

# NEW YORK, NEW JERSEY, AND PENNSYLVANIA.<sup>1</sup>

## TRIANGULATION STATIONS.

### Milford and White Lake quadrangles.

SULLIVAN COUNTY, N. Y.; SUSSEX COUNTY, N. J.; PIKE AND WAYNE COUNTIES, PA.

Triangulation control for above-named quadrangles was obtained in 1913 by George T. Hawkins. Positions are based upon Coast and Geodetic Survey stations Culvers Gap and High Point, N. J., North American datum.

### CULVERS GAP, SUSSEX COUNTY, N. J.

A station of the United States Coast and Geodetic Survey on southwest side of Culvers Gap on ridge of Blue Mountains about 200 paces from its abrupt end at gap and 170 paces southwest from spot where recently stood tower, the location of which is well known in that region. The land is owned by estate of Capt. Robt. J. Holman, who lived at New Brunswick, N. J. Culvers Gap is about 3.5 miles from Branchville, on road to Milford, Pa. Branchville is nearest railroad station and can be reached by Sussex Railroad, a branch of the Delaware, Lackawanna & Western Railroad. To reach station proceed from "Mounted House" (a hotel just northwest of gap) toward Branchville, 0.25 mile to wood road near culvert, lead-off to right, and following this wood road around end and up side of mountain to "old tower" and thence along ridge of mountain to station.

Station mark: Copper bolt  $\frac{3}{4}$  inch in diameter driven into rock even with its surface. Just west of bolt about 4 inches is an offset in ledge which rises 6 or 8 inches, upon which there is a cross cut.

Reference marks: Cross mark on ledge south 6 feet 4 inches; loose boulder with cross mark northeast 16 feet 3 inches.

NOTE.—John Stepenfield, who lives on the east side of the mountain and found the bolt for Edwin Smith in 1908, and William V. Sutton, who lives at the Mountain House, and was lamp tender for Mr. Smith, know where the station is.

[Latitude  $41^{\circ} 10' 21.060''$ . Longitude  $74^{\circ} 47' 41.862''$ .]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Hamburg.....	276 51 31.19	97 01 57.87	4.3495179	.....
Mount Olive.....	348 41 03.72	168 44 13.74	4.5385140	.....
Montana.....	26 19 47.42	206 09 21.34	4.7032565	.....
Hilliard.....	143 45 29.53	323 39 57.14	4.2974507	12.325
Greening.....	150 10 44.20	330 04 44.78	4.4059640	15.824
Buck.....	172 28 44.24	352 27 12.72	4.3914970	15.305

<sup>1</sup> Additional data for New York are given on pages 479-492; for Pennsylvania on pages 493-496.

## HIGH POINT, SUSSEX COUNTY, N. J.

A station of the United States Coast and Geodetic Survey on prominent projection of Blue Ridge, highest point in State, 4 miles south of Port Jervis, 3.5 miles northwest of Coleville, 1 mile north of (New Jersey) turnpike leading from Coleville to Port Jervis, on land owned by Mrs. C. S. Rutherford. To reach station leave above-mentioned turnpike on crest of mountain and follow well-conditioned road to "Little Pond" or Mascia Lake and thence along an indifferent road by shore of Pond to foot of High Point, and up hill by path to station.

Station mark: Copper bolt in ledge to within  $\frac{1}{2}$  inch of its end.

Reference marks: Cross on large boulder 5 feet  $10\frac{1}{2}$  inches northeast; north 8 feet to cross mark cut in flat ledge; north 21 feet to south corner of tower.

NOTE.—James E. Fuller and Sheridan Bross, both living on mountain along turnpike, know where station is. Station was recovered in 1908; no reference marks were found, but bolt was in place and there is no doubt of recovery of station. The boulder mentioned is there and not likely to be removed, but cross has been chipped off.

[Latitude  $41^{\circ} 19' 15.225''$ . Longitude  $74^{\circ} 39' 42.833''$ .]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Bear Fort.....	311 25 20.30	131 36 00.59	4.4802153	.....
Hamburgh.....	330 05 10.77	150 10 22.60	4.3448148	.....
Culvers Gap.....	34 08 12.03	214 02 56.17	4.2988189	.....
Hilliard.....	88 51 47.63	268 40 58.47	4.3593266	14.213
Greening.....	103 20 29.54	283 09 13.10	4.3883974	15.197
Buckhorn.....	118 59 47.97	298 52 59.76	4.2151097	10.197
McKinzie.....	144 20 15.12	324 14 21.48	4.3280216	13.224
Liberty.....	170 09 44	350 05 13	4.72032	32.634

## LIBERTY, SULLIVAN COUNTY, N. Y. (Not occupied.)

The main tower of hotel on Walnut Hill near the town of Liberty.

[Latitude  $41^{\circ} 47' 10.55''$ . Longitude  $74^{\circ} 46' 11.64''$ .]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
McKenzie.....	5 37 00	185 35 43	4.53880	21.486
Weber.....	34 07 50	213 59 59	4.46610	18.174
Vine.....	56 38 54	236 22 51	4.60857	25.230
High Point.....	350 05 13	170 09 44	4.72032	32.634

## McKENZIE, SULLIVAN COUNTY, N. Y.

South chimney on Mr. Ed. McKenzie's house, which is on high wooded knoll about 4 miles nearly north from Pondeddy and 12 miles northwest from Port Jervis. A good view in all directions.

Signal and station mark: Center of south chimney.

[Latitude  $41^{\circ} 28' 35.37''$ . Longitude  $74^{\circ} 48' 37.60''$ .]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Buckhorn.....	11 40 13.86	191 39 18.91	3.9794034	5.926
Bald.....	53 45 40.57	233 40 29.67	4.1312400	8.406
Vine.....	111 35 57.37	291 21 23.59	4.5163034	20.401
Weber.....	128 04 05	307 57 52	4.21852	10.277
Liberty.....	185 35 43	5 37 00	4.53880	21.486
High Point.....	324 14 21.48	144 20 15.12	4.3280216	13.224

**WEBER, SULLIVAN COUNTY, N. Y.**

About 7 miles east of Narrowsburg, 7 miles north of Lackawaxen, and 1.5 miles southwest of Four Corners at Beaver Brook post office on a low bald knob owned by Mr. George Weber and 60 yards west of his house. Good view except southeast.

Station mark: A triangulation tablet in stone in place 4 feet by 4 feet by 6 inches above ground.

Signal: Sawed lumber tripod.

Reference marks: Cross cut on rock in place 30 feet northeast.

[Latitude 41° 34' 05.56". Longitude 74° 57' 59.60".]

To station—	Azimuth.	Back azimuth.	Distance.	
			<i>Log. meters.</i>	<i>Miles.</i>
Vine.....	° ' " 96 03 06	° ' " 275 54 44	4. 24568	10. 940
Liberty.....	213 59 59	34 07 50	4. 46610	18. 174
McKenzie.....	307 57 52	128 04 05	4. 21852	10. 277

**BALD, PIKE COUNTY, PA.**

On a hill known locally as Bald Hill, about 10 miles southeast from Lackawaxen, and 2 miles northeast of Shohola Falls. Hill is covered with dense growth of scrub oak about 6 feet high and has few scattering dead pines. Good view in all directions except south. Mr. Jerry Greening, who lives near forks of road south of station, knows its location.

Station mark: Aluminum tablet cemented in rock in place 24 by 18 by 12 inches above ground on highest part of hill.

Signal: Targets in dead pine.

[Latitude 41° 24' 15.88". Longitude 74° 56' 27.34".]

To station—	Azimuth.	Back azimuth.	Distance.	
			<i>Log. meters.</i>	<i>Miles.</i>
Greening.....	° ' " 7 01 08. 77	° ' " 187 00 55. 93	3. 5680145	2. 298
Vine.....	135 35 17. 67	315 25 55. 74	4. 4482938	17. 444
McKenzie.....	233 40 29. 67	53 45 40. 57	4. 1312400	8. 406
Buckhorn.....	278 24 50. 46	98 29 06. 19	3. 9581785	5. 643

**BUCKHORN, PIKE COUNTY, PA.**

About 5 miles north of Milford and about 5 miles southeast of Pondeddy on point locally known as Buckhorn on State forest land and about 0.5 mile west of second-class road between Milford and Pondeddy.

Signal: A 12-inch pine trimmed up and white targets fastened about 20 feet from ground.

Station mark: Sandstone post 6 by 8 by 30 inches set 24 inches in ground with tablet cemented in top.

[Latitude 41° 23' 32.62". Longitude 74° 50' 00.63".]

