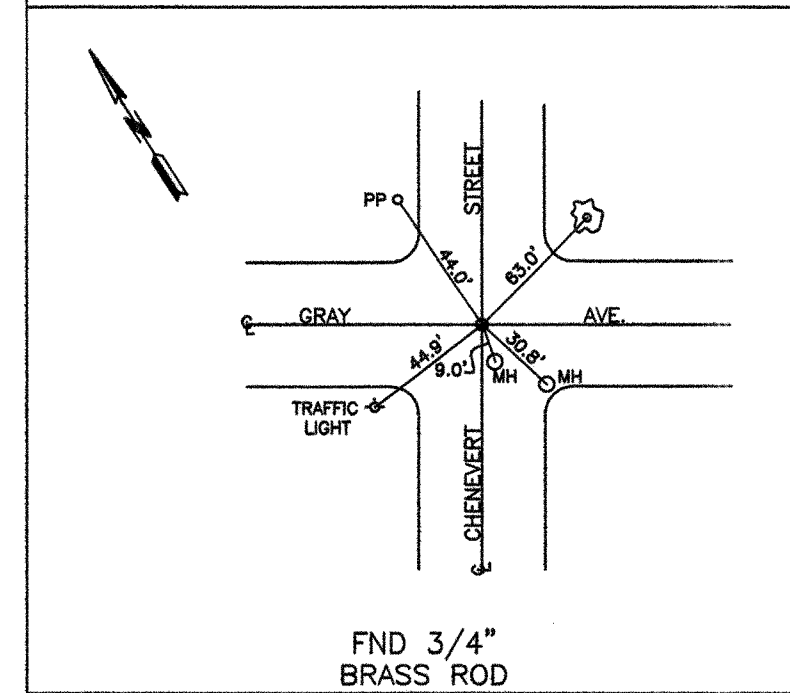
FND 3/4" BRASS ROD

COH MON 66 AUSTIN STREET =STA. 66+37.48  
5457-7101A GRAY AVENUE =STA. 33+18.63



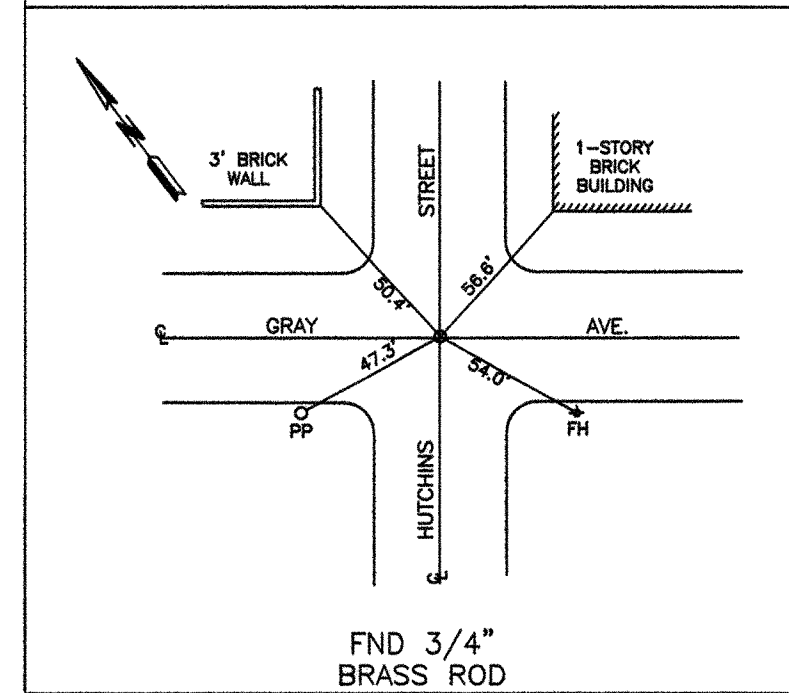
FND 3/4" BRASS ROD

COH MON 67 CHENEVERT STREET =STA. 66+37.84  
5456-7216 GRAY AVENUE =STA. 46+38.94



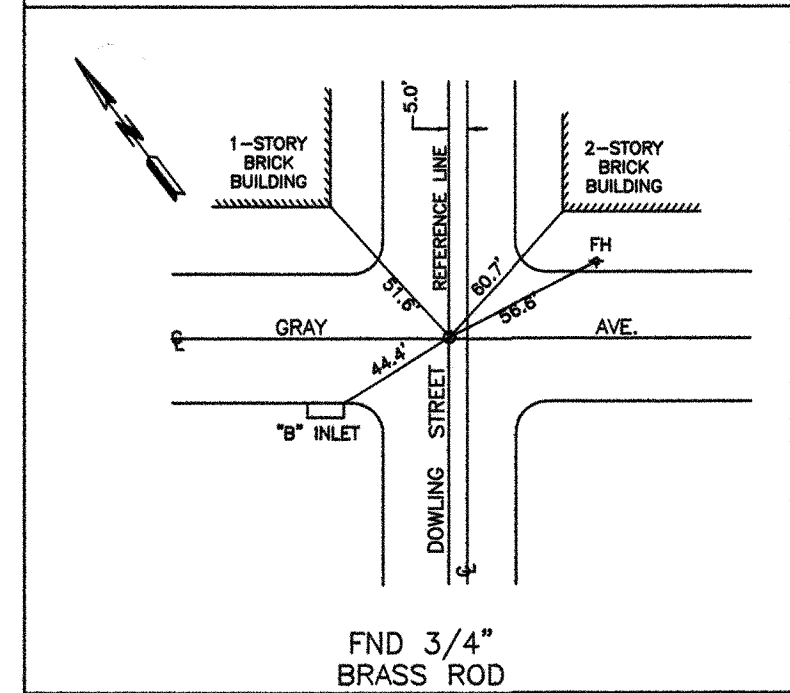
FND 3/4" BRASS ROD

COH MON 68 HUTCHINS STREET =STA. 66+38.19  
5456-7415 GRAY AVENUE =STA. 59+58.97



FND 3/4" BRASS ROD

COH MON 69 HUTCHINS STREET =STA. 66+14.07  
5456-7414 GRAY AVENUE =STA. 66+14.07



FND 3/4" BRASS ROD

NOTES:

- ALL COORDINATES SHOWN HEREON ARE EXPRESSED IN U.S. SURVEY FEET.
- ALL POINTS SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983, CORRS 96 (EPOCH 2002.00).
- THE PRIMARY CONTROL POINTS USED FOR THIS PROJECT ARE CITY OF HOUSTON COOPERATIVE CORRS MONUMENTS AS FOLLOWS:  
COH2, NGS PID# DF8773 N=13,793,560.96 E=3,108,315.43  
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
- 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.

**RODS**  
Surveying, Inc.  
8810 LEE ROAD  
SPRING, TEXAS 77379  
TEL (281) 257-4020  
FAX (281) 257-4021

PRIVATE UTILITY LINES SHOWN

RELIANT ENERGY ENTEX, INC.

SWBT CO. VALID FOR ONE YEAR  
APPROVED ONLY FOR UNDERGROUND CONDUIT FACILITIES  
UNLESS NOTED.

RELIANT ENERGY  
HOUSTON LIGHTING & POWER CO.  
APPROVED ONLY FOR CROSSING UNDERGROUND DUCTLINES  
UNLESS NOTED. VALID AT TIME OF REVIEW ONLY.

CABLE COMPANY

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

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

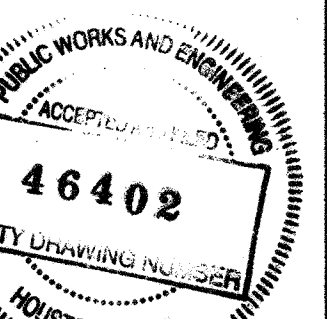
**CITY OF HOUSTON**  
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

