



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 4th 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 4th 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 4th 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 19th 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,



Jack R. Chiles, Senior
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