

INVENTORY AND EVALUATION OF HORIZONTAL & VERTICAL CONTROL MONUMENTS

***CITY OF GRAPEVINE
Tarrant County, Texas***



**DEPARTMENT OF PUBLIC WORKS
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Prepared by



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October 2002

**INVENTORY AND EVALUATION OF
HORIZONTAL & VERTICAL CONTROL MONUMENTS**
City of Grapevine, Tarrant County, Texas

INTRODUCTION

The City of Grapevine Department of Public Works contacted Pacheco Koch Consulting Engineers to reset a City control monument that had been destroyed during a street improvement construction project. In the initial stages of that task, it was necessary to utilize other nearby City control monuments. At that time it was discovered that some of those monuments were damaged, missing azimuth and/or reference marks, or had also been destroyed. Pacheco Koch contacted the Public Works Department who agreed that an inventory and evaluation of all City control monuments would be prudent at this time.

OBJECTIVE

The goal of this inventory and evaluation was as follows:

- Recover existing City control monuments and associated azimuth and reference marks.
- Evaluate condition and reliability of each monument, azimuth mark and reference mark.
- Make recommendations regarding actions necessary to restore each monument to the condition required to serve the original purpose.

PROCEDURE

A Pacheco Koch survey crew traveled to each City control monument. Using the information shown on the published data sheets, they attempted to recover the monument. If the monument was found, the survey crew attempted to locate each azimuth mark and reference mark published on the data sheet. The distance to each found reference mark was measured for verification. A photographic record of the condition of the monument, as well as surrounding conditions, was made. The data gathered was compiled in this report.

SUMMARY OF RESULTS

Of the thirteen (13) original monuments, eleven (11) were recovered and two (2) have been destroyed by construction. One (1) of the monuments has been rendered almost unusable for direct GPS observations due to new tree cover. Two (2) other monuments are likely to also become unusable for direct GPS observations if actions are not taken to restrict growth of nearby trees. The found monuments appear to be stable and the horizontal and vertical location of each are highly likely to be accurate. Due to new development, construction, tree growth, etc. most azimuth marks either are no longer visible or no longer exist. Most monuments have sufficient reliable reference marks. The access covers for most of the monuments have been lost.

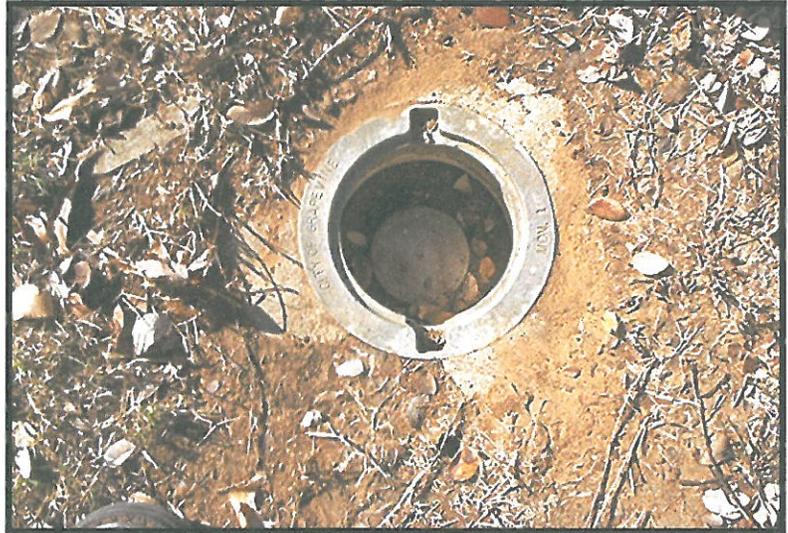
SUMMARY OF RECOMMENDATIONS

Due to destroyed or unusable conditions, it is recommended that three (3) new monuments be established. It may be advisable to set additional monuments to expand the network citywide, however, the sufficiency of the original network layout was not reviewed as a part of this evaluation. It is recommended that additional azimuth marks and reference marks be established as necessary to provide a minimum of two (2) azimuth marks and three (3) reference marks for each monument. It is also recommended that the access covers be repaired or adjusted as necessary to protect the integrity of the monument.

MONUMENT NO. 1

(SILVERCREST LANE MEDIAN)

Monument Name	Mon. 1
<i>Date Established</i>	1991
<i>Date Recovered</i>	October 2002
<i>General Condition</i>	Good
<i>Azimuth Mark 1</i>	Not visible
<i>Azimuth Mark 2</i>	N/A
<i>Reference Mark 1</i>	Found
<i>Reference Mark 2</i>	Found
<i>Reference Mark 3</i>	Found
<i>Reference Mark 4</i>	N/A
Comments: <ol style="list-style-type: none">1. Lid and screw missing2. Insufficient azimuth marks3. Future growth of trees will likely hinder GPS observations	
Recommendations: <ol style="list-style-type: none">1. Replace lid and screw2. Establish 2 new azimuth marks3. Relocate nearby trees	