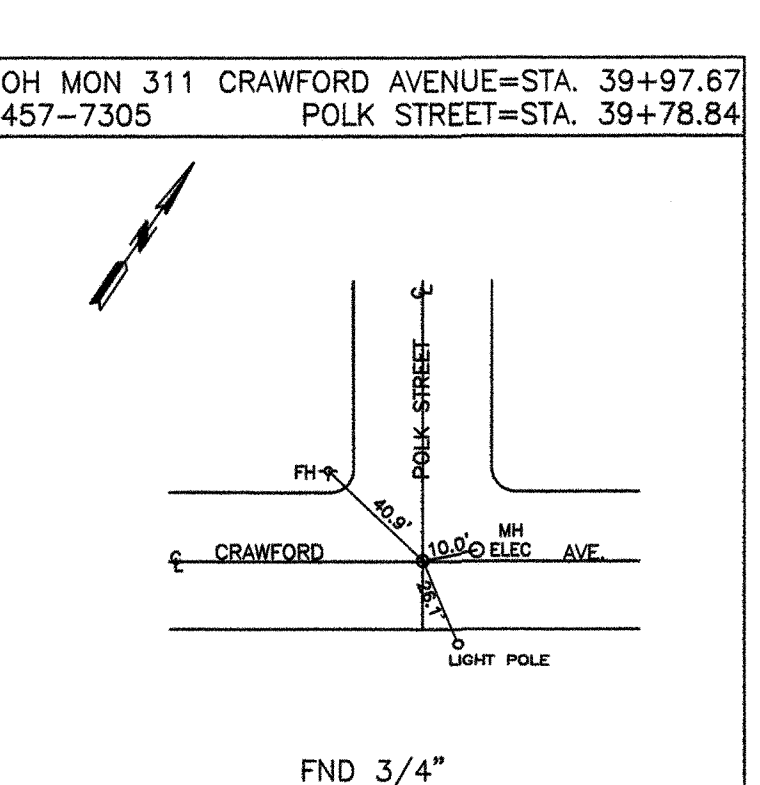
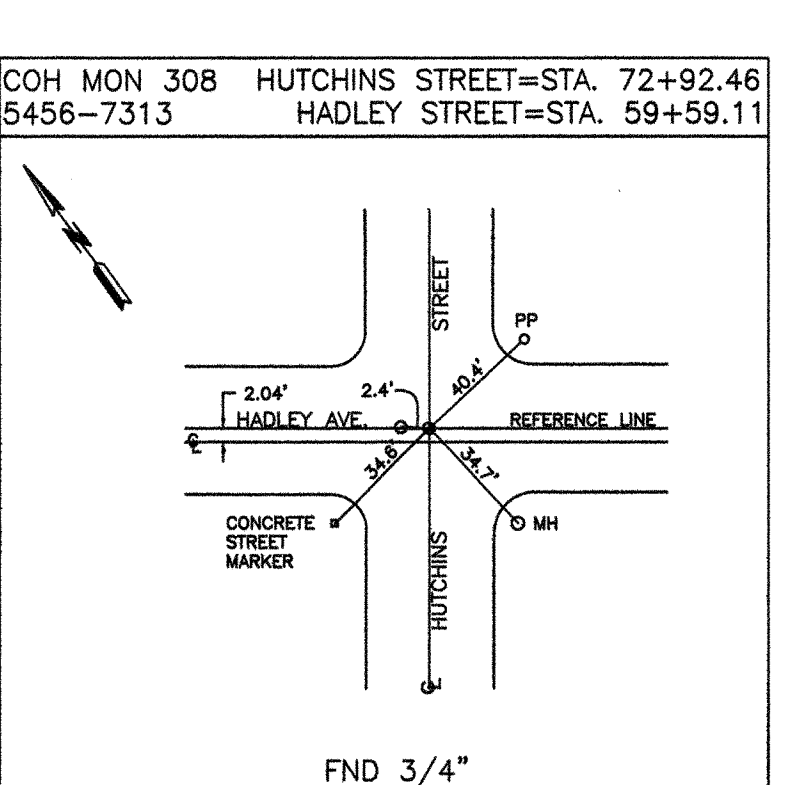
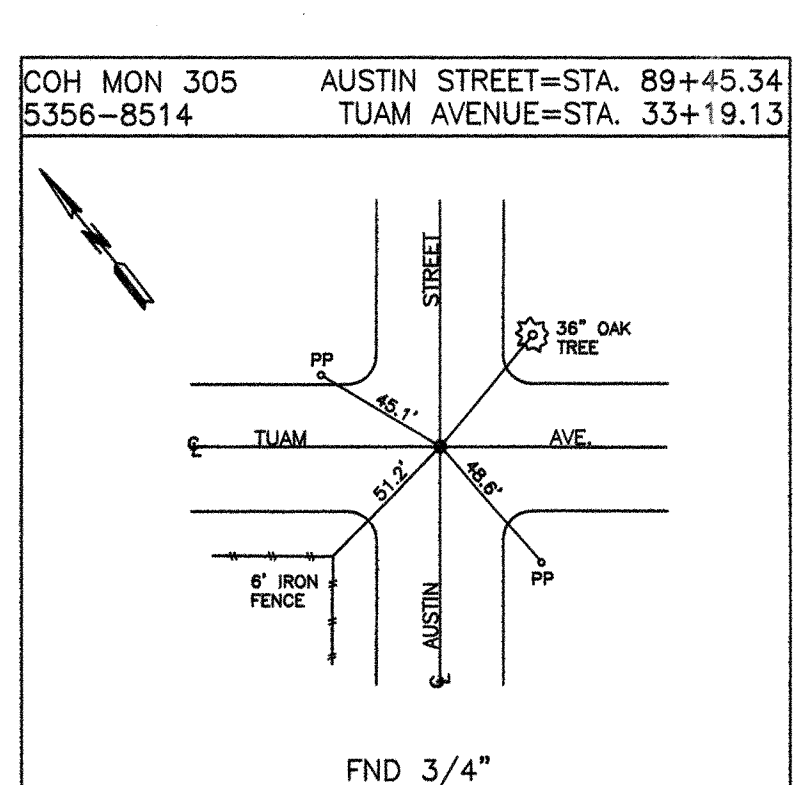
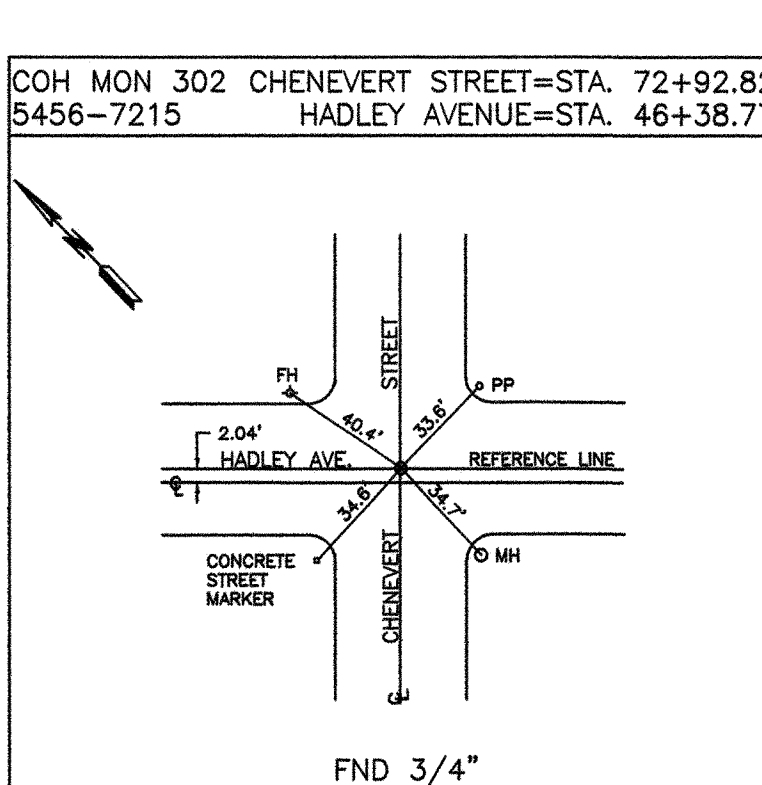
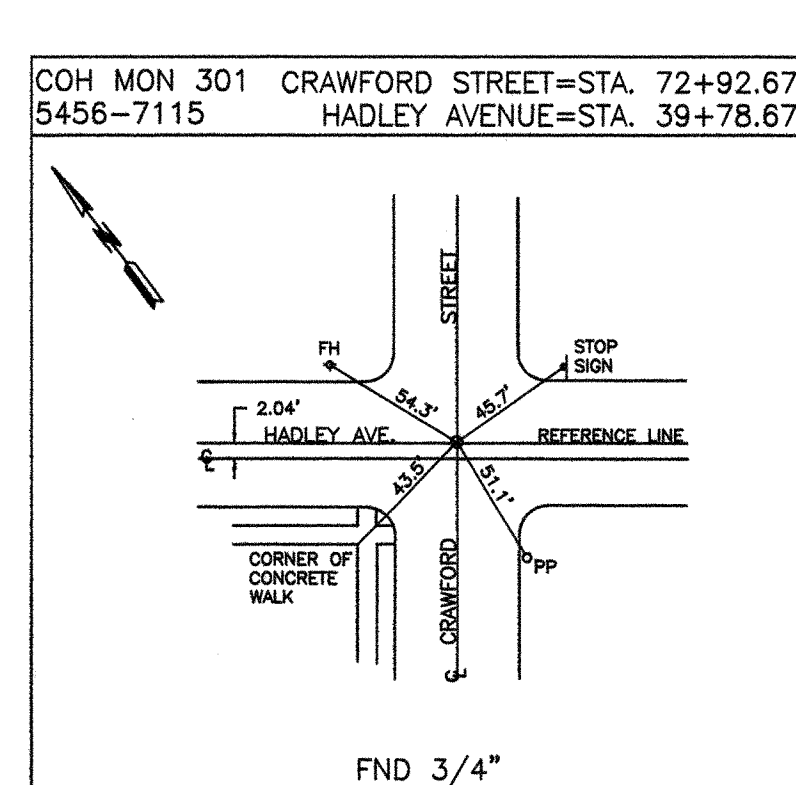
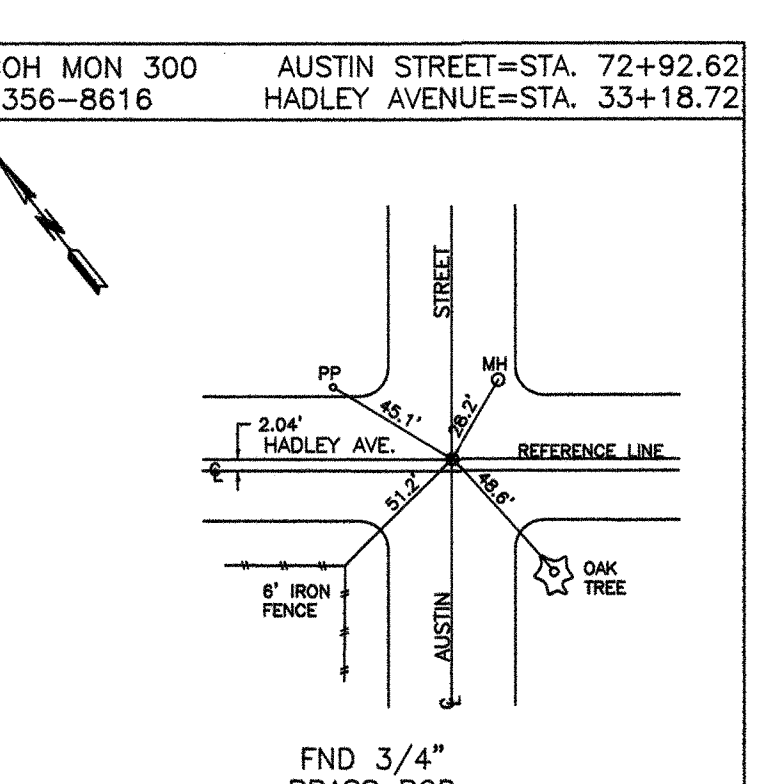
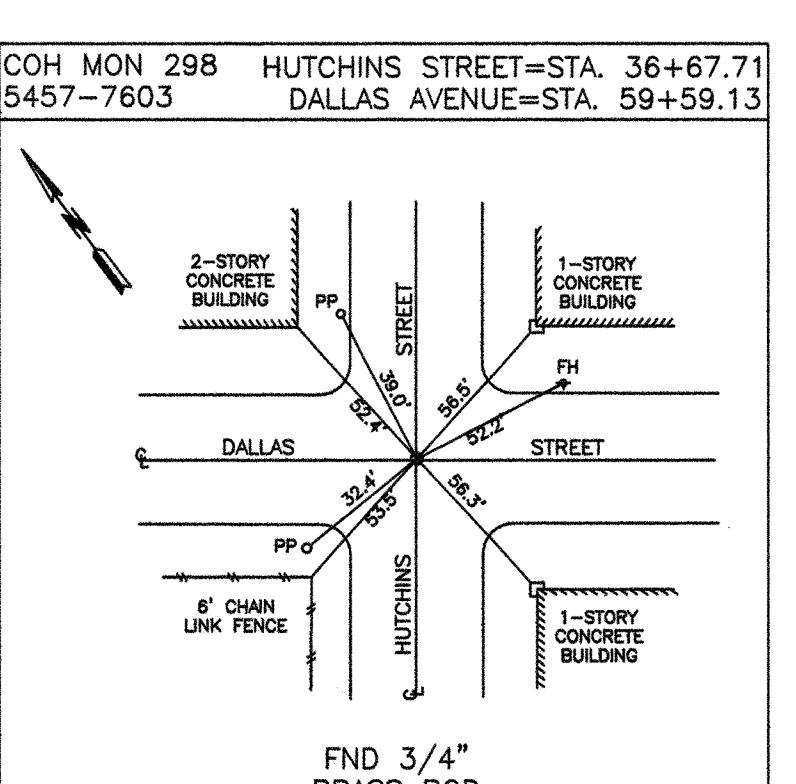
