

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 THE SAN FRANCISCO BUREAU OF STREET USE AND MAPPING DEPARTMENT OF PUBLIC WORKS IN NOVEMBER, 2012.

BY: Michael R. McGee DATE: 03/14/2014
MICHAEL R. MCGEE P.L.S. 3945



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 THE SAN FRANCISCO BUREAU OF STREET USE AND MAPPING DEPARTMENT OF PUBLIC WORKS IN NOVEMBER, 2012.

BY: Fred A. Feickert DATE: 03/15/2014
FRED A. FEICKERT P.L.S. 8428



CITY AND COUNTY SURVEYOR'S STATEMENT

I HEREBY STATE THAT I HAVE EXAMINED THIS MAP IN ACCORDANCE WITH SECTION 8766 OF THE PROFESSIONAL LAND SURVEYORS' ACT

THIS 3rd DAY OF APRIL, 2014

BRUCE R. STORRS, CITY AND COUNTY SURVEYOR
CITY AND COUNTY OF SAN FRANCISCO

BY: Bruce R. Storrs
BRUCE R. STORRS L.S. 6914



RECORDER'S STATEMENT

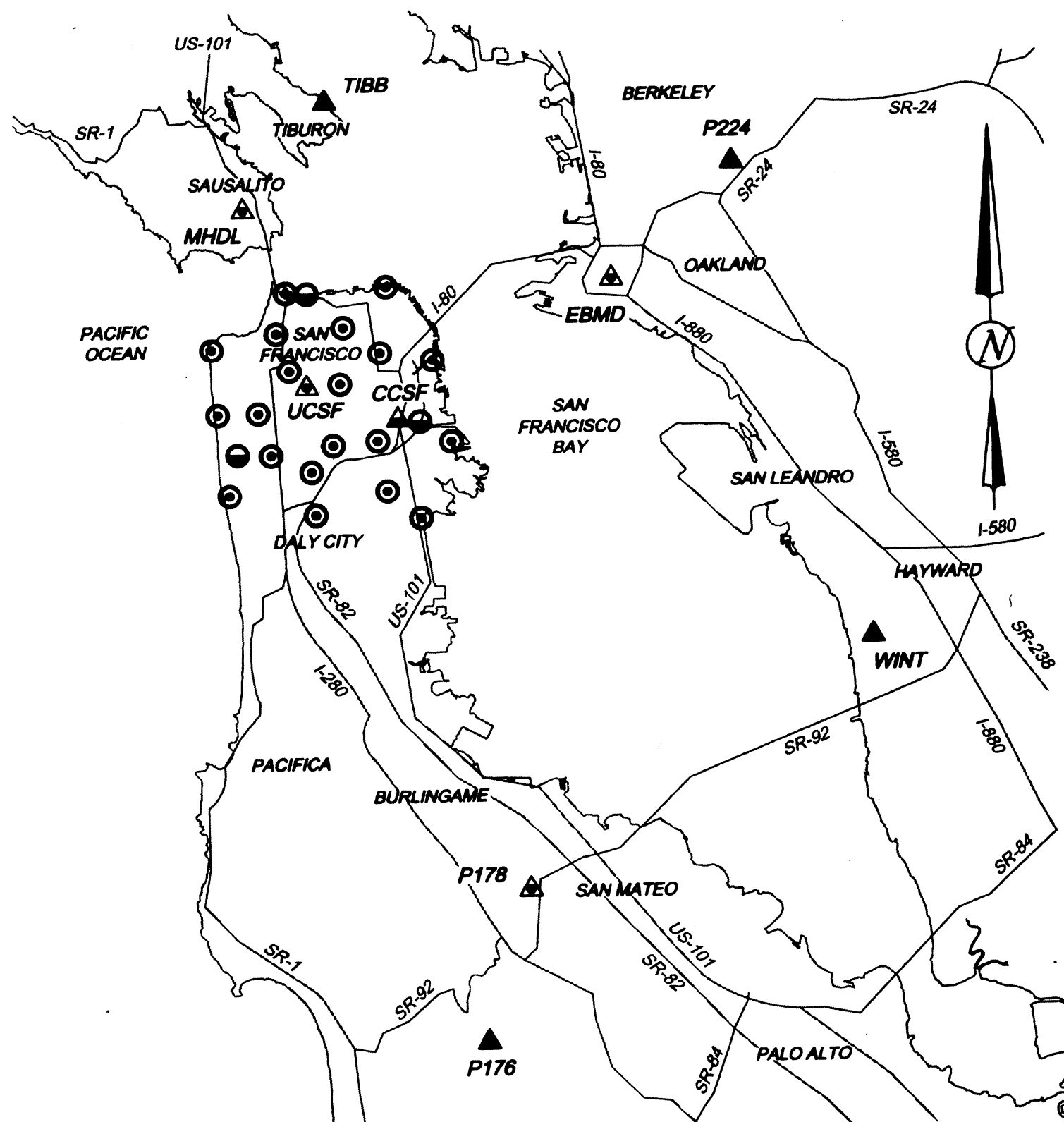
FILED FOR RECORD THIS 4TH DAY OF APRIL, 2014
AT 4 MINUTES PAST 8 A.M., IN BOOK EE

OF SURVEY MAPS, AT PAGES 147-151, INCLUSIVE, OFFICIAL RECORDS OF THE CITY AND COUNTY OF SAN FRANCISCO, STATE OF CALIFORNIA, AT THE

REQUEST OF _____
BY: _____ DATE: _____
COUNTY RECORDER
CITY AND COUNTY OF SAN FRANCISCO
STATE OF CALIFORNIA

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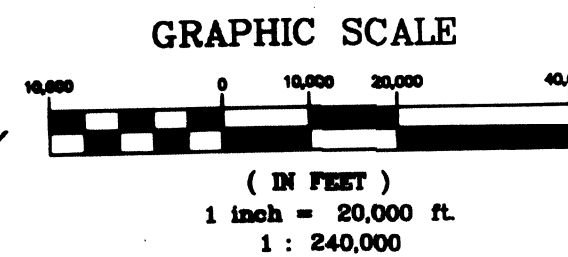
**CITY AND COUNTY OF SAN FRANCISCO
REGIONAL AND HIGH PRECISION NETWORK CONTROL SURVEY
VICINITY MAP**
SCALE 1" = 20,000'



LEGEND

AV AVERAGE
AZIMUTH
CCSF CITY AND COUNTY OF SAN FRANCISCO
DE DELTA EASTING
DIST DISTANCE
DMS DEGREES MINUTES SECONDS
DN DELTA NORTHING
DZ DELTA UP
EH ELLIPSOID HEIGHT
GNSS GLOBAL NAVIGATION SATELLITE SYSTEM
ID IDENTIFICATION
HPN HIGH PRECISION NETWORK
LAT. LATITUDE
LONG. LONGITUDE
MM MILLIMETERS

MTRS METERS
N. NORTH
NO. NUMBER
NGS NATIONAL GEODETIC SURVEY
PID POINT IDENTIFICATION
PREC PRECISION
SEC SECONDS
SPC STATE PLANE COORDINATES
STD DEV STANDARD DEVIATION
W. WEST
▲ NGS CORS STATION
▲ CALIFORNIA CGPS STATION
▲ PRIVATE RTN STATION
○ HIGH PRECISION NETWORK (HPN) MONUMENT
○ SECONDARY CONTROL



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**CITY & COUNTY OF SAN FRANCISCO
2013 HIGH PRECISION NETWORK SURVEY**

OVERVIEW

THIS RECORD OF SURVEY SUMMARIZES THE CITY AND COUNTY OF SAN FRANCISCO 2013 HIGH PRECISION NETWORK "B" ORDER CONTROL SURVEY (2013 CCSF-HPN). A DETAILED REPORT IS ON FILE WITH THE COUNTY SURVEYOR'S OFFICE. THIS SURVEY ESTABLISHED 20 PERMANENT HIGH PRECISION CONTROL POINTS IN JULY 2013 REFERRED TO AS THE 2013 CCSF-HPN. THIS NETWORK PROVIDES THE FRAMEWORK FOR ESTABLISHING A DENSIFICATION NETWORK TO SUPPORT GENERAL SURVEY ACTIVITIES, GIS, AND FOR MEASURING ANNUAL AND EPISODIC EARTH MOVEMENTS. THE FIELD SURVEYS WERE PLANNED AND COORDINATED IN A JOINT EFFORT BY CCSF, MICHAEL MCGEE, PLS3945 AND F3 & ASSOCIATES, INC. MICHAEL MCGEE, PLS WAS RESPONSIBLE FOR THE FINAL PROCESSING OF THE OBSERVATIONS, NETWORK ADJUSTMENTS, ANALYSIS AND REPORTS. THE GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) WAS USED TO DETERMINE POSITIONS BASED ON THE NORTH AMERICAN DATUM OF 1983 (NAD83) AND INTERNATIONAL GNSS SERVICE 2008 REFERENCE FRAME (IGS08). THE SURVEY IS REFERENCED TO FOUR NATIONAL GEODETIC SURVEY (NGS) CONTINUOUSLY OPERATED REFERENCE STATIONS (CORS) IN THE REGION. THIS SURVEY CONFORMS TO THE REQUIREMENTS OF CALIFORNIA PUBLIC RESOURCES CODE SECTION 8801 THROUGH 8819 AND 8850 THROUGH 8880.

PROJECT DATUMS, REFERENCE SYSTEM

GEOMETRIC DATUMS: NORTH AMERICAN DATUM OF 1983 - NAD83(2011) EPOCH 2010.00 REALIZATION AND IGS08(2005) EPOCH 2013.54 (JULY 17, 2013 AVERAGE DATE OF FIELD SURVEY)
REFERENCE NETWORK: THE SURVEY IS REFERENCED TO FOUR NGS CORS STATIONS
VERTICAL DATUM: CCSF 2013 NAVD88 VERTICAL DATUM. NOTE, THIS SURVEY EVALUATED THE USE OF GNSS TECHNOLOGY FOR ESTABLISHING ACCURATE ORTHOMETRIC HEIGHTS AND MODELED THE ORTHOMETRIC HEIGHT OF UCSF.
REFERENCE NETWORK: CCSF 2013 LEVELING NETWORK
PROJECTIONS: THE PLANE COORDINATES PUBLISHED IN THE SURVEY ARE IN UNITS OF METERS AND FEET, AND IN TWO PROJECTIONS. COORDINATES ARE PROVIDED IN THE CALIFORNIA STATE PLANE COORDINATE SYSTEM (SPCS) ZONE III AND IN A LOCAL CUSTOM COORDINATE SYSTEM CREATED BY THIS SURVEY AND REFERRED TO AS THE CITY & COUNTY OF SAN FRANCISCO COORDINATE SYSTEM (CCSF-CS).

RECORD OF SURVEY #8080

OF THE SAN FRANCISCO HIGH PRECISION GNSS NETWORK SURVEY
CITY AND COUNTY OF SAN FRANCISCO,
STATE OF CALIFORNIA

PREPARED BY:
F3 AND ASSOCIATES, BENICIA, CALIFORNIA
AND
MCGEE SURVEYING CONSULTING, SANTA BARBARA, CALIFORNIA
FOR
BUREAU OF STREET USE AND MAPPING DEPARTMENT OF PUBLIC WORKS,
CITY AND COUNTY OF SAN FRANCISCO, CALIFORNIA

SCALE AS NOTED

MARCH, 2014



BUREAU OF STREET USE AND MAPPING
DEPARTMENT OF PUBLIC WORKS
1185 MARKET STREET, ROOM 323
SAN FRANCISCO, CA. 94103

SHEET 1 OF 11

ASSESSOR'S BLOCK 9999, LOT 9999

ALL STREETS

THE CCSF-CS IS A LOW DISTORTION GRID PROJECTION DESIGNED FOR CCSF TO BE A GROUND COORDINATE SYSTEM. CCSF VARIES FROM SEA LEVEL TO APPROXIMATELY 1000 FEET IN ELEVATION. TO MINIMIZE THE DIFFERENCES IN GROUND AND GRID DISTANCES, THE PROJECTION SURFACE WAS POSITIONED AT THE MOST COMMON GROUND HEIGHT IN THE COUNTY TAKEN AT AN ELLIPSOID HEIGHT OF 44.50 METERS (146.0 FEET). THE AVERAGE GEOID HEIGHT IS -32.6 METERS (-107 FEET) AND THE NAVD83 HEIGHT OF THE PROJECTION SURFACE IS 77 METERS (253 FEET). AT THIS HEIGHT THE COMBINED SCALE FACTOR IS 1.0 AND THE DISTORTION IS ZERO. CHANGES IN HEIGHT WILL INCREASE OR DECREASE THE SCALE 4.8 PPM FOR EVERY 30.5 METERS (100 FOOT). THIS COORDINATE SYSTEM PROVIDES A GRID SCALE DISTORTION OF LESS THAN 1:100,000 (10 PPM) IN MOST PARTS OF CCSF EXCEPT FOR THE HIGHER ELEVATIONS. AT THE CENTRAL MERIDIAN, NORTH COINCIDES WITH GEODETIC NORTH REFERENCED TO THE GRS80 ELLIPSOID, CENTERED IN THE NAD83(2011) 2010.00 EPOCH REFERENCE FRAME. THE CONVERGENCE ANGLE VARIES +/- TWO MINUTES AS SHOWN IN THE PLANE COORDINATE LIST ON PAGE 9. THE PROJECTION SPECIFICATIONS (SIMILAR TO AN SPCS PROJECTION) FOR INPUT IN USER'S SOFTWARE FOLLOW.

