OPUS 61D DEDHAM PRECISEtxt.txt

From: opus <opus@ngs.noaa.gov>
Sent: Friday, August 1, 2025 12:13 PM
To: Patrick Rockwell
Subject: OPUS solution : 61D_DEDHAM_6216_0630_075104.m00 OP1754064663894

CAUTION: *** This email comes from a sender outside NorfolkCounty.org / NorfolkDeeds.org. *** Please
inspect this message before clicking links, opening attachments, or responding. Contact I.T. if you need
help or have questions/concerns.

FILE: 61D_DEDHAM_6216_0630_075104.m00 OP1754064663894

NGS OPUS SOLUTION REPORT
========================

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: https://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: prockwell@norfolkcounty.org DATE: August 01, 2025
RINEX FILE: 61d_181m.25o TIME: 16:12:05 UTC

SOFTWARE: page5 2008.25 master295.pl 160321 START: 2025/06/30 12:11:00
EPHEMERIS: igs23731.eph [precise] STOP: 2025/06/30 17:27:00
NAV FILE: brdc1810.25n OBS USED: 9950 / 12281 : 81%
ANT NAME: LEIGS12 NONE # FIXED AMB: 102 / 112 : 91%
ARP HEIGHT: 2.000 OVERALL RMS: 0.020(m)

REF FRAME:	NAD_83(2011)(EPOCH:2010.0000)		ITRF2020 (EPOCH:2025.4948)	
X:	1525669.208(m)	0.022(m)	1525668.192(m)	0.022(m)
Y:	-4475549.948(m)	0.012(m)	-4475548.531(m)	0.012(m)
Z:	4266126.339(m)	0.012(m)	4266126.360(m)	0.012(m)
LAT:	42 14 56.62342	0.016(m)	42 14 56.66028	0.016(m)
E LON:	288 49 25.38638	0.022(m)	288 49 25.36439	0.022(m)
W LON:	71 10 34.61362	0.022(m)	71 10 34.63561	0.022(m)
EL HGT:	5.788(m)	0.004(m)	4.566(m)	0.004(m)
ORTHO HGT:	33.978(m)	0.054(m)	[NAVD88 (Computed using GEOID18)]	

	UTM COORDINATES (UTM (Zone 19))	STATE PLANE COORDINATES (SPC (2001 MA M))
Northing (Y) [meters]	4679722.976	888783.785
Easting (X) [meters]	320465.854	226714.477
Convergence [degrees]	-1.46362222	0.21745000

OPUS 61D DEDHAM PRECISEtxt.txt

Point Scale	0.99999661	0.99996491
Combined Factor	0.99999570	0.99996400

US NATIONAL GRID DESIGNATOR: 19TCG2046579722(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DP2492	MAMI MILTON CORS ARP	N421619.386	W0710255.250	10833.9
AF9520	WES2 WESTFORD CORS ARP	N423647.974	W0712935.967	48144.8
DR6404	MAWR MAWR WRENTHAM CORS GRP	N420230.133	W0711815.039	25343.1

NEAREST NGS PUBLISHED CONTROL POINT

MY3591	DEDHAM CRTHSE FLAGPOLE	N421455.299	W0711034.136	42.3

BASE STATION INFORMATION

STATION NAME: mami a 3 (MILTON; Milton, Massachusetts USA)
MONUMENT: NO DOMES NUMBER

XYZ	1535068.4659	-4470499.1407	4268000.6381	MON @ 2020.0000 (M)
XYZ	-0.0156	-0.0010	0.0043	VEL (M/YR)
NEU	0.0000	0.0000	0.0000	MON TO ARP (M)
NEU	0.0005	0.0001	0.1249	ARP TO L1 PHASE CENTER (M)
NEU	0.0001	-0.0002	0.1335	ARP TO L2 PHASE CENTER (M)
XYZ	-0.0860	-0.0053	0.0239	VEL TIMES 5.4967 YRS
XYZ	0.0000	0.0000	0.0000	MON TO ARP
XYZ	0.0300	-0.0870	0.0844	ARP TO L1 PHASE CENTER
XYZ	1535068.4100	-4470499.2330	4268000.7464	L1 PHS CEN @ 2025.4948
XYZ	0.0000	-0.0000	-0.0000	+ XYZ ADJUSTMENTS
XYZ	1535068.4100	-4470499.2330	4268000.7464	NEW L1 PHS CEN @ 2025.4948
XYZ	1535068.3800	-4470499.1460	4268000.6620	NEW ARP @ 2025.4948
XYZ	1535068.3800	-4470499.1460	4268000.6620	NEW MON @ 2025.4948
LLH	42 16 19.42329	288 57 4.72796	-18.5724	NEW L1 PHS CEN @ 2025.4948
LLH	42 16 19.42328	288 57 4.72796	-18.6973	NEW ARP @ 2025.4948
LLH	42 16 19.42328	288 57 4.72796	-18.6973	NEW MON @ 2025.4948