To station—	Azimuth.	Back azimuth.	Distance.	
			<i>Log. meters.</i>	<i>Miles.</i>
Hilliard.....	° ' " 45 14 55. 94	° ' " 225 10 54. 51	4. 0780056	7. 436
Greening.....	76 08 00. 48	256 03 31. 98	3. 9877724	6. 041
Bald.....	98 29 06. 19	278 24 50. 46	3. 9581785	5. 643
McKenzie.....	191 39 18. 91	11 40 13. 86	3. 9794034	5. 926
High Point.....	298 52 59. 76	118 59 47. 97	4. 2151097	10. 197
Culvers Gap.....	352 27 12. 72	172 28 44. 24	4. 3914970	15. 305

## GREENING, PIKE COUNTY, PA.

About 10 miles north of west from Milford on land owned by Jerry Greening and 0.5 mile southeast from his house on hill covered with scrub brush 6 feet high. From Milford follow pike leading to Shohola to Jerry Greenings then by old trail to point.

Mr. Greening knows location..

Signal: Sawed lumber tripod with targets.

Station mark: A sandstone block 10 by 12 by 30 inches set 26 inches in ground, cross cut on top.

Reference marks: Three piles of stone, one east 10 feet distant, one southwest 10 feet distant, one northwest 10 feet distant.

[Latitude 41° 22' 16.89". Longitude 74° 56' 46.79".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Vine.....	141 01 18.94	320 52 10.06	4.4845337	18.962
Bald.....	187 00 55.93	7 01 08.77	3.5680145	2.298
Buckhorn.....	256 03 31.98	76 08 00.48	3.9877724	6.041
High Point.....	283 09 13.10	103 20 29.54	4.3883974	15.197
Culvers Gap.....	330 04 44.78	150 10 44.20	4.4059640	15.824
Hilliard.....	351 09 30.94	171 09 57.86	3.7901079	3.832

## HILLIARD, PIKE COUNTY, PA.

About 10 miles nearly west from Milford on land owned by Mr. J. G. Hilliard and between the Log Cabin lakes about same distance from each. The point used is in the woods and across the big Log Cabin Lake from Mr. Hilliard's house, and is a look-out tower 40 feet high built of rough timber and has flag pole in center. To reach point from Milford, go 10½ miles on pike to fork of good private road, to Mr. Hilliard's house. From house row across lake about 0.25 mile, then by trail to tower.

Station mark: Sandstone post, 6 by 8 by 30 inches, set 25 inches in ground.

One inch hole 1 inch deep and cross cut across top.

Reference marks: 4 corners of tower 11 feet northwest, northeast, southwest, and southeast.

[Latitude 41° 18' 59.35". Longitude 74° 56' 06.03".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Greening.....	171 09 57.86	351 09 30.94	3.7901079	3.832
Buckhorn.....	225 10 54.51	45 14 55.94	4.0780056	7.436
High Point.....	268 40 58.47	88 51 47.63	4.3593266	14.213
Culvers Gap.....	323 39 57.14	143 45 29.53	4.2974507	12.325

## VINE, WAYNE COUNTY, PA.

About 7.5 miles southwest from Narrowsburg Mount, and 1.5 miles southwest from Beech Lake on land owned by Mr. Marshall and 0.25 mile southwest from his house, in cleared field on highest hill in neighborhood.

Signal: Sawed lumber tripod with targets.

Station mark: Aluminum Pennsylvania tablet in rock in place 8 by 4 feet, projecting 2.5 feet above ground.

Reference mark: Cross cut in rock in place 24 feet northeast from center. Signal over center.

[Latitude 41° 35' 05.04". Longitude 75° 10' 35.48".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Liberty.....	236 22 51	56 38 54	4.60857	25.230
Weber.....	275 54 44	96 03 06	4.24568	10.940
McKenzie.....	291 21 23.59	111 35 57.37	4.5163034	20.401
Bald.....	315 25 55.74	135 35 17.67	4.4482938	17.444
Greening.....	320 52 10.06	141 01 18.94	4.4845337	18.962

## PRIMARY TRAVERSE.

Hawley, Milford, and Wallpack quadrangles.

SUSSEX COUNTY, N. J.; SULLIVAN COUNTY, N. Y.; PIKE COUNTY, PA.

The following geographic positions on North American datum were determined by G. T. Hawkins in 1913, and are based on Hilliard, Greening, and McKenzie triangulation stations of the United States Geological Survey (see pp. 474, 476) and on triangulation station Culver Gap of the Coast and Geodetic Survey.

## WALLPACK QUADRANGLE.

Along highways through northern part of quadrangle.

Station.	Latitude.	Longitude.	Distance between stations.
NEW JERSEY.			
Culvers Gap, on southwest side of, on ridge of Blue Mountains, about 200 paces from its abrupt end at gap and 170 paces southwest from spot where recently stood tower, the location being well known in that region; copper bolt in rock with several reference marks near by (Coast and Geodetic Survey triangulation station Culvers Gap).....	° ' " 41 10 21.06	° ' " 74 47 41.86	<i>Feet.</i> .....
Layton, 1 mile southeast of, 30 feet south to signboard; three corners.....	41 12 03.5	74 49 11.6	12,435
Layton post office, four corners at.....	41 12 55.3	74 49 39.2	5,653
Dingmans Ferry, 1 mile east of, near east end of iron bridge over Delaware River; three corners.....	41 13 12.5	74 51 25.0	8,274
PENNSYLVANIA.			
Dingmans Ferry, four corners at post office.....	41 13 23.2	74 52 17.2	4,127
Dingmans Ferry, 1.25 miles northwest of, 15 feet northwest to sign "Edgemere 6½ mi."; three corners.....	41 14 02.3	74 53 07.6	5,524
Dingmans Ferry, 2.5 miles northwest of, at white schoolhouse 25 feet northeast to signpost; four corners.....	41 14 10.2	74 54 29.0	6,270
Dingmans Ferry, 3.5 miles northwest of, 30 feet east to pine at corner of fence; second-class fork to north.....	41 14 37.6	74 55 20.9	4,840

Magnetic declination for north border of quadrangle, 8° 58' W.

## MILFORD QUADRANGLE.

Along highways near north border of quadrangle.

Station.	Latitude.	Longitude.	Distance between stations.
NEW YORK.			
Lackawaxen, 1.8 miles east of, 1,000 feet northeast to white house and barn; second-class fork north.....	° ' " 41 28 47.3	° ' " 74 57 22.3	<i>Feet.</i> 8,344
Barryville, 1 mile west of; bridge at mouth of hollow.....	41 28 58.7	74 55 56.1	6,674
Barryville, in west part of; four corners on towpath.....	41 28 42.9	74 55 25.2	2,851
Barryville, in east part of, 300 feet to church on hill; four corners on towpath.....	41 28 41.0	74 54 48.8	2,779
Barryville, 0.5 mile southeast of, at Dr. Ash's office; three corners.....	41 28 25.4	74 54 30.6	2,103
Barryville, 1.5 miles east of, 100 feet southeast to signpost; three corners.....	41 28 25.1	74 53 21.8	5,242
Proctor estate, southeast corner of, T road east at.....	41 29 07.5	74 52 13.8	6,729
Proctor estate, southeast corner of, 20 feet northwest to signpost; three corners at.....	41 29 29.0	74 50 28.8	8,290
Pond Eddy, 4 miles nearly north of, 12 miles northwest of Port Jervis, on high wooded knoll; center of south chimney on Mr. Ed. McKenzie's house (U. S. Geological Survey triangulation station McKenzie).....	41 28 35.4	74 48 37.5	10,060

## MILFORD QUADRANGLE—Continued.

Along highways near southwest corner and west border of quadrangle.