GRAPEVINE, TEXAS

HORIZONTAL CONTROL MONUMENT

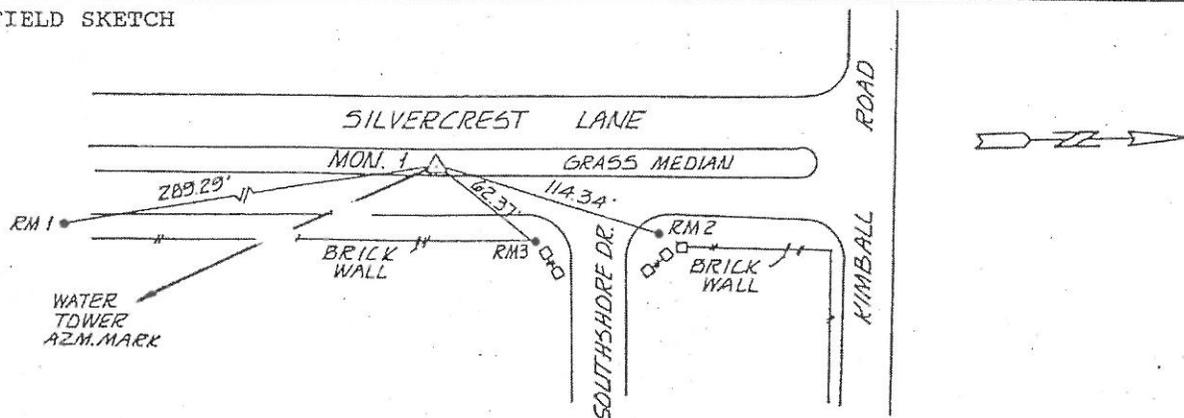
MONUMENT NAME MON. 1 ●	DATE ESTABLISHED 1991	STATE: TEXAS	COUNTY TARRANT
NAD - 27 GEODETIC POSITION LATITUDE N 032° 58' 07.04805" LONGITUDE W 097° 06' 17.71325"		NAD - 83 GEODETIC POSITION LATITUDE N 032° 58' 07.49184" LONGITUDE W 097° 06' 18.74997"	
NAD-27 TEXAS STATE PLANE COORDINATES, NORTH CENTRAL ZONE Y COORDINATE 473878.583 X COORDINATE 2121163.085		NAD-83 TEXAS STATE PLANE COORDINATES, NORTH CENTRAL ZONE (US Survey Feet) Y COORDINATE 7038216.971 X COORDINATE 2396233.387	
CONVERGENCE = 0° 12' 55.71" SCALE FACTOR = 0.9998737		CONVERGENCE = 0° 45' 38.56" SCALE FACTOR = 0.9998737	

ELEVATION : 603.45 ft. (NGVD 1929 MEAN SEA LEVEL DATUM)

AZIMUTH MARK WATER TOWER	ASTRONOMIC AZIMUTH (FROM NORTH) N 157° 26' 22"	GRID AZIMUTH (FROM NORTH) N 156° 40' 43" (NAD-83)	
REFERENCE MARK DESCRIPTION		DISTANCE (ft)	DIRECTION
CENTER OF VENT ON DOVE PARK WATER TOWER			000°00'00"
RM1: CENTER OF FIRE HYDRANT		289.29	016°06'39"
RM2: LIGHT POLE		114.34	222°48'30"
RM3: CENTER OF BRICK FENCE COLUMN, CORNER OF FENCE		62.37	243°44'35"
NOTE: NAD-27 GRID AZIMUTH TO WATER TOWER IS N 157° 13' 26".			

DETAILED DESCRIPTION:
5.5' ALUMINUM ROD WITH CAP SET 0.4' BELOW ACCESS COVER. ACCESS COVER IS STAMPED, "CITY OF GRAPEVINE, MON. 1".
MONUMENT IS LOCATED APPROXIMATELY 300 FEET SOUTH OF KIMBALL RD. AND SILVERCREST LN. INTERSECTION IN THE CENTER OF GRASS MEDIAN.

FIELD SKETCH



MONUMENT NO. 2

(DOVE PARK PARKING LOT)

Monument Name	Mon. 2
<i>Date Established</i>	1991
<i>Date Recovered</i>	October 2002
<i>General Condition</i>	Destroyed
<i>Azimuth Mark 1</i>	Found
<i>Azimuth Mark 2</i>	Found
<i>Reference Mark 1</i>	Destroyed
<i>Reference Mark 2</i>	Found
<i>Reference Mark 3</i>	Destroyed
<i>Reference Mark 4</i>	N/A
<i>Comments:</i> 1. Monument and 2 reference marks destroyed by parking lot expansion	
<i>Recommendations:</i> 1. Set new monument 2. Establish 2 new azimuth marks 3. Establish 3 new reference marks	