STATION NAME: wes2 a 6 (WESTFORD, UNITED STATE)
MONUMENT: 40440S020

XYZ	1492233.0199	-4458089.4896	4296046.0825	MON @ 2020.0000 (M)
XYZ	-0.0157	-0.0008	0.0041	VEL (M/YR)
NEU	0.0000	0.0000	0.0000	MON TO ARP (M)
NEU	0.0008	0.0012	0.1264	ARP TO L1 PHASE CENTER (M)
NEU	-0.0001	0.0002	0.1380	ARP TO L2 PHASE CENTER (M)
XYZ	-0.0862	-0.0041	0.0226	VEL TIMES 5.4967 YRS
XYZ	0.0000	0.0000	0.0000	MON TO ARP

```
XYZ         0.0305        -0.0873         0.0862  ARP TO L1 PHASE CENTER
XYZ   1492232.9641  -4458089.5810   4296046.1914  L1 PHS CEN @ 2025.4948
XYZ        -0.0000        -0.0000        -0.0000  + XYZ ADJUSTMENTS
XYZ   1492232.9641  -4458089.5810   4296046.1914  NEW L1 PHS CEN @ 2025.4948
XYZ   1492232.9336  -4458089.4937   4296046.1052  NEW ARP @ 2025.4948
XYZ   1492232.9336  -4458089.4937   4296046.1052  NEW MON @ 2025.4948
LLH  42 36 48.01208  288 30 24.00993     85.1174  NEW L1 PHS CEN @ 2025.4948
LLH  42 36 48.01206  288 30 24.00988     84.9910  NEW ARP @ 2025.4948
LLH  42 36 48.01206  288 30 24.00988     84.9910  NEW MON @ 2025.4948

STATION NAME: mawr  a    2 (MAWR WRENTHAM; Wrentham, Massachusetts  United Sta
 MONUMENT: NO DOMES NUMBER
XYZ   1520635.5311  -4493604.3477   4249069.6439  MON @ 2020.0000 (M)
XYZ        -0.0158        -0.0037         0.0066  VEL (M/YR)
NEU        -0.0000         0.0000         0.0350  MON TO ARP (M)
NEU         0.0005         0.0001         0.1249  ARP TO L1 PHASE CENTER (M)
NEU         0.0001        -0.0002         0.1335  ARP TO L2 PHASE CENTER (M)
XYZ        -0.0870        -0.0203         0.0361  VEL TIMES 5.4967 YRS
XYZ         0.0083        -0.0246         0.0234  MON TO ARP
XYZ         0.0297        -0.0875         0.0840  ARP TO L1 PHASE CENTER
XYZ   1520635.4821  -4493604.4801   4249069.7874  L1 PHS CEN @ 2025.4948
XYZ         0.0000         0.0000         0.0000  + XYZ ADJUSTMENTS
XYZ   1520635.4821  -4493604.4801   4249069.7874  NEW L1 PHS CEN @ 2025.4948
XYZ   1520635.4524  -4493604.3926   4249069.7034  NEW ARP @ 2025.4948
XYZ   1520635.4440  -4493604.3680   4249069.6800  NEW MON @ 2025.4948
LLH  42  2 30.17061  288 41 44.93801     35.6025  NEW L1 PHS CEN @ 2025.4948
LLH  42  2 30.17059  288 41 44.93801     35.4776  NEW ARP @ 2025.4948
LLH  42  2 30.17059  288 41 44.93801     35.4426  NEW MON @ 2025.4948

                        REMOTE STATION INFORMATION

STATION NAME: 61d_       1
 MONUMENT: NO DOMES NUMBER
XYZ   1525668.2204  -4475549.0113   4266127.2684  MON @ 2025.4945 (M)
NEU         0.0013        -0.0013         2.0000  MON TO ARP (M)
NEU        -0.0013         0.0013         0.0872  ARP TO L1 PHASE CENTER (M)
NEU         0.0002        -0.0012         0.0847  ARP TO L2 PHASE CENTER (M)
XYZ         0.4762        -1.4009         1.3457  MON TO ARP
XYZ         0.0223        -0.0615         0.0577  ARP TO L1 PHASE CENTER
XYZ   1525668.7189  -4475550.4737   4266128.6717  L1 PHS CEN @ 2025.4948

BASELINE NAME:   mami  61d_
XYZ        -0.0271         0.4739        -0.9135  + XYZ ADJUSTMENTS
XYZ   1525668.6918  -4475549.9998   4266127.7583  NEW L1 PHS CEN @ 2025.4948
XYZ   1525668.6695  -4475549.9383   4266127.7006  NEW ARP @ 2025.4948
XYZ   1525668.1933  -4475548.5374   4266126.3549  NEW MON @ 2025.4948
LLH  42 14 56.66001  288 49 25.36436      6.6549  NEW L1 PHS CEN @ 2025.4948
LLH  42 14 56.66006  288 49 25.36430      6.5678  NEW ARP @ 2025.4948
```

