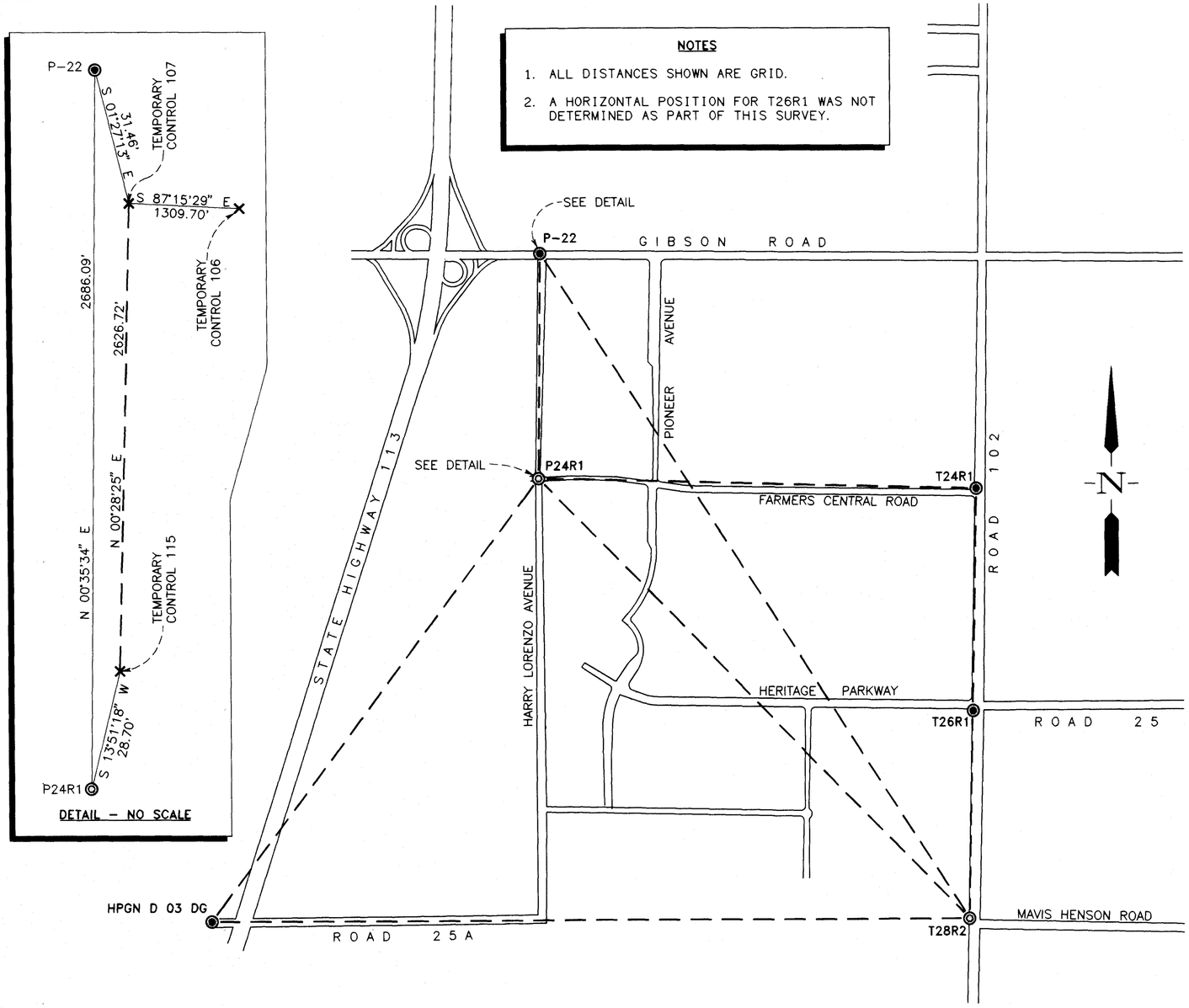

SURVEYOR'S STATEMENT

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIREMENTS OF THE PROFESSIONAL LAND SURVEYORS' ACT AT THE REQUEST OF MARQUES PIPELINE, INC. IN JULY, 2016.

JAMES H. FRAME III L. S. 5435

LICENSED LAND SURVEYOR JAMES H. FRAME III No. 5435 STATE OF CALIFORNIA

COUNTY SURVEYOR'S STATEMENT

THIS MAP HAS BEEN EXAMINED IN ACCORDANCE WITH SECTION 8766 OF THE PROFESSIONAL LAND SURVEYORS ACT THIS 1st DAY OF May, 2017.

