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 POSITIONAL VALUES FOR REPLACEMENT CITY OF WOODLAND GEODETIC CONTROL STATIONS T24R1, T26R1 AND T28R1. THE STATIONS THAT THESE REPLACE, DESIGNATED T-24, T-26 AND T-28, ARE SHOWN UPON 2002 M 88-94 BUT WERE SUBSEQUENTLY DESTROYED BY CONSTRUCTION ACTIVITY.

3. STATION V-22 APPEARS TO HAVE BEEN DISTURBED BY CONSTRUCTION ACTIVITY. AS OF THE DATE OF THIS SURVEY V-22 APPEARS TO BE IN STABLE CONDITION, AND NEW POSITIONAL VALUES ESTABLISHED BY THIS SURVEY ARE SHOWN.

4. STATION V-20 WAS FOUND IN AN UNSTABLE CONDITION. THE POSITION SHOWN PERTAINS TO THE DATE OF THIS SURVEY, BUT MAY NOT BE RELIABLE THEREAFTER.

5. POSITIONS SHOWN FOR STATIONS T24R1, T26R1, T28R1 AND V-22 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 AND ORTHOMETRIC HEIGHT.

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

7. OBSERVATION EQUIPMENT, LEVELING: A LEICA DNA03 DIGITAL LEVEL AND GKNL4F BARCODE ROD WERE USED FOR ALL LEVELING OBSERVATIONS. THIS COMBINATION IS CAPABLE OF PRODUCING A STANDARD ERROR OF 1 MILLIMETER PER KILOMETER DOUBLE-RUN.

8. OBSERVATION PROCEDURES, GPS: SIMULTANEOUS GPS OBSERVATIONS WERE MADE AT STATIONS AS INDICATED BY NETWORK CONNECTION LINES SHOWN ON SHEET 1. 15-MINUTE NOMINAL RAPID-STATIC SESSIONS WERE OBSERVED AT LEAST TWICE ON EACH LINE, WITH SESSIONS ON AT LEAST TWO DIFFERENT DAYS.

9. OBSERVATION PROCEDURES, LEVELING: LEVEL LINES WERE DOUBLE-RUN BETWEEN V-22 AND T-22, T-22 AND T24R1, T24R1 AND T26R1, T26R1 AND T28R1, T28R1 AND A TEMPORARY BENCHMARK, AND BETWEEN THE TEMPORARY BENCHMARK AND P-28. SECOND-ORDER CLASS II PROCEDURES WERE OBSERVED, EXCEPT THAT MATCHED INVAR RODS WERE NOT USED.

10. TRIMBLE GEOMATICS OFFICE V1.63 WAS USED TO PROCESS ALL GPS BASELINES, USING INTERNATIONAL GNSS SERVICE (IGS) RAPID PRECISE EPHEMERIDES. A CURRENT-EPOCH ITRF00 POSITION WAS OBTAINED FOR THE CONTINUOUSLY OPERATING REFERENCE STATION (CORS) P271, LOCATED AT THE CITY OF WOODLAND WASTEWATER TREATMENT PLANT AND OPERATED BY THE PLATE BOUNDARY OBSERVATORY (PBO). THIS POSITION WAS USED AS THE SEED VALUE FOR BASELINE PROCESSING IN ORDER TO MAINTAIN CONSISTENCY WITH THE PRECISE EPHEMERIDES.

11. STAR*NET PRO V6.0 WAS USED FOR THE SIMULTANEOUS ADJUSTMENT OF GPS AND LEVEL OBSERVATIONS. AN INITIAL MINIMALLY CONSTRAINED ADJUSTMENT WAS RUN, HOLDING FIXED THE POSITION OF P271, WHICH WAS CONVERTED TO NAD83 EPOCH 1999.51 VIA THE HORIZONTAL TIME DEPENDENT POSITIONING (HTDP) TOOL DEVELOPED BY THE NATIONAL GEODETIC SURVEY (NGS). THIS ADJUSTMENT PRODUCED A STANDARD ERROR OF UNIT WEIGHT OF 1.029.

12. DISREGARING STATIONS V-20 AND V-22 (SEE NOTES 3 AND 4 ABOVE), DIFFERENCES BETWEEN THE PUBLISHED VALUES OF THE CITY OF WOODLAND STATIONS AND THE POSITIONS PRODUCED BY THE INITIAL MINIMALLY CONSTRAINED ADJUSTMENT WERE CONSISTENT AMONG ALL STATIONS EXCEPT P-24, AT WHICH THE DIFFERENCES WERE SLIGHTLY LARGER. THE AVERAGE OFFSETS WERE 0.004 METER NORTH, -0.027 METER EAST, AND 0.098 METER ELEVATION. THESE AVERAGE OFFSETS WERE WITHIN 0.002 METER OF THE OFFSETS AT T-22.