PROJECTION: TRANSVERSE MERCATOR, ELLIPSOID: GRS-80, SCALE: 1.000007, LATITUDE OF ORIGIN: 37°45'00", CENTRAL MERIDIAN: -122°27'00", FALSE NORTHING: 24000.0 METERS, FALSE EASTING: 48000.0 METERS.

THE AVERAGE SCALE FACTOR, HEIGHT REDUCTION FACTOR AND CONVERGENCE ANGLES LISTED BELOW FOR THE 20 HPN POINTS PROVIDE A GENERAL COMPARISON OF THE TWO PROJECTIONS.

STATE PLANE COORDINATES ZONE 3:
 COMBINED FACTOR= 0.99992496 CONVERGENCE ANGLE= -1-11-34
SAN FRANCISCO COORDINATE SYSTEM:
 COMBINED FACTOR= 1.00000275 CONVERGENCE ANGLE= +0-00-04

THE SPECIFIC VALUES FOR EACH POINT ARE LISTED ON PAGE 8 AND 9. APPLYING THE AVERAGE COMBINED FACTORS TO A GROUND DISTANCE OF 1000 FOOT EQUALS 1000.003 FEET IN THE CCSF-CS WHEREAS IN THE SPCS IT IS 999.925 FEET.

HISTORICAL CCSF CONTROL NETWORK:
 A MAP ON FILE WITH THE CCSF TITLED "CITY AND COUNTY OF SAN FRANCISCO PRECISE HORIZONTAL SURVEY CONTROL" DATED MAY 2001 DEPICTS A GPS SURVEY BASED ON NAD83 (1991) 1991.35 EPOCH WITH STATE PLANE COORDINATES PUBLISHED IN 1991, 1998 AND 1999. THIS 2013 HPN SURVEY SUPERSEDES THE 1991-1998-1999 SURVEYS.

REFERENCE NETWORK VELOCITY: THE NORTH AMERICAN DATUM OF 1983 IS REFERENCED TO THE NORTH AMERICAN PLATE. CCSF SITS ON THE PACIFIC PLATE AND IS SITUATED BETWEEN THE SAN ANDREAS FAULT APPROXIMATELY 2 KILOMETERS WEST OF THE SOUTHWEST CORNER OF CCSF AND THE HAYWARD FAULT APPROXIMATELY 15 KILOMETERS EAST OF THE NORTHEAST CORNER OF CCSF. CCSF IS MOVING 3.1 CENTIMETERS (0.10 FEET) NORTH AND 2.1 CENTIMETERS (0.07 FEET) WEST (N34°W 0.12 FEET) PER YEAR RELATIVE TO THE NORTH AMERICAN PLATE AT THE CGPS STATION UCSF AS PREDICTED BY THE NGS HORIZONTAL TIME DEPENDENT POSITIONING (HTDP) MODEL. CONTINUED MONITORING OF THE 2013 CCSF HPN OVER TIME WILL DEVELOP A MODEL OF DIFFERENTIAL MOVEMENTS ACROSS THE COUNTY.

GEOMETRIC COORDINATES OF THE CONTROLLING CORS & CGPS STATIONS

THE FOLLOWING POSITIONS WERE CONSTRAINED OR DERIVED IN THE ADJUSTMENTS DISCUSSED HEREAFTER.

NAD83(2011) EPOCH 2010.00 POSITIONS PER NGS DATA SHEETS

ID	LATITUDE(DMS)	W.LONGITUDE(DMS)	EH(MTRS)	NGS PID	NAME
P176	37-28-18.36834	122-21-25.69989	434.339	DN7544	MILLS CREEK CN2007 GRP
P224	37-51-50.01427	122-13-08.56363	407.873	DH3981	SIBLEY VOL CN2005 GRP
TIBB	37-53-27.13936	122-26-51.31741	-20.585	AM4887	TIBURON PENINSUL GRP
WINT	37-38-08.50579	122-08-25.98416	-28.258	AM4810	WINT_BARD_CN1991 GRP

NAD83(2011) EPOCH 2013.54 PER NAD83 VELOCITIES APPLIED TO EPOCH 2010.00 POSITIONS**

ID	LATITUDE(DMS)	W.LONGITUDE(DMS)	EH(MTRS)	VELOCITIES (MM)
P176	37-28-18.37230	122-21-25.69398	434.334	N 34.5 E-22.9 UP -1.3*
P224	37-51-50.01854	122-13-08.59963	407.869	N 19.8 E-13.8 UP -1.2
TIBB	37-53-27.14260	122-26-51.31998	-20.570	N 28.1 E-17.7 UP -1.4*
WINT	37-38-08.50872	122-08-25.99086	-28.264	N 25.5 E-17.3 UP -1.3*

NAD83(2011) EPOCH 2013.54 RESULTS OF THE CONSTRAINED ADJUSTMENT TO THE CORS POSITIONS LISTED ABOVE (SEE ADJUSTMENTS & ANALYSIS)

ID	LATITUDE(DMS)	W.LONGITUDE(DMS)	EH(MTRS)
CCSF	37-44-55.64324	122-24-01.88987	-15.950
EBMD	37-49-54.01939	122-17-01.68916	-15.403
MHDL	37-50-32.35159	122-29-39.55828	66.403
P176	37-32-04.25894	122-19-58.46131	129.572
UCSF	37-45-48.67953	122-27-29.29178	155.123

IGS08(2005) EPOCH 2013.54 PER IGS08 VELOCITIES APPLIED TO EPOCH 2005 POSITIONS

ID	LATITUDE(DMS)	W.LONGITUDE(DMS)	EH(MTRS)	VELOCITIES (MM)
P176	37-28-18.38315	122-21-25.71047	433.610	N 21.3 E-36.2 UP 0.0*
P224	37-51-50.02759	122-13-08.62234	407.349	N 6.8 E-27.5 UP 0.1
TIBB	37-53-27.15354	122-26-51.37882	-21.084	N 14.8 E-31.4 UP 0.0*
WINT	37-38-09.51974	122-08-26.65320	-28.790	N 12.5 E-31.0 UP 0.0*

*HTDP V3.2.3 VELOCITIES APPLIED TO CORS WITH LESS THAN 2.5 YEARS OF DATA
 **EPOCH OF SURVEY

NETWORK DESCRIPTION

THE CCSF GNSS SURVEY IS COMPRISED OF A BAY AREA REGIONAL NETWORK SHOWN ON PAGE 5 AND THE CCSF HIGH PRECISION NETWORK SHOWN ON PAGE 6. THE REGIONAL NETWORK UTILIZED FOUR OF THE NEAREST OPERATING NGS CORS STATIONS (TIBB, P224, WINT AND P176) AS A BASIS FOR RECOVERING IGS08(2005) EPOCH 2013.54 AND NAD83(2011) EPOCH 2010.00 REFERENCE FRAMES. FOUR CGPS STATIONS (EBMD, MHDL, P176 AND UCSF) WERE INCLUDED TO ADD STRENGTH AND REDUNDANCY TO THE REGIONAL NETWORK. A PRIVATE RTN STATION (CCSF) WAS INCLUDED TO ESTABLISH A POSITION RELATIVE TO THE CCSF HPN. THREE VECTORS OR BASELINES WERE COMPUTED FOR EACH CONNECTION SHOWN USING 24 HOUR OBSERVATIONS STAGGERED EVERY OTHER DAY DURING THE FIELD CAMPAIGN.

THE 2013 CCSF HPN CONSISTS OF 20 PRIMARY HIGH PRECISION POINTS DISTRIBUTED ACROSS CCSF. THE FIELD CAMPAIGN TOOK PLACE DURING THE WEEK OF JULY 15-19, 2013 (AVERAGE EPOCH 2013.54). FOUR CREWS OPERATED FOUR LEICA GS15 GNSS RECEIVERS MOUNTED ON FIXED-HEIGHT POLES. THE RECEIVERS AND FIXED HEIGHT POLES WERE CALIBRATED, AND A VALIDATION SURVEY OF EQUIPMENT AND PROCEDURES TOOK PLACE PRIOR TO THE FIELD CAMPAIGN.

THE FIELD CAMPAIGN BEGAN ON JULY 15 (DAY 1) WITH A BASE RECEIVER OCCUPYING POINT #101 (CORONA HEIGHTS) FOR THE DAY WHILE THE THREE CREWS OCCUPIED ALL POINTS FOR 45 MINUTES EACH DEVELOPING A RADIAL NETWORK. ON DAY 2, A SECOND RADIAL NETWORK WAS DEVELOPED WITH A BASE RECEIVER OCCUPYING POINT #102 (MARIETTA DRIVE) AS A BASE STATION WHILE THREE CREWS OCCUPIED POINTS FOR 45 MINUTES COMPLETING A SECOND INDEPENDENT OCCUPATION OF ALL POINTS. ON DAY 3 AND 4, A TANDEM OPERATION WAS CONDUCTED WITH FOUR CREWS WORKING IN UNISON COLLECTING 45 MINUTES IN COMMON AT THEIR ASSIGNED POINTS TO COMPLETE THE INNER NETWORK CONNECTIONS BETWEEN ALL ADJACENT POINTS. AT THE END OF THE FIELD CAMPAIGN, ALL HPN POINTS WERE OCCUPIED FOUR OR MORE TIMES ON DIFFERENT DAYS AND UNDER DIFFERENT CONSTELLATIONS.

IN ADDITION TO THE 20 PRIMARY HPN CONTROL POINTS, THREE SECONDARY POINTS 201 (TIDAL), 202 (SLOAT) AND 203 (ARMY) SHOWN ON THE MAP OF THE 1999 GPS SURVEY ON FILE WITH THE CCSF PUBLIC WORKS REFERRED TO ABOVE WERE OCCUPIED TWICE WITH A FIFTH RECEIVER FOR 15-30 MINUTES. THESE POINTS ARE NOT PART OF THE HPN. THESE POINTS WERE INCLUDED TO DETERMINE THE RELATIONSHIP BETWEEN THE 1999 CCSF REFERENCE FRAME AND THE 2013 NAD83(2011) 2010.00 EPOCH REFERENCE FRAME ESTABLISHED BY THIS SURVEY. TRANSFORMATIONS FROM THE 1999 REFERENCE FRAME TO THIS 2013 SURVEY ARE PROVIDED HEREAFTER.