STEPHEN D. WILLIAMS, LS 6878
YOLO COUNTY SURVEYOR

PROFESSIONAL LAND SURVEYOR STEPHEN DAVID WILLIAMS LS 6878 STATE OF CALIFORNIA

RECORDER'S STATEMENT

FILED THIS 5th DAY OF MAY, 2017, AT 3:40 P M.
IN BOOK 2017 OF MAPS AT PAGE 44-45, AT THE REQUEST OF FRAME SURVEYING & MAPPING.

JESSE SALINAS
COUNTY RECORDER

BY: Victoria Zarnes
DEPUTY

CALCULATED VECTOR COMPARISONS

CALCULATED FROM MEASUREMENTS PER THIS SURVEY VERSUS RECORD PER 2002 M 88 AND 2007 M 175 (RECORD VALUES SHOWN IN PARENTHESES)

FROM	TO	BEARING	DISTANCE
03DG	P-22	N 26° 21' 55" E	8883.04'
		(N 26° 21' 56" E	8883.05')
P-22	T24R1	S 61° 34' 02" E	5900.96'
		(S 61° 34' 05" E	5900.96')
T24R1	03DG	S 60° 35' 15" W	10485.58'
		(S 60° 35' 14" W	10485.70')

LEGEND

◉ . . . . CITY OF WOODLAND GEODETIC CONTROL NETWORK MARK PER 2002 M 88-94.

◎ . . . . CITY OF WOODLAND GEODETIC CONTROL NETWORK MARK ESTABLISHED PER THIS SURVEY.

— — — . . . . OBSERVED VECTOR (GPS)

NEW MONUMENT DESCRIPTIONS

P24R1: FOUND 2-1/2" BRONZE DISK LS 5161 IN WELL IN THE CENTER OF TRAFFIC CIRCLE, INTERSECTION OF HARRY LORENZO AVENUE AND FARMERS CENTRAL ROAD.

T28R2: FOUND 1-METER FENO SPIKE WITH BRONZE CAP MARKED "CITY OF WOODLAND GPS SURVEY MONUMENT NO. T28R2 2016" IN A MONUMENT WELL ON THE EAST SIDE ROAD 102 1/2 MILE SOUTH OF EAST HERITAGE PARKWAY, ABOUT 20 FEET SOUTH OF A LIGHT POLE AND ABOUT 2 FEET EAST OF THE EAST EDGE OF SIDEWALK.

0 500 1000 2000 3000
SCALE IN FEET

RECORD OF SURVEY
CITY OF WOODLAND GEODETIC CONTROL MONUMENT REPLACEMENT

JANUARY, 2017 | SCALE: 1"=1000'

SHEET 1 OF 2

FRAME SURVEYING & MAPPING
609 A STREET DAVIS, CA 95616
530.756.8584 jhframe@dcn.org

4839-001

NOTES

1. THIS MAP PRESENTS THE SPATIAL RELATIONSHIPS BETWEEN CERTAIN GEODETIC SURVEY CONTROL MARKS IN THE CITY OF WOODLAND. IT DOES NOT PERTAIN TO REAL PROPERTY BOUNDARY LINES OR CORNERS.

2. THE PURPOSE OF THIS SURVEY IS TO ESTABLISH CCS83 EPOCH 1999.51 AND CITY OF WOODLAND ELEVATION VALUES FOR REPLACEMENT GEODETIC CONTROL STATIONS P24R1 AND T28R2. THE STATIONS THAT THESE REPLACE, DESIGNATED P-24 AND T28R1, ARE SHOWN UPON 2002 M 88-94 AND 2007 M 175-176 RESPECTIVELY AND WERE DESTROYED DURING CONSTRUCTION ACTIVITY. IN THE COURSE OF THIS SURVEY REVISED CCS83 VALUES WERE ALSO ESTABLISHED FOR STATIONS T24R1 AND HPGN D CA 03 DG (HEREINAFTER REFERRED TO AS 03DG), AND A REVISED CITY ELEVATION VALUE WAS ESTABLISHED FOR STATION T26R1.