OPUS 61D DEDHAM PRECISEtxt.txt

```
 LLH  42 14 56.66001  288 49 25.36436      4.5677  NEW MON @ 2025.4948

 BASELINE NAME:   wes2  61d_
 XYZ        -0.0179         0.4857        -0.9102  + XYZ ADJUSTMENTS
 XYZ   1525668.7010  -4475549.9879   4266127.7615  NEW L1 PHS CEN @ 2025.4948
 XYZ   1525668.6786  -4475549.9264   4266127.7038  NEW ARP @ 2025.4948
 XYZ   1525668.2025  -4475548.5256   4266126.3582  NEW MON @ 2025.4948
 LLH  42 14 56.66027  288 49 25.36490      6.6510  NEW L1 PHS CEN @ 2025.4948
 LLH  42 14 56.66031  288 49 25.36485      6.5638  NEW ARP @ 2025.4948
 LLH  42 14 56.66027  288 49 25.36490      4.5638  NEW MON @ 2025.4948

 BASELINE NAME:   mawr  61d_
 XYZ        -0.0404         0.4813        -0.9019  + XYZ ADJUSTMENTS
 XYZ   1525668.6786  -4475549.9924   4266127.7699  NEW L1 PHS CEN @ 2025.4948
 XYZ   1525668.6562  -4475549.9309   4266127.7122  NEW ARP @ 2025.4948
 XYZ   1525668.1800  -4475548.5300   4266126.3665  NEW MON @ 2025.4948
 LLH  42 14 56.66054  288 49 25.36392      6.6543  NEW L1 PHS CEN @ 2025.4948
 LLH  42 14 56.66058  288 49 25.36386      6.5672  NEW ARP @ 2025.4948
 LLH  42 14 56.66054  288 49 25.36392      4.5671  NEW MON @ 2025.4948
```

G-FILES

```
Axx2025 630  25 630
B2025 6301210  25 6301726 1 page5 v2008.25IGS     142 1 2 27NGS   2025 8 1IFDDPF
IITRF2020_2370          IGS   20250608
C00090004   94001866   17   50493914   45   18743070   38 X1815A61D_X1815AMAMI
D  1  2 -4925292  1  3  5089710  2  3 -9657639

Axx2025 630  25 630
B2025 6301210  25 6301726 1 page5 v2008.25IGS     142 1 2 27NGS   2025 8 1IFDDPF
IITRF2020_2370          IGS   20250608
C00090001 -334352688   16  174590318   41  299197470   40 X1815A61D_X1815AWES2
D  1  2 -8442886  1  3  6158220  2  3 -8935920

Axx2025 630  25 630
B2025 6301210  25 6301726 1 page5 v2008.25IGS     142 1 2 27NGS   2025 8 1IFDDPF
IITRF2020_2370          IGS   20250608
C00090002  -50327360   15 -180558380   44 -170566865   36 X1815A61D_X1815AMAWR
D  1  2 -8491913  1  3  8793381  2  3 -8235899
```

POST-FIT RMS BY SATELLITE VS. BASELINE

```
            OVERALL     01     03     04     05     06     09     11     12
 mami-61d_|  0.021    ...  0.013    ...  0.024  0.018  0.026  0.024  0.019
               13     14     15     17     18     19     20     21     22
 mami-61d_|  0.037  0.018    ...  0.024    ...  0.019  0.019  0.019  0.002
               24     25     29     30
 mami-61d_|    ...  0.025  0.024    ...
```

OPUS 61D DEDHAM PRECISEtxt.txt

	OVERALL	01	03	04	05	06	09	11	12
wes2-61d_|	0.020	...	0.009	...	0.025	...	0.027	0.017	0.021
	13	14	15	17	18	19	20	21	22
wes2-61d_|	0.027	0.019	...	0.018	...	0.015	0.021	0.020	0.017
	24	25	29						
wes2-61d_|	0.023	0.021	0.025						

	OVERALL	01	03	04	05	06	09	11	12
mawr-61d_|	0.020	...	0.011	...	0.019	0.017	0.026	0.022	0.019
	13	14	15	17	18	19	20	21	22
mawr-61d_|	0.033	0.017	...	0.024	...	0.018	0.018	0.017	0.025
	24	25	29	30					
mawr-61d_|	0.019	0.030	0.028	...					