ADJUSTMENTS & ANALYSIS

NON-TRIVIAL VECTORS WERE PROCESSED FROM THE OBSERVATIONS AND EVALUATED IN THE NETWORK ADJUSTMENTS LISTED BELOW. THE REGIONAL NETWORK CONNECTED NINE STATIONS INCLUDING FOUR CORS, FOUR CGPS STATIONS AND ONE PRIVATE CONTINUOUSLY OPERATED RTN STATION. THE REGIONAL NETWORK CONTAINS 57 VECTORS AVERAGING 20 KILOMETERS IN LENGTH WITH A MAXIMUM OF 38 KILOMETERS. THE TWO-DIMENSIONAL RESIDUALS AVERAGED 0.002 METERS WITH A STANDARD DEVIATION OF 0.002 METERS AND A MAXIMUM OF 0.010 METERS. THE ABSOLUTE VALUE OF THE VERTICAL RESIDUALS AVERAGED 0.002 METERS WITH A STANDARD DEVIATION OF 0.002 METERS AND A RANGE OF -0.007 TO +0.008 METERS. THE 2013 CCSF HPN CONNECTED 20 POINTS, THREE SECONDARY POINTS, TWO CGPS STATIONS AND THE PRIVATE RTN STATION. THE NETWORK CONTAINS 83 VECTORS AVERAGING 4.3 KILOMETERS IN LENGTH WITH A MAXIMUM OF 8.3 KILOMETERS. THE TWO-DIMENSIONAL RESIDUALS AVERAGED 0.003 METERS WITH A STANDARD DEVIATION OF 0.002 METERS AND A MAXIMUM OF 0.010 METERS. THE ABSOLUTE VALUE OF THE VERTICAL RESIDUALS AVERAGED 0.003 METERS WITH A STANDARD DEVIATION OF 0.003 METERS AND A RANGE OF -0.009 TO +0.016 METERS.

SIX NETWORK ADJUSTMENTS WERE PROCESSED TO DEVELOP THE GEODETIC AND PLANE COORDINATES IN TWO REFERENCE FRAMES AT DIFFERENT EPOCHS. AN OVERVIEW OF THE ADJUSTMENTS FOLLOW WITH DETAILS THEREAFTER.

ADJUSTMENT #1 AND #2: DEVELOPED IGS08(2005) EPOCH 2013.54 POSITIONS FOR REFERENCING FUTURE SECULAR AND EPISODIC MOVEMENTS OF THE REGION AND CCSF. THE IGS08(2005) POSITIONS OF THE FOUR CORS WERE OBTAINED FROM THE NGS AND MOVED TO EPOCH 2013.54 (EPOCH OF THIS SURVEY) USING THE NGS HTDP V3.2.3 VELOCITY MODEL. ADJUSTMENT #1 FIXED WINT TO EVALUATE THE VECTOR RESIDUALS AND CLOSURES ON THE REMAINING THREE CORS. ADJUSTMENT #2 CONSTRAINED THE NETWORK TO ALL FOUR CORS TO DEVELOP IGS08(2005) EPOCH 2013.54 POSITIONS.

ADJUSTMENT #3 AND #4: DEVELOPED NAD83(2011) EPOCH 2013.54 POSITIONS FOR REFERENCING THE REGIONAL NETWORK. THE NAD83(2011) EPOCH 2010.00 POSITIONS OF THE FOUR CORS WERE OBTAINED FROM THE NGS AND MOVED TO EPOCH 2013.54 (EPOCH OF THIS SURVEY) USING THE HTDP V3.2.3 VELOCITY MODEL. ADJUSTMENT #3 FIXED WINT TO EVALUATE THE CLOSURES ON THE REMAINING THREE CORS. ADJUSTMENT #4 CONSTRAINED THE NETWORK TO ALL FOUR CORS TO DEVELOP NAD83(2011) EPOCH 2013.54 POSITIONS ON THE FOUR CGPS STATIONS.

ADJUSTMENT #5: DEVELOPED NAD83(2011) EPOCH 2010.00 POSITIONS FOR CCSF HPN. THE NAD83(2011) EPOCH 2013.54 POSITIONS OF STATIONS UCSF, MHDL AND CCSF, DETERMINED IN ADJUSTMENT #4, WERE MOVED TO EPOCH 2010.00 USING THE HTDP V3.2.3 VELOCITY MODEL. ADJUSTMENT #5 FIXED THE CGPS STATION UCSF TO EVALUATE THE CLOSURES ON MHDL AND CCSF AND DEVELOP THE POSITIONS OF THE 2013 CCSF HPN NETWORK.

ADJUSTMENT #6: ANALYZED THE GEOID 2012A MODEL UTILIZING A SEVEN PARAMETER CONFORMAL TRANSFORMATION WITH THE SCALE PARAMETER FIXED AT 1.0 TO BEST FIT THE GNSS MEASUREMENTS TO THE NAVD83 HEIGHTS OF THE HPN POINTS DETERMINED IN THE CCSF 2013 LEVELING NETWORK SURVEY (REPORT ON FILE WITH CCSF). THE ADJUSTMENT DEMONSTRATES THE APPLICATION AND EXPECTED RESULTS OF USING GNSS SURVEY TECHNOLOGY TO DEVELOP ORTHOMETRIC HEIGHTS IN CCSF.

IGS08(2005) EPOCH 2013.54 POSITIONS

ADJUSTMENT 1: 3D MINIMALLY CONSTRAINED ADJUSTMENT
 THE FOUR NEAREST OPERATING CORS FORM THE BASIS FOR RECOVERY OF THE IGS08 REFERENCE FRAME FOR THIS SURVEY. IGS08(2005) EPOCH POSITIONS AND VELOCITIES WERE OBTAINED FROM THE NGS WEBSITE FOR THE CORS. THE HTDP V3.2.3 MODEL WAS USED TO UPDATE THE CORS POSITIONS TO THE 2013.54 EPOCH OF THIS SURVEY. FOUR CGPS STATIONS AND A PRIVATE RTN STATION CCSF WERE INCLUDED IN THE ADJUSTMENTS.

STATION WINT WAS FIXED IN A MINIMALLY CONSTRAINED ADJUSTMENT TO DETERMINE PRELIMINARY LATITUDE, LONGITUDE, ELLIPSOID HEIGHTS AT OTHER STATIONS AND COMPUTE CLOSURES. THE RESULTS FOLLOW WITH THE COORDINATE DIFFERENCES (CLOSURES) FROM THE IGS08 POSITIONS TO THE COMPUTED POSITIONS LISTED IN METERS BELOW. THE POSITION FOR UCSF WAS DETERMINED FROM THE MEAN OF THREE 24 HOURS OBSERVATIONS SUBMITTED TO OPUS AND USED AS A CHECK ON THE RESULTS OF THIS ADJUSTMENT AS SHOWN.

COORDINATE DIFFERENCES: IGS08 TO COMPUTED

STATION	DN	DE	DE
P176	0.007	-0.004	0.000
P224	0.012	0.003	0.002
TIBB	0.003	-0.001	-0.016
WINT	0.000	0.000	0.000 FIXED
UCSF	0.004	0.000	-0.016 OPUS IGS08 POSITION TO COMPUTED POSITION

NOTE: THE DIFFERENCES BETWEEN THE PUBLISHED AND COMPUTED POSITIONS RANGE 0.000 TO 0.012 METERS IN NORTH, -0.001 TO +0.003 METERS IN EAST AND -0.015 TO +0.008 METERS IN THE UP DIRECTION. NETWORK LOOP CLOSURES WERE LESS THAN A CENTIMETER. THE HORIZONTAL CHECK ON THE OPUS POSITION OF UCSF IS 0.004 METERS.

RECORD OF SURVEY #8080

OF THE SAN FRANCISCO HIGH PRECISION GNSS NETWORK SURVEY
 CITY AND COUNTY OF SAN FRANCISCO,
 STATE OF CALIFORNIA

PREPARED BY:
 F3 AND ASSOCIATES, BENICIA, CALIFORNIA
 AND
 MCGEE SURVEYING CONSULTING, SANTA BARBARA, CALIFORNIA
 FOR
 BUREAU OF STREET USE AND MAPPING DEPARTMENT OF PUBLIC WORKS,
 CITY AND COUNTY OF SAN FRANCISCO, CALIFORNIA

MARCH, 2014



SHEET 2 OF 11

ASSESSOR'S BLOCK 9899, LOT 9899

ALL STREETS

AS A MATTER OF INFORMATION, THE NGS PUBLISHES THE US GRAVIMETRIC GEOID 2012 (USGG2012) WHICH IS A GRAVIMETRIC MODEL REFERENCED TO THE GRS80 ELLIPSOID, CENTERED IN THE IGS08(2005.00) REFERENCE FRAME, AND IS THE BEST GEO-POTENTIAL SURFACE THAT APPROXIMATES MEAN SEA LEVEL (MSL). USGG2012 IS APPLIED TO WGS84 = IGS08 ELLIPSOID HEIGHTS TO OBTAIN ESTIMATED HEIGHTS REFERENCED TO GLOBAL MEAN SEA LEVEL (GEOID). UTILIZING THE USGG2012 MODEL IN A TRANSFORMATION TO BEST FIT THE NAVD88 HEIGHTS OF THE HPN POINTS (DESCRIBED ABOVE) RETURNED ESSENTIALLY THE SAME RESULTS AS THE HYBRID MODEL; HOWEVER, THE ROTATIONS WERE +0.138 AND +0.120 SECONDS AROUND THE NORTH AND EAST AXIS RESPECTIVELY, REPRESENTING A NEGLIGIBLE IMPROVEMENT. A NEW NORTH AMERICAN VERTICAL DATUM IS EXPECTED TO BE INTRODUCED IN LESS THAN TEN YEARS. THE ORIGIN OR ZERO HEIGHT IS EXPECTED TO BE THE GEO-POTENTIAL SURFACE DESCRIBED ABOVE WHICH IS APPROXIMATELY 0.9 METERS LOWER THAN THE NAVD88 DATUM AND APPROXIMATES THE NGVD29 DATUM.

DATA COLLECTION, PROCESSING AND EQUIPMENT

FIVE LEICA GS15 GEODETIC GNSS RECEIVERS/ANTENNAS LISTED BELOW WERE MOUNTED ON FIXED HEIGHT POLES TO COLLECT, AND STORE SATELLITE SIGNAL DATA. THE GS15 RECEIVERS TRACKED NAVSTAR GPS AND GLONASS SATELLITES. PRIOR TO INITIATING THE FIELD OBSERVATIONS A CALIBRATION OF THE FIXED HEIGHT POLES WAS CONDUCTED WITH A THEODOLITE TO VERIFY THEIR HEIGHTS AND PLUMB. THE TOP OF THE POLES WERE FOUND TO BE PLUMB WITHIN 1 MILLIMETER OF THE POINT. THERE WERE NO EQUIPMENT FAILURES DURING THE SURVEY.

DATE OF FIELD SURVEYS: JULY 15 TO JULY 19, 2013 (AVERAGE DATE 2013.54)

GNSS SURVEY PARAMETERS:

OBSERVATIONS: STATIC OCCUPATIONS COLLECTED GPS AND GLONASS SIGNAL DATA AT A 15 SECOND EPOCH RATE FOR 45 MINUTES AT ALL POINTS WITH 8 HOURS AT THE BASE STATION SETUPS FOR THE RADIAL OBSERVATIONS ON THE FIRST TWO DAYS OF THE FIELD CAMPAIGN. OBSERVATIONS AT THE CORS AND CGPS STATIONS WERE GPS ONLY FOR 24 HOUR AT A 15 SECOND EPOCH RATE AND DOWNLOADED FROM THE INTERNET.
 CONSTELLATION: 32 HEALTHY US NAVSTAR GPS SATELLITES; 24 HEALTHY RUSSIAN GLONASS SATELLITES.

SATELLITE OBSERVATIONS: 12-21 SATELLITES OBSERVED WITH A MINIMUM OF 6 GPS AND 6 GLONASS AT ANY TIME; GDOP < 2; ELEVATION MASK FOR DATA COLLECTION SET AT 10° AND POST PROCESSED AT 15°.

OBSERVABLES: GPS L1 & L2 CARRIER WAVE, GLONASS L1 & L2.

EPHEMERIS: PRECISE GPS AND GLONASS FOR STATIC POST PROCESSING.

WEATHER CONDITIONS: GENERALLY OVERCAST MARINE LAYER AND MILD TEMPERATURES.

SPACE WEATHER: BOULDER K INDEX = 1-3 (GAUGES IONOSPHERIC ACTIVITY ON A SCALE OF 0-9, <5 PREFERRED). THE K INDEX WAS 1-2 ON ALL DAYS EXCEPT ON JULY 15 IT WAS 3.