Station.	Latitude.	Longitude.	Distance between stations.
PENNSYLVANIA.			
Hunting Tower Hotel, 0.25 mile east of, just east of sawmill; second-class T road north.	° ' "	° ' "	Feet.
Silver Lake, 0.25 mile north of, 20 feet northwest to sign on tree "To Edgemere Club;" three corners.	41 15 08.6	74 56 53.8	.....
Silver Lake, 0.8 mile west of, 40 feet north of east-west road, 200 feet east to Ferdinand Frank's house, 160 feet east to Bushkill Creek, in solid rock; aluminum tablet stamped "Prim. Trav. Sta. No. 1, 1913"	41 15 33.1	74 58 53.0	9,432
Ferdinand Frank's house, 0.5 mile north of; forks in woods, roads north-northeast and south.	41 15 32.0	74 59 47.4	4,149
Ferdinand Frank's house, 2 miles north of, 10 feet east to fire warning on red oak; forks in woods.	41 15 53.8	74 59 43.7	2,229
Forks of Milford and Blooming Grove road and Dingman Pike, 200 feet south to signboard.	41 16 41.8	74 58 24.6	7,753
J. G. Hilliard's house, 2 miles south of, private road at turnpike; three corners.	41 17 54.5	74 57 44.4	7,974
Milford, 10 miles nearly west of, on land owned by Mr. J. G. Hilliard and between log cabin and lakes, about same distance from both; it is in woods and across Big Log Cabin Lake from Mr. Hilliard's house; cross cut in top of 6 by 8 by 30 inch sandstone post (U. S. Geological Survey triangulation station Hilliard).	41 18 00.6	74 55 58.7	8,100
Milford, 10 miles north of west from, on land owned by Jerry Greening and 0.5 mile southeast from his house on hill covered with scrub brush 6 feet high; cross cut on top of sandstone post (U. S. Geological Survey triangulation station Greening).	41 18 59.5	74 56 06.2	5,985
Jerry Greening's house, 100 yards east of; three corners.	41 22 17.0	74 56 46.9	.....
Shohola Falls, 250 feet west of bridge at, 50 feet northwest to old house; three corners.	41 22 43.6	74 57 03.8	2,984
Shohola Falls, 1.5 miles northwest of, road crossing old tramroad.	41 23 21.7	74 58 21.0	7,033
Greely post office, road opposite.	41 24 21.8	74 58 53.5	6,568
Lackawaxen, in wall east of frame house at south end of bridge over Delaware River, 20 feet southwest to front door of frame house; aluminum tablet stamped "Prim. Trav. Sta. No. 2, 1913"	41 25 18.0	74 59 44.6	6,886
	41 28 55.0	74 59 11.4	.....

Magnetic declination for south border of quadrangle,  $8^{\circ} 58'$  W.; for west border,  $8^{\circ} 49'$  W.; for north border,  $9^{\circ} 24'$  W.

## HAWLEY QUADRANGLE.

Along highways near northeast corner of quadrangle.

Station.	Latitude.	Longitude.	Distance between stations.
Feet.			
Greely Meat Market; road opposite.	° ' "	° ' "	.....
Greely Meat Market, 0.5 mile north of, 10 feet southeast to Kubler's mail box; T lane east.	41 26 06.1	75 00 10.4	.....
Lackawaxen, 2 miles southwest of, second-class forks to southeast	41 26 25.4	75 00 16.4	2,007
	41 27 30.2	75 00 00.4	6,673

Magnetic declination for east border of quadrangle,  $8^{\circ} 49'$  W.

## NEW YORK.<sup>1</sup>

### TRIANGULATION STATIONS.

Oneonta and Unadilla quadrangles.

DELAWARE AND OTSEGO COUNTIES.

Additional triangulation control for the above-named quadrangles was obtained in 1914 by George T. Hawkins. Three new stations were located, based on stations Butternut and Whitcomb (described in Bulletin 181), on North American datum.

#### BUTTERNUT, OTSEGO COUNTY, N. Y.

On a cleared knob in Butternut Township, on land owned by Walter Wood and occupied by Mr. Foote.

Station mark: A marble post 36 by 6 by 6 inches, set 32 inches in the ground, in the center of top of which is cemented a bronze triangulation tablet marked "New York 517."

[Latitude 42° 27' 58.70". Longitude 75° 14' 22.18".]

To station—	Azimuth.	Back azimuth.	Distance.	
			<i>Log. meters.</i>	<i>Miles.</i>
Sidney.....	6 57 10.96	186 55 49.88	4.3575862	14.156
Palmer.....	41 06 10.51	221 02 35.62	4.0446156	6.886
Persons.....	303 59 43.53	124 07 16.70	4.2680993	11.520
Johnson.....	340 49 38.44	160 52 57.30	4.3134480	12.788
Willis.....	18 30 41.8	198 25 48.0	4.4986447	.....
Bobell.....	59 42 52.4	239 25 01.1	4.6251388	.....
Whitcomb.....	81 29 42.09	261 18 39.06	4.3560978	.....
Sherburne.....	140 03 35.8	319 55 51.7	4.3866556	.....
Teiford.....	195 38 15.2	15 42 04.0	4.4555214	.....
Meredith.....	284 02 38.0	104 16 10.6	4.4531355	.....
Andes.....	303 06 51.2	123 27 10.9	4.6953369	.....

#### JOHNSON, DELAWARE COUNTY, N. Y.

In Franklin Township, 4 miles south of Franklin and 1.5 miles northeast of Mericksville, on bare hill owned by Mr. Johnson and about 400 feet east of his house.

Station mark: Marble post 6 by 6 by 26 inches set in ground. Tablet in top is 6 feet north of line fence crossing the hill.

Signal: Two-foot oak tree with target.

Reference marks: Fence line 6 feet south; signal tree southwest 28 feet.

Instrument over center, signal off center.

[Latitude 42° 17' 28.60". Longitude 75° 09' 27.16".]

To station—	Azimuth.	Back azimuth.	Distance.	
			<i>Log. meters.</i>	<i>Miles.</i>
Sidney.....	71 36 08.04	251 31 28.62	4.0014096	6.234
Palmer.....	128 20 47.52	308 13 54.27	4.2527007	11.119
Butternut.....	160 52 57.30	340 49 38.44	4.3134480	12.788
Persons.....	223 33 47.32	43 38 01.05	4.0972288	7.773

<sup>1</sup> Additional data for New York are given on pp. 473-478.

**PALMER, OTSEGO COUNTY, N. Y.**

About 3 miles northeast of Sidney and 1 mile southwest of Unadilla Center, on bare hill owned by Elmer Palmer and 300 yards southwest of his house.

Station mark: Marble post 6 by 6 by 26 inches, 24 inches in ground.

Signal: Sawed lumber tripod over center.

Reference marks: North-south rail fence, 128 feet west; corner of rail fence 155 feet east.

[Latitude 42° 23' 27.94". Longitude 75° 19' 40.69'.]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Whitcomb.....	108 09 33.36	288 02 05.61	4.2032840	9.923
Butternut.....	221 02 35.62	41 06 10.51	4.0446156	6.886
Johnson.....	308 13 54.27	128 20 47.52	4.2527007	11.119
Sidney.....	342 19 47.53	162 22 00.98	4.1750740	9.299

**PERSONS, DELAWARE COUNTY, N. Y.**

On a round bare knoll in Franklin Township, on land owned by A. R. Persons (Treadwell post office).

Station mark: A bronze tablet cemented in solid rock 15 inches below surface of ground and covered with a small pile of flat stones.

[Latitude 42° 22' 22.20". Longitude 75° 03' 10.38'.]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Johnson.....	43 38 01.05	223 33 47.32	4.0972288	7.773
Sidney.....	56 04 54.25	235 56 00.95	4.3400169	13.595
Butternut.....	124 07 16.70	303 59 43.53	4.2680993	11.520
Butternut a.....	124 07 36	304 00 03	4.26812	

a By McNair, 1900.

**SIDNEY, DELAWARE COUNTY, N. Y.**

Near north line of town of Masonville, Delaware County, 2 miles nearly south of village of Sidney Center, on land owned by Arthur Rudenbur. On north slope of hill which is timbered on top. Good view in all directions except from southeast to southwest.

Station mark: Marble post 6 by 6 by 26 inches, set 18 inches in ground. New York tablet in top.

Signal: Tripod of poles covered with white cloth.

Reference marks: 90 feet N. 20° (true) W. to edge of solid ledge; 115 feet N. 30° E. to old stump.

Instrument over center and under signal. Solid rock was struck under signal, stone projects 8 inches above ground, pile of stone around mark.

[Latitude 42° 15' 45.77". Longitude 75° 16' 22.51'.]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Whitcomb.....	134 19 49.26	314 10 08.58	4.4400486	17.116
Palmer.....	162 22 00.98	342 19 47.53	4.1750740	9.299
Butternut.....	186 55 49.88	6 57 10.96	4.3575862	14.156
Persons.....	235 56 00.95	56 04 54.25	4.3400169	13.595
Johnson.....	251 31 28.61	71 36 08.04	4.0014096	6.234



**WHITCOMB, CHENANGO COUNTY, N. Y.**

On the south end of a hill in the town of Guilford and on the west side of north pond.

Station mark: A cut bluestone post 48 by 6 by 6 inches, set 36 inches in the ground, in the center of top of which is cemented a bronze triangulation tablet marked "New York 518."

[Latitude 42° 26' 08.71". Longitude 75° 30' 44.55".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	<i>Log. meters.</i>	<i>Miles.</i>
Bobell.....	37 45 58.1	217 39 09.0	4.3564016	.....
Berry.....	130 56 19.9	310 49 06.8	4.2869704	.....
Sherburne.....	197 00 17.2	17 03 37.4	4.3629384	.....
Butternut.....	261 18 39.06	81 29 42.09	4.3560978	.....
Palmer.....	288 02 05.61	108 09 33.36	4.2032840	9.923
Sidney.....	314 10 08.58	134 19 49.26	4.24400486	17.116
Willis.....	334 41 21.3	154 47 29.00	4.4669983	.....