3. ELEVATION VALUES SHOWN ARE NOMINALLY NAVD88. THE CURRENT SURVEY DISCLOSED THAT SIGNIFICANT VERTICAL MOVEMENT HAS OCCURRED BETWEEN STATIONS SINCE BOTH THE 2002 AND 2007 SURVEYS, AND IT DOES NOT APPEAR TO BE EVENLY DISTRIBUTED ACROSS THE CITY NETWORK. ABSENT A COMPREHENSIVE RESURVEY OF THE ENTIRE NETWORK, THE DECISION WAS MADE TO REALIZE NAVD88 BY HOLDING FIXED THE 2002 VALUE AT STATION P-22.

4. POSITIONS SHOWN FOR STATIONS P24R1, T24R1, T28R2 AND 03DG MEET FEDERAL GEODETIC DATA COMMITTEE (FGDC) 1998 DRAFT GEOSPATIAL POSITIONING STANDARDS FOR LOCAL NETWORK ACCURACY (CITY OF WOODLAND GEODETIC CONTROL NETWORK, EPOCH 1999.51) AT THE 1 CENTIMETER LEVEL FOR HORIZONTAL POSITION.

5. OBSERVATION EQUIPMENT, GPS: TRIMBLE 4000SSI RECEIVERS WITH GROUNDPLANE-EQUIPPED TRIMBLE COMPACT L1/L2 GEODETIC ANTENNAS MOUNTED ON 2-METER FIXED-HEIGHT TRIPODS WERE USED FOR ALL GPS OBSERVATIONS.

6. OBSERVATION EQUIPMENT, TOTAL STATION: A GEOMAX (LEICA) ZOOM80R 2-SECOND ROBOTIC TOTAL STATION WAS USED FOR ALL HORIZONTAL POSITIONING NOT ACCOMPLISHED DIRECTLY VIA GPS OBSERVATIONS. THIS WAS USED IN CONJUNCTION WITH A LEICA GMP101 RETROREFLECTOR MOUNTED ON A HEIGHT-ADJUSTABLE PRISM POLE FITTED WITH A 10-ARC-MINUTE PLUMBING VIAL, OR WITH A LEICA GPR1 RETROREFLECTOR MOUNTED ON A 2-METER FIXED-HEIGHT TRIPOD FITTED WITH A SIMILAR VIAL. ALL MEASUREMENTS TAKEN WITH THE ADJUSTABLE POLE USED A REFLECTOR HEIGHT OF 5.00 FEET FOR CONSISTENCY.

7. OBSERVATION EQUIPMENT, LEVELING: A LEICA DNA03 DIGITAL LEVEL AND GPCL2 INVAR BARCODE ROD WERE USED FOR ALL LEVELING OBSERVATIONS. THIS COMBINATION IS NOMINALLY CAPABLE OF PRODUCING A STANDARD ERROR OF 0.3 MILLIMETER PER KILOMETER DOUBLE-RUN.

8. OBSERVATION PROCEDURES, GPS: SIMULTANEOUS GPS OBSERVATIONS WERE MADE AT OR NEAR STATIONS AS INDICATED BY NETWORK CONNECTION LINES SHOWN ON SHEET 1. 20-MINUTE NOMINAL RAPID-STATIC SESSIONS WERE OBSERVED AT LEAST TWICE ON EACH LINE, WITH SESSIONS ON AT LEAST TWO DIFFERENT DAYS.

9. OBSERVATION PROCEDURES, TOTAL STATION: PRIOR TO EACH MEASUREMENT SESSION, AIR TEMPERATURE AND PRESSURE VALUES TAKEN WITH A DIGITAL THERMOMETER/BAROMETER WERE ENTERED INTO THE INSTRUMENT TO COMPENSATE FOR AIR DENSITY EFFECTS ON THE SPEED OF THE EMITTED LIGHT BEAM. ALL INSTRUMENT AND BACKSIGHT STATIONS WERE PART OF THE GPS CONTROL NETWORK. BACKSIGHTS WERE TRIPOD-MOUNTED RETROREFLECTORS, AND THE MINIMUM BACKSIGHT DISTANCE WAS APPROXIMATELY 1300 FEET. THE MAXIMUM FORESIGHT DISTANCE WAS APPROXIMATELY 30 FEET. MEASUREMENTS TO BOTH BACKSIGHT AND FORESIGHT WERE TAKEN IN BOTH INSTRUMENT FACES, AND 3 MEASUREMENT SETS WERE TAKEN TO EACH FORESIGHT.