EQUIPMENT:

GNSS BASE RECEIVER UNIT NO.: B, OPERATOR: JTM, RA;

RECEIVER MAKE & MODEL: LEICA GS15;

ANTENNA MAKE & MODEL: LEICA GS15

ANTENNA MOUNT: FIXED HT. POLE B;

ANTENNA HEIGHT: 1.800M

GNSS BASE RECEIVER UNIT NO.: C, OPERATOR: DPL;

RECEIVER MAKE & MODEL: LEICA GS15;

ANTENNA MAKE & MODEL: LEICA GS15

ANTENNA MOUNT: FIXED HT. POLE C;

ANTENNA HEIGHT: 1.800M

GNSS BASE RECEIVER UNIT NO.: D, OPERATOR: GP;

RECEIVER MAKE & MODEL: LEICA GS15;

ANTENNA MAKE & MODEL: LEICA GS15

ANTENNA MOUNT: FIXED HT. POLE D;

ANTENNA HEIGHT: 1.800M

GNSS BASE RECEIVER UNIT NO.: E, OPERATOR: AV;

RECEIVER MAKE & MODEL: LEICA GS15;

ANTENNA MAKE & MODEL: LEICA GS15

ANTENNA MOUNT: FIXED HT. POLE E;

ANTENNA HEIGHT: 1.800M

GNSS BASE RECEIVER UNIT NO.: F, OPERATOR: MM, PC;

RECEIVER MAKE & MODEL: LEICA GS15;

ANTENNA MAKE & MODEL: LEICA GS15

ANTENNA MOUNT: FIXED HT. POLE F;

ANTENNA HEIGHT: 1.800M

CORS & CGPS NATIONAL GEODETIC SURVEY ANTENNAS

NOTE: ABSOLUTE ANTENNA MODELS WERE USED IN THE BASELINE PROCESSING AND MEASUREMENTS WERE REFERENCED TO THE MONUMENT NOT THE ANTENNA REFERENCE POINT (ARP).

STATION	ANTENNA	RADOME
CCSF	AX1202 GG	NONE
EBMD	LEIAR10	NONE
MHDL	ASH70036C_M	SNOW
P178	TRM29659.00	SCIT
P224	TRM29659.00	SCIT
P178	TRM29659.00	SCIT
TBB	ASH701945B_M	SCIT
UCSF	ASH701945B_M	SCIT
WNT	ASH70036D_M	CAFG*

CAFG* <NO MODEL AVAILABLE, SUBSTITUTED "ASH70036D_M NONE"

RINEX DATA, ANTENNA MODELS, PRECISE EPHEMERIS AND PROCESSING SOFTWARE: RINEX FILES FOR THE CORS AND CGPS WERE IMPORTED FROM THE NGS AND SOPAC. ABSOLUTE ANTENNA MODELS WERE IMPORTED FROM THE NGS AND THE PRECISE EPHEMERIS WAS IMPORTED FROM THE NGS FOR THE GPS AND IGS FOR THE GLONASS CONSTELLATIONS. THE PRECISE EPHEMERIS WAS USED FOR ALL STATIC POST-PROCESSING IN IGS08. THE BASELINE PROCESSING WAS PERFORMED IN LEICA GEOMATICS OFFICE (LGO) V8.1. THE NETWORK ADJUSTMENTS WERE PERFORMED IN STARNET V7.2.

ACCURACY: LOCAL & NETWORK

THIS SURVEY CONFORMS TO THE REQUIREMENTS OF PUBLIC RESOURCES CODE SECTION 8801 THROUGH 8819 AND 8850 THROUGH 8860, THE INTENT OF THE FGCC "GEOMETRIC GEODETIC ACCURACY STANDARDS AND SPECIFICATIONS FOR USING GPS POSITIONING TECHNIQUES" (1989), THE CALIFORNIA GEODETIC CONTROL COMMITTEE (CGCC) "SPECIFICATIONS FOR HIGH-PRODUCTION GPS SURVEYING TECHNIQUES" (1993), AND NOAA TECHNICAL MEMORANDUM NOS NGS 58 "GUIDELINES FOR ESTABLISHING GPS-DERIVED ELLIPSOID HEIGHTS".

VECTOR RESIDUALS: THE NUMBER OF VECTORS, TWO-DIMENSIONAL VECTOR RESIDUALS AND THE ABSOLUTE VALUE OF THE VERTICAL RESIDUALS RESULTING FROM THE MINIMALLY CONSTRAINED ADJUSTMENT ARE LISTED BELOW IN METERS.

TWO DIMENSIONAL RESIDUALS

	NO.	AVERAGE	STD.DEV.	MAXIMUM
CCSF HPN	53	0.003	0.002	0.019
REGIONAL CORS	57	0.002	0.002	0.019

VERTICAL RESIDUALS (ABSOLUTE VALUES)

	AVERAGE	STD.DEV.	RANGE
CCSF HPN	0.003	0.003	-0.009 TO +0.016
REGIONAL CORS	0.002	0.002	-0.007 TO +0.009

LOCAL ACCURACY: THE LOCAL VECTOR LENGTHS, PRECISIONS, RELATIVE DISTANCE ACCURACY AND RELATIVE VERTICAL ACCURACY RESULTING FROM THE MINIMALLY CONSTRAINED ADJUSTMENT AT THE 95% LEVEL OF CONFIDENCE ARE LISTED BELOW IN METERS.

NETWORK	LENGTHS		PPM PRECISIONS	
	VARY	AVERAGE	VARY	AVERAGE
CCSF HPN	1675-6291	4267	0.4-2.3	1.1 PPM
REGIONAL	5323-37898	28224	0.1-0.6	0.3 PPM

NETWORK	RELATIVE DISTANCE ERROR			RELATIVE VERTICAL ERROR		
	AVERAGE	MAXIMUM	PRECISION	AVERAGE	MAXIMUM	PRECISION
CCSF HPN	0.004	0.005	1:1,067,000	0.003	0.004	
REGIONAL	0.003	0.003	1:5,741,000	0.003	0.004	

FOLLOWING THE CRITERIA OF THE FORMER FGCC CLASSIFICATION SYSTEM DESCRIBED IN "GEOMETRIC GEODETIC ACCURACY STANDARDS AND SPECIFICATIONS FOR USING GPS POSITIONING TECHNIQUES" (1989), THE MAXIMUM ALLOWABLE RELATIVE ERROR AT THE 95% CONFIDENCE LEVEL IS DEFINED AS $S = \sqrt{(E^2 + (0.1PD)^2)}$ WHERE E IS THE BASE ERROR, P IS THE PPM AND D IS THE DISTANCE IN KILOMETERS. FOR THE CCSF HPN, B-ORDER IS EQUIVALENT TO $\sqrt{(0.9^2 + (0.1 \cdot 1 \cdot 4.3)^2)} = 0.9$ CENTIMETERS AND A-ORDER IS EQUIVALENT TO $\sqrt{(0.9^2 + (0.1 \cdot 0.1 \cdot 4.3)^2)} = 0.5$ CENTIMETERS. LOOP CLOSURES FOR THE HPN VARY BETWEEN 1 PPM AND 5 PPM. IN CONCLUSION, THIS SURVEY EXCEEDS A B-ORDER CLASSIFICATION (1:1,000,000) UNDER THE FORMER SYSTEM AND THE REGIONAL NETWORK EXCEEDS AN A-ORDER CLASSIFICATION (1:10,000,000).

NETWORK ACCURACY: THE STANDARD DEVIATIONS (95% LEVEL OF CONFIDENCE) OF THE LATITUDE, LONGITUDE AND ELLIPSOID HEIGHTS AND THE 95% LEVEL OF CONFIDENCE OF THE HORIZONTAL POSITIONS AND ELLIPSOID HEIGHTS FOR THE REGIONAL NETWORK AND THE HPN ARE LISTED BELOW IN METERS. THIS TABLE ALLOWS USERS TO CALCULATE THE PROPAGATED ERROR FOR FUTURE SURVEYS BASED ON THE HPN POSITIONS. FOR P178, TBB, AND WNT THE NGS DATA SHEETS STATE "FORMAL POSITIONAL ACCURACY ESTIMATES ARE NOT AVAILABLE FOR THIS CORS BECAUSE ITS COORDINATES WERE DETERMINED IN PART USING MODELED VELOCITIES. APPROXIMATE ONE-SIGMA ACCURACIES FOR LATITUDE, LONGITUDE, AND ELLIPSOID HEIGHT CAN BE OBTAINED FROM THE SHORT-TERM TIME SERIES". STANDARD DEVIATIONS WERE ONLY AVAILABLE FOR P224 (MORE THAN 2.5 YEARS OF DATA). THEREFORE, FOR CONSISTENCY THE POSITIONAL ACCURACY ESTIMATES FOR ALL CORS STATIONS (P178, P224, TBB, AND WNT) WERE TAKEN FROM THE "SHORT TERM TIME SERIES" AVAILABLE AT THE NGS WEBSITE. THESE ONE-SIGMA ACCURACY ESTIMATES WERE USED FOR WEIGHTING THE CONSTRAINED ADJUSTMENT TO DEVELOP NETWORK ACCURACIES.

NETWORK ACCURACY IN METERS					
COORDINATE STANDARD DEVIATION			NETWORK ACCURACY AT 95% CONFIDENCE		
STATION	LATITUDE	LONGITUDE	ELLIPSOID HEIGHT	HORIZONTAL	ELLIPSOID HEIGHT
101	0.002	0.002	0.004	0.005	0.005
102	0.002	0.002	0.004	0.005	0.005
103	0.003	0.003	0.004	0.005	0.005
104	0.003	0.003	0.004	0.005	0.005
105	0.002	0.002	0.004	0.005	0.005
106	0.003	0.003	0.004	0.005	0.005
107	0.003	0.003	0.004	0.005	0.005
108	0.002	0.002	0.004	0.005	0.005
109	0.003	0.002	0.004	0.005	0.005
110	0.002	0.002	0.004	0.005	0.005
111	0.002	0.002	0.004	0.005	0.005
112	0.002	0.002	0.004	0.005	0.005
113	0.002	0.002	0.004	0.005	0.005
114	0.003	0.002	0.004	0.005	0.005
115	0.002	0.002	0.004	0.005	0.005
116	0.003	0.002	0.004	0.005	0.005
117	0.002	0.002	0.004	0.005	0.005
118	0.002	0.002	0.004	0.005	0.005
119	0.002	0.002	0.004	0.005	0.005
120	0.002	0.002	0.004	0.005	0.005
CCSF	0.002	0.002	0.004	0.005	0.005
EBMD	0.002	0.002	0.004	0.004	0.005
MHDL	0.002	0.002	0.004	0.004	0.005
P178	0.001	0.001	0.004	0.004	0.005
P178	0.002	0.002	0.004	0.004	0.005
P224	0.001	0.001	0.004	0.003	0.005
TBB	0.001	0.001	0.004	0.004	0.005
UCSF	0.001	0.001	0.004	0.003	0.005
WNT	0.001	0.001	0.004	0.003	0.005

THESE GEODETIC CONTROL DATA MEET THE 5-MILLIMETER LOCAL ACCURACY STANDARD FOR THE HORIZONTAL COORDINATE VALUES, THE 5-MILLIMETER LOCAL ACCURACY STANDARD FOR THE VERTICAL COORDINATE VALUES (HEIGHTS), THE 1-CENTIMETER NETWORK ACCURACY STANDARD FOR THE HORIZONTAL COORDINATE VALUES, AND THE 1-CENTIMETER NETWORK ACCURACY STANDARD FOR THE VERTICAL COORDINATE VALUES (HEIGHTS) AT THE 95-PERCENT CONFIDENCE LEVEL ACCORDING TO THE REPORTING STANDARD PUBLISHED BY FGDC IN "GEOSPATIAL POSITIONING ACCURACY STANDARD, PART 2, GEODETIC CONTROL NETWORKS", FGDC-STD-007, 2-1998.

RECORD OF SURVEY #8080

OF THE SAN FRANCISCO HIGH PRECISION GNSS NETWORK SURVEY
 CITY AND COUNTY OF SAN FRANCISCO,
 STATE OF CALIFORNIA
 PREPARED BY:
 F3 AND ASSOCIATES, BENICIA, CALIFORNIA
 AND
 MCGEE SURVEYING CONSULTING, SANTA BARBARA, CALIFORNIA
 FOR
 BUREAU OF STREET USE AND MAPPING DEPARTMENT OF PUBLIC WORKS,
 CITY AND COUNTY OF SAN FRANCISCO, CALIFORNIA

MARCH, 2014



SHEET 4 OF 11

ASSESSOR'S BLOCK 9899, LOT 9899

ALL STREETS

TRANSFORMATION

1999 NAD83(1991.35 EPOCH) SPCS > 2013 NAD83(2011) 2010.00 EPOCH SPCS

A MAP IS ON FILE WITH CCSF TITLED "CITY AND COUNTY OF SAN FRANCISCO PRECISE HORIZONTAL SURVEY CONTROL" DATED MAY 2001. THE SURVEY IS BASED ON NAD83 (1991) 1991.35 EPOCH WITH ADJUSTMENTS PUBLISHED IN 1991, 1998 AND 1999. THE 1999 STATE PLANE COORDINATE VALUES SHOWN ON SHEETS 4 & 5 OF 7 FOR ARMY=203, CANDLESTICK=107, SLOAT=202 AND TIDAL=201 WERE USED TO COMPUTE A FOUR PARAMETER CONFORMAL TRANSFORMATION TO CONVERT 1999 STATE PLANE COORDINATES IN FEET TO THIS 2013 SURVEY.

