

CREATING A PROJECT IN STATE PLANE COORDINATES AND GROUND MODIFIED COORDINATES

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- I. Introduction.
- II. Terminology used in this seminar.
 - a. One page describing language used in this seminar.
- III. Web sites with information direct and indirectly pertaining to recovering monumentation for your project control.
 - a. Web sites available to recover Geodetic Monuments.
 - b. Web sites that help to find monuments with state plane coordinates values.
 - c. Contacts to find the latest data information.
 - d. Understanding and matching the monument value control.
 - e. Obtaining the information on how the Geodetic control was established.
- IV. Establishing project control through conventional methods.
 - a. Different procedures in traversing in state plane coordinates with conventional instruments
 - b. Reducing ground distances to grid distances.
 - c. Programs and worksheets available to perform these reductions.
- V. Establishing project control through GPS methods.
 - a. Utilizing RTK, Static and OPUS in establish project control in State Plane Coordinates system.
- VI. NJDOT, PADOT and NYDOT Survey Manual procedure in converting State Plane Coordinates to ground modified coordinates.
 - a. Where the manual is available.
 - b. Brief description of what is in the manual.
 - c. Section 2.2 showing the NJDOT procedure in converting state plane coordinates to modified ground coordinates.
- VII. Writing a survey report documenting your procedures used.
 - a. Sample of NJDOT survey reports.
 - b. Samples of brief reports with that highlights your procedure.
 - c. Samples of a thru report.

WEB Site LINKS and Information

PADOT

Forms and Publication

PUB 122 Survey Manual

<http://www.dot.state.pa.us/Internet/Bureaus/pdBOS.nsf/FormsAndPubsHomePage?OpenFrameSet>

NJDOT

Engineering

Survey Manual

<http://www.state.nj.us/transportation/eng/documents/survey/>

NYDOT

Office of Design

Survey Standards & Procedures Manual

<https://www.nysdot.gov/portal/page/portal/divisions/engineering/design/documents-and-forms>

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NJDOT

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Survey Manual

<http://www.state.nj.us/transportation/eng/documents/survey/>

New Jersey DOT Survey Manual

Table of Contents	I
<hr/>	
PREFACE	III
Purpose.....	III
Content and Format.....	III
Preparation	IV
Revisions.....	IV
Acknowledgment	V
Survey Reference Documents.....	VI
<hr/>	
Chapter 1 INTRODUCTION	1-1
1.1 Purposes of Manual.....	1-2
1.2 Importance of Surveys	1-2
1.3 Definition of Surveying	1-3
1.4 Organization.....	1-5
1.5 Public Relations	1-7
1.6 Safety	1-14
1.7 Communications	1-15
<hr/>	
Chapter 2 CONTROL SURVEYS AND STATE PLANE COORDINATE SYSTEMS	2-1

7.4	The Photogrammetric Procedure	7-12
7.5	Orthophoto	7-16

APPENDICES

A	New Jersey Statutory and Administrative Laws on Surveying	A-1
B	NJDOT Feature Code List for Electronic Data Collection	B-1
C	Miscellaneous Check Lists	C-1
D	Metrification Issues.....	D-1
E	Surveying and Transportation INTERNET Resources.....	E-1
F	Surveying Terms and Glossary.....	F-1

NYDOT

**Office of Design
Survey Standards & Procedures Manual**

<https://www.nysdot.gov/portal/page/portal/divisions/engineering/design/documents-and-forms>

Publication about ground to grid

<http://libraries.maine.edu/Spatial/gisweb/spatdb/acsm/ac94125.html>

http://www.geonavsystems.com/geonav_support_groundcoordinates.pdf

http://www.ngs.noaa.gov/PUBS_LIB/FundSPCSys.pdf
to ground to grid coordinates and conversions

Page 27 refers

http://www.ngs.noaa.gov/PUBS_LIB/ManualNOSNGS5.pdf

<http://www.patentstorm.us/patents/6735348-claims.html>

<http://cobweb.ecn.purdue.edu/~bethel/regis.pdf>

<http://libraries.maine.edu/Spatial/gisweb/spatdb/acsm/ac94019.html>

Examples and brief descriptions of state plane coordinates

http://welcome.warnercnr.colostate.edu/class_info/nr502/lg3/datums_coordinates/spcs.html

<http://surveying.wb.psu.edu/psu-surv/Projects/PASingleZone.pdf>

<http://www.metrokc.gov/gis/kb/Content/StatePlane.htm>

<http://osdir.com/ml/gis.proj-4.devel/2005-12/msg00045.html>

http://axiomint.com/microstation_tips/foot-controversy-and-stateplane.htm

GEOCASHING

<http://www.geocaching.com/>

<http://www.geocaching.com/mark/nearest.aspx?zip=19007>

[Home](#) > [Benchmarking](#) > Find a Benchmark you are not logged in. [\[log in\]](#)



Listing local benchmarks

Searching Benchmarks

By Postal Code: 19007 [[new search](#)]