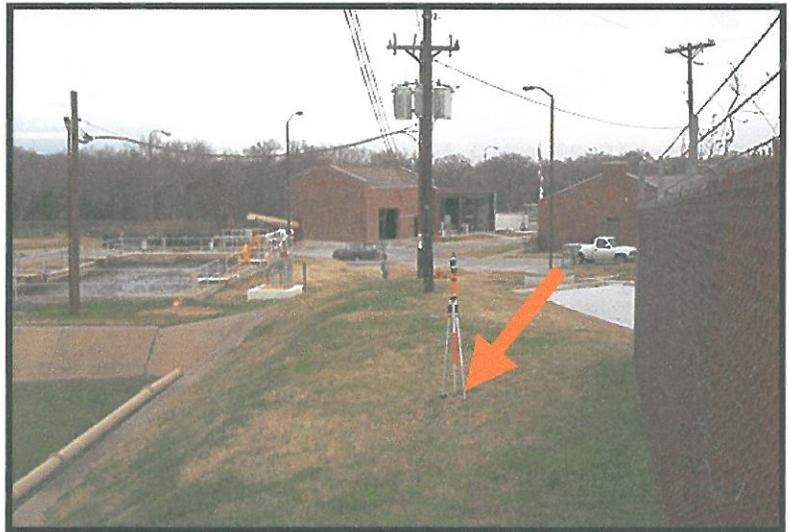
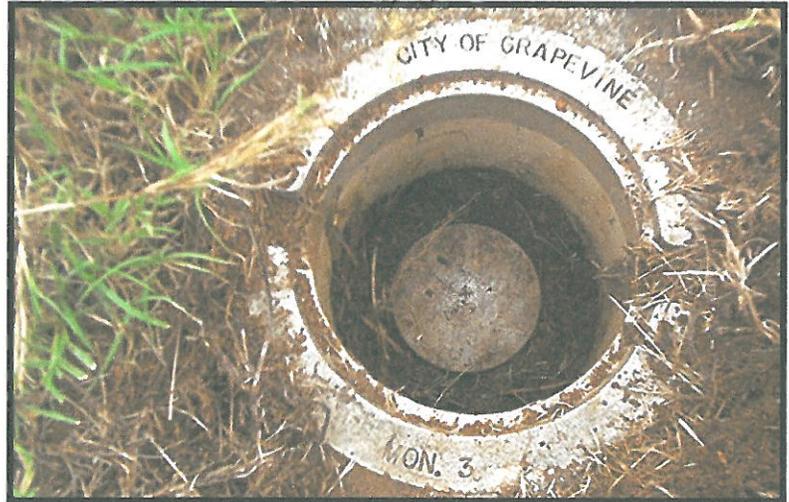
MONUMENT
NOT
FOUND



MONUMENT NO. 3

(WASTEWATER TREATMENT PLANT)

Monument Name	Mon. 3
<i>Date Established</i>	1991
<i>Date Recovered</i>	October 2002
<i>General Condition</i>	Good
<i>Azimuth Mark 1</i>	Not visible
<i>Azimuth Mark 2</i>	Not visible
<i>Reference Mark 1</i>	Found
<i>Reference Mark 2</i>	Found
<i>Reference Mark 3</i>	Found
<i>Reference Mark 4</i>	Found
<i>Comments:</i> 1. Lid and screw missing 2. Insufficient azimuth marks	
<i>Recommendations:</i> 1. Replace lid and screw 2. Establish 2 new azimuth marks	



GRAPEVINE, TEXAS

HORIZONTAL CONTROL MONUMENT

MONUMENT NAME MON. 3	DATE ESTABLISHED 1991	STATE: TEXAS	COUNTY TARRANT
NAD - 27 GEODETIC POSITION LATITUDE N 032° 56' 50.68014" LONGITUDE W 097° 04' 56.45178"		NAD - 83 GEODETIC POSITION LATITUDE N 032° 56' 51.12627" LONGITUDE W 097° 04' 57.48584"	
NAD-27 TEXAS STATE PLANE COORDINATES, NORTH CENTRAL ZONE Y COORDINATE 466188.031 X COORDINATE 2128116.308		NAD-83 TEXAS STATE PLANE COORDINATES, NORTH CENTRAL ZONE (US Survey Feet) Y COORDINATE 7030592.933 X COORDINATE 2403259.544	
CONVERGENCE = 0° 13' 40.03" SCALE FACTOR = 0.9998743		CONVERGENCE = 0° 46' 22.88" SCALE FACTOR = 0.9998743	

ELEVATION : 590.51 ft. (NGVD 1929 MEAN SEA LEVEL DATUM)

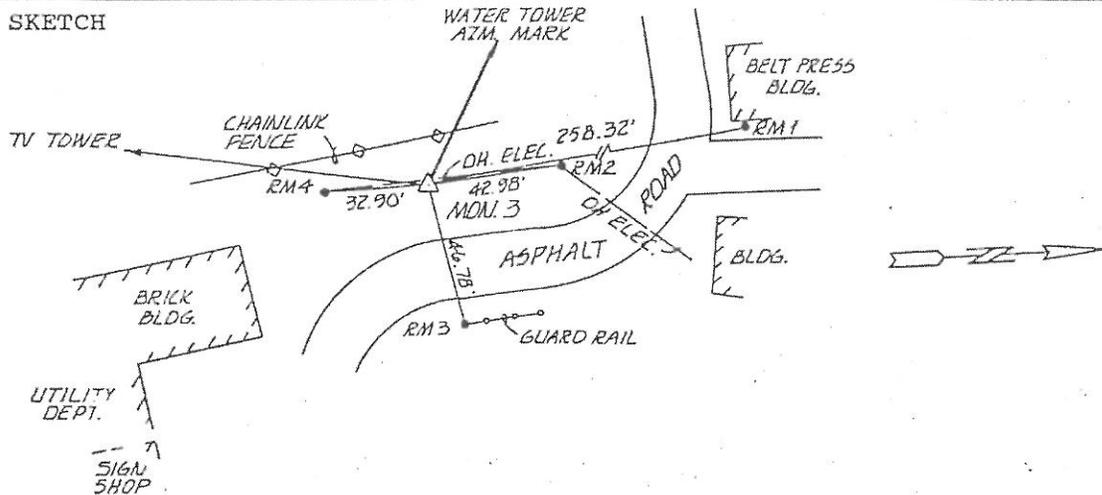
AZIMUTH MARK WATER TOWER	ASTRONOMIC AZIMUTH (FROM NORTH) N 301° 29' 26"	GRID AZIMUTH (FROM NORTH) N 300° 43' 03" (NAD-83)
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REFERENCE MARK DESCRIPTION	DISTANCE (ft)	DIRECTION
CENTER OF VENT ON DOVE PARK WATER TOWER		000°00'00"
CENTER OF RED LIGHT ON TV TOWER		251°01'02"
RM1: CITY OF GRAPEVINE BM (3" DISK)	258.32	055°16'41"
RM2: PK NAIL W/SHINER IN POWER POLE	42.98	055°59'58"
RM3: PK NAIL W/SHINER IN GUARD RAIL POST	46.78	139°11'18"
RM4: PK NAIL W/SHINER IN POWER POLE	32.90	240°54'27"

NOTE: NAD-27 GRID AZIMUTH TO WATER TOWER IS N 301° 15' 46".