INPUT COORDINATES (FEET)

PT#	1999 NAD83 (1991) 1991.35 SPCS		PT#	2013 NAD83 (2011) 2010.00 SPCS	
	NORTH(1)	EAST(1)		NORTH(2)	EAST(2)
CANDLESTICK	2085128.546	6013911.480	107	2085130.280	6013916.280
TIDAL	2121772.462	5983470.060	201	2121774.233	5983466.889
SLOAT	2095878.561	5984226.406	202	2095880.395	5984225.175
ARMY	2100667.364	6012652.104	203	2100669.127	6012656.919

TRANSFORMATION SOLUTION RESIDUALS (FEET)

1999	2013	NORTH	EAST	N.AZIM & DIST
CANDLESTICK	107	-0.019	+0.018	138° 0.026
TIDAL	201	-0.031	-0.009	197° 0.032
SLOAT	202	+0.034	-0.011	342° 0.036
ARMY	203	+0.015	+0.003	11° 0.016

ROOT MEAN SQUARE OF THE NORTH AND EAST RESIDUALS = 0.02
 SCALE FACTOR = 1.00000077 STANDARD DEVIATION = 0.00000078
 ROTATION = +0° 00' 00.4"
 TRANSFORMATION EQUATIONS: $N2=A1*N1-A2*E1+A4$ $E2=A2*N1+A1*E1+A3$
 $A1=1.0000007745$ $A2=0.0000018602$ $A3=-0.96251$ $A4=11.90684$

THE SCALE AND ROTATION ARE NEGLIGIBLE AS EXPECTED BETWEEN EPOCHS OF THE SAME DATUM. THE TRANSFORMATION PRIMARILY ACCOUNTS FOR THE NORTH 1.7± FEET AND WEST 1.2± FEET SHIFT BETWEEN THE 1991.35 AND THE 2010.00 EPOCHS.

UTILIZE THE TRANSFORMATION EQUATIONS AND CONSTANTS LISTED TO CONVERT 1999 NAD83 (1991) EPOCH 1991.35 SPCS TO NAD83 (2011) EPOCH 2010.00 SPCS IN CCSF. THE HORIZONTAL ACCURACY OF THE COMPUTED POSITIONS ARE ESTIMATED AT 0.05 FEET AT THE 95% LEVEL OF CONFIDENCE BASED ON THE RESIDUALS.

TO CONVERT THE 1999 SURVEY NAD83(1991) 1991.35 EPOCH SPCS IN FEET TO NAD83(2011) 2010.00 EPOCH OF THE CITY & COUNTY OF SAN FRANCISCO COORDINATE SYSTEM (CCSF-CS) IN FEET USE THE FOLLOWING TRANSFORMATION.

TRANSFORMATION

1999 NAD83(1991) SPCS > NAD83(2011) 2010.00 EPOCH CCSF-CS

INPUT COORDINATES (FEET)

PT#	1999 NAD83 (1991) 1991.35 SPCS		PT#	2010.00 CCSF-CS	
	NORTH(1)	EAST(1)		NORTH(2)	EAST(2)
CANDLESTICK	2085128.546	6013911.480	107	62778.214	173901.613
TIDAL	2121772.462	5983470.060	201	98991.152	152589.533
SLOAT	2095878.561	5984226.406	202	72708.341	143909.815
ARMY	2100667.364	6012652.104	203	78288.679	172218.652

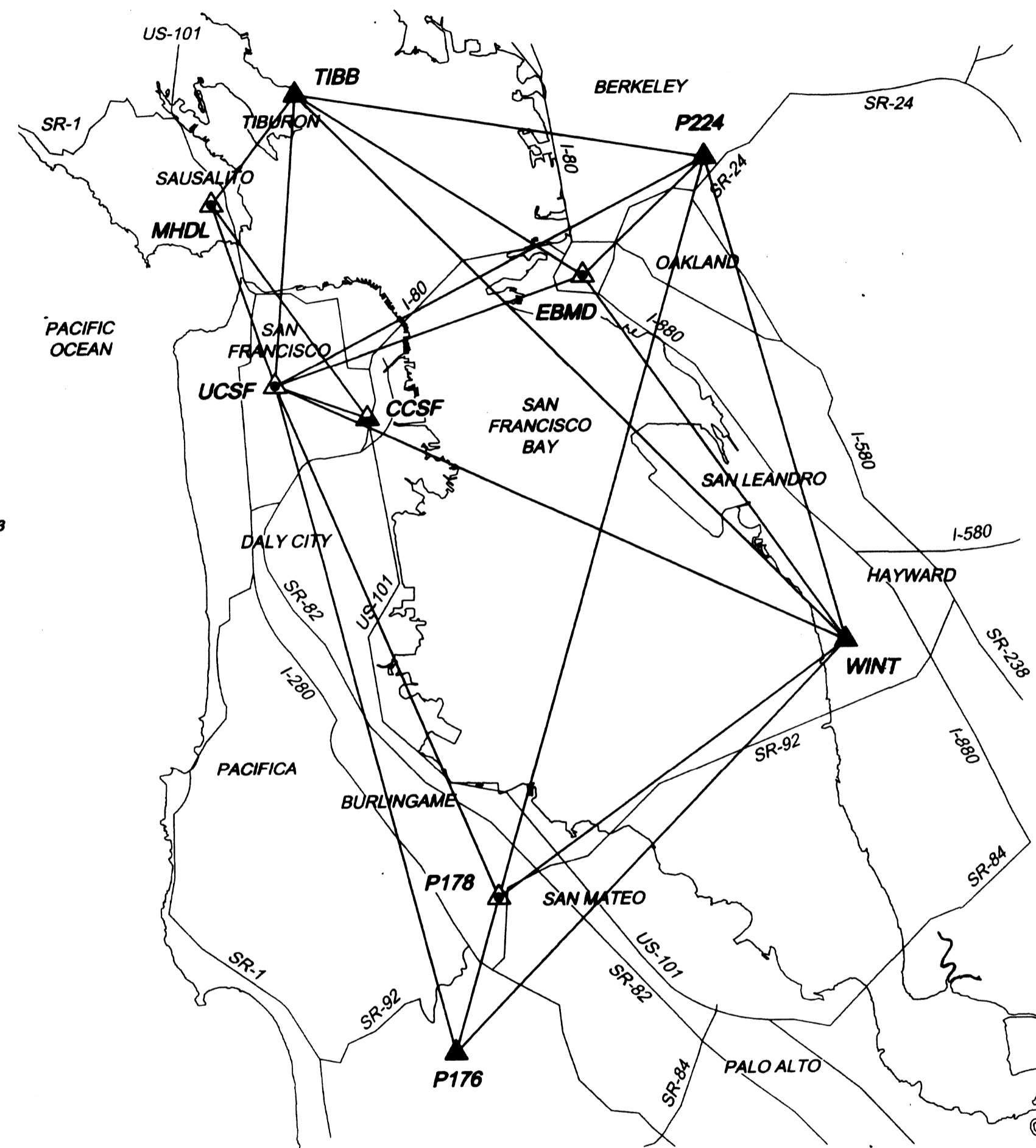
TRANSFORMATION SOLUTION RESIDUALS (FEET)

1999	2013	NORTH	EAST	N.AZIM & DIST
CANDLESTICK	107	-0.020	+0.016	140° 0.026
TIDAL	201	-0.032	-0.009	195° 0.033
SLOAT	202	+0.034	-0.012	340° 0.036
ARMY	203	+0.018	+0.004	13° 0.018

ROOT MEAN SQUARE OF THE NORTH AND EAST RESIDUALS = 0.02
 SCALE FACTOR = 1.00007856 STANDARD DEVIATION = 0.00000079
 ROTATION = -1° 11' 37.4"
 TRANSFORMATION EQUATIONS: $N2=A1*N1-A2*E1+A4$ $E2=A2*N1+A1*E1+A3$
 $A1=0.9999815081$ $A2=-0.0206347280$ $A3=-5795833.91914$ $A4=-2147358.74825$

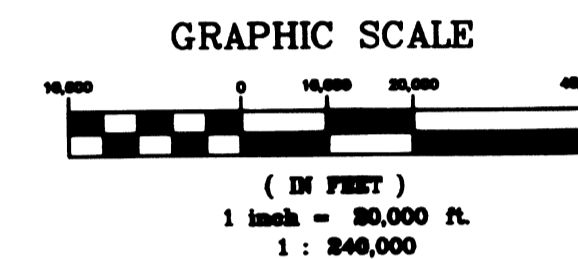
**CITY AND COUNTY OF SAN FRANCISCO
 REGIONAL CORS AND CGPS NETWORK**

SCALE 1" = 20,000'



LEGEND

- NGS CORS STATION
- CALIFORNIA CGPS STATION
- PRIVATE RTN STATION
- MEASURED VECTOR (BASELINE)



RECORD OF SURVEY #8080

OF THE SAN FRANCISCO HIGH PRECISION GNSS NETWORK SURVEY
 CITY AND COUNTY OF SAN FRANCISCO,
 STATE OF CALIFORNIA
 PREPARED BY:
 F3 AND ASSOCIATES, BENICIA, CALIFORNIA
 AND
 MCGEE SURVEYING CONSULTING, SANTA BARBARA, CALIFORNIA
 FOR
 BUREAU OF STREET USE AND MAPPING DEPARTMENT OF PUBLIC WORKS,
 CITY AND COUNTY OF SAN FRANCISCO, CALIFORNIA