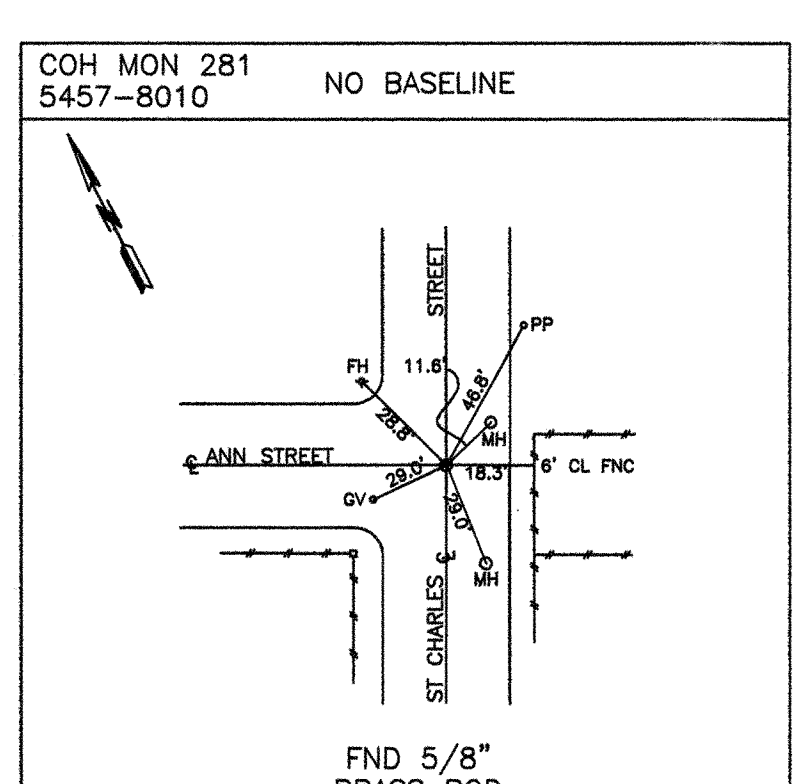
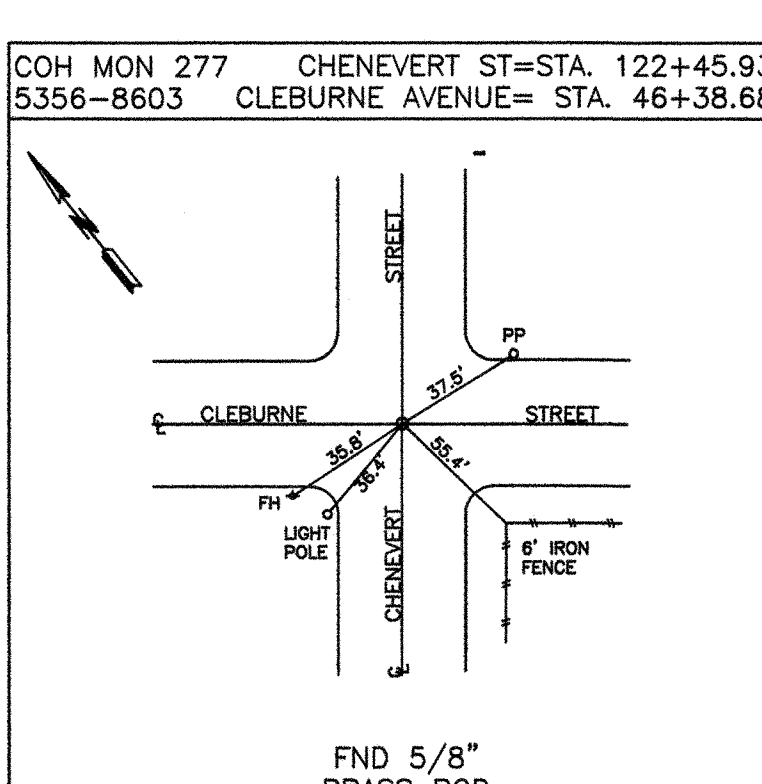
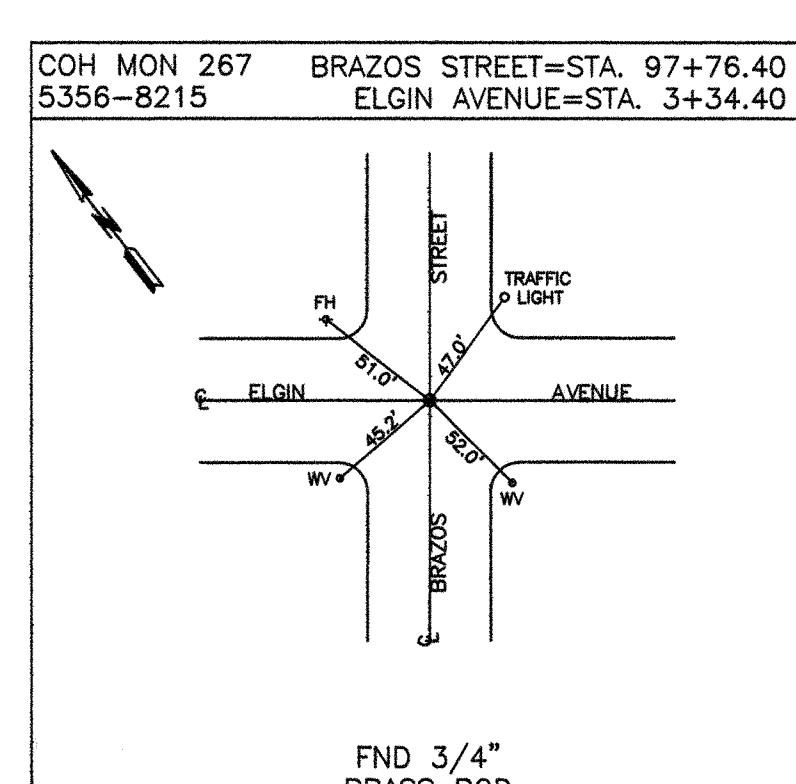
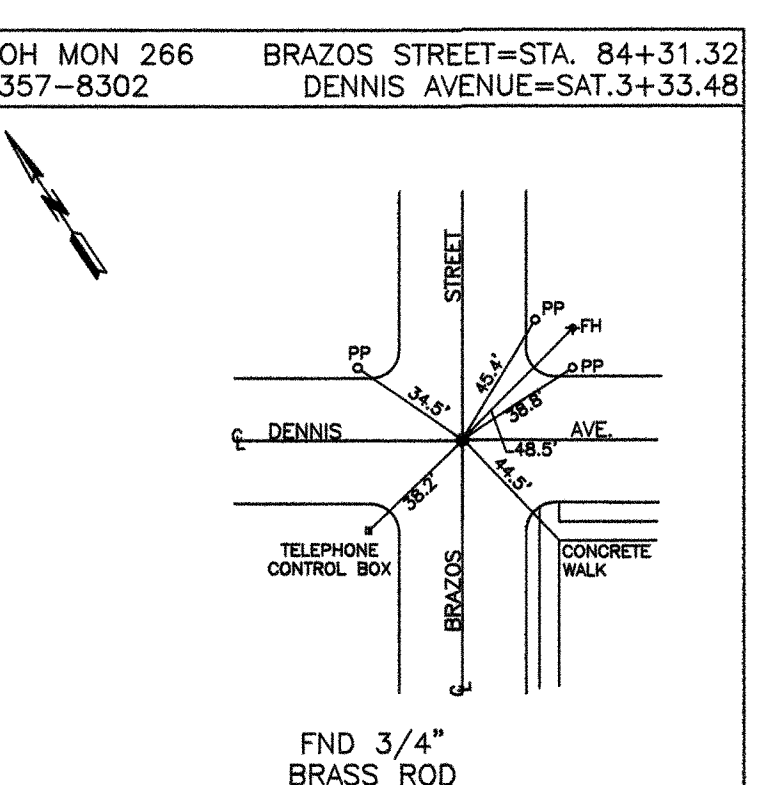
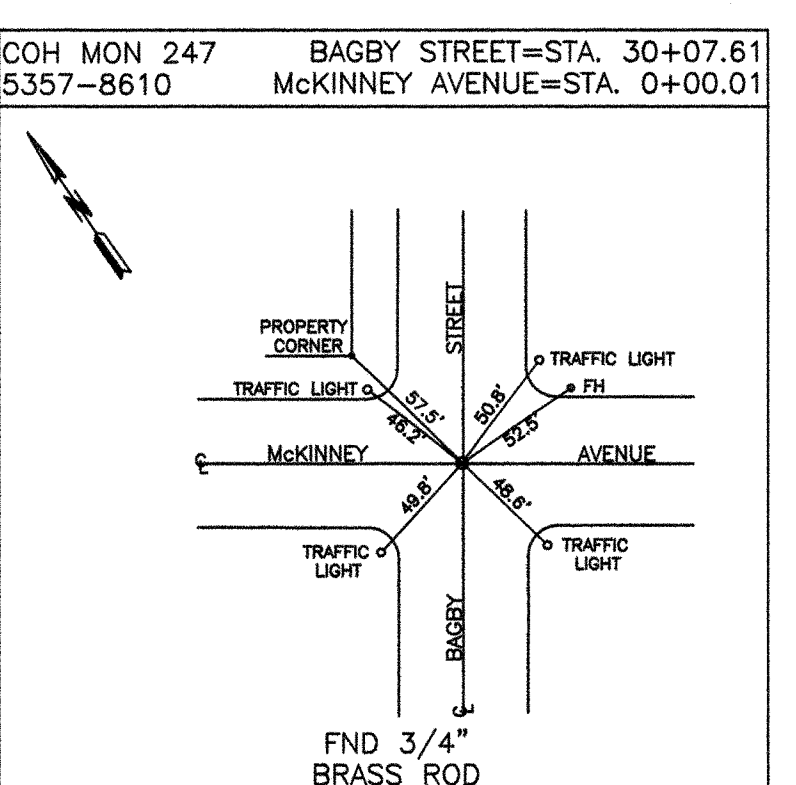
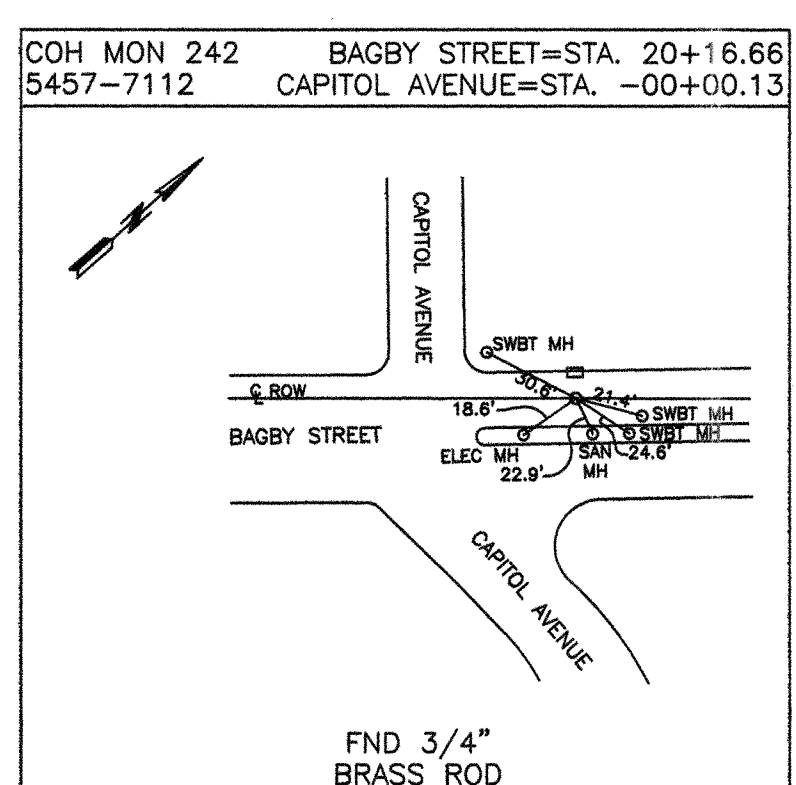
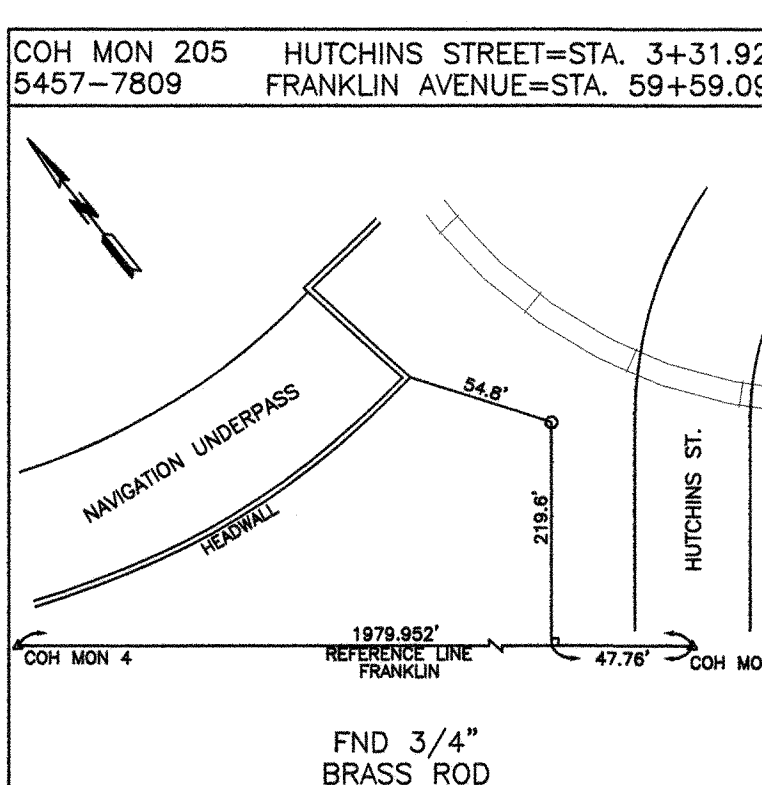