13. THE ADJUSTMENT WAS RERUN WITH THE T-22 PUBLISHED VALUES AS THE ONLY CONSTRAINT. THE RESULTS OF THIS ADJUSTMENT PRODUCED RESIDUALS WITH RESPECT TO PUBLISHED VALUES AS FOLLOWS (VALUES ARE IN METERS):

STATION	NORTH	EAST	ELEVATION
P-24	0.011	-0.015	-0.019
P-26	-0.006	0.002	0.001
P-28	0.005	0.000	0.000
T-22	0.000	0.000	0.000
V-24	-0.006	0.001	-0.005
V-26	0.000	0.007	-0.002

14. WITH THE EXCEPTION OF P-24, THE RESIDUALS SHOWN ABOVE ARE WITHIN THE NOISE LEVEL OF THE TECHNOLOGY. CONSTRAINING THE ADJUSTMENT AT ADDITIONAL STATIONS WOULD SERVE ONLY TO DISTORT THE POSITIONS OF THE REPLACEMENT STATIONS WITHOUT PROVIDING ANY COUNTERVAILING BENEFIT. IT WAS THEREFORE DECIDED TO MAINTAIN THE VALUES OBTAINED FROM THE ADJUSTMENT CONSTRAINED ONLY AT T-22 AS THE FINAL ADJUSTED VALUES.

15. THE DISCREPANCY AT P-24 MAY BE ATTRIBUTABLE TO SKYVIEW OBSTRUCTIONS AT THE STATION. THERE IS A LARGE WALNUT TREE TO THE NORTHEAST OF THE STATION, AND THE TREE VEGETATION OBSCURES A SIGNIFICANT PORTION OF THE NORTHERN SKY. IT IS ALSO POSSIBLE THAT THE P-24 STATION MARK, A 3/4" REBAR IN A WELL, HAS SHIFTED SLIGHTLY SINCE THE 2002 SURVEY. BECAUSE THE PROJECT NETWORK IS SUFFICIENTLY OVERDETERMINED WITHOUT INCLUDING P-24 IN THE SOLUTION, THE DISCREPANCY AT P-24 IS NOT ADDRESSED BY THIS SURVEY.

16. FINAL ADJUSTED VALUES ARE SHOWN BELOW.

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

STATION	NORTHING	EASTING	ELEVATION
T24R1	609748.490	2023590.981	11.511
T26R1	608941.563	2023578.493	11.542
T28R1	608166.381	2023588.725	11.994
V-20	611375.722	2024457.059	10.748
V-22	610593.289	2024423.702	9.930

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

STATION	LATITUDE	LONGITUDE	EH (M)	EH (FT)
T24R1	38° 39' 18.086224"	121° 43' 44.274033"	-19.238	-63.115
T26R1	38° 38' 51.917535"	121° 43' 44.890022"	-19.235	-63.107
T28R1	38° 38' 26.776179"	121° 43' 44.562423"	-18.810	-61.714
V-20	38° 40' 10.774541"	121° 43' 08.245023"	-19.934	-65.399
V-22	38° 39' 45.402375"	121° 43' 09.724889"	-20.779	-68.173

STATION COORDINATE 95% ERROR ELLIPSES – METERS

STATION	SEMI-MAJOR AXIS	SEMI-MINOR AXIS	MAJOR AXIS AZIMUTH	ELEVATION
T24R1	0.003	0.003	173° 27'	0.002
T26R1	0.003	0.003	172° 51'	0.003
T28R1	0.004	0.004	160° 03'	0.003
V-20	0.004	0.004	170° 41'	0.004
V-22	0.003	0.003	173° 30'	0.002

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

STATION	NORTHING	EASTING	ELEVATION
T24R1	2000483.171	6639064.744	37.765
T26R1	1997835.778	6639023.771	37.867
T28R1	1995292.534	6639057.343	39.351
V-20	2005821.849	6641906.201	35.261
V-22	2003254.815	6641796.763	32.578

CONVERGENCE ANGLES AND GRID FACTORS

STATION	CONVERGENCE	SCALE FACTOR	ELEV. FACTOR	COMB. FACTOR
T24R1	0° 10' 15.16"	0.99994262	1.00000302	0.99994564
T26R1	0° 10' 14.78"	0.99994357	1.00000302	0.99994659
T28R1	0° 10' 14.98"	0.99994450	1.00000295	0.99994745
V-20	0° 10' 37.88"	0.99994075	1.00000313	0.99994388
V-22	0° 10' 36.95"	0.99994164	1.00000326	0.99994490

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

STATION	SEMI-MAJOR AXIS	SEMI-MINOR AXIS	MAJOR AXIS AZIMUTH	ELEVATION
T24R1	0.010	0.010	173° 27'	0.008
T26R1	0.011	0.011	172° 51'	0.009
T28R1	0.013	0.013	160° 03'	0.010
V-20	0.015	0.015	170° 41'	0.012
V-22	0.011	0.011	173° 30'	0.008

MAY, 2007 | SCALE: NONE | SHEET 2 OF 2

RECORD OF SURVEY
CITY OF WOODLAND GEODETIC CONTROL NETWORK REPLACEMENT CONTROL STATIONS

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