**Canaseraga and Hornell quadrangles.****ALLEGANY AND STEUBEN COUNTIES.**

Control for the above-named quadrangles was obtained in 1913 by George T. Hawkins, who extended triangulation from Nunda and Sandhill, described in appendix to Twenty-first Annual Report and in Bulletin 216, by occupying five new stations, all computed on North American datum.

**BIRD, STEUBEN COUNTY, N. Y.**

In town of Howard, about 9 miles northeast of Hornell and 3 miles northeast of Big Creek post office, on cleared hill on land owned by Mrs. Bird. There is a good view in nearly all directions except to the south.

Signal: A white target in apple tree.

Station mark: Tablet in top of marble post 6 by 8 by 24 inches set 24 inches in ground.

Reference marks: Apple tree 48 feet north; another apple tree 35 feet north.

[Latitude 42° 22' 26.62". Longitude 77° 32' 33.64".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	<i>Log. meters.</i>	<i>Miles.</i>
Sherwood.....	23 41 40.33	203 40 48.01	3.6457766	2.749
Johnson.....	50 09 00.80	230 02 37.11	4.2306653	10.568
Jersey.....	85 01 50.09	264 48 23.83	4.4391581	17.081

**JERSEY, ALLEGANY COUNTY, N. Y.**

In lot 5, town of Birdsall, on land owned by Mr. Young and about 300 yards southeast of his house in old orchard.

Signal: Sawed lumber tripod with targets and platform for instrument 20 feet high.

Station mark: A sandstone block 10 by 14 by 30 inches set 24 inches in ground with New York tablet in top.

Reference marks: Small apple tree near old one 24 feet southeast; apple tree 24 feet southwest.

[Latitude 42° 21' 07.71". Longitude 77° 52' 30.18".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	<i>Log. meters.</i>	<i>Miles.</i>
Marsh.....	167 23 02.80	347 21 40.29	4.1071070	7.952
Nunda.....	179 39 55.67	359 39 51.42	4.3905314	15.272
Sand.....	230 35 05.52	50 45 27.22	4.4350671	16.921
Bird.....	264 48 23.83	85 01 50.09	4.4391581	17.081
Johnson.....	300 30 22.45	120 37 24.34	4.2218890	10.357

## JOHNSON, STEUBEN COUNTY, N. Y.

On land owned by Mr. Johnson, who lives about 5 miles southwest of Hornell, and is 0.25 mile north of his house on east-west fence line between two fields on highest hill in neighborhood. A good view in all directions.

Signal: Sawed lumber tripod with targets.

Station mark: A marble post 4 by 4 by 24 inches set 22 inches in ground with tablet in top.

Reference marks: Small apple tree 25 feet west; corner of north-south and east-west fences 235 feet east.

[Latitude 42° 16' 33.01". Longitude 77° 42' 03.48".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Jersey.....	120 37 24.34	300 30 22.45	4.2218890	10.357
Sand.....	194 39 12.52	14 42 31.25	4.4249292	16.530
Bird.....	230 02 37.11	50 09 00.80	4.2306653	10.568
Sherwood.....	237 37 56.94	58 43 28.23	4.1204455	8.200

## MARSH, ALLEGANY COUNTY, N. Y.

In lot No. 28, Grove Township, on land owned by E. N. Marsh, about 3.5 miles southwest of Swain, a station on the Erie Railroad. The station is the well, which is 150 feet southeast of Mr. Marsh's residence. A good view in all directions from windmill tower.

Signal: Windmill tower, 40 feet high.

Station mark: Center of well, 300 feet deep.

[Latitude 42° 27' 52.42". Longitude 77° 54' 32.52".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Sand.....	258 35 05.99	78 46 50.99	4.3858191	15.107
Jersey.....	347 21 40.29	167 23 02.80	4.1071070	7.952

## NUNDA, LIVINGSTON COUNTY, N. Y.

Situated in town of Nunda on highest part of what is locally known as East Hill.

Station mark: Boulder 30 inches in diameter sunk flush with ground, in top of which is cemented a triangulation tablet. Station No. 514.

[Latitude 42° 34' 24.22". Longitude 77° 52' 36.47".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Davis.....	78 25 47.18	258 10 54.79	4.4878673	.....
Carpenter.....	109 34 18.32	289 18 54.91	4.5179208	.....
Felch.....	128 32 12.16	308 26 02.46	4.2013176	.....
Perry.....	147 23 40.42	327 16 44.05	4.4136080	.....
Ridge.....	165 22 48.65	345 21 19.84	4.0730232	.....
Scottsville.....	196 00 33.60	16 07 21.29	4.6927834	.....
Conesus.....	228 43 06.21	48 52 44.48	4.4122965	.....
Springwater.....	251 22 43.10	71 37 21.95	4.4940585	.....
Sand Hill.....	288 58 56.92	109 09 24.17	4.3502399	.....
Jersey a.....	359 39 51.42	179 39 55.67	4.3905314	15.272

a By G. T. Hawkins in 1913.

**SAND HILL, STEUBEN COUNTY, N. Y.**

In the corner of field 0.1 mile southwest of farmhouse, on land owned by William Sanders, in town of Wayland, about 2 miles south of village of Perkinsville.

Station mark: A stone post 24 by 8 by 8 inches, set 24 inches in ground, in center of top of which is cemented a bronze tablet. Station number 512.

Mr. Hawkins in 1913 reported that stone mark has been destroyed. The point was identified by men who own the land. A new signal of sawed lumber erected on place identified as original position and marked by stone with New York tablet, 6 by 8 by 26 inches set 26 inches in ground. Reference marks: east-west fence 228 feet south; north-south fence 334 feet west.

[Latitude 42° 30' 27.04". Longitude 77° 37' 08.72".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	<i>Log. meters.</i>	<i>Miles.</i>
Johnson <sup>a</sup> .....	14 42 31.25	194 39 12.52	4.4249292	16.530
Jersey <sup>a</sup> .....	50 45 27.22	230 35 05.52	4.4350671	16.921
Marsh <sup>a</sup> .....	78 46 50.99	258 35 05.99	4.3858191	15.107
Nunda.....	109 09 24.17	288 58 56.92	4.3502399	.....
Springwater.....	206 05 08.98	26 09 19.48	4.2827117	.....
Cohocton.....	300 51 30.26	120 54 52.08	3.9004487	.....

<sup>a</sup> By G. T. Hawkins in 1913.

**SHERWOOD, STEUBEN COUNTY, N. Y.**

In town of Howard, about 6 miles nearly east from Hornell on a cleared hill which gives a good view in all directions except southeast. The station is on fence line on east side of Mr. Sherwood's property and about 300 yards northeast of his farmhouse and 250 yards north of Pike.

Signal: A group of four elm trees that grow so close together that the trunks touch.

Station mark: A marble post 6 by 8 by 24 inches set 20 inches in ground with New York tablet in top.

Reference marks: Cluster of four elm trees which touch each other 4 feet south; large bushy oak 130 feet south; rail fence 1 foot west.

[Latitude 42° 20' 15.33". Longitude 77° 33' 51.29".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	<i>Log. meters.</i>	<i>Miles.</i>
Johnson.....	58 43 28.23	238 37 56.94	4.1204455	8.200
Bird.....	203 40 48.01	23 41 40.33	3.6457706	2.749

**Berne quadrangle.****ALBANY COUNTY.**

In the fall of 1914 George T. Hawkins determined the position of a tablet set in a large boulder in John Boyd Thacher Park. This point was occupied and located from Coast and Geodetic Survey station Helderberg and New York State Survey station Guilderland, on North American datum.

**GUILDERLAND, ALBANY COUNTY, N. Y.**

In Guilderland Township, on land owned by A. Van Hensen. About 200 yards south of four corners at hotel in Guilderland Center, on east side of road, in edge of orchard. Is granite post 8 inches square marked with "X" on top, "11" on south face, and "N. Y." on east face.

Signal: Tripod of sawed lumber with flag and target.

Station mark: Stone monument No. 11.

[Latitude 42° 42' 02.298". Longitude 73° 58' 01.516".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Helderberg.....	23 46 08.08	203 44 21.71	3.9481223	5.514
Winne.....	118 15 04.32	298 12 00.50	3.8449722	4.348
Park.....	38 53 04	218 51 03	3.81093	4.020

**HELDERBERG, ALBANY COUNTY, N. Y.**

In New Scotland Township, on the highest part of Helderberg Mountain, in a field belonging to John Hallenbeck who lives at New Salem Village. Best approached from house of Garrett Flansburgh, whose lands adjoin. Eight and one-half miles from New Scotland depot and 5 miles from New Salem. Summit covered with growth of small birch, pine, and basswood.