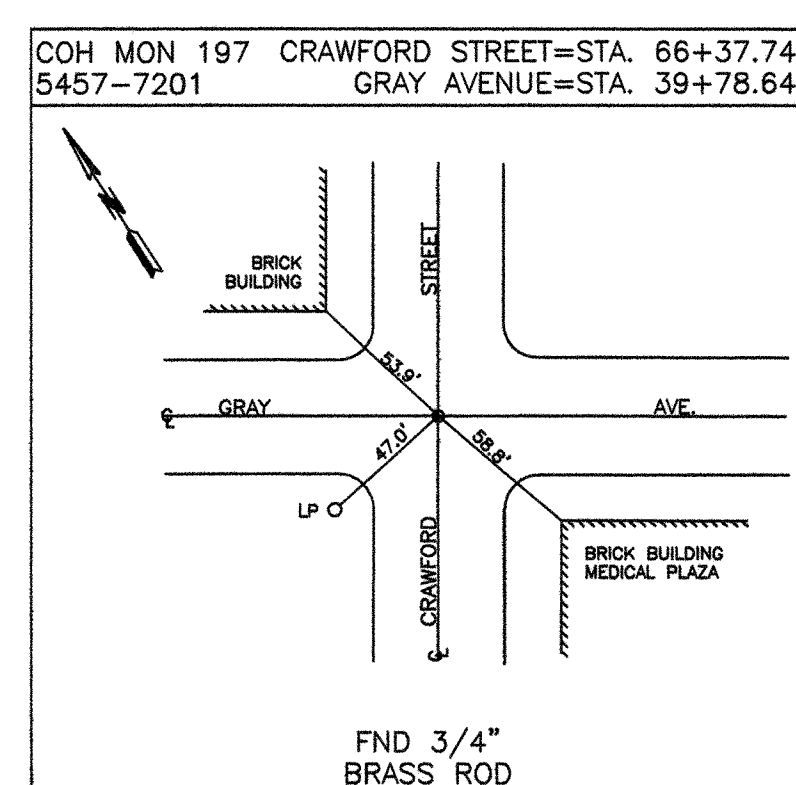
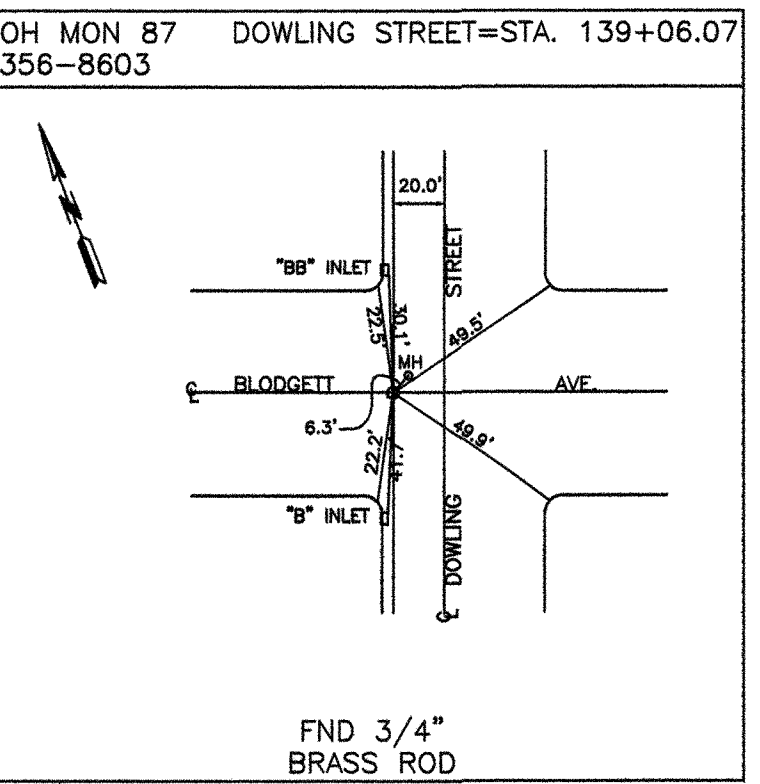
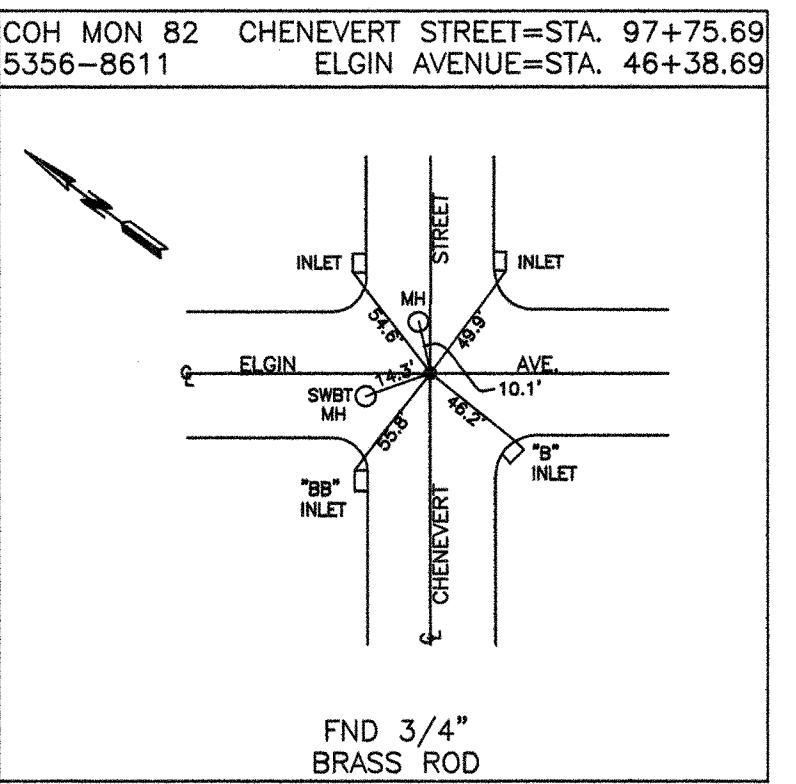
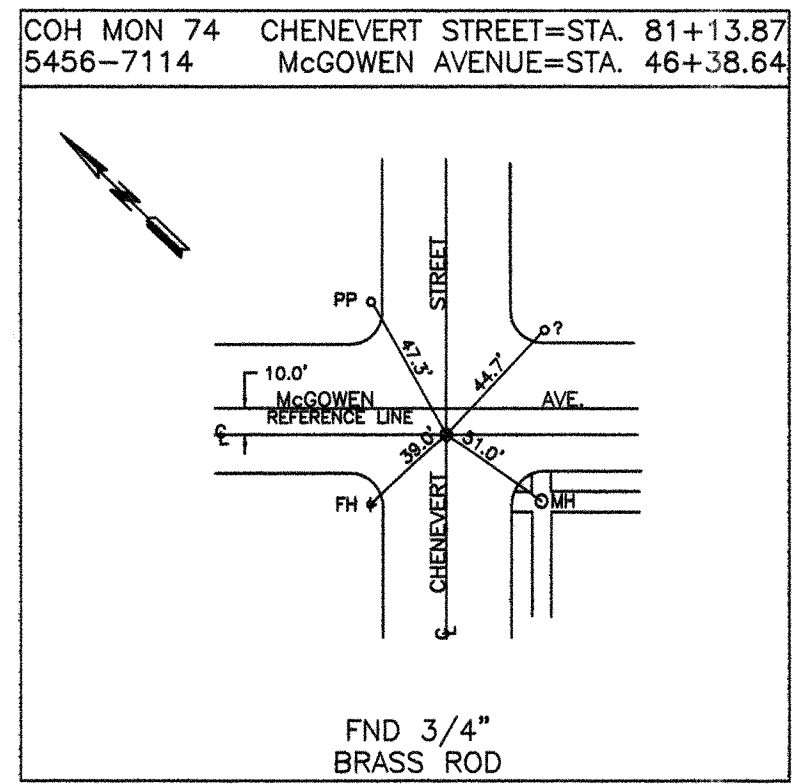
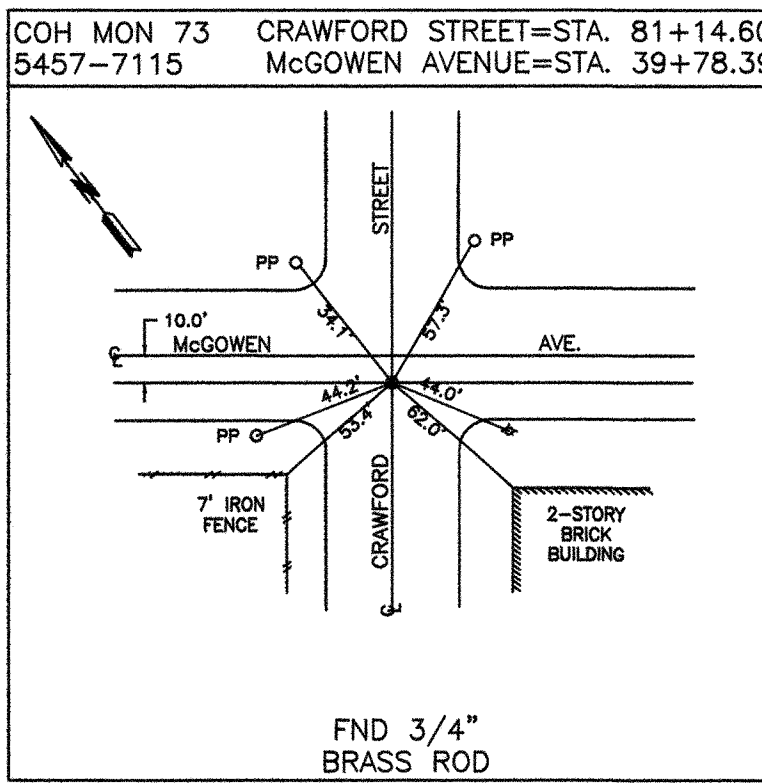
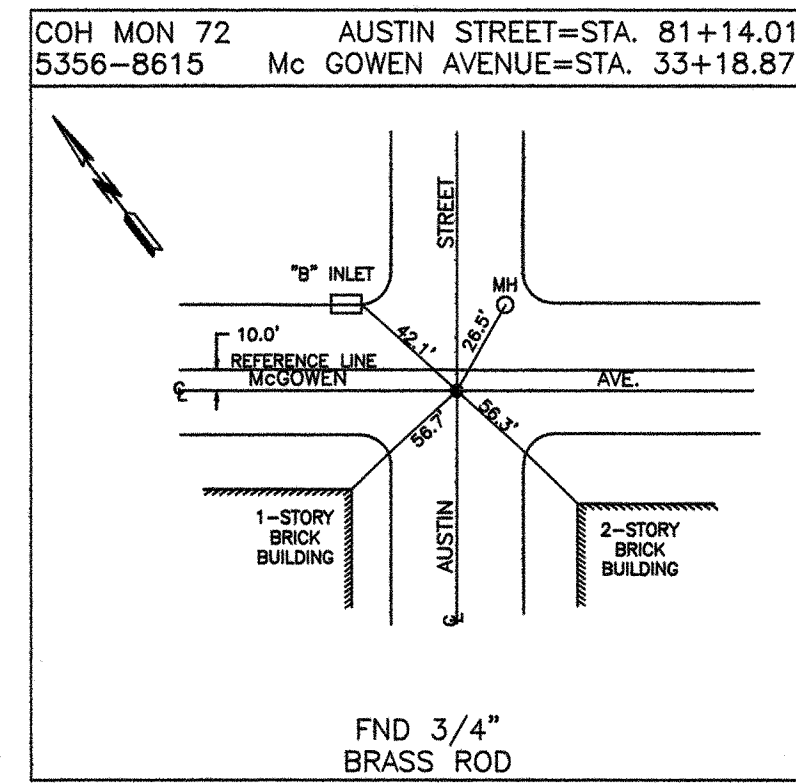
**DOWNTOWN CENTERLINE  
REFERENCE ROD SYSTEM  
REVITALIZATION**