SCALE AS NOTED

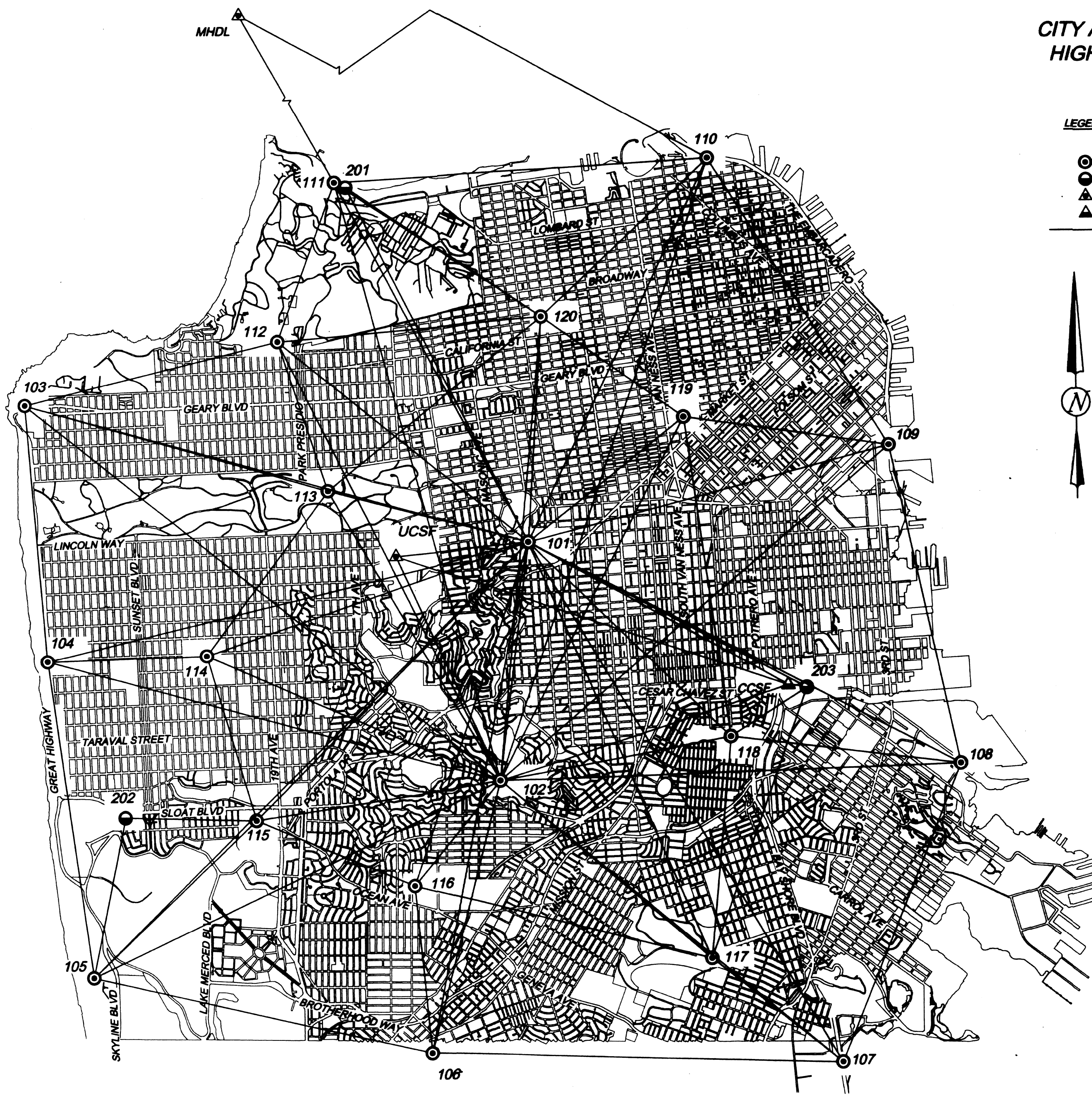
MARCH, 2014

BUREAU OF STREET USE AND MAPPING
 DEPARTMENT OF PUBLIC WORKS
 1185 MARKET STREET, ROOM 323
 SAN FRANCISCO, CA. 94103

ASSESSOR'S BLOCK 9000, LOT 9000

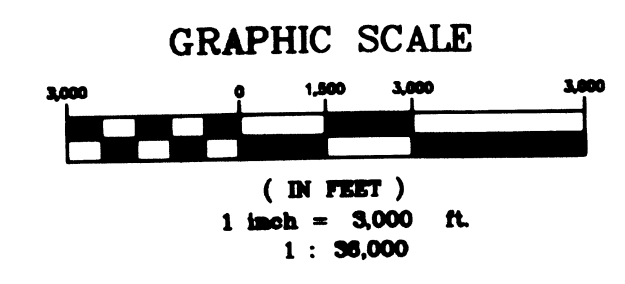
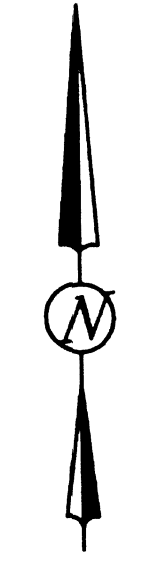
SHEET 5 OF 11

ALL STREETS



**CITY AND COUNTY OF SAN FRANCISCO
HIGH PRECISION NETWORK SURVEY**
SCALE 1" = 3,000'

- LEGEND**
- HIGH PRECISION NETWORK (HPN) MONUMENT
 - SECONDARY CONTROL
 - ▲ CALIFORNIA CGPS STATION
 - ▲ PRIVATE RTN STATION
 - MEASURED VECTOR (BASELINE)



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OF THE SAN FRANCISCO HIGH PRECISION GNSS NETWORK SURVEY
CITY AND COUNTY OF SAN FRANCISCO,
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PREPARED BY:
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FOR
BUREAU OF STREET USE AND MAPPING DEPARTMENT OF PUBLIC WORKS,
CITY AND COUNTY OF SAN FRANCISCO, CALIFORNIA

SCALE AS NOTED

MARCH, 2014

 BUREAU OF STREET USE AND MAPPING
DEPARTMENT OF PUBLIC WORKS
1155 MARKET STREET, ROOM 323
SAN FRANCISCO, CA 94103

SHEET 6 OF 11

ASSESSOR'S BLOCK 9999, LOT 9999

ALL STREETS

**CITY AND COUNTY OF SAN FRANCISCO
HIGH PRECISION NETWORK SURVEY
NAD83 AND IGS08 GEODETIC COORDINATE LIST**

<u>NAD83 GEODETIC COORDINATE LIST</u>					<u>IGS08 GEODETIC COORDINATE LIST</u>		
DATUM AND REFERENCE FRAME: NAD83 (2011) EPOCH 2010.00					DATUM AND REFERENCE FRAME: IGS08 (2005) EPOCH 2013.54		
POINT NUMBER	NORTH LATITUDE ° ' "	WEST LONGITUDE ° ' "	ELLIPSOID HEIGHT METERS	ELLIPSOID HEIGHT FEET	NORTH LATITUDE ° ' "	WEST LONGITUDE ° ' "	ELLIPSOID HEIGHT METERS
101	37-45-54.52969	122-26-21.55846	118.188	387.754	37-45-54.54414	122-26-21.61608	117.885
102	37-44-16.70006	122-26-35.16804	136.344	453.883	37-44-16.71449	122-26-35.22784	137.821
103	37-46-48.82346	122-30-42.66982	13.582	44.594	37-46-48.83787	122-30-42.75949	13.072
104	37-45-03.75809	122-30-29.78795	-25.278	-82.831	37-45-03.77249	122-30-29.84759	-25.798
105	37-42-54.76774	122-30-04.94280	23.607	77.449	37-42-54.78214	122-30-05.00241	23.085
106	37-42-25.30189	122-27-08.62037	77.575	254.510	37-42-25.31641	122-27-08.67985	77.053
107	37-42-22.15117	122-23-36.80485	-28.944	-94.889	37-42-22.16562	122-23-36.86440	-29.467
108	37-44-24.76543	122-22-36.10746	-28.108	-92.221	37-44-24.77980	122-22-36.16703	-28.633
109	37-46-35.29523	122-23-14.65957	-29.088	-95.467	37-46-35.30971	122-23-14.71918	-29.621
110	37-48-32.30625	122-24-49.85029	-29.261	-98.002	37-48-32.32072	122-24-49.90984	-29.783
111	37-48-21.50380	122-28-02.95054	-28.805	-93.848	37-48-21.51824	122-28-03.01021	-29.128
112	37-47-16.23698	122-28-31.85382	21.682	71.188	37-47-16.25141	122-28-31.91358	21.171
113	37-46-15.21109	122-28-05.24080	42.158	138.316	37-46-15.22552	122-28-05.30044	41.637
114	37-45-06.84452	122-29-07.34048	68.915	219.538	37-45-06.85894	122-29-07.40011	68.394
115	37-43-59.89229	122-28-41.12820	28.692	94.135	37-43-59.90670	122-28-41.18882	28.171
116	37-43-33.80444	122-27-19.05816	57.282	187.988	37-43-33.81887	122-27-19.11578	56.770
117	37-43-04.58553	122-24-45.07281	84.526	277.316	37-43-04.60008	122-24-45.13238	84.003
118	37-44-35.20539	122-24-35.75058	45.947	150.745	37-44-35.21984	122-24-35.81017	45.424
119	37-46-46.37893	122-25-01.43882	-13.634	-44.731	37-46-46.39139	122-25-01.49844	-14.157
120	37-47-27.12584	122-28-15.67191	53.304	174.881	37-47-27.14010	122-28-15.73155	52.782
CCSF	37-44-55.63989	122-24-01.58310	-15.938	-52.280	37-44-55.65415	122-24-01.64289	-16.481
EBMD	"	"	"	"	37-48-54.03039	122-17-01.70888	-15.922
MHDL	37-50-32.34805	122-29-39.54740	68.402	217.855	37-50-32.36248	122-29-39.60710	68.888
UCSF	37-45-46.67189	122-27-29.28890	155.128	508.949	37-45-46.68643	122-27-29.34853	154.608
P176	"	"	"	"	37-28-18.38315	122-21-25.71047	433.810
P178	"	"	"	"	37-32-04.28983	122-19-56.51784	128.049
P224	"	"	"	"	37-51-50.02759	122-13-08.62234	407.349
T1BB	"	"	"	"	37-53-27.15354	122-28-51.37882	-21.084
WINT	"	"	"	"	37-39-09.51974	122-08-28.05320	-28.780

NOTE:

* EBMD AND P178 WERE NOT PART OF THE NAD83(2011) 2010.00 EPOCH ADJUSTMENT, SEE PAGE 2 FOR NAD83(2011) 2013.54 EPOCH POSITIONS.
** SEE PAGE 2 FOR NAD83(2011) 2010.00 EPOCH POSITIONS.

RECORD OF SURVEY #8080

OF THE SAN FRANCISCO HIGH PRECISION GNSS NETWORK SURVEY
CITY AND COUNTY OF SAN FRANCISCO,
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PREPARED BY:
F3 AND ASSOCIATES, BENICIA, CALIFORNIA
AND
MCGEE SURVEYING CONSULTING, SANTA BARBARA, CALIFORNIA
FOR
BUREAU OF STREET USE AND MAPPING DEPARTMENT OF PUBLIC WORKS,
CITY AND COUNTY OF SAN FRANCISCO, CALIFORNIA

MARCH, 2014



BUREAU OF STREET USE AND MAPPING
DEPARTMENT OF PUBLIC WORKS
1155 MARKET STREET, ROOM 323
SAN FRANCISCO, CA 94103

SHEET 7 OF 11

ASSESSOR'S BLOCK 9889, LOT 9889

ALL STREETS

**CITY AND COUNTY OF SAN FRANCISCO
HIGH PRECISION NETWORK SURVEY
STATE PLANE COORDINATE LIST**

CALIFORNIA STATE PLANE COORDINATES ZONE 3: NAD83 (2011) 2010.00 EPOCH AND NAVD88 HEIGHTS PER CCSF 2013 2ND ORDER LEVELING SURVEY

POINT NUMBER	STATE PLANE COORDINATES		NAVD88 HEIGHT (M)	STATE PLANE COORDINATES		NAVD88 HEIGHT (FT)	CONVERGENCE ANGLE	FACTORS SCALE X ELLIPSOID = COMBINED		
	NORTH (M)	EAST (M)		NORTH (FT)	EAST (FT)			PROJECTION SCALE FACTOR	ELLIPSOID HEIGHT FACTOR	COMBINED FACTOR
101	642177.520	1829147.188	150.799	2108877.414	8001127.084	494.746	-1-11-14.3	0.99992921	0.99998145	0.99991088
102	639169.103	1828751.516	170.991	2087007.299	5999828.933	590.993	-1-11-22.7	0.99992920	0.99997829	0.99990750
103	643985.863	1822793.428	46.352	2112810.286	5990281.439	152.073	-1-13-54.2	0.99992931	0.99999787	0.99992718
104	640740.769	1823039.791	7.550	2102163.674	5991089.714	24.770	-1-13-46.3	0.99992918	1.00000397	0.99993315
105	636752.037	1823562.796	56.489	2089077.308	5992905.572	185.331	-1-13-31.1	0.99992937	0.99998630	0.99992587
106	635753.146	1827836.561	110.302	2085800.113	5999827.116	361.882	-1-11-43.8	0.99992947	0.99998783	0.99991730
107	635548.974	1833043.520	3.898	2085130.280	6013910.280	12.133	-1-09-33.5	0.99992948	1.00000454	0.99993403
108	639298.261	1834608.138	4.484	2087431.045	6019043.533	14.711	-1-08-58.3	0.99992920	1.00000441	0.99993361
109	643340.513	1833745.648	3.461	2110893.000	6016213.847	11.355	-1-09-18.9	0.99992928	1.00000457	0.99993384
110	646894.405	1831490.574	3.279	2122880.811	6008815.324	10.758	-1-10-18.2	0.99992989	1.00000499	0.99993428
111	646759.384	1826761.484	4.000	2121908.745	5993299.989	13.123	-1-12-18.4	0.99992984	1.00000449	0.99993412
112	644762.606	1826012.184	54.344	2115358.651	5990841.639	178.294	-1-12-34.1	0.99992938	0.99998980	0.99992588
113	642867.936	1826623.601	74.816	2109142.554	5992847.597	245.459	-1-12-17.8	0.99992924	0.99998338	0.99992282
114	640792.840	1825059.534	99.656	2102334.511	5987716.154	326.955	-1-12-55.8	0.99992918	0.99998850	0.99991888
115	638715.658	1825657.369	61.448	2095519.621	5999877.550	201.801	-1-12-39.8	0.99992923	0.99998550	0.99992472
116	637869.351	1827649.621	89.985	2082743.029	5998213.798	295.226	-1-11-49.5	0.99992927	0.99999101	0.99992028
117	636891.154	1831400.952	117.172	2089533.729	6008521.289	384.422	-1-10-15.3	0.99992935	0.99998874	0.99991808
118	639679.300	1831686.204	78.553	2089881.170	6009457.154	257.719	-1-10-09.5	0.99992919	0.99998279	0.99992188
119	643735.185	1831140.342	18.941	2111987.853	6007888.271	62.142	-1-10-25.3	0.99992930	1.00000214	0.99993144
120	645028.567	1829350.275	85.887	2116231.223	6001793.381	281.781	-1-11-10.7	0.99992942	0.99998164	0.99992108
201	646718.080	1826812.971	3.659	2121774.233	5993488.889	12.005	-1-12-15.1	0.99992963	1.00000464	0.99993417
202	638764.862	1823985.481	23.781	2095880.395	5994225.175	77.958	-1-13-21.4	0.99992923	1.00000142	0.99993085
203	640285.230	1832659.665		2100889.127	6012850.919		-1-09-45.5	0.99992918	1.00000434	0.99993352
CCSF	640292.109	1832535.278		2100891.893	6012242.824		-1-09-48.6	0.99992918	1.00000250	0.99993188
MHDL	650842.310	1824485.178		2135305.146	5995831.789		-1-13-15.5	0.99993044	0.99998958	0.99992002
UCSF	641989.844	1827484.810	187.77	2108198.083	5995873.081	616.04	-1-11-55.8	0.99992920	0.99997588	0.99990488
						AVERAGE	-1-11-33.7	0.99992936	0.99998980	0.99992488