DETAILED DESCRIPTION:
 9.0' ALUMINUM ROD WITH CAP SET 0.6' BELOW ACCESS COVER. ACCESS COVER IS STAMPED, "CITY OF GRAPEVINE, MON. 3".
 MONUMENT IS LOCATED AT THE INTERSECTION OF SCRIBNER AND SHADY BROOK INSIDE THE GRAPEVINE PUBLIC WORK FACILITY.

FIELD SKETCH



MONUMENT NO. 4

(GRAPEVINE MILLS PARKWAY)

Monument Name	Mon. 4
<i>Date Established</i>	1991
<i>Date Recovered</i>	October 2002
<i>General Condition</i>	Poor
<i>Azimuth Mark 1</i>	Visible
<i>Azimuth Mark 2</i>	Not visible
<i>Reference Mark 1</i>	Found
<i>Reference Mark 2</i>	Not found
<i>Reference Mark 3</i>	Found
<i>Reference Mark 4</i>	N/A
Comments: <ol style="list-style-type: none">1. Lid and screw missing2. Monument protrudes approximately 0.2' above case	
Recommendations: <ol style="list-style-type: none">1. Verify elevation of monument2. Establish 1 new azimuth mark3. Remove and replace access cover assembly at proper grade	



GRAPEVINE, TEXAS

HORIZONTAL CONTROL MONUMENT

MONUMENT NAME MON. 4	DATE ESTABLISHED 1991	STATE: TEXAS	COUNTY TARRANT
NAD - 27 GEODETIC POSITION LATITUDE N 032° 59' 03.83949" LONGITUDE W 097° 02' 26.67593"		NAD - 83 GEODETIC POSITION LATITUDE N 032° 59' 04.28224" LONGITUDE W 097° 02' 27.70584"	
NAD-27 TEXAS STATE PLANE COORDINATES, NORTH CENTRAL ZONE Y COORDINATE 479697.655 X COORDINATE 2140819.700		NAD-83 TEXAS STATE PLANE COORDINATES, NORTH CENTRAL ZONE (US Survey Feet) Y COORDINATE 7044222.906 X COORDINATE 2415833.859	
CONVERGENCE = 0° 15' 01.71" SCALE FACTOR = 0.9998733		CONVERGENCE = 0° 47' 44.57" SCALE FACTOR = 0.9998733	
ELEVATION : 471.73 ft.		(NGVD 1929 MEAN SEA LEVEL DATUM)	

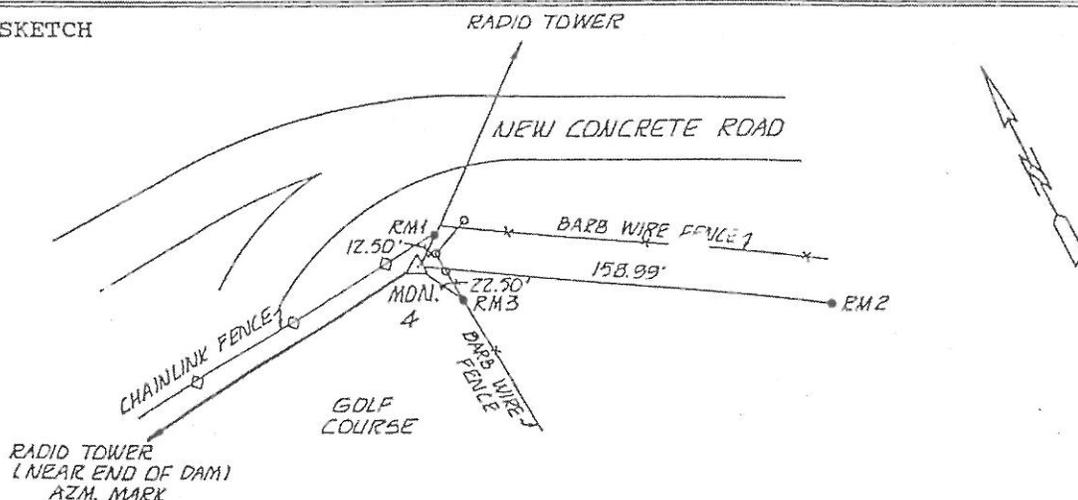
AZIMUTH MARK RADIO TOWER	ASTRONOMIC AZIMUTH (FROM NORTH) N 265° 57' 23"	GRID AZIMUTH (FROM NORTH) N 265° 09' 38" (NAD-83)
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REFERENCE MARK DESCRIPTION	DISTANCE (ft)	DIRECTION
CENTER OF RED LIGHT ON RADIO TOWER (NEAR END OF DAM)		000°00'00"
CENTER OF RED LIGHT ON RADIO TOWER		147°21'42"
RM1: FENCE POST AT END OF CHAIN LINK FENCE	12.50	146°10'45"
RM2: PIPELINE MARKER	158.99	218°18'58"
RM3: STEEL FENCE POST (6" PIPE)	22.50	249°28'14"

NOTE: NAD-27 GRID AZIMUTH TO RADIO TOWER IS N 265° 42' 21".