Underground mark: A stone jug 2 feet below surface.

Station mark: A granite post 6 by 6 by 30 inches set 24 inches in ground.

Reference marks: Granite posts set 7 feet north, south, east, and west of center.

[Latitude 42° 37' 39.072". Longitude 74° 00' 38.487".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Rafinesque.....	240 47 42.718	61 03 45.635	4.5677959	.....
Greylock.....	268 49 12.873	89 23 31.424	4.8404909	.....
Winne.....	167 13 04.85	347 11 47.56	4.0690359	7.284
Sittles Hill.....	170 10 49.17	350 09 47.57	4.0334815	7.530
Guilderland.....	203 44 21.71	23 46 08.08	3.9481223	5.514
Hamiltonville.....	219 36 52.80	.....	4.0654066	7.224
Park.....	171 01 59	351 01 44	3.49452	1.940

**PARK, ALBANY COUNTY, N. Y.**

Park is about 5 miles nearly south from Altamont and is in the John Boyd Thatcher park near edge of cliff at the pincic grounds and 200 feet southeast of where county road comes to top of hill through rock walls.

Station mark: Tablet set in granite boulder about 4 by 3 by 6 feet bedded in ground about 2 feet, marked "John Boyd Thacher Park. Latitude, 42° 39' 19"; longitude, 74° 01' 00". Elevation above sea 1,125.6 feet. Determined by U. S. Geological Survey, 1914."

Signal: Tripod of poles with flag and target.

Reference marks: Edge of bluff 45 feet east; large granite boulder in place 215 feet south.

[Latitude 42° 39' 19.045". Longitude 74° 00' 59.863".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Miles.
Guilderland.....	218 51 03	38 53 04	3.81093	4.020
Helderberg.....	351 01 44	171 01 59	3.49452	1.940

**PRIMARY TRAVERSE.**

Cranberry Lake, Number Four, Oswegatchie, and Russell quadrangles.

HERKIMER AND ST. LAWRENCE COUNTIES.

The following geographic positions on North American datum were determined in 1913 by S. S. Gannett and are based on points located by primary traverse at Bacon, Pond Settlement Schoolhouse, and at outlet of Greggs Lake in 1910 and 1911, published in Bulletins 496 and 551.

**CRANBERRY LAKE QUADRANGLE.**

[See also p. 487.]

**Along New York Central & Hudson River Railroad near northwest corner of quadrangle.**

Station.	Latitude.	Longitude.	Distance between stations.
	° ' "	° ' "	<i>Feet.</i>
Benson Mines, 0.6 mile northeast of; road crossing .....	44 10 33.4	74 59 39.6	.....
Road crossing, Benson Mines-Newton Falls, milepost No. 74 is 105 feet northwest.....	44 11 33.8	74 59 19.1	6, 296
Newton Falls, 23 feet south of southeast corner of station, 12 feet north of side track, in granite boulder; bronze tablet stamped "Prim. Trav. Sta. No. 3 1913".....	44 12 43.6	74 59 32.8	7, 139

**RUSSELL QUADRANGLE.**

[See also pp. 487-488.]

**Along highways near south border of quadrangle.**

Station.	Latitude.	Longitude.	Distance between stations.
	° ' "	° ' "	<i>Feet.</i>
Fine, 1.5 miles northwest of; creek crossing .....	44 15 21.1	75 09 52.5	.....
Forks of road opposite sugar camp .....	44 15 37.9	75 10 56.2	4, 939
T road northeast.....	44 16 20.3	75 11 52.0	5, 911
South Edwards, 0.3 mile northeast of; junction of north-south road.....	44 16 17.9	75 12 19.0	1, 985
South Edwards; T road south.....	44 16 02.7	75 12 30.4	1, 747
Forks of road northeast and northwest.....	44 15 53.0	75 12 33.2	1, 001
Pond Settlement schoolhouse, near, in solid rock in southwest corner of T road south, 30 feet south of center of triangle at three corners and 80 feet south of northeast corner of schoolhouse; aluminum tablet stamped "Prim. Trav. Sta. No. 5 New York 1912".....	44 15 36.7	75 13 22.0	3, 915

**OSWEGATCHIE QUADRANGLE.****Along New York Central & Hudson River Railroad from Kalurah to Benson Mines.**

Station.	Latitude.	Longitude.	Distance between stations.
	° ' "	° ' "	<i>Feet.</i>
Road crossing.....	44 09 55.7	75 14 07.3	.....
Kalurah, west of station; road crossing .....	44 09 35.7	75 12 39.2	6, 732
Long Lake, 300 feet southwest of; road crossing .....	44 09 32.1	75 12 21.3	1, 350
Creek crossing .....	44 09 15.5	75 12 18.9	1, 693
Jayville station.....	44 09 23.3	75 11 20.2	4, 353
Milepost No. 61, center of track opposite.....	44 09 50.8	75 09 42.6	7, 639
Bear Lake, 1,000 feet northeast of; road crossing.....	44 09 43.4	75 09 24.9	1, 487
Briggs station, track opposite sawmill .....	44 09 52.1	75 09 17.1	5, 019
Milepost No. 63, center of track opposite.....	44 09 24.0	75 08 11.2	2, 874
Road crossing.....	44 09 30.7	75 07 16.0	4, 077
Aldrich, center of track in front of station.....	44 08 57.1	75 06 37.1	4, 428
Aldrich, highway bridge over Little River on north side of west abut- ment; chisel mark.....	44 08 55.2	75 06 21.9	1, 123
Aldrich, 0.3 mile east of station, in southwest corner of abutment of railroad bridge over Little River, 1 foot from edge of abutment, 86 feet west of center of bridge; bronze tablet stamped "Prim. Trav. Sta. No. 1 1913".....	44 09 00.2	75 06 24.8	548
Road crossing.....	44 09 37.0	75 06 18.1	3, 759
Milepost No. 66, center of track opposite.....	44 09 49.6	75 06 08.1	1, 463
Coffins Mills, north-south road crossing .....	44 10 20.6	75 05 09.6	5, 293
Oswegatchie, 135 feet east of station, north-south road crossing.....	44 10 57.0	75 04 16.3	5, 354
Road crossing; road southeast and northwest.....	44 10 48.8	75 02 55.0	5, 981
Milepost No. 70, 1,210 feet east of; road crossing.....	44 10 42.0	75 01 59.8	4, 084
Milepost No. 71, 150 feet northwest of; road crossing.....	44 10 33.9	75 01 13.5	3, 472
Benson Mines, 188 feet northeast of station, in concrete base of water tower; bronze tablet stamped "Prim. Trav. Sta. No. 2 1913".....	44 10 11.6	75 00 09.1	5, 202

## OSWEGATCHIE QUADRANGLE—Continued.

Along highways near north border of quadrangle.

Station.	Latitude.			Longitude.			Distance between stations.
	°	'	"	°	'	"	
Opposite Mr. Schuyler's house.....	44	12	36.1	75	00	24.5	.....
Opposite Wm. Perrigo's house.....	44	12	37.6	75	00	39.4	1,094
Creek crossing.....	44	12	27.0	75	00	53.3	1,480
Opposite Louis Costos's house.....	44	12	14.0	75	01	40.3	3,669
F. C. Kilbourne's house, 50 feet northwest of, 50 feet north of road west; road north-south.....	44	11	32.4	75	02	58.5	7,087
Schoolhouse (District No. 10), 370 feet northwest of; junction with main road northeast-southwest.....	44	12	38.4	75	03	11.3	6,748
Oswegatchie River, center of iron bridge over.....	44	12	52.0	75	02	58.8	.....
Forks of road.....	44	12	54.5	75	03	14.6	1,647
Opposite cemetery.....	44	13	45.6	75	04	31.2	7,605
Creek crossing.....	44	14	14.6	75	05	25.9	4,951
Road forks, southwest, 225 feet northwest of schoolhouse, 300 feet north of iron bridge.....	44	14	21.4	75	05	36.8	1,052
Road forks.....	44	14	30.6	75	07	07.6	6,648
Fine, east end of village, 50 feet east of T road north, on north side of road, in large boulder; bronze tablet stamped "Prim. Trav. Sta. No. 4, 1913".....	44	14	47.6	75	08	02.2	4,359
Fine, center of.....	44	14	52.5	75	08	22.6	1,569

Along highways near east border of quadrangle from Benson Mines south to Chartrand Camp.