RECORD OF SURVEY #8080

OF THE SAN FRANCISCO HIGH PRECISION GNSS NETWORK SURVEY
CITY AND COUNTY OF SAN FRANCISCO,
STATE OF CALIFORNIA
PREPARED BY:
F3 AND ASSOCIATES, BENICIA, CALIFORNIA
AND
MCGEE SURVEYING CONSULTING, SANTA BARBARA, CALIFORNIA
FOR
BUREAU OF STREET USE AND MAPPING DEPARTMENT OF PUBLIC WORKS,
CITY AND COUNTY OF SAN FRANCISCO, CALIFORNIA

MARCH, 2014



BUREAU OF STREET USE AND MAPPING
DEPARTMENT OF PUBLIC WORKS
1185 MARKET STREET, ROOM 323
SAN FRANCISCO, CA. 94103

SHEET 8 OF 11

ASSESSOR'S BLOCK 9000, LOT 9000

ALL STREETS

**CITY AND COUNTY OF SAN FRANCISCO
HIGH PRECISION SURVEY NETWORK
CCSF PLANE COORDINATE LIST**

CCSF LOCAL PROJECTION PLANE COORDINATES: NAD83 (2011) 2010.00 EPOCH AND NAVD88 HEIGHTS PER CCSF 2013 NAVD88 DATUM 2ND ORDER LEVELING SURVEY

POINT NUMBER	CCSF PLANE COORDINATES			CCSF PLANE COORDINATES			CONVERGENCE ANGLE	FACTORS SCALE X ELLIPSOID = COMBINED		
	NORTH (M)	EAST (M)	NAVD88 HEIGHT (M)	NORTH (FT)	EAST (FT)	NAVD88 HEIGHT (FT)		PROJECTION SCALE FACTOR	ELLIPSOID HEIGHT FACTOR	COMBINED FACTOR
101	25681.275	48940.932	150.799	84255.983	160567.041	494.746	0-00-23.5	1.00000701	0.99999145	0.99999847
102	22665.032	48608.002	170.991	74360.193	159474.752	560.983	0-00-15.2	1.00000700	0.99997829	0.99998530
103	27356.975	42550.378	46.352	89753.676	139800.687	152.073	-0-02-16.4	1.00000737	0.99999787	1.00000523
104	24117.486	42864.322	7.550	79125.385	140630.688	24.770	-0-02-08.4	1.00000732	1.00000397	1.00001128
105	20140.186	43470.358	56.489	66076.592	142618.999	165.331	-0-01-53.1	1.00000725	0.99998630	1.00000365
106	19230.486	47764.351	110.302	63082.021	156706.874	361.862	-0-00-05.9	1.00000700	0.99998783	0.99999483
107	19134.838	52974.838	3.698	62778.214	173601.613	12.133	0-02-04.2	1.00000730	1.00000454	1.00001186
108	22916.205	54461.117	4.484	75184.248	178677.849	14.711	0-02-41.5	1.00000751	1.00000441	1.00001192
109	26939.924	53514.519	3.461	86386.400	175572.218	11.365	0-02-18.0	1.00000737	1.00000457	1.00001194
110	30546.317	51183.622	3.279	100217.376	167924.933	10.758	0-01-19.8	1.00000712	1.00000469	1.00001172
111	30212.789	46460.090	4.000	99123.126	152427.813	13.123	-0-00-38.6	1.00000703	1.00000449	1.00001152
112	28200.678	45752.500	54.344	82521.723	150106.327	178.294	-0-00-58.3	1.00000706	0.99999660	1.00000368
113	26319.011	46403.311	74.816	86348.290	152241.529	245.469	-0-00-40.0	1.00000703	0.99999338	1.00000042
114	24211.614	44682.700	99.656	79434.271	147252.657	326.955	-0-01-18.0	1.00000712	0.99999650	0.99999862
115	22147.178	45523.733	61.448	72861.189	149355.781	201.801	-0-01-01.9	1.00000708	0.99999550	1.00000257
116	21342.501	47533.342	89.985	70021.189	155948.974	295.226	-0-00-11.7	1.00000700	0.99999101	0.99999801
117	20442.606	51304.532	117.172	67088.783	168321.620	384.422	0-01-22.5	1.00000713	0.99998674	0.99999367
118	23236.307	51531.650	78.553	76234.451	169086.754	257.719	0-01-28.3	1.00000715	0.99998279	0.99998964
119	27280.254	50901.352	18.941	89501.986	166998.851	62.142	0-01-12.6	1.00000710	1.00000214	1.00000894
120	28536.156	49084.584	85.887	93622.371	161036.340	261.781	0-00-27.1	1.00000701	0.99999164	0.99998885
201	30172.563	46512.431	3.659	98901.152	152599.533	12.005	-0-00-37.3	1.00000703	1.00000454	1.00001157
202	22161.547	43861.056	23.781	72708.341	143900.815	77.956	-0-01-43.4	1.00000721	1.00000142	1.00000863
203	23862.437	52492.350		78268.679	172218.652		0-01-52.3	1.00000725	1.00000434	1.00001159
CCSF	23866.723	52367.837		78302.739	171810.144		0-01-49.2	1.00000723	1.00000250	1.00000874
MHDL	34247.715	44099.030		112381.043	144681.588		-0-01-37.9	1.00000719	0.99999658	0.99999677
UCSF	25438.989	47283.113	187.77	83461.083	155126.014	616.04	-0-00-17.9	1.00000701	0.99997986	0.99998286
						AVERAGE	0-00-04.1	1.00000715	0.99999560	1.00000275

PROJECTION SPECIFICATIONS:
PROJECTION: TRANSVERSE MERCATOR, ELLIPSOID: GRS-80, SCALE: 1.000007, LATITUDE OF ORIGIN: 37°45'00",
CENTRAL MERIDIAN: -122°27'00", FALSE NORTHING: 24000.0 METERS, FALSE EASTING: 48000.0 METERS

RECORD OF SURVEY #8080

OF THE SAN FRANCISCO HIGH PRECISION GNSS NETWORK SURVEY
CITY AND COUNTY OF SAN FRANCISCO,

STATE OF CALIFORNIA

PREPARED BY:

F3 AND ASSOCIATES, BENICIA, CALIFORNIA

AND

MCGEE SURVEYING CONSULTING, SANTA BARBARA, CALIFORNIA
FOR

BUREAU OF STREET USE AND MAPPING DEPARTMENT OF PUBLIC WORKS,
CITY AND COUNTY OF SAN FRANCISCO, CALIFORNIA

MARCH, 2014



BUREAU OF STREET USE AND MAPPING
DEPARTMENT OF PUBLIC WORKS
1185 MARKET STREET, ROOM 323
SAN FRANCISCO, CA 94103

SHEET 9 OF 11

ASSESSOR'S BLOCK 9889, LOT 9889

ALL STREETS

**CITY AND COUNTY OF SAN FRANCISCO
HIGH PRECISION NETWORK SURVEY
MONUMENT DESCRIPTIONS**

POINT NUMBER	ALIAS	LOCATION	DESCRIPTION
101	IRENE	CORONA HEIGHTS	SET 3 1/4" DOMED BRASS DISK STAMPED "CCSF MONUMENTATION NETWORK CONTROL POINT, L.S. 8914". IN 2" x 18" STEEL PIPE SET IN CEMENT WITH REBAR STEM. ON NORTHERLY ROCK OUTCROPPING AT THE TOP OF CORONA HEIGHTS PARK. 5' WESTERLY OF 10' WIDE x 6' HIGH BOULDER @ NORTHERLY EXTENT OF OUTCROPPING.
102	MARIETTA	MARIETTA DRIVE	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 8914". IN ROCK WITH CEMENT AT THE TOP OF ROCK OUTCROPPING APPROX. 170' EASTERLY FROM #404 MARIETTA DRIVE.
103	MLO	LAND'S END VIEWPOINT	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 8914". IN WESTERLY CONCRETE WALKWAY OF LAND'S END VIEWPOINT PARKING LOT ON POINT LOBOS AVE. BETWEEN 4TH AND 5TH (1.5' x 7') CONCRETE BENCHES FROM SOUTH. 6' SOUTHERLY OF CENTERLINE OF 2ND HANDICAP RAMP (FROM SOUTH) IN SOUTHWESTERLY PORTION OF PARKING LOT DEDICATED TO HANDICAP PARKING ONLY. 4' EASTERLY OF WESTERLY EDGE OF WALKWAY AT BACK OF BENCHES.
104	FRANK	GREAT HIGHWAY @ ORTEGA	FOUND NATIONAL GEODETIC SURVEY 3 1/2" DOMED BRASS DISK MONUMENT HT1843, STAMPED "U.S. COAST & GEODETIC SURVEY BENCHMARK Q588" IN CONCRETE CURB OVER CATCH BASIN ON WEST SIDE OF LOWER GREAT HIGHWAY. 28' NORTH FROM CENTERLINE OF ORTEGA. 55' WEST OF FIRE HYDRANT.
105	BILL	FORT FUNSTON	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 8914". IN THE CENTER OF 1.2' x 2' CONCRETE SUPPORT BASE LOCATED 6' EASTERLY OF NORTHWESTERLY CORNER OF MOST EASTERN OF (3) 9'x18' CONCRETE BUILDING FOUNDATIONS IN THE CENTER OF FORT FUNSTON TRAIL HEAD PARKING LOT.
106	NORM	LINCOLN PARK (DALY CITY)	SET 2" DOMED BRASS DISK. IN NORTHERLY CONCRETE SIDEWALK SURROUNDING PLAYGROUND AREA OF LINCOLN PARK. 6.5' NORTHERLY OF CURB FACE. 15' EASTERLY OF EASTERNMOST EDGE OF CONCRETE "LINCOLN PARK" SIGN. 32' NORTHERLY OF THE EASTERLY END OF A PLAYGROUND STRUCTURE RESEMBLING THE BOW OF A BOAT.
107	CANDLESTICK	HARNEY WAY (BRISBANE)	FOUND NATIONAL GEODETIC SURVEY 2 1/2" DOMED ALUMINUM DISK MONUMENT AB7679, STAMPED "CALIF. DEPT. OF TRANSPORTATION 1894 STA 04 GF". ON TOP OF A RETAINING WALL @ EASTERLY (BAY) SIDE OF AN ASPHALT PATH WHICH RUNS PARALLEL (EASTERLY) OF HARNEY WAY. 138' NORTHERLY OF AN IRON ACCESS GATE LEADING TO THE ASPHALT PATH. 5' NORTHERLY OF WHERE THE CONCRETE AREA NORTH OF THE GATE ENDS AND THE ASPHALT PATH BEGINS.
108	KARMA	HERON'S HEAD PARK	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 8914". IN EASTERLY CONCRETE CURB OF JENNINGS ST. 8.3' SOUTHERLY OF NORTHERLY CURBLINE OF CARGO WAY (PROJECTED). 5' NORTHERLY OF NORTHERLY EXTENT OF CONCRETE SIGN TO HERON'S HEAD PARK.
109	BRS	CHINA BASIN PARK	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 8914". IN CONCRETE SIDEWALK AT EAST END OF CHINA BASIN PARK, APPROX 10' SOUTH OF NORTHERLY CURB LINE OF TERRY FRANCOIS BLVD (PROJECTED). 3' EASTERLY OF 1.5' HIGH CONCRETE WALL/BENCH DISPLAYING BASEBALL PLAQUES AND TILES.
110	LIBERTY	FISHERMAN'S WHARF	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 8914". IN CONCRETE SIDEWALK ON NORTHERLY SIDE OF THE EMBARCADERO, OPPOSITE #93 JEFFERSON ST "SF GIFT SHOP". +- 70' EASTERLY OF WESTERLY ANGLE POINT OF 4' HIGH CHAIN LINK FENCE WITH WOODEN RAILING, WHERE THE FENCE RUNS NORTHWESTERLY TOWARD THE NORTH SIDE OF THE "FRANCISCAN CRAB RESTAURANT". 3' EASTERLY OF THE EASTERLY EXTENT OF THE WESTERNMOST GROUP OF 10 BENCHES PARALLEL TO THE EMBARCADERO. 21.4' NORTHERLY OF THE NORTHERLY FACE OF CURB OF THE EMBARCADERO. 24' EASTERLY OF CENTER/CENTER CATCH BASIN.