DETAILED DESCRIPTION:
 21' ALUMINUM ROD WITH CAP SET 0.5' BELOW ACCESS COVER. ACCESS COVER IS STAMPED, "CITY OF GRAPEVINE, MON. 4".
 MONUMENT IS LOCATED AT THE NORTHEAST CORNER OF THE GRAPEVINE MUNICIPAL GOLF COURSE.

FIELD SKETCH



MONUMENT NO. 5

(CANNON ELEMENTARY SCHOOL)

Monument Name	Mon. 5
<i>Date Established</i>	1991
<i>Date Recovered</i>	October 2002
<i>General Condition</i>	Fair
<i>Azimuth Mark 1</i>	Visible
<i>Azimuth Mark 2</i>	Visible
<i>Reference Mark 1</i>	Found
<i>Reference Mark 2</i>	Destroyed
<i>Reference Mark 3</i>	Destroyed
<i>Reference Mark 4</i>	N/A
<i>Comments:</i> <ol style="list-style-type: none">1. Screw missing from lid2. Insufficient reference marks3. Access lid protrudes approx. 0.7' above surrounding grade	
<i>Recommendations:</i> <ol style="list-style-type: none">1. Replace lid screw2. Establish 2 new reference marks3. Remove and replace access cover assembly flush with ground (optional)	



MONUMENT NO. 6

(BOYD DRIVE MEDIAN)

Monument Name	Mon. 6
<i>Date Established</i>	1991
<i>Date Recovered</i>	October 2002
<i>General Condition</i>	Destroyed
<i>Azimuth Mark 1</i>	Not visible
<i>Azimuth Mark 2</i>	Destroyed
<i>Azimuth Mark 3</i>	Not visible
<i>Reference Mark 1</i>	Found
<i>Reference Mark 2</i>	Found
<i>Reference Mark 3</i>	Found
<i>Reference Mark 4</i>	N/A
<i>Comments:</i> 1. Monument destroyed by street construction	
<i>Recommendations:</i> 1. Set new monument 2. Establish 2 new azimuth marks 3. Establish 3 new reference marks	

MONUMENT
NOT
FOUND



GRAPEVINE, TEXAS

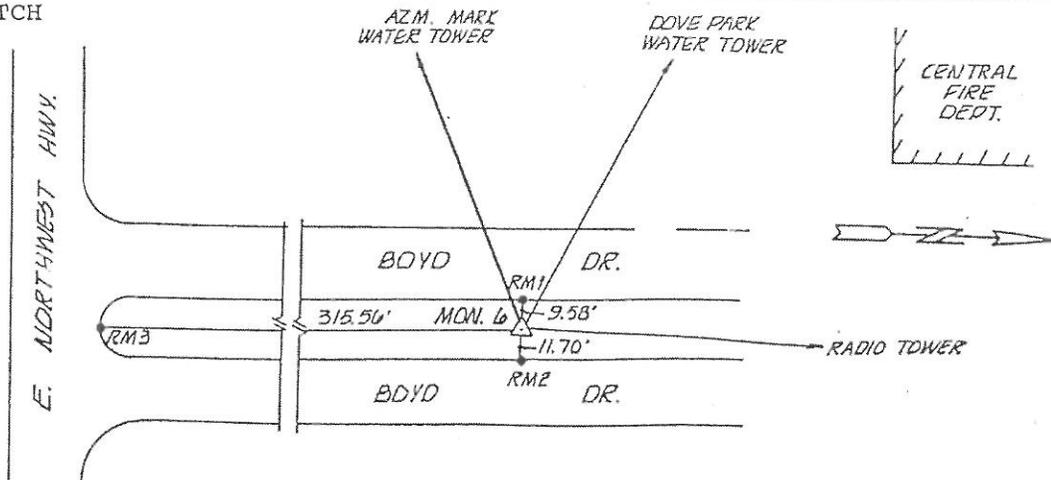
HORIZONTAL CONTROL MONUMENT

MONUMENT NAME MON. 6	DATE ESTABLISHED 1991	STATE: TEXAS	COUNTY TARRANT
NAD - 27 GEODETIC POSITION LATITUDE N 032° 56' 30.88029" LONGITUDE W 097° 04' 09.28805"		NAD - 83 GEODETIC POSITION LATITUDE N 032° 56' 31.32701" LONGITUDE W 097° 04' 10.32065"	
NAD-27 TEXAS STATE PLANE COORDINATES, NORTH CENTRAL ZONE Y COORDINATE 464203.396 X COORDINATE 2132143.279		NAD-83 TEXAS STATE PLANE COORDINATES, NORTH CENTRAL ZONE (US Survey Feet) Y COORDINATE 7028646.708 X COORDINATE 2407305.249	
CONVERGENCE = 0° 14' 05.75" SCALE FACTOR = 0.9998745		CONVERGENCE = 0° 46' 48.61" SCALE FACTOR = 0.9998744	
ELEVATION : 613.99 ft. (NGVD 1929 MEAN SEA LEVEL DATUM)			

AZIMUTH MARK WATER TOWER	ASTRONOMIC AZIMUTH (FROM NORTH) N 248° 38' 57"	GRID AZIMUTH (FROM NORTH) N 247° 52' 09" (NAD-83)
REFERENCE MARK DESCRIPTION	DISTANCE (ft)	DIRECTION
CENTER OF VENT ON WATER TOWER		000°00'00"
CENTER OF VENT ON DOVE PARK WATER TOWER		050°39'58"
CENTER OF RED LIGHT ON RADIO TOWER (DAM)		116°35'18"
RM1: CHISELED "+" ON CURB	9.58	022°59'51"
RM2: CHISELED "+" ON CURB	11.70	202°42'45"
RM3: CHISELED "+" ON GUTTER	315.56	291°44'08"
NOTE: NAD-27 GRID AZIMUTH TO WATER TOWER IS N 248° 24' 52".		