SHEET NO. 1

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

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





- 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 96 (EPOCH 2002.00).
  - THE PRIMARY CONTROL POINTS USED FOR THIS PROJECT ARE CITY OF HOUSTON COOPERATIVE CORNS MONUMENTS AS FOLLOWS:  
COH2, NGS PID# DF8773 N=13,793,560.96 E=3,108,315.43  
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
  - 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.

**RODS**  
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810 LEE ROAD  
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TEL (281) 257-4020  
FAX (281) 257-4021

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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

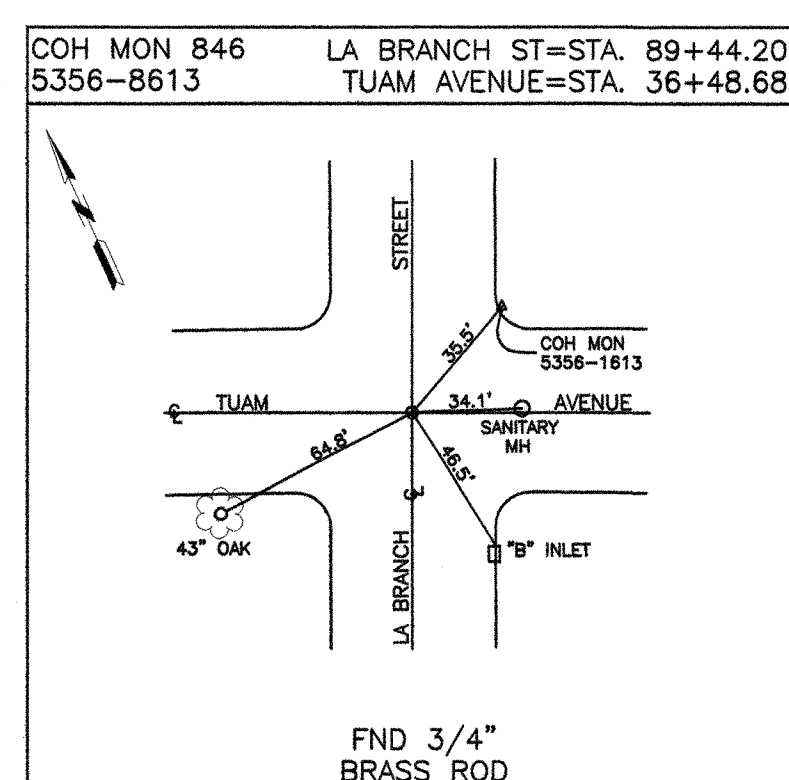
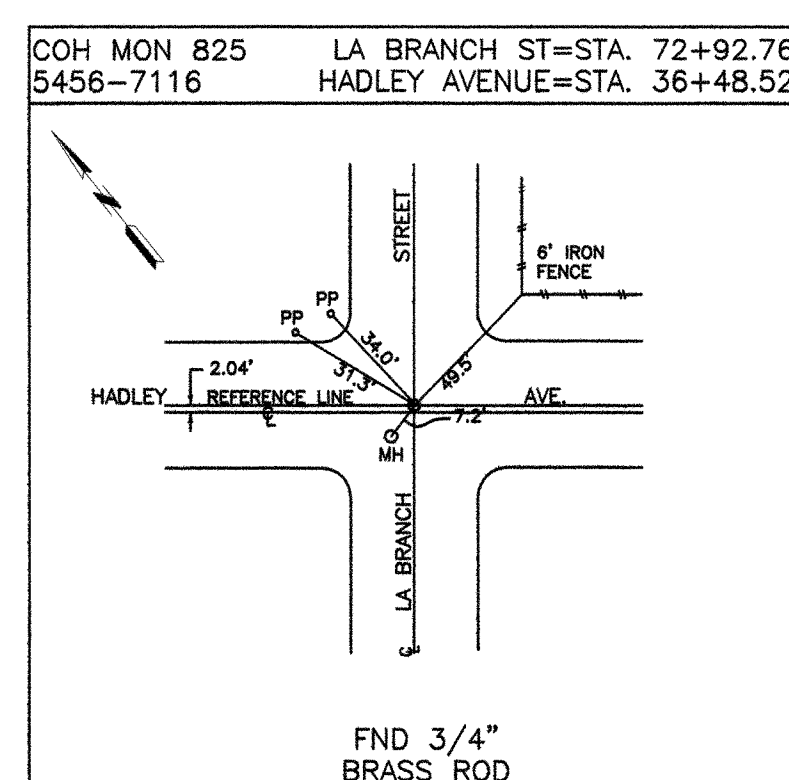
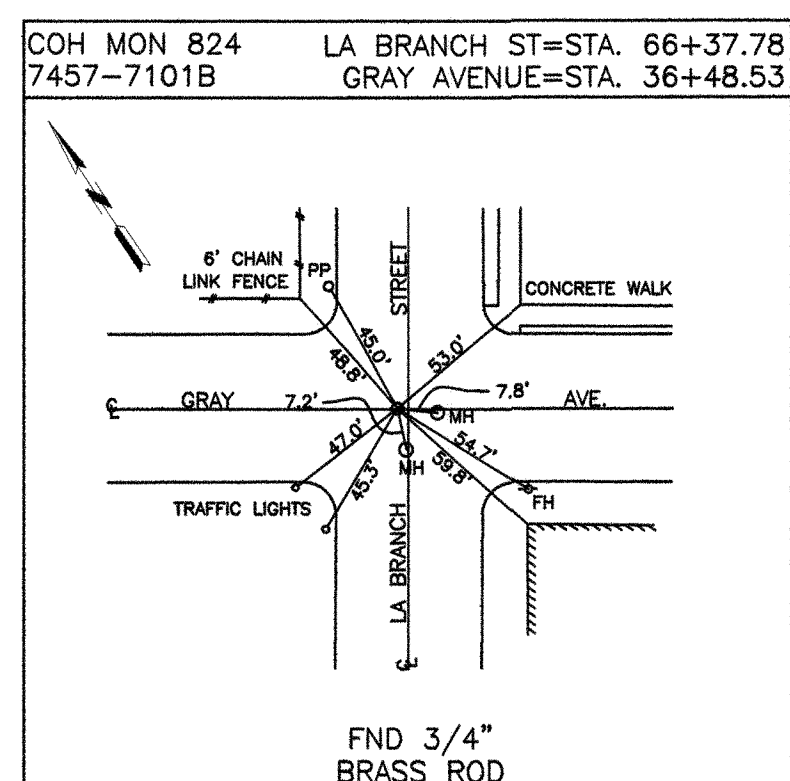
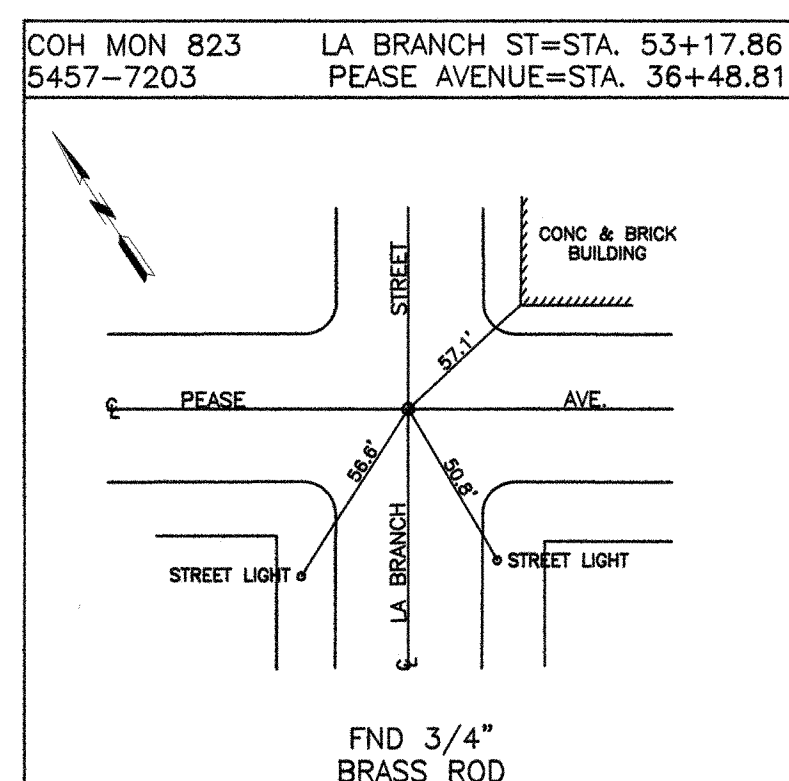
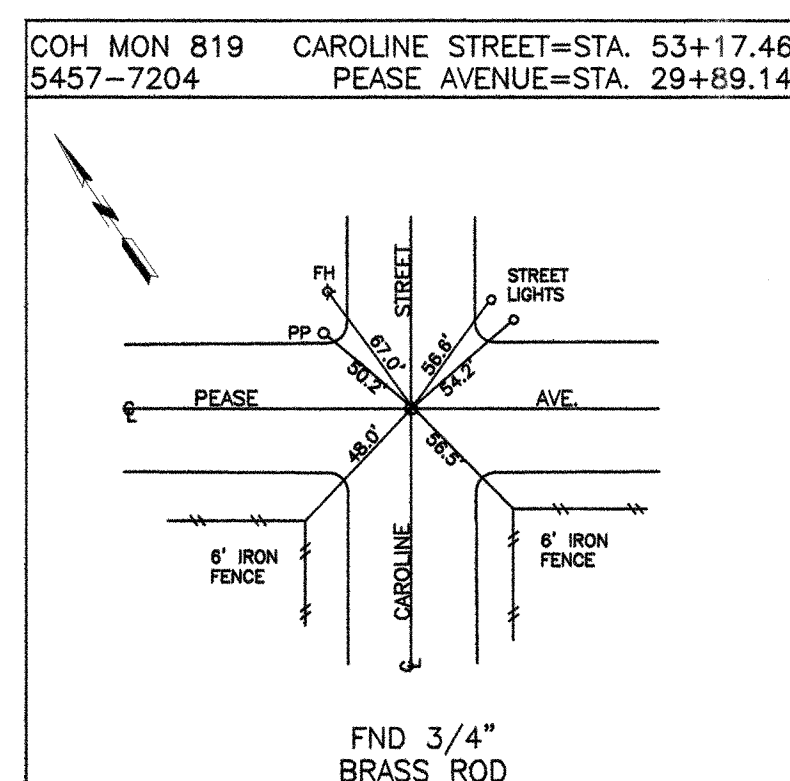