Benson Mines, in front of post office; center of road forks.....	44	10	02.8	75	00	04.6	.....
Forks of road southwest.....	44	09	49.6	75	00	43.7	3,150
Grove Hotel, forks of road.....	44	09	41.3	75	01	52.6	5,089
Star Lake, 30 feet southeast of post office; triangular plot at road intersection.....	44	09	35.5	75	02	05.0	1,078
Little River, center of bridge over.....	44	08	36.5	75	01	40.8	6,231
Forks of road, Joe Fournier's house is 60 feet northeast.....	44	08	11.5	75	01	38.7	2,530
Tamarack Creek, center of corduroy bridge over.....	44	08	10.7	75	02	10.9	2,354
Decass Old Camp, small creek southeast.....	44	07	38.0	75	02	46.6	4,210
Summit of flat ridge.....	44	07	00.3	75	03	14.3	4,315
Streeter Lake, bridge over outlet from.....	44	06	52.0	75	03	17.6	873
Balls Camp, forks on left road to, right road to Francis Camp.....	44	06	42.7	75	03	22.7	1,016
Old road west.....	44	06	32.5	75	03	34.7	1,356
Creek crossing.....	44	05	51.0	75	03	44.1	4,258
Middle branch of Oswegatchie River, east bank of bend where tote road runs along river.....	44	05	00.6	75	04	01.4	5,256
Francis Camp, west end of bunk house.....	44	04	39.9	75	04	00.0	2,093
Francis Camp, 650 feet south of, 20 feet east of road, in large granite boulder; bronze tablet stamped "Prim. Trav. Sta. No. 5 1913".....	44	04	34.5	75	03	58.3	558
Stream northwest.....	44	04	09.0	75	03	49.2	2,667
Corduroy bridge (200 feet long) over small creek.....	44	03	18.1	75	03	54.4	5,174
St. Lawrence-Herkimer county line, iron post 300 feet northwest of stone monument, stamped "St. Lawrence County 1903—Macomb Purchase G. T. tract No. 4" on one side and "Herkimer County 1903 T. & C. Purchase 0.05 mile" on other.....	44	03	04.0	75	03	51.2	1,443
St. Lawrence-Herkimer county line, angle; granite monument 4 feet high, 12 inches square, marked "St. Lawrence County" on one side and "Herkimer County" on other, northwest corner of Totten and Crossfield purchase.....	44	03	02.5	75	03	47.7	298
Alder Bed Driving Camp, log bridge over Middle Branch of Oswegatchie River.....	44	02	45.8	75	03	49.6	1,699
Alder Bed Driving Camp, opposite bunk house.....	44	02	39.9	75	03	48.6	601
Alder Bed Driving Camp, 0.9 mile southeast of, road opposite old log pile.....	44	02	01.4	75	03	03.4	5,110
North summit of flat ridge.....	44	01	53.0	75	03	04.2	852
Alder Bed Driving Camp, 1.8 miles south of, at summit of ridge, on large flat granite rock at edge of road, maple tree 15 feet south, blazed on three sides, beech tree opposite; bronze tablet stamped "Prim. Trav. Sta. No. 6, 1913".....	44	01	26.5	75	03	14.3	2,779
Corduroy bridge over drain.....	44	00	45.4	75	03	35.5	4,445
Chartrand Camp, bunk house peak northwest corner.....	44	00	38.8	75	03	37.8	679

Magnetic declination for north border of quadrangle, 11° 46' W.; for east border, 12° 40' W.

## NUMBER FOUR QUADRANGLE.

Along highways near northeast corner of quadrangle.

Station.	Latitude.	Longitude.	Distance between stations.
	° ' "	° ' "	Feet.
Middle Branch of Oswegatchie River, bank.....	43 59 53.0	75 03 42.1	.....
Forks of road southwest.....	43 59 36.0	75 03 41.0	1,719
Bridge over Greggs Lake outlet (center of creek).....	43 59 38.3	75 03 34.6	524

Magnetic declination near northeast corner of quadrangle, 12° 40' W.

Cranberry Lake, Russell, and Stark quadrangles.

## ST. LAWRENCE COUNTY.

The line starts from Hermon street corners established by primary traverse and follows highways eastward near north border of quadrangle and is tied to Stark triangulation station described in Bulletin 201. Thence along highways via Clare, Degrasse, and Russell to starting point. Starting from adjusted position on main circuit at Degrasse, follows highways to New Bridge, thence south along log railroad to Newton Falls, and is tied to primary traverse position at that place, described on page 485, North American datum. This work was done by George T. Hawkins in 1914.

## CRANBERRY LAKE QUADRANGLE.

[See also p. 485.]

Along log railroad near northwest corner of quadrangle.

Station.	Latitude.	Longitude.	Distance between stations.
	° ' "	° ' "	Feet.
Newton Falls, 3 miles northeast of, railway track where trail starts east through woods.....	44 14 48.1	74 57 38.2	.....
Newton Falls, 1 mile northeast of, switch block at head of blind siding.....	44 13 34.3	74 58 54.8	9,321
Newton Falls, 23 feet south of southeast corner of station, 12 feet north of sidetrack, in granite boulder; bronze tablet stamped "Prim. Trav. Sta. No. 3 1913".....	44 12 43.6	74 59 32.8	5,822

## RUSSELL QUADRANGLE.

[See also p. 485.]

Along highways near north border of quadrangle.

Station.	Latitude.	Longitude.	Distance between stations.
	° ' "	° ' "	Feet.
Hermon, cross streets at hotel.....	44 28 01.1	75 13 52.8	.....
Hermon, 1.5 miles east of, T road south, 150 feet southwest to small brick house.....	44 28 12.0	75 12 15.5	7,144
Hermon, 2.5 miles east of, iron bridge over Grasse River, west end of.....	44 28 00.1	75 11 03.5	5,361
Hermon, 4 miles east of, 4 corners, 120 feet southwest to schoolhouse, 100 feet northeast to house.....	44 28 06.2	75 09 23.7	7,270
Hermon, 5.5 miles east of, and 3 miles south of North Russell, on south side of east and west road, and 700 feet east of J. C. Smith's house, cemented in large granite boulder in place; bench-mark tablet stamped "Prim. Trav. Sta. No. 5, 1914".....	44 28 12.2	75 07 39.6	7,572
Three corners, 20 feet southwest to mail box.....	44 28 38.0	75 05 40.8	9,011
Three corners, 40 feet south to 14-inch elm tree.....	44 29 16.3	75 05 15.5	4,293
Red schoolhouse, crossroads 120 feet east of.....	44 28 41.6	75 04 18.4	5,432
West Pierpont, T road east at, 30 feet southeast to cheese factory, 30 feet west to store.....	44 29 32.9	75 03 37.6	5,976
West Pierpont, 1 mile east of, T road south, 250 feet northwest to barn.....	44 29 38.2	75 02 22.4	5,481
West Pierpont, 2.5 miles east of, on south side of road, set in south rail of concrete bridge; bench-mark tablet stamped "Prim. Trav. Sta. No. 6, 1914".....	44 29 15.6	75 00 48.7	7,164

## RUSSELL QUADRANGLE—Continued.

Along highways near east border of quadrangle.

Station.	Latitude.	Longitude.	Distance between stations.
	° ' "	° ' "	Feet.
Clare, 2 miles east of, wooden bridge on tote road, notch cut on each side.....	44 26 02.6	75 01 30.8	.....
Clare, T road east at, 300 feet southeast to townhouse, 400 feet south-west to schoolhouse.....	44 26 09.0	75 03 23.1	8,180
Clare, 1 mile south of, 30 feet northwest to bars, T road west.....	44 25 21.8	75 03 19.8	4,774
Clare, 2 miles south of, county road opposite creamery door.....	44 24 27.9	75 03 37.5	5,602
Clare, 3 miles south of, second-class road west, 400 feet west to gate.....	44 23 21.7	75 03 56.1	6,834
Clare, 3.5 miles south of, 2.5 miles north of Degrasse, 650 feet north of iron bridge over Grasse River; bench-mark tablet set in north side of concrete bridge, stamped "Prim. Trav. Sta. No. 7, 1914".....	44 22 38.3	75 03 41.4	4,518
Degrasse, 1 mile northeast of, turn in road, 50 feet southwest to wind-mill, 20 feet south to culvert.....	44 21 42.5	75 03 52.5	5,696
Degrasse, 0.25 mile northeast of, three corners.....	44 21 05.9	75 04 25.0	4,393
Degrasse, 2 miles southeast of, three corners, 300 feet west to bridge over Grasse River.....	44 20 16.9	75 02 39.4	9,132
Rainbow Falls, county road opposite log hotel at.....	44 20 03.6	75 01 35.2	4,852
Rainbow Falls, 1 mile southeast of, concrete bridge with high concrete rails.....	44 19 44.6	75 00 28.6	5,211

Along highways diagonally northwest through quadrangle.