DETAILED DESCRIPTION:
 12' ALUMINUM ROD WITH CAP SET 0.6' BELOW ACCESS COVER. ACCESS COVER IS STAMPED, "CITY OF GRAPEVINE, MON. 6".
 MONUMENT IS LOCATED APPROXIMATELY 350 FEET NORTH OF THE INTERSECTION OF EAST NORTHWEST HWY. AND BOYD DRIVE IN MEDIAN.

FIELD SKETCH



MONUMENT NO. 7

(CORPS OF ENGINEERS FACILITY)

Monument Name	Mon. 7
<i>Date Established</i>	1991
<i>Date Recovered</i>	October 2002
<i>General Condition</i>	Very good
<i>Azimuth Mark 1</i>	Not visible
<i>Azimuth Mark 2</i>	Not visible
<i>Azimuth Mark 3</i>	Not visible
<i>Reference Mark 1</i>	Destroyed
<i>Reference Mark 2</i>	Destroyed
<i>Reference Mark 3</i>	Destroyed
<i>Reference Mark 4</i>	N/A
Comments: 1. Insufficient azimuth marks 2. Insufficient reference marks	
Recommendations: 1. Establish 2 new azimuth marks 2. Establish 3 new reference marks	



MONUMENT NO. 8

(VINE STREET MEDIAN)

Monument Name	Mon. 8
<i>Date Established</i>	1991
<i>Date Recovered</i>	October 2002
<i>General Condition</i>	Fair
<i>Azimuth Mark 1</i>	Visible
<i>Azimuth Mark 2</i>	N/A
<i>Reference Mark 1</i>	Found
<i>Reference Mark 2</i>	Not found
<i>Reference Mark 3</i>	Found
<i>Reference Mark 4</i>	N/A
Comments: <ol style="list-style-type: none">1. Lid and screw missing2. Monument in depressed area that ponds water	
Recommendations: <ol style="list-style-type: none">1. Replace lid and screw2. Establish 1 new azimuth mark3. Establish 1 new reference mark4. Regrade area around monument to alleviate ponding	



GRAPEVINE, TEXAS

HORIZONTAL CONTROL MONUMENT

MONUMENT NAME MON. 8	DATE ESTABLISHED 1991	STATE: TEXAS	COUNTY TARRANT
NAD - 27 GEODETIC POSITION LATITUDE N 032° 55' 44.64343" LONGITUDE W 097° 04' 39.95838"		NAD - 83 GEODETIC POSITION LATITUDE N 032° 55' 45.09125" LONGITUDE W 097° 04' 40.99173"	
NAD-27 TEXAS STATE PLANE COORDINATES, NORTH CENTRAL ZONE Y COORDINATE 459520.352 X COORDINATE 2129548.513		NAD-83 TEXAS STATE PLANE COORDINATES, NORTH CENTRAL ZONE (US Survey Feet) Y COORDINATE 7023939.151 X COORDINATE 2404755.163	
CONVERGENCE = 0° 13' 49.02" SCALE FACTOR = 0.9998749		CONVERGENCE = 0° 46' 31.88" SCALE FACTOR = 0.9998749	

ELEVATION : 635.97 ft. (NGVD 1929 MEAN SEA LEVEL DATUM)

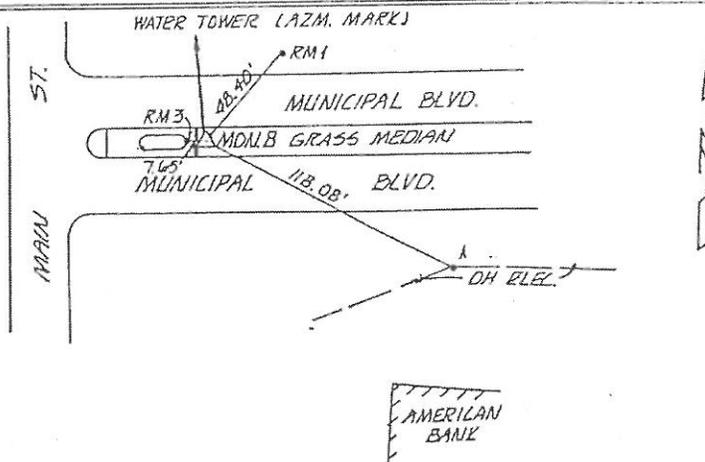
AZIMUTH MARK WATER TOWER	ASTRONOMIC AZIMUTH (FROM NORTH) N 354° 14' 30"	GRID AZIMUTH (FROM NORTH) N 353° 27' 58" (NAD-83)
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REFERENCE MARK DESCRIPTION	DISTANCE (ft)	DIRECTION
CENTER OF VENT ON WATER TOWER		000°00'00"
RM1: LIGHT POLE	48.40	047°13'35"
RM2: PK NAIL W/SHINER IN POWER POLE	118.08	122°22'57"
RM3: CENTER OF THE EAST END OF THE GRAPEVINE CONVENTION CENTER AND LIBRARY SIGN.	7.65	273°59'52"

NOTE: NAD-27 GRID AZIMUTH TO WATER TOWER IS N 354° 00' 41".