10. OBSERVATION PROCEDURES, LEVELING: LEVEL LINES WERE DOUBLE-RUN FROM A TEMPORARY CONTROL POINT ABOUT 30 FEET SOUTH OF P-22, THROUGH P24R1, T24R1, T26R1 AND T28R2. SECOND-ORDER CLASS II EQUIPMENT AND PROCEDURES WERE EMPLOYED.

11. DUE TO THE PHYSICAL CHARACTERISTICS OF STATION P-22 – IT IS LOCATED DEEP IN A MONUMENT WELL IN A HIGH-SPEED TRAFFIC LANE OF A MAJOR ARTERIAL STREET – DIRECT OBSERVATION OF P-22 WITH GPS AND LEVELING EQUIPMENT WAS DEEMED TO BE UNSAFE. INSTEAD, A NEARBY TEMPORARY CONTROL POINT WAS INCORPORATED INTO THE GPS NETWORK, AND A TIE MADE BETWEEN THE TEMPORARY CONTROL POINT AND P-22 USING A 2-SECOND GEOMAX (LEICA) ROBOTIC TOTAL STATION IN CONJUNCTION WITH A RETROREFLECTOR POLE SET AT A TARGET HEIGHT OF 5.00 FEET. THE INSTRUMENT HEIGHT WAS MEASURED WITH A TAPE, AND THE MEASUREMENT TO THE BACKSIGHT STATION SERVED TO VALIDATE THE INSTRUMENT HEIGHT MEASUREMENT. THE POLE-MOUNTED TARGET HEIGHT WAS VERIFIED WITH A TAPE.

12. STATION P24R1 IS LOCATED IN THE CENTER OF A TRAFFIC CIRCLE AT THE INTERSECTION OF FARMERS CENTRAL ROAD AND HARRY LORENZO AVENUE. DECORATIVE COLUMNS SURROUNDING THE STATION OBSCURE THE VIEW TO THE NORTH, WHICH PRECLUDED A DIRECT TERRESTRIAL MEASUREMENT BETWEEN THE STATION AND THE TEMPORARY CONTROL POINT NEAR P-22. FOR THIS REASON, A TEMPORARY CONTROL POINT APPROXIMATELY 30 FEET NORTH OF P24R1 WAS ESTABLISHED AND USED IN THE GPS CONTROL NETWORK. THE HORIZONTAL POSITION OF P24R1 WAS DETERMINED BY TOTAL STATION MEASUREMENTS TAKEN FROM THIS CONTROL POINT.

13. TRIMBLE BUSINESS CENTER V3.61 WAS USED TO PROCESS ALL GPS VECTORS USING IGS RAPID ORBITS. CURRENT-EPOCH ITRF08 POSITIONS WERE OBTAINED FOR STATION T28R2 AND THE TEMPORARY CONTROL POINT NEAR P24R1 BY MEANS OF THE NGS OPUS TOOL. THESE POSITIONS SERVED AS SEED VALUES FOR THE VECTOR PROCESSING IN ORDER TO MINIMIZE SCALE ERRORS.

14. STAR*NET PRO V6.0 WAS USED FOR THE SIMULTANEOUS ADJUSTMENT OF GPS, LEVEL AND TOTAL STATION OBSERVATIONS. A MINIMALLY CONSTRAINED ADJUSTMENT WAS RUN HOLDING FIXED THE CCS83 EPOCH 1999.51 POSITION OF P-22. AFTER APPLYING A SCALAR OF 1.5 TO THE GPS VECTORS, THIS ADJUSTMENT PRODUCED A STANDARD ERROR OF UNIT WEIGHT OF 0.995.

15. PRIOR EXPERIENCE WITH THE WOODLAND NETWORK HAS SHOWN THE PUBLISHED 2002 POSITIONS TO BE TIGHTLY ALIGNED WITH THE CCS83 GRID. ATTEMPTING TO CONSTRAIN THE ADJUSTMENT TO THE PUBLISHED POSITIONS AT 03DG AND/OR T24R1 WOULD UNREASONABLY DISTORT THE SURVEY, SO THE ONLY OTHER CONSTRAINT IMPOSED WAS TO FIX THE ELEVATION VALUE OF P-22 IN ORDER TO PROPAGATE NAVD88 HEIGHTS TO THE OTHER STATIONS INCLUDED IN THIS SURVEY. THE RESULTING POSITIONS VARY FROM THE PUBLISHED 2002 VALUES AT 03DG AND FROM THE 2007 VALUES AT T24R1 AS SHOWN BELOW (VALUES ARE IN FEET, ADJUSTED MINUS PUBLISHED):