Degrasse, county road opposite entrance to hotel.....	44 20 58.4	75 04 36.3	.....
Degrasse, 1.5 miles northwest of, T road northeast, 150 feet west to house.....	44 21 27.9	75 06 07.6	7,268
Old mill, three corners at.....	44 21 50.0	75 07 00.2	4,426
Degrasse, 3.5 miles northwest of, large granite bowlder in place on south side of road and 30 feet southeast of three corners, and 100 feet northwest of house, 80 feet southwest of house has bench-mark tablet cemented in top and marked "Prim. Trav. Sta. No. 8, 1914".....	44 22 16.3	75 07 38.9	3,865
Chase factory, T road northeast, 500 feet southeast of.....	44 22 54.4	75 08 22.3	4,976
Burnt house, three corners, 200 feet southeast of.....	44 24 12.3	75 09 17.8	8,851
Russell, south end of iron bridge across Grasse River at.....	44 25 38.6	75 08 59.3	8,841
Russell, 1.5 miles northwest of, county road opposite water trough, 50 feet north to barn.....	44 26 21.5	75 10 24.6	7,551
Hermon, 2 miles southeast of, county road between house and barn owned by Mr. Louck.....	44 26 45.4	75 11 34.7	5,627
Hermon, 1.5 miles southeast of, crossroads at schoolhouse.....	44 27 07.5	75 12 12.9	3,550
Hermon, cross streets at hotel.....	44 28 01.1	75 13 52.8	9,048

Magnetic declination for north border of quadrangle,  $11^{\circ} 27' W.$ ; for east border,  $11^{\circ} 48' W.$ ; near center,  $11^{\circ} 27' W.$

## STARK QUADRANGLE.

Along highways near west border of quadrangle.

Station.	Latitude.	Longitude.	Distance between stations.
	° ' "	° ' "	Feet.
Sellecks four corners, 40 feet northeast to store.....	44 29 17.3	74 59 04.5	.....
T road west, 400 feet northwest to house.....	44 29 28.5	74 57 57.3	5,009
Three corners, 400 feet northwest to house.....	44 28 00.5	74 57 06.1	9,654
Stark triangulation station, on a timbered ridge in northeast corner of town of Clare, on the west side of the North Branch of the Grasse River, on land owned by Irving Stark, theodolite elevated 52 feet on a tower built around trunk of a beech tree; bronze triangulation tablet cemented in solid rock.....	44 27 11.69	74 57 52.9	5,992
Stark triangulation station, 2 miles southwest of, three corners in woods 20 feet west to blazed tree.....	44 26 29.8	74 59 25.1	7,911
Sam Starks cabin, twin maple trees in front of.....	44 26 28.2	74 59 54.9	2,175
Rainbow Falls, 2 miles southeast of, second-class fork to east, 30 feet south to large maple tree.....	44 19 07.6	74 59 56.1	.....
Rainbow Falls, 3 miles southeast of, concrete bridge at log camp.....	44 18 18.9	74 59 41.1	5,048
New Bridge, 1.25 miles northwest of, county road crossing log railroad.....	44 17 57.3	74 59 19.7	2,676
New Bridge, 0.75 mile northwest of, second-class road east, signboard reads "Spicer's Camp, 3 miles".....	44 17 32.0	74 58 45.8	3,547
New Bridge, west end of iron bridge at.....	44 17 10.3	74 58 35.0	2,337



**STARK QUADRANGLE—Continued.**

Along log railroad near southwest corner of quadrangle.

Station.	Latitude.	Longitude.	Distance between stations.
New Bridge, 1.75 miles southeast of, small fill on railway, notches cut in stringers on both sides of track .....	° ' " 44 16 23.0	° ' " 74 57 28.8	<i>Feet.</i> 6,782
New Bridge, 2 miles southeast of, railway track opposite north end of old hunting shack .....	44 16 02.0	74 57 31.2	2,125
New Bridge, 3 miles southeast of, railway track crossing creek .....	44 15 11.5	74 57 46.1	5,215

Magnetic declination near west border of quadrangle,  $11^{\circ} 48' W.$ 

Chateaugay, Loon Lake, Malone, Moira, Nicholville, and Santa Clara quadrangles.

**FRANKLIN AND ST. LAWRENCE COUNTIES.**

The following geographic positions were determined by primary traverse and are upon North American datum. The work was done by George T. Hawkins in 1914. Lines run by E. L. McNair in 1900 in Malone and Moira quadrangles, described in Bulletin 181, have been readjusted and are included.

**CHATEAUGAY QUADRANGLE.**

On highway near south border of quadrangle.

Station.	Latitude.	Longitude.	Distance between stations.
Salmon River, 1 mile west of, 100 feet east of house, T road southwest .....	° ' " 44 45 07.0	° ' " 74 14 09.6	<i>Feet.</i> .....

Magnetic declination,  $11^{\circ} 33' W.$ **LOON LAKE QUADRANGLE.**

Station.	Latitude.	Longitude.	Distance between stations.
Owls Head station, 0.75 mile north of, railroad crossing .....	° ' " 44 44 33.2	° ' " 74 10 32.9	<i>Feet.</i> .....

**MALONE QUADRANGLE.**

Along highways near south border of quadrangle.

Station.	Latitude.	Longitude.	Distance between stations.
Wooden bridge, 80 feet southeast to old house (magnetic declination, $9^{\circ} 20' W.$ ) .....	° ' " 44 45 41.9	° ' " 74 17 27.5	<i>Feet.</i> 7,141
T road west, 40 feet west to iron bridge (magnetic declination, $9^{\circ} 43' W.$ ) .....	44 46 47.1	74 18 22.1	7,690
Four corners, 40 feet west to three mail boxes (magnetic declination, $10^{\circ} 10' W.$ ) .....	44 46 44.2	74 19 29.8	4,890
T road east, 30 feet northwest to three mail boxes (magnetic declination $11^{\circ} 38' W.$ ) .....	44 46 41.7	74 20 25.3	4,010
T road west, 70 feet southwest to log house (magnetic declination, $11^{\circ} 45' W.$ ) .....	44 46 09.3	74 20 21.4	3,298
Three corners, 20 feet southwest to maple tree (magnetic declination, $11^{\circ} 55' W.$ ) .....	44 45 50.9	74 21 19.0	4,550

## MALONE QUADRANGLE—Continued.

## Along highways near south border of quadrangle—Continued.

Station.	Latitude.	Longitude.	Distance between stations.
	° ' "	° ' "	Feet.
Skerry, 0.20 mile east of, 300 feet south of T road west, on west side north and south road, 15 feet west of road, in large granite boulder; tablet marked "Prim. Trav. Sta. 1914" (magnetic declination, 11° 55' W.).....	44 46 00.9	74 22 55.4	7,030
T road south, 150 feet southwest to house.....	44 46 33.9	74 22 59.6	3,359
Four corners, 70 feet northeast to church, 80 feet southwest to church, 100 feet southeast to schoolhouse (magnetic declination, 0° 25' W.).....	44 46 27.0	74 24 44.7	7,616
Four corners, 120 feet southwest to red house.....	44 46 23.1	74 25 53.0	4,940
Crossroad, 20 feet southeast to telegraph pole.....	44 46 20.4	74 27 12.1	5,713
T road north, 15 feet north to mail box.....	44 46 14.5	74 28 25.5	5,329
Skerry, about 2.8 miles west of, in south abutment of concrete bridge over small stream; tablet marked "Prim. Trav. Sta. No. 2, 1914".....	44 46 12.9	74 28 46.8	1,546
T road east, 20 feet east to mail box (magnetic declination, 1° 10' W.).....	44 46 11.8	74 29 06.9	1,450
T road south, on State road, 400 feet northeast large house.....	44 47 04.8	74 29 14.2	5,389
East Dickinson, T road north at.....	44 46 46.8	74 29 54.9	3,458

## Along highways near west border of quadrangle.

T road west, 160 feet northwest to schoolhouse.....	44 51 42.4	74 29 59.3	.....
Turn in road, 20 feet east to Mr. Keifer's mail box (magnetic declination, 13° 11' W.).....	44 57 30.0	74 29 44.1	.....
Crossroads, 70 feet northwest to brick house.....	44 58 02.4	74 29 36.4	3,324
Fort Covington, in southwest part of, three corners, 70 feet southeast to sign "Brushton 12 miles" (magnetic declination 12° 40' W.).....	44 59 11.6	74 29 45.9	7,041
Fort Covington, 900 feet east of Grand Trunk Ry. station, road crossing.....	44 59 52.19	74 29 36.8	4,155

## Along Ogdensburg &amp; Lake Champlain Railway from Brushton to Malone.

Brushton station, road crossing, 245 feet east of.....	44 49 48.6	74 30 32.9	.....
Road crossing, 110 feet west of milepost 65.....	44 50 24.9	74 27 00.2	.....
Bangor station, road crossing, 100 feet west of.....	44 51 05.2	74 24 11.2	.....
Road crossing, 620 feet west of milepost 60.....	44 51 30.9	74 21 35.8	.....
Overhead road crossing, 1,580 feet east of milepost 58.....	44 51 39.5	74 18 45.3	.....
Malone station, center of.....	44 50 58.3	74 17 34.2	.....
Malone Junction, crossing of Ogdensburg & Lake Champlain and Mohawk & Malone railways.....	44 51 30.4	74 16 30.0	.....
Malone, Franklin County fair grounds, south meridian monument <sup>a</sup> .....	44 50 48.4	74 16 41.4	.....
Malone, Franklin County fair grounds, north meridian monument <sup>a</sup> .....	44 50 58.1	74 16 41.4	.....