POINT NUMBER	ALIAS	LOCATION	DESCRIPTION
111	TIDAL WEST	CRISSEY FIELD	FOUND NATIONAL GEODETIC SURVEY 3 1/2" BRASS DISK MONUMENT HT0701, STAMPED "U.S. COAST & GEODETIC SURVEY BENCHMARK 181 1895" ON TOP OF 2" THICK CONCRETE SEAWALL NORTH OF PARKING LOT TO GULF OF THE FARALLONES MARINE PRESERVATION CENTER. @ NORTHWESTERLY CORNER OF SEAWALL WHERE IT INTERSECTS WITH DRIVEWAY/ENTRANCE TO PARKING LOT.
112	YONAS	LOBOS VALLEY OVERLOOK	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 8914". IN LOBOS VALLEY OVERLOOK PARKING LOT IN THE PRESIDIO, SOUTHWESTERLY OF PRESIDIO LANDMARK BUILDING 1801. IN CENTER OF CONCRETE PAD AT WESTERLY MOST EXTENT OF PARKING LOT IN FRONT OF "LOBOS CREEK VALLEY" INFORMATION PLAQUE. 6' SOUTHEASTERLY OF 5' WEST CONCRETE WALK LEADING FROM PARKING LOT TO AC PATH AND TO LOBOS VALLEY OVERLOOK OBSERVATION POINT. 12' SOUTHEASTERLY OF "PRESIDIO TRAILS" MAPSIGN. NORTHWESTERLY OF PARKING SPACE #446. 28' SOUTHEASTERLY OF CENTERLINE ENTRANCE TO PARKING LOT FROM WEDEMEYER ST.
113	FRED	MUSIC CONCOURSE GOLDEN GATE PARK	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 8914". 78' SOUTHWESTERLY OF SOUTHWESTERLY EDGE OF STAIRS LEADING FROM MUSIC CONCOURSE TO DE YOUNG MUSEUM. SET AT SOUTHWESTERLY END OF 1.1' WIDE x 1.2' HIGH CONCRETE HEAD WALL AT SOUTHEASTERLY EDGE OF ASPHALT PATH ABOVE THE PEDESTRIAN ENTRANCE/EXIT TO MUSIC CONCOURSE UNDERGROUND PARKING GARAGE. 2' SOUTHWESTERLY FROM SOUTHWESTERLY END OF 3' HIGH METAL RAILING ON HEAD WALL. 13' NORTHEASTERLY OF EASTERLY ANGLE POINT OF FACE OF CURB AT NORTHEASTERLY EXTENT OF CONCRETE HANDICAP RAMP LEADING TO MUSIC CONCOURSE. OPPOSITE SOUTHWESTERLY END OF WOODEN BENCH DEDICATED TO "DORIAN CROCKER ADAMS".
114	SUNSET	SUNSET RESERVOIR	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 8914". IN SOUTHERLY CONCRETE SIDEWALK MIDBLOCK OF ORTEGA, BETWEEN 27TH AND 28TH AVENUES. ACROSS FROM CENTERLINE STAIRS TO ENTRANCE OF #2024 ORTEGA. 4.5' SOUTH OF FACE OF CURB. 67' EAST OF THE EAST FACE OF 2' WIDE x 4' LONG x 4' HIGH "AT&T" VAULT CABINET.

RECORD OF SURVEY #8080

OF THE SAN FRANCISCO HIGH PRECISION GNSS NETWORK SURVEY
CITY AND COUNTY OF SAN FRANCISCO,
STATE OF CALIFORNIA
PREPARED BY:
FJ AND ASSOCIATES, BENICIA, CALIFORNIA
AND
MCGEE SURVEYING CONSULTING, SANTA BARBARA, CALIFORNIA
FOR
BUREAU OF STREET USE AND MAPPING DEPARTMENT OF PUBLIC WORKS,
CITY AND COUNTY OF SAN FRANCISCO, CALIFORNIA

MARCH, 2014



BUREAU OF STREET USE AND MAPPING
DEPARTMENT OF PUBLIC WORKS
1125 MARKET STREET, ROOM 323
SAN FRANCISCO, CA. 94103

SHEET 10 OF 11

ASSESSOR'S BLOCK 8988, LOT 9988

ALL STREETS

**CITY AND COUNTY OF SAN FRANCISCO
HIGH PRECISION NETWORK SURVEY
MONUMENT DESCRIPTIONS**

POINT NUMBER	ALIAS	LOCATION	DESCRIPTION
115	TW	MERCED MANOR RESERVOIR	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 0014". IN CONCRETE LANDING OF EAST STAIRCASE LEADING TO TOP OF MERCED MANOR RESERVOIR. ON 22ND AVENUE MIDBLOCK, BETWEEN SLOAT BLVD. AND OCEAN AVE. IN THE CENTER OF THE UPPER MOST LANDING OF THE SOUTHERLY OF THE 2 SET OF STAIRS OPPOSITE #2004 22ND AVE. 5.4' EAST OF THE EAST EDGE OF THE RESERVOIR ROOF. 4.4' NORTH OF THE FACE OF THE TOP STEP AT THE SOUTH SIDE OF LANDING.
116	AK	CITY COLLEGE OF SAN FRANCISCO	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 0014". IN 12.5' x 18' CONCRETE DRAINAGE STRUCTURE AT WEST SIDE OF WESTERN MOST (LOWER) PARKING LOT OF SAN FRANCISCO CITY COLLEGE. SET IN THE MOST NORTHERLY OF 2 DRAINAGE STRUCTURES. APPROX. 320' SOUTH OF NORTHWESTERLY ENTRANCE TO PARKING LOT. AT CENTERLINE OF STRUCTURE, 3.5' SOUTHWESTERLY OF NORTHEASTERLY EDGE OF HEADWALL. MOST WESTERLY PARKING LOT, WESTERLY OF PHELAN BETWEEN JUDSON AND OCEAN AVE. SOUTHWESTERLY OF ARCH BISHOP RIORIAN HIGH SCHOOL.
117	MCLAREN	MCLAREN PARK VIEWPOINT	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 0014". IN THE EASTERLY SIDE OF A 1.5' THICK BY 2' HIGH CIRCULAR CONCRETE WALL PLANTER, SOUTHWEST OF THE VIEWPOINT PARKING LOT AT MANSELL ST AND VISITACION AVE IN MCLAREN PARK, APPROXIMATELY 140' SOUTH OF THE NORTHERLY ENTRANCE GATE ON MANSELL ST.
118	BERNAL	BERNAL HEIGHTS BLVD	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 0014". IN NORTHERLY CONCRETE SIDEWALK OF BERNAL HEIGHTS BLVD AT THE INTERSECTION OF CARVER STREET. AT THE PROJECTION OF EASTERLY CURB FACE OF CARVER STREET. 24.4' EASTERLY OF CENTERLINE OF HANDICAP RAMP. 2.75' NORTHERLY OF NORTHERLY CURB FACE OF BERNAL HEIGHTS BLVD.
119	MC GEE	CIVIC CENTER PLAZA	FOUND 1.5' x 1' BRASS PLAQUE DEDICATED TO "JOSEPH L. ALIOTO PERFORMING ARTS PLAZA". PUNCHED IN CENTER OF PLAQUE AND STAMPED "118". AT CENTERLINE OF FULTON ST. 43' WESTERLY OF WESTERLY CURB LINE OF LARKIN ST. 39' EASTERLY OF EASTERLY EXTENT OF LARGE RECTANGULAR OPEN DIRT AREA IN THE CENTER OF CIVIC CENTER PLAZA. 52' SOUTHWEST OF HIGH PRESSURE FIRE HYDRANT. 34' EASTERLY OF "CISTERN SFFD" MANHOLE.
120	HEC358	ALTA PLAZA PARK	SET 2" DOMED BRASS DISK STAMPED "CCSF SURVEY MONUMENT L.S. 0014". IN CENTER OF 0.6' TALL BY 2.5' WIDE CONCRETE COLUMN AT THE TOP OF THE HIGHEST SET OF STAIRS FROM PIERCE STREET AND CLAY STREET OF ALTA PLAZA PARK AT WEST SIDE OF STAIRS. 24' +/- SOUTHEASTERLY CORNER OF WROUGHT IRON FENCE OF CHILDREN PLAY AREA.

POINT NUMBER	ALIAS	LOCATION	DESCRIPTION
201	TIDAL EAST	CRISSY FIELD	FOUND NATIONAL GEODETIC SURVEY 3 1/2" DOMED BRASS DISK MONUMENT AES208, STAMPED "NATIONAL OCEAN SERVICE BENCH MARK 4290 N 1995". ON TOP OF A CONCRETE SEAWALL ON NORTHERLY SIDE OF PARKING AREA FOR THE GULF OF FARALLONS NATIONAL MARINE SANCTUARY HEADQUARTERS. 10.5' WESTERLY OF THE CENTERLINE OF CONCRETE RAMP LEADING TO WOODEN PIER.
202	SLOAT	SLOAT @ SKYLINE	FOUND NATIONAL GEODETIC SURVEY 2 1/2" DOMED ALUMINUM DISK MONUMENT A87877, STAMPED "CALIF. DEPT. OF TRANSPORTATION 1994 STA 04 GE". IN HANDWELL IN CENTER ISLAND OF SKYLINE BLVD @ SOUTHERLY EXTENT OF SLOAT. 7.3' WEST OF WEST FACE OF CURB OF NORTH BOUND SKYLINE BLVD. 72.5' SOUTH OF STREET LIGHT ON NORTH END OF ISLAND.
203	ARMY	CESAR CHAVEZ MAINTENANCE YARD	FOUND 2 1/2" DOMED BRASS DISK STAMPED "DPW, B - 0001". IN 3.5' X 5' CONCRETE STRUCTURE ALONG CURBLINE AND BETWEEN CONCRETE K-RAIL BARRIERS WHICH RUN ALONG EAST SIDE OF ACCESS ROAD INSIDE EASTERLY SECTION OF SF DPW MAINTENANCE YARD. 91' NORTHWEST OF CENTERLINE OF THE SOUTHERLY VEHICLE ENTRANCE GATE ACCESSIBLE FROM NAPOLEON ST.

RECORD OF SURVEY #8080

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FOR
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CITY AND COUNTY OF SAN FRANCISCO, CALIFORNIA

MARCH, 2014



BUREAU OF STREET USE AND MAPPING
DEPARTMENT OF PUBLIC WORKS
1188 MARKET STREET, ROOM 323
SAN FRANCISCO, CA. 94103

SHEET 11 OF 11

ASSESSOR'S BLOCK 9899, LOT 9899

ALL STREETS