STATION	NORTH	EAST	ELEVATION
03DG	-0.017	0.047	-0.471
T24R1	-0.088	-0.052	0.175

16. DIFFERENCES BETWEEN ADJUSTED AND PUBLISHED POSITIONS INDICATE MODEST HORIZONTAL MOVEMENT AND SIGNIFICANT VERTICAL MOVEMENT BETWEEN NETWORK STATIONS. AS A BLUNDER CHECK, OPUS-RS SOLUTIONS OF THE RAPID-STATIC FILES AND RTK MEASUREMENTS TAKEN DURING RECONNAISSANCE OPERATIONS AT STATIONS R-22 AND P-26 CONFIRM THE ADJUSTED RESULTS. HOWEVER, THE SCOPE OF THIS SURVEY IS TOO LIMITED TO DISCERN ANY PATTERN IN THE MOVEMENT OR POINT TO ANY CAUSE.

ADJUSTED STATION POSITIONS – CCS83 ZONE 2 (EPOCH 1999.51) METERS

STATION	NORTHING	EASTING	ELEVATION
03DG	608178.916	2020806.902	23.986
P-22	610604.835	2022009.307	14.848
P24R1	609786.158	2022000.838	15.436
T24R1	609748.463	2023590.966	11.564
T26R1	N/A	N/A	11.563
T28R2	608187.555	2023563.448	11.981

ADJUSTED STATION POSITIONS – CCS83 ZONE 2 (EPOCH 1999.51) U.S. SURVEY FEET

STATION	NORTHING	EASTING	ELEVATION
03DG	1995333.660	6629930.646	78.695
P-22	2003292.697	6633875.535	48.715
P24R1	2000606.753	6633847.749	50.644
T24R1	2000483.083	6639064.692	37.940
T26R1	N/A	N/A	37.936
T28R2	1995362.003	6638974.412	39.307

ADJUSTED STATION POSITIONS – NAD83 (EPOCH 1999.51) GEOGRAPHIC (ELLIPSOID HEIGHT IN METERS AND U.S. SURVEY FEET)

STATION	LATITUDE	LONGITUDE	EH (M)	EH (FT)
03DG	38° 38' 27.435841"	121° 45' 39.594035"	-6.903	-22.647
P-22	38° 39' 46.006695"	121° 44' 49.593356"	-15.946	-52.317
P24R1	38° 39' 19.456480"	121° 44' 50.037873"	-15.385	-50.476
T24R1	38° 39' 18.085360"	121° 43' 44.274687"	-19.236	-63.112
T28R2	38° 38' 27.465335"	121° 43' 45.605076"	-18.871	-61.912

STATION COORDINATE 95% ERROR ELLIPSES – METERS

STATION	SEMI-MAJOR AXIS	SEMI-MINOR AXIS	MAJOR AXIS AZIMUTH	ELEVATION
03DG	0.006	0.005	3° 35'	0.007
P-22	FIXED	FIXED	FIXED	FIXED
P24R1	0.006	0.005	6° 15'	0.002
T24R1	0.005	0.004	175° 33'	0.002
T26R1	N/A	N/A	N/A	0.002
T28R2	0.005	0.004	3° 12'	0.002

STATION COORDINATE 95% ERROR ELLIPSES – U.S. SURVEY FEET

STATION	SEMI-MAJOR AXIS	SEMI-MINOR AXIS	MAJOR AXIS AZIMUTH	ELEVATION
03DG	0.020	0.016	3° 35'	0.024
P-22	FIXED	FIXED	FIXED	FIXED
P24R1	0.019	0.015	6° 15'	0.008
T24R1	0.017	0.015	175° 33'	0.008
T26R1	N/A	N/A	N/A	0.008
T28R2	0.016	0.012	3° 12'	0.008

JANUARY, 2017 | SCALE: NONE

SHEET 2 OF 2

RECORD OF SURVEY
CITY OF WOODLAND GEODETIC CONTROL MONUMENT REPLACEMENT

Yolo County
Book of Maps
2017
Page 45

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