Download all results to *.loc

GETTING STARTED

HIDE & SEEK A C/ Total Records:

728 - Prev. << <[[1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#)]> >> [Next](#)

FIND A BENCHMARK of **30**

TRACKABLE ITEM

Icon	PID	Dist	Designation	State	Type	Found	Last / Location
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MY ACCOUNT

FORUMS

	KV5617	0.7mi S	BRISTOL WATER WORKS SW TANK	PA	elevated tank		<input type="checkbox"/>
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RESOURCES


CONTACT US

	KV5594	0.7mi SE	BRISTOL GRUNDY MILLS CLOCK TOWER	PA	tower	8/1/2005	<input type="checkbox"/>
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	KV5596	0.8mi SE	BRISTOL WARNER J STEEL CO TANK	PA	elevated tank		<input type="checkbox"/>
	KV5605	0.8mi SE	BRISTOL T L	PA	tank		<input type="checkbox"/>

LEEDOM
CO TANK

	KV55 90	0.9mi E	BRIST	PA	triangul ation station disk			Γ
	KV56 07	1mi S	BRISTOL MUNICIP AL TANK	PA	elevated tank			Γ
	KV56 13	1.1mi SE	BRISTOL ST JAMES PRESB SPIRE	PA	church spire	8/1/2 005		Γ
	KV57 22	1.1mi W	ROGERS	PA	triangul ation station disk			Γ
	KV56 06	1.1mi S	BRISTOL ME CHURCH SPIRE	PA	church spire			Γ
	KV56 43	1.1mi E	BRISTOL WATER WORKS SE TANK	PA	elevated tank			Γ
	KV55 91	1.2mi SE	BRISTOL ST MARKS CATH CH SPIRE	PA	church spire	8/1/2 005		Γ
	KV55 89	1.2mi SE	BRISTOL ANDERS ONS HOUSE CUPOLA	PA	cupola	8/1/2 005		Γ
	KV55 92	1.2mi SE	BRISTOL 2	PA	triangul ation			Γ

Section V Establishing project control through GPS methods.

Chapter 4 in NJDOT Survey Manual

RTK methods in establishing project control.

RTK stands for REAL TIME KINEMATICS. Equipment needed to utilize this method is a base station and rover or multiple base stations and rovers. A base station consists of the following antenna, receiver, radio and power source. The antenna is connected to the radio, which transmits a signal on a certain frequency. The information transmitted is location. The receiver collects the satellite information and some have the ability to store that data collected. These stored data once converted to a suitable file type can be set to OPUS for an accurate location in Latitude and Longitude, State Plane Coordinates in metric and English values. OPUS will also provide a combine scale factor. There what is called a rover. The rover consists of a radio receiver and antenna and satellite receiver. The rover receives the transmitted location from the base station and collects data from the satellites to fix an accurate location.

So what I am referring to as project primary control I would collect data for 3 minutes at 5 second intervals which relates to 36 epochs. One epoch being the amount of data collected 3×60 second equals 180/5 equals 36 blocks of data, collected what I am going to call a session of data. Another session of data needs to be collected at approximately 4 hour in time from the prior session. Then averaging the data collected from these two sessions gives a precise location and elevation in relationship to the base station. Secondary control using RTK method could occupy a control point for 30 seconds to 90 seconds and at least twice with a four hour window of time between sessions. The more sessions the better the precision.

Static GPS method utilizes the same equipment as RTK above but without the radio link. This procedure with static GPS collection of data for occupying primary control points is using more receiver that are collecting data from the same satellites simultaneously. These sessions I found forty minutes a standard. Some like less and some like more. The same idea of spacing the sessions out four hour apart for a different satellite constellation.

Utilizing RTK, Static and OPUS in establish project control in State Plane Coordinates system.

Section VI NJDOT, PADOT and NYDOT Survey Manual procedure in converting State Plane Coordinates to ground modified coordinates.

2.2 NJDOT provides in chapter 2.2 formulas to convert “From Topography (Surface) to State Plane The reduction from ground to state plane is a simple two-stage process. Reduction from ground to ellipsoid is called the elevation factor and reduction from the ellipsoid to state plane grid is called the scale factor. The scale factor in New Jersey is set to 0.9999 at the central meridian and it increases as a function of easterly or westerly distance from the central meridian . The maximum scale factor value being 1.0001.

2.2.2.1 Reduction I (grid) scale factor K_{ab} for a line from point A to point B.

$$K = 0.9999 + (E - 150000)^2 \times (1.23 \times 10^{-14})$$

2.2.2.2 Reduction II Elevation factor Reducing Measured Distanced Horizontal distance to Grid distance.

$$S = d * (R \sqrt{R + H + N}) * K_{ab}$$

2.2.2.3 State Plane to Surface Coordinates

$$D = S * (R + H + N) \text{ Where the manual is available.}$$

Brief description of what is in the manual.

Section 2.2 showing the NJDOT procedure in converting state plane coordinates to modified ground coordinates.