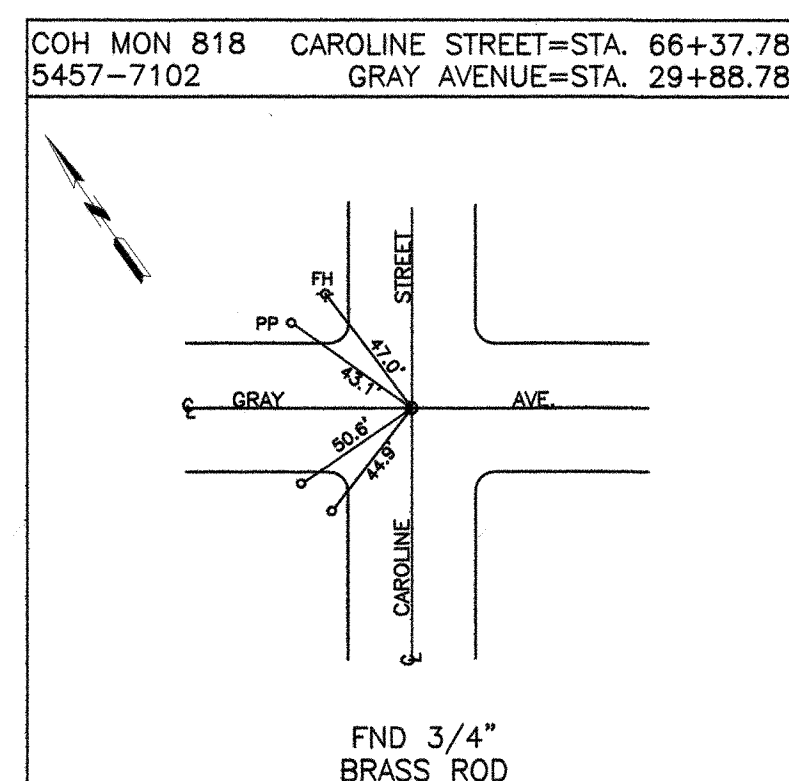
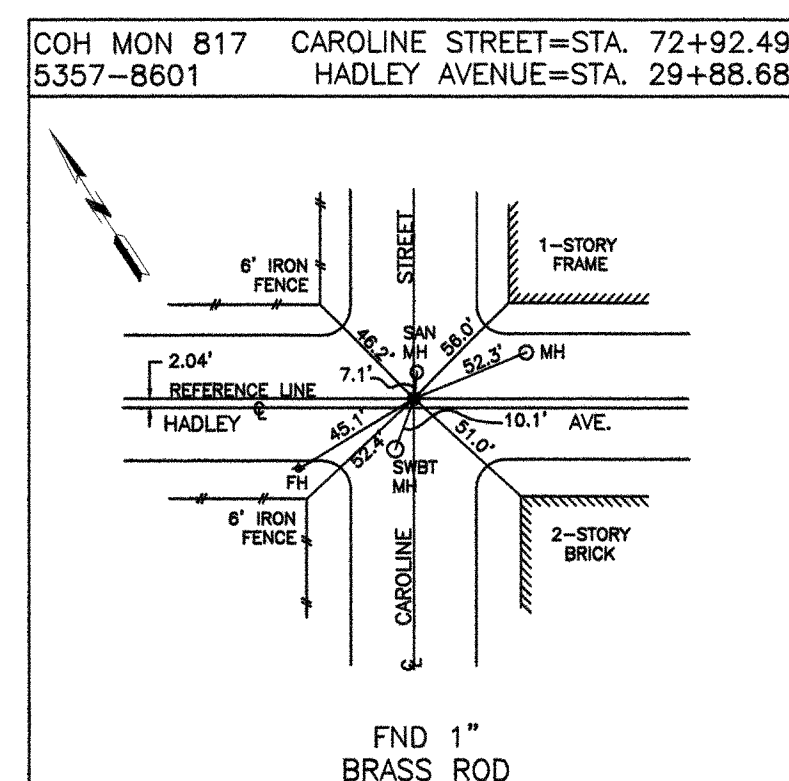
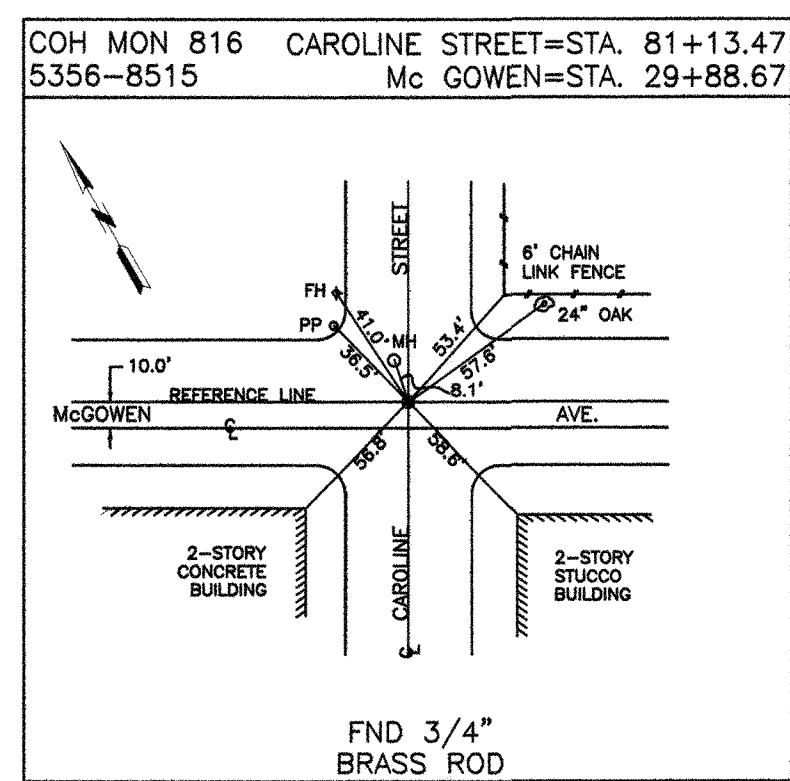
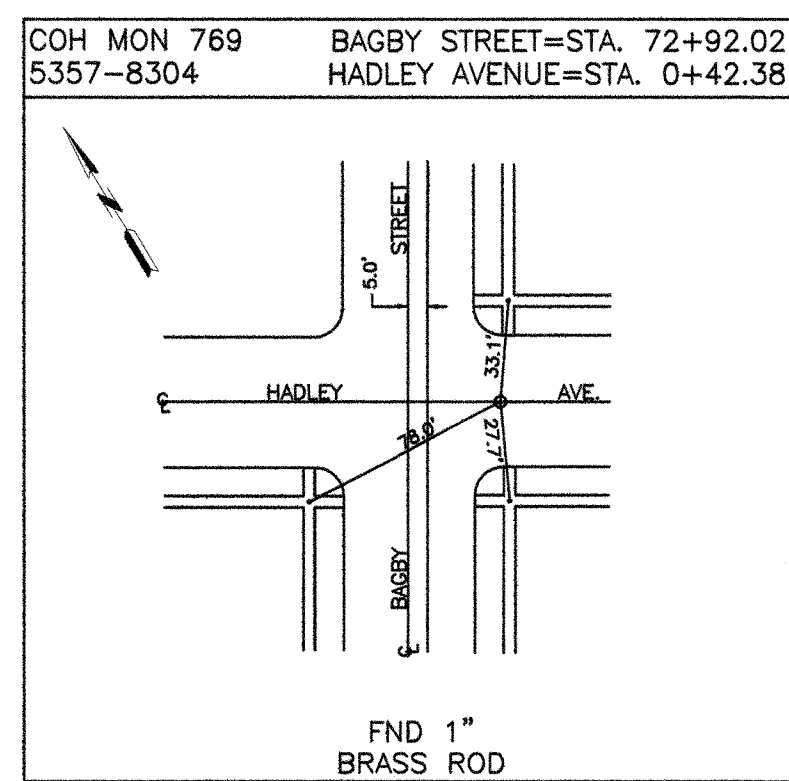
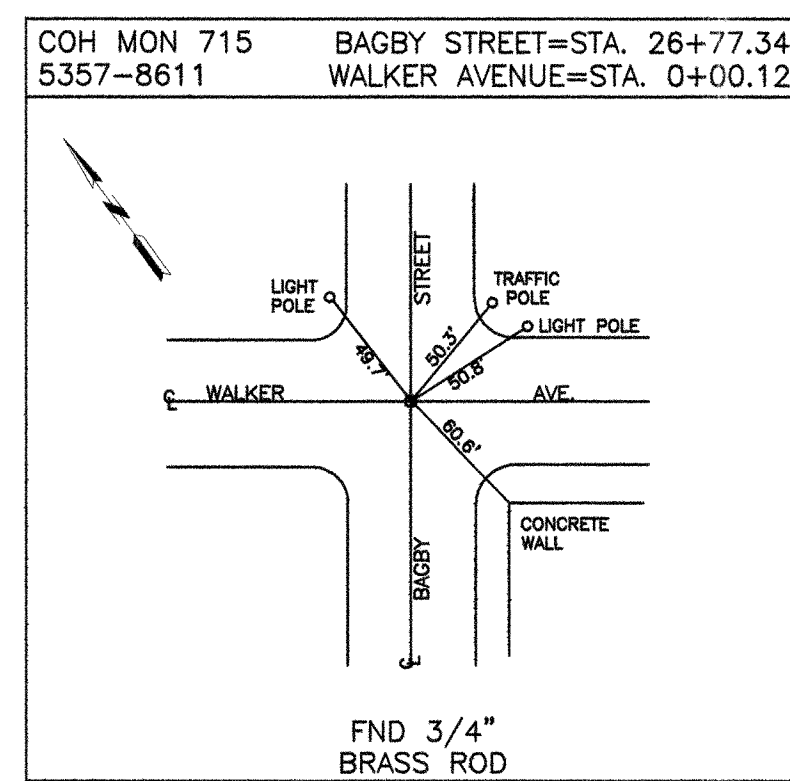
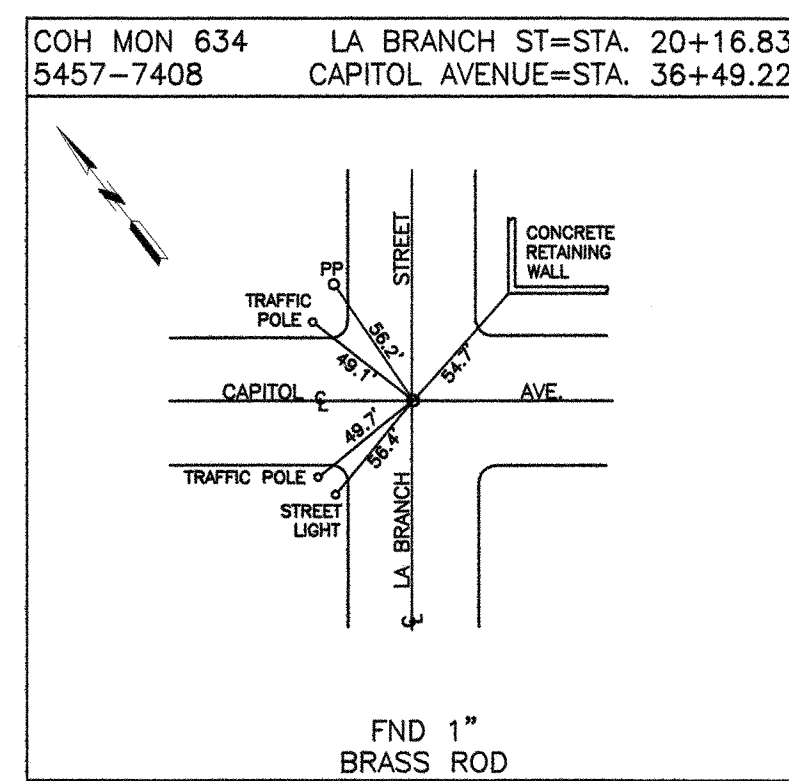
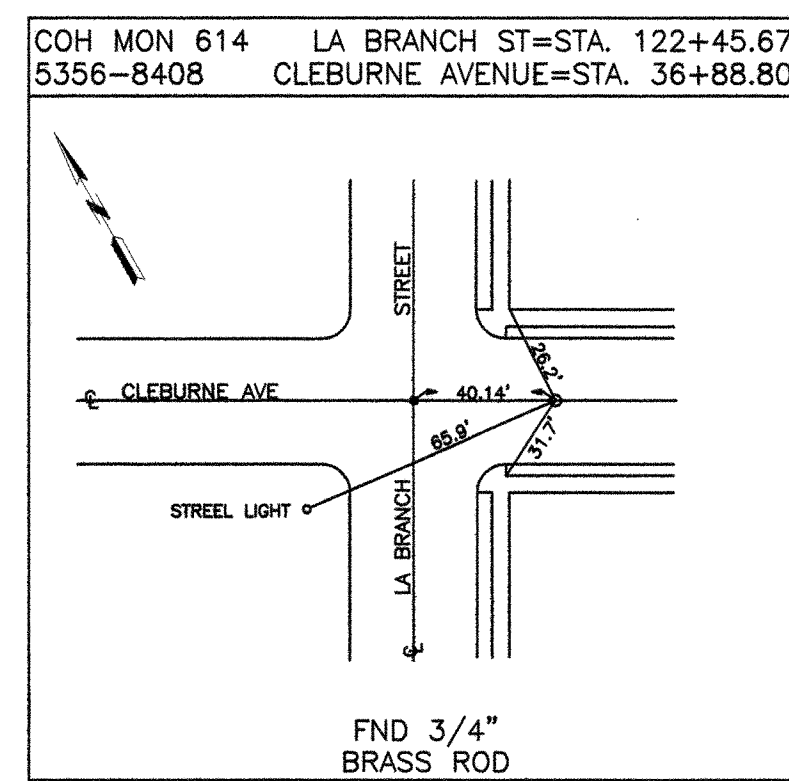
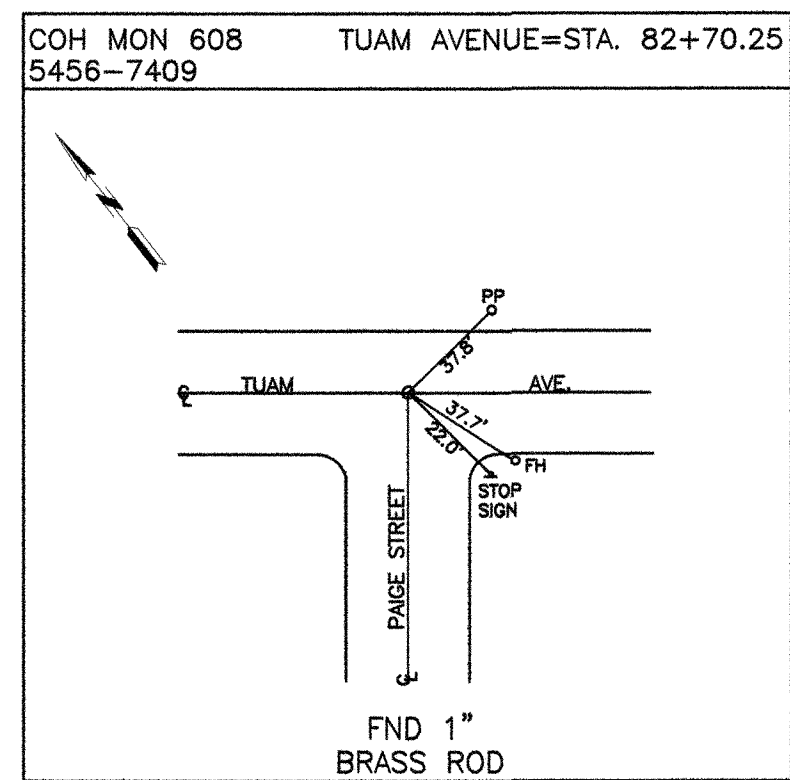
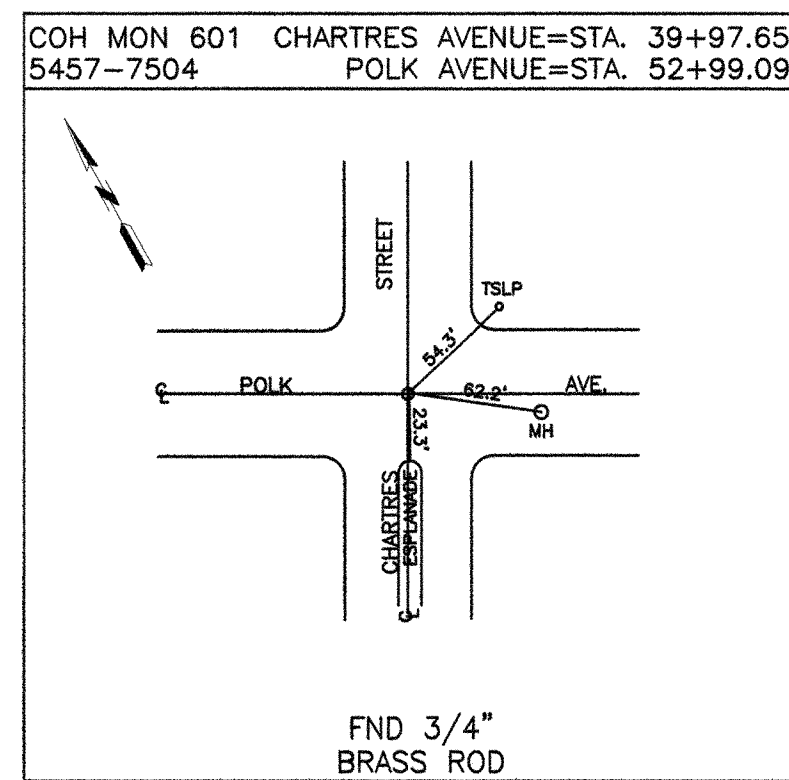
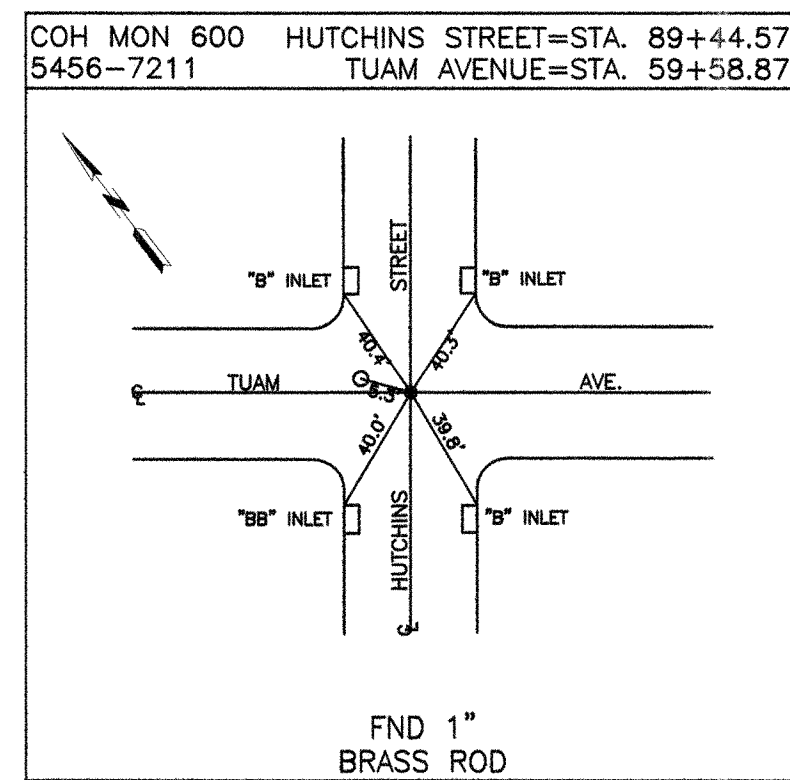
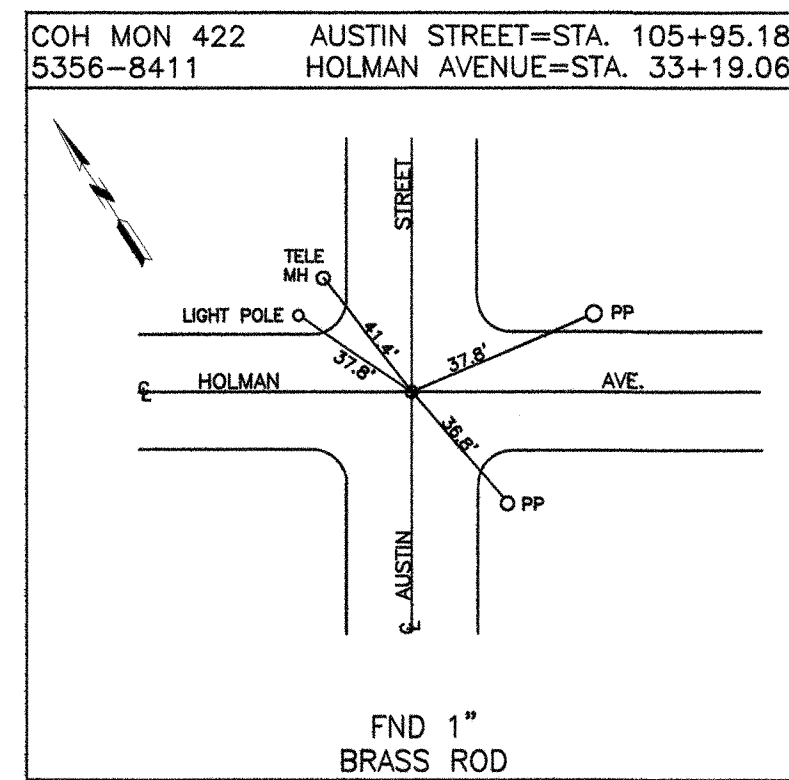
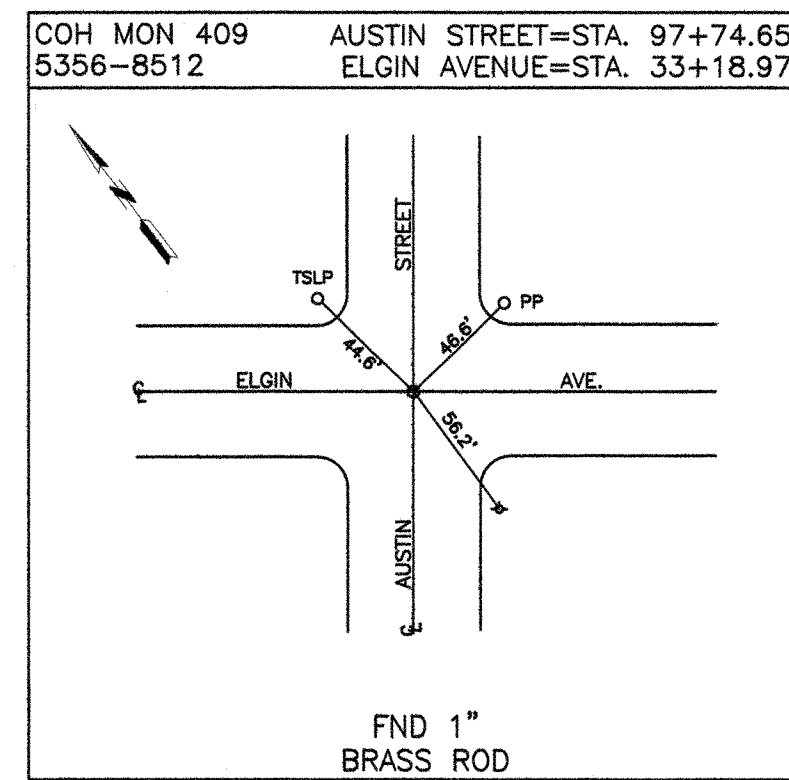
SHEET NO. 2