DETAILED DESCRIPTION:
 15' ALUMINUM ROD WITH CAP SET 0.5' BELOW ACCESS COVER. ACCESS COVER IS STAMPED, "CITY OF GRAPEVINE, MON. 8".
 MONUMENT IS LOCATED APPROXIMATELY 100 FEET EAST OF THE INTERSECTION OF MAIN ST. AND MUNICIPAL BLVD. IN GRASS MEDIAN.

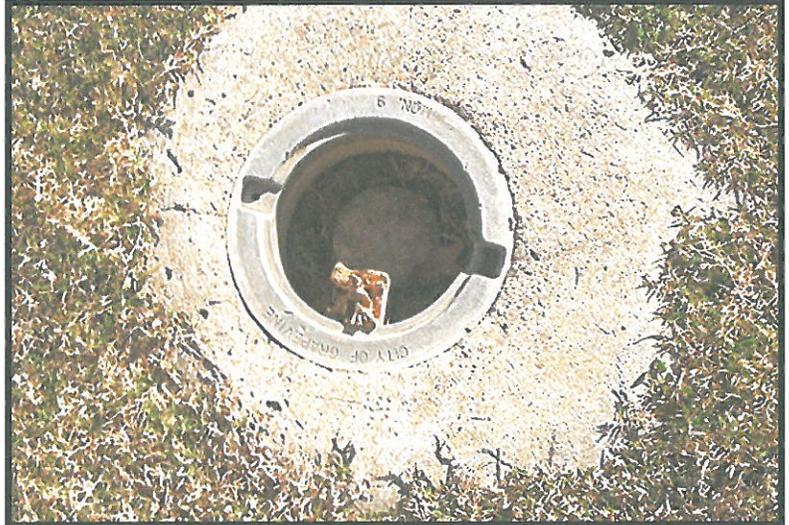
FIELD SKETCH



MONUMENT NO. 9

(GRAPEVINE HIGH SCHOOL)

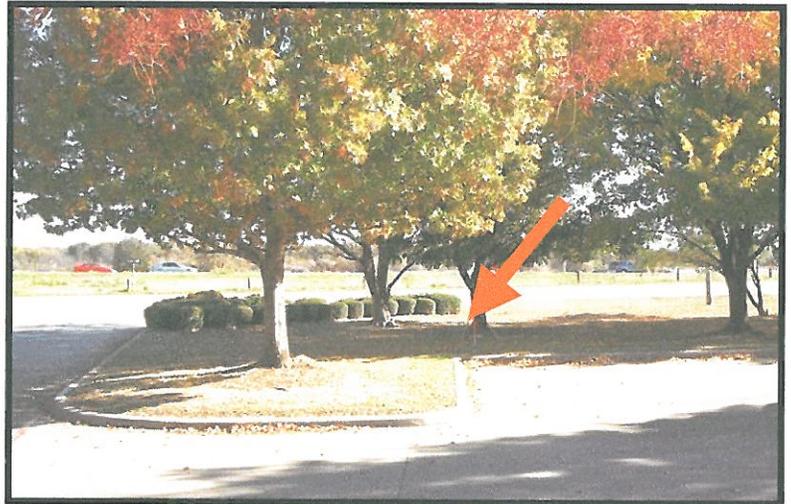
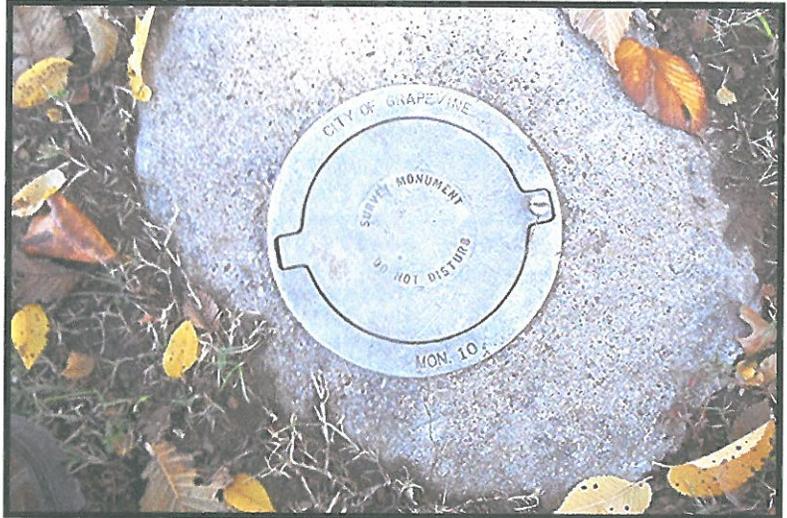
Monument Name	Mon. 9
<i>Date Established</i>	1991
<i>Date Recovered</i>	October 2002
<i>General Condition</i>	Good
<i>Azimuth Mark 1</i>	Not visible
<i>Azimuth Mark 2</i>	Visible
<i>Reference Mark 1</i>	Found
<i>Reference Mark 2</i>	Found
<i>Reference Mark 3</i>	Found
<i>Reference Mark 4</i>	N/A
<i>Comments:</i> 1. Lid and screw missing	
<i>Recommendations:</i> 1. Replace lid and screw 2. Establish 1 new azimuth mark	