OBS BY SATELLITE VS. BASELINE

	OVERALL	01	03	04	05	06	09	11	12
mami-61d_|	3355	...	23	...	284	464	57	151	372
	13	14	15	17	18	19	20	21	22
mami-61d_|	66	46	...	225	...	407	405	387	1
	24	25	29	30					
mami-61d_|	...	263	204	...					
	OVERALL	01	03	04	05	06	09	11	12
wes2-61d_|	3243	...	23	...	278	...	33	471	398
	13	14	15	17	18	19	20	21	22
wes2-61d_|	66	65	...	239	...	377	367	369	159
	24	25	29						
wes2-61d_|	3	231	164						
	OVERALL	01	03	04	05	06	09	11	12
mawr-61d_|	3352	...	23	...	261	468	36	156	395
	13	14	15	17	18	19	20	21	22
mawr-61d_|	64	48	...	230	...	410	389	373	1
	24	25	29	30					
mawr-61d_|	3	271	224	...					

ITRF position of 61d_ as determined by individual baselines

	X	Y	Z
mami	1525668.193	-4475548.537	4266126.355
wes2	1525668.202	-4475548.526	4266126.358
mawr	1525668.180	-4475548.530	4266126.366

Residuals of position determined by individual baselines from the final position

	X	Y	Z	East	North	Up
mami	0.001	-0.006	-0.005	-0.001	-0.008	0.001

wes2 0.011 0.005 -0.002 0.012 -0.000 -0.002
mawr -0.012 0.001 0.007 -0.011 0.008 0.001

Covariance Matrix for the xyz OPUS Position (meters^2).

0.0000016378	-0.0000003884	0.0000002917
-0.0000003884	0.0000121467	-0.0000009255
0.0000002917	-0.0000009255	0.0000094778

Covariance Matrix for the enu OPUS Position (meters^2).

0.0000024946	0.0000019271	-0.0000021697
0.0000019271	0.0000093259	-0.0000008018
-0.0000021697	-0.0000008018	0.0000114417

Horizontal network accuracy = 0.00633 meters.
Vertical network accuracy = 0.00663 meters.

Derivation of NAD 83 vector components

Position of reference station ARP in NAD_83(2011)(EPOCH:2010.0000).

	Xa(m)	Ya(m)	Za(m)	
MAMI	1535069.39746	-4470500.56733	4268000.63083	2010.00
WES2	1492233.95314	-4458090.91205	4296046.07561	2010.00
MAWR	1520636.46343	-4493605.74936	4249069.61727	2010.00

Position of reference station monument in NAD_83(2011)(EPOCH:2010.0000).

	Xr(m)	Yr(m)	Zr(m)	
MAMI	1535069.39746	-4470500.56733	4268000.63083	2010.00
WES2	1492233.95314	-4458090.91205	4296046.07561	2010.00
MAWR	1520636.45513	-4493605.72476	4249069.59387	2010.00

Velocity of reference station monument in NAD_83(2011)(EPOCH:2010.0000).

	Vx (m/yr)	Vy (m/yr)	Vz (m/yr)
MAMI	0.00186	0.00028	-0.00124
WES2	0.00187	0.00048	-0.00129
MAWR	0.00160	-0.00242	0.00112

Vectors from unknown station monument to reference station monument in NAD_83(2011)(EPOCH:2010.0000).

	Xr-X= DX(m)	Yr-Y= DY(m)	Zr-Z= DZ(m)	
MAMI	9400.18946	5049.38067	1874.29183	2010.00
WES2	-33435.25486	17459.03595	29919.73661	2010.00
MAWR	-5032.75287	-18055.77676	-17056.74513	2010.00

STATE PLANE COORDINATES - U.S. Survey Foot

OPUS 61D DEDHAM PRECISEtxt.txt

SPC (2001 MA M)

Northing (Y)	[feet]	2915951.468
Easting (X)	[feet]	743812.413
Convergence	[degrees]	0.21745000
Point Scale		0.99996491
Combined Factor		0.99996400

********** New Reference Frame Preview **********

We are replacing the nation s NAD 83 and NAVD 88 datums, to improve access and accuracy of the
National Spatial Reference System. More at
https://geodesy.noaa.gov/datums/newdatums/

Below are approximate coordinates for this solution in the new frames:

APPROX ORTHO HGT: 33.635 (m) [PROTOTYPE (Computed using xGeoid19B,GRS80,ITRF2020)]

This position and the above vector components were computed without any knowledge by the National
Geodetic Survey regarding the equipment or field operating procedures used.