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

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

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





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  3. THE PRIMARY CONTROL POINTS USED FOR THIS PROJECT ARE CITY OF HOUSTON COOPERATIVE CORS MONUMENTS AS FOLLOWS:  
COH2, NGS PID# DFB773 N=13,793,560.96 E=3,108,315.43  
COH3, NGS PID# DFB775 N=13,800,460.33 E=3,155,320.54  
COH4, NGS PID# DFB777 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  
\*MONUMENT NOT RECOVERED IN FIELD. POSITION CALCULATED FROM RECOVERED COH REFERENCE POINTS.

**RODS**  
Surveying, Inc.  
8810 LEE ROAD  
SPRING, TEXAS 77379  
TEL (281) 257-4020  
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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. 3

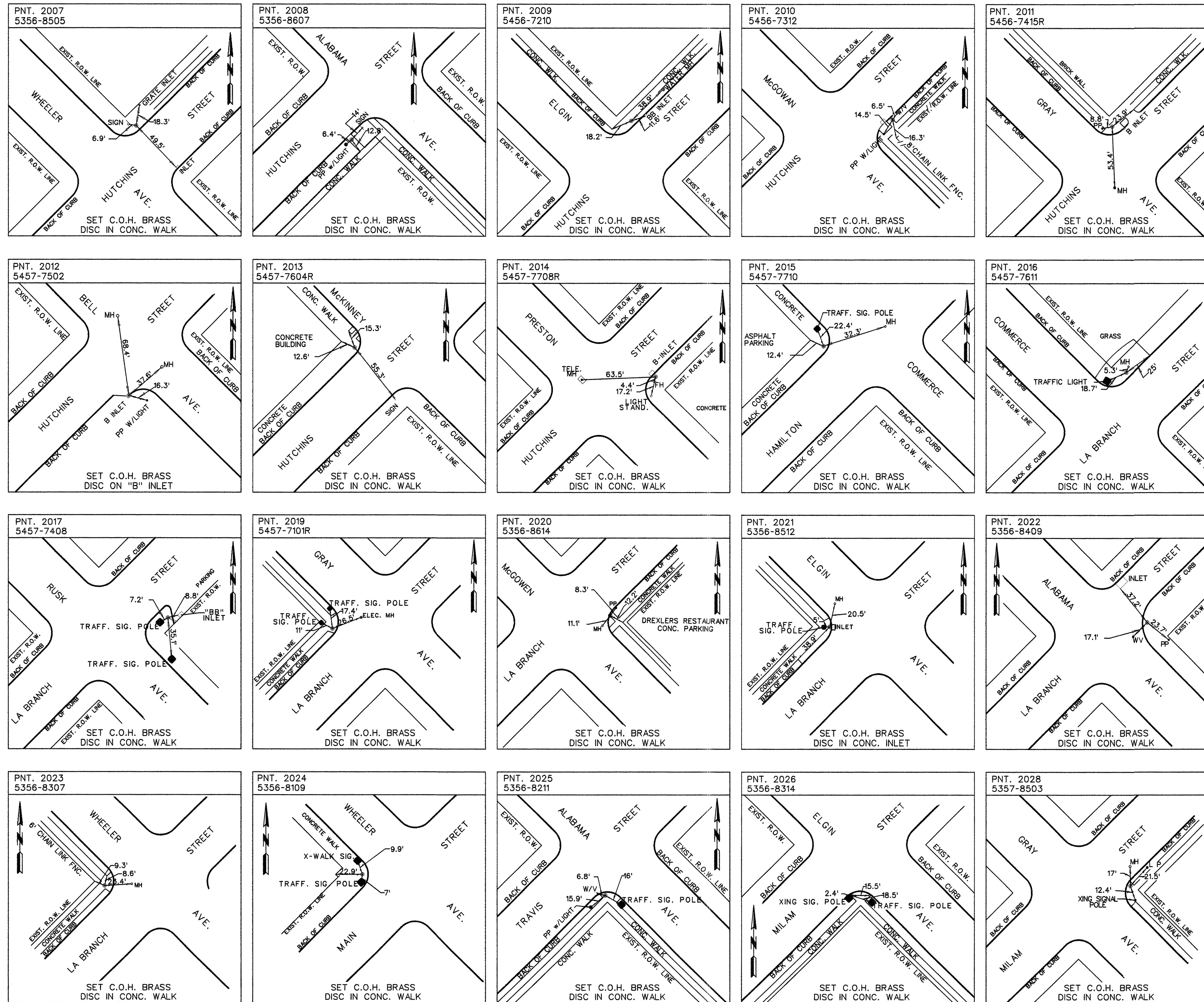
GPS NUMBER	N-0645-04-3
DRAWING SCALE	N.T.S.
CITY OF HOUSTON PM	
SHEET NO. 7 OF 9	

46402

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R.L.S. #4778

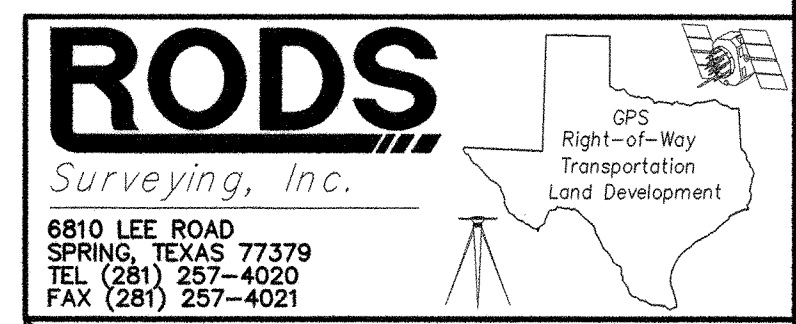




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LEGEND  
 \* = MONUMENT NOT RECOVERED IN FIELD. POSITION CALCULATED FROM RECOVERED COH REFERENCE POINTS.



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**CITY OF HOUSTON**  
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING  
**DOWNTOWN CENTERLINE**  
**REFERENCE ROD SYSTEM**  
**REVITALIZATION**

SHEET NO. 4
GFS NUMBER
N-0645-04-3
DRAWING SCALE
N.T.S.
CITY OF HOUSTON PM
SHEET NO. 8 OF 9

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









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." (1) 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.



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-

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.




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,

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



Thursday, March 27, 2008