MONUMENT NO. 10

(CHARTER HOSPITAL)

Monument Name	Mon. 10
Date Established	1991
Date Recovered	October 2002
General Condition	Good
Azimuth Mark 1	Visible
Azimuth Mark 2	Not visible
Reference Mark 1	Found
Reference Mark 2	Found
Reference Mark 3	Found
Reference Mark 4	N/A
Comments: 1. Existing trees will likely hinder GPS observations	
Recommendations: 1. Establish 1 new azimuth mark 2. Set replacement monument nearby due to tree cover (optional)	



MONUMENT NO. 11

(PECAN PARK)

Monument Name	Mon. 11
<i>Date Established</i>	1991
<i>Date Recovered</i>	October 2002
<i>General Condition</i>	Good
<i>Azimuth Mark 1</i>	Not visible
<i>Azimuth Mark 2</i>	N/A
<i>Reference Mark 1</i>	Found
<i>Reference Mark 2</i>	Found
<i>Reference Mark 3</i>	Found
<i>Reference Mark 4</i>	N/A
Comments: <ol style="list-style-type: none">1. Insufficient azimuth marks2. Future growth of trees will likely hinder GPS observations	
Recommendations: <ol style="list-style-type: none">1. Establish 2 new azimuth marks2. Relocate nearby trees	



MONUMENT NO. 12

(SHADOW GLEN PARK)

Monument Name	Mon. 12
<i>Date Established</i>	1991
<i>Date Recovered</i>	October 2002
<i>General Condition</i>	Good
<i>Azimuth Mark 1</i>	Not visible
<i>Azimuth Mark 2</i>	N/A
<i>Reference Mark 1</i>	Found
<i>Reference Mark 2</i>	Found
<i>Reference Mark 3</i>	Found
<i>Reference Mark 4</i>	N/A
<i>Comments:</i>	<ol style="list-style-type: none">1. Lid and screw missing2. Insufficient azimuth marks
<i>Recommendations:</i>	<ol style="list-style-type: none">1. Replace lid and screw2. Establish 2 new azimuth marks



MONUMENT NO. 13

(WILLIAM D. TATE AVENUE)

Monument Name	Mon. 13
<i>Date Established</i>	1991
<i>Date Recovered</i>	October 2002
<i>General Condition</i>	Good
<i>Azimuth Mark 1</i>	Not visible
<i>Azimuth Mark 2</i>	Visible
<i>Azimuth Mark 3</i>	Not visible
<i>Reference Mark 1</i>	Found
<i>Reference Mark 2</i>	Not found
<i>Reference Mark 3</i>	Found
<i>Reference Mark 4</i>	N/A
Comments: <ol style="list-style-type: none">1. Aluminum disk set flush in center of concrete road2. Location in heavy traffic area may be hazardous for GPS observations	
Recommendations: <ol style="list-style-type: none">1. Establish 1 new azimuth mark2. Establish 1 new reference mark3. May wish to establish new monument nearby due to traffic conditions	



GRAPEVINE, TEXAS

HORIZONTAL CONTROL MONUMENT

MONUMENT NAME MON. 13	DATE ESTABLISHED 1991	STATE: TEXAS	COUNTY TARRANT
NAD - 27 GEODETIC POSITION LATITUDE N 032° 55' 32.89101" LONGITUDE W 097° 05' 15.65323"		NAD - 83 GEODETIC POSITION LATITUDE N 032° 55' 33.33912" LONGITUDE W 097° 05' 16.68755"	
NAD-27 TEXAS STATE PLANE COORDINATES, NORTH CENTRAL ZONE Y COORDINATE 458320.637 X COORDINATE 2126511.027		NAD-83 TEXAS STATE PLANE COORDINATES, NORTH CENTRAL ZONE (US Survey Feet) Y COORDINATE 7022710.577 X COORDINATE 2401729.219	
CONVERGENCE = 0° 13' 29.55" SCALE FACTOR = 0.9998750		CONVERGENCE = 0° 46' 12.41" SCALE FACTOR = 0.9998750	
ELEVATION : 660.14 ft.		(NGVD 1929 MEAN SEA LEVEL DATUM)	

AZIMUTH MARK WATER TOWER	ASTRONOMIC AZIMUTH (FROM NORTH) N 029° 45' 53"	GRID AZIMUTH (FROM NORTH) N 028° 59' 41" (NAD-83)
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REFERENCE MARK DESCRIPTION	DISTANCE (ft)	DIRECTION
CENTER OF VENT ON WATER TOWER		000°00'00"
CENTER OF VENT ON EULESS WATER TOWER (SOLID BASE)		144°28'57"
CENTER OF VENT ON DOVE PARK WATER TOWER		313°10'21"
RM1: PK NAIL W/SHINER IN POWER POLE	82.81	098°48'47"
RM2: CHISELED "+" ON CURB	6.18	182°14'04"
RM3: PK NAIL W/SHINER IN POWER POLE	85.73	267°40'34"

NOTE: NAD-27 GRID AZIMUTH TO WATER TOWER IS N 029° 32' 24".

DETAILED DESCRIPTION:
 CAP SET FLUSH WITH SURFACE OF ROAD STAMPED, "CITY OF GRAPEVINE, MON. 13".
 MONUMENT IS LOCATED APPROXIMATELY 200 FEET NORTH OF THE INTERSECTION OF
 HIGHWAY 114 AND WILLIAM D. TATE AVE. AND IS LOCATED IN THE CENTER OF
 WILLIAM D. TATE AVE.

FIELD SKETCH