<sup>a</sup> These meridian marks are on a spur of both Kendall's and McNair's traverse. Kendall's values accepted.

## MOIRA QUADRANGLE.

## Along Rutland Railroad from milepost 79 to Brushton.

Station.	Latitude.	Longitude.
	° ' "	° ' "
Road crossing 1,120 feet east of milepost 79.....	44 47 58.2	74 43 09.8
Road crossing 960 feet east of milepost 77.....	44 48 12.6	74 40 46.6
Road crossing 1,965 feet west of milepost 75.....	44 48 25.1	74 39 02.2
Road crossing 2,070 feet east of milepost 74.....	44 48 49.6	74 36 57.7
Moira station, road crossing 185 feet west of.....	44 49 31.3	74 33 25.3
Moira station, about 1,130 feet east of, in rocky pasture about 95 feet south of the center of railway track; a bronze triangulation tablet set in rock outcrop about 1 foot above surface of ground, 70.5 feet from corner of pasture.....	44 49 33.7	74 33 07.4
Moira station, about 2,100 feet east of, in rocky pasture about 79 feet south of center of railway track; a bronze triangulation tablet set in boulder about 5 feet by 2 feet 6 inches above ground. (Tablets 972.65 feet apart).....	44 49 36.3	74 32 54.7
Brushton station, road crossing, 245 feet east of.....	44 49 48.6	74 30 32.9

## MOIRA QUADRANGLE—Continued.

Along Grand Trunk Railway from Massena Springs to Bombay.

Station.	Latitude.	Longitude.
	° ' "	° ' "
Center of bridge, 330 feet east of milepost 94.....	44 55 22.9	74 50 44.2
Road crossing 2,480 feet east of milepost 92.....	44 55 34.5	74 47 56.3
Road crossing 1,090 feet east of milepost 90.....	44 55 38.5	74 45 49.4
Helena station, New York & Ottawa Ry. crossing.....	44 55 26.9	74 43 02.1
Road crossing 2,045 feet west of milepost 85.....	44 55 35.7	74 40 32.1
Road crossing 1,670 feet west of milepost 83.....	44 55 43.9	74 38 01.1
Road crossing 245 feet west of milepost 82.....	44 55 50.6	74 36 28.5
Bombay station, northwest corner of.....	44 56 19.0	74 34 19.6
Bombay, church steeple.....	44 56 22.5	74 33 56.8

## Along New York Central &amp; Hudson River Railroad from Helena to Moira.

Ironton flag station, road crossing 380 feet north of.....	44 53 55.6	74 41 07.5
Road crossing 4,125 feet north of milepost 62.....	44 53 13.9	74 39 44.0
Road crossing 370 feet north of milepost 57.....	44 51 12.4	74 36 15.4
Road crossing one-half mile south of milepost 56.....	44 50 14.5	74 34 57.3

## Along highways near east border of quadrangle.

Station.	Latitude.	Longitude.	Distance between stations.
	° ' "	° ' "	Feet.
Private T road east to large house.....	44 48 19.6	74 30 01.8	.....
Brushton, 1 mile south of, T road east (magnetic declination, 12° 06' W.).....	44 48 52.4	74 30 05.8	3,329
Brushton station, 245 feet east of.....	44 49 48.6	74 30 33.0	6,012
Brushton, 0.60 mile north of, three corners (magnetic declination 13° 55' W.).....	44 50 15.7	74 30 54.0	3,132
Brushton, about 3.50 miles north of, in northeast corner of abutment of bridge over Little Salmon River; tablet stamped "Prim. Trav. Sta. No. 3, 1914".....	44 52 22.3	74 30 21.3	.....
Brushton, about 5 miles north of, four corners, 40 feet southwest to corner of barn (magnetic declination 11° 38' W.).....	44 53 41.9	74 30 51.2	8,341
Brushton, about 5.60 miles north of, on town line, 160 feet northwest to yellow house, T road north (magnetic declination 11° 32' W.).....	44 53 47.8	74 30 07.0	3,240
Brushton, about 6.20 miles north of, T road east, 400 feet northeast to house.....	44 54 18.3	74 30 11.1	3,098
Brushton, about 6.80 miles north of, three corners, road northwest, 40 feet through gate (magnetic declination 11° 32' W.).....	44 54 48.1	74 30 15.0	3,030
Fort Covington, about 4 miles south of, north and south road at fork southwest, 240 feet northwest to house.....	44 56 07.2	74 30 25.9	8,043
Fort Covington, about 3.40 miles south of, four corners, 100 feet southwest to red schoolhouse.....	44 56 42.7	74 30 31.6	3,611

## Along highways near south border of quadrangle.

T road south, 50 feet southeast to house, 100 feet southwest to house.....	44 46 23.1	74 30 46.2	.....
Red schoolhouse, 150 feet southwest of, T road north.....	44 45 48.4	74 32 00.4	6,410
T road south to Dickinson Center, 30 feet southwest to signpost.....	44 45 12.2	74 33 16.8	6,630
Drill hole in stone 10 by 10 feet and 2.50 feet above ground; 15 feet east to a +, 120 feet northwest to log house, 50 feet southeast to bars, at north and south road.....	44 45 17.7	74 36 15.2	.....
T road west, 150 feet southwest to red schoolhouse.....	44 46 12.9	74 36 23.8	5,617
Four corners, 40 feet southeast to two mail boxes.....	44 46 08.7	74 37 45.2	5,895
Lawrenceville, 0.50 mile southeast of, T road north.....	44 46 04.4	74 38 34.7	3,600
Lawrenceville, west part of, 70 feet southwest to brick house, three corners.....	44 46 20.4	74 39 18.8	3,565
Lawrenceville, 0.80 mile southwest of, 30 feet northeast to signpost, crossroads.....	44 46 10.5	74 40 18.3	4,410
Lawrenceville, 1.60 miles southwest of, 30 feet south to bridge, 30 feet west to bridge, crossroads.....	44 45 59.5	74 41 23.7	4,850
Lawrenceville, 2.80 miles southwest of, 80 feet northwest to cheese factory, 80 feet southwest to yellow house, four corners.....	44 45 43.2	74 42 50.9	6,510
Lawrenceville, 2.10 miles southwest of, 40 feet northeast to yellow schoolhouse, T road south.....	44 46 19.4	74 42 59.0	3,700
Lawrenceville, 1.30 miles southwest of, 20 feet northeast to mail box, 40 feet southeast to two mail boxes; four corners.....	44 47 00.6	74 43 02.2	4,176
Lawrenceville, 0.30 mile southwest of, 1,120 feet east of milepost No. 83 (formerly milepost No. 79), road crossing (lie to McNair's traverse line 1900), McNair's position accepted.....	44 47 58.2	74 43 09.8	5,847

Magnetic declination near south border of quadrangle, 12° 36' W.; near west border, 13° 08' W.

**NICHOLVILLE QUADRANGLE.**

Along highways near north border of quadrangle.

Stations.	Latitude.	Longitude.	Distance between stations.
	° ' "	° ' "	<i>Feet.</i>
Dickinson Center, 40 feet northwest to store, four corners.....	44 44 55.0	74 33 51.5	.....
Dickinson Center, 1.60 miles southwest of, 20 feet southwest to sign, 20 feet northwest to sign, four corners.....	44 44 12.2	74 35 31.4	8,419

Magnetic declination near north border of quadrangle, 12° 36' W.

**SANTA CLARA QUADRANGLE.**

On highways near north border of quadrangle.

Stations.	Latitude.	Longitude.	Distance between stations.
	° ' "	° ' "	<i>Feet.</i>
T road north, 30 feet northeast to three mail boxes (magnetic declina- tion, 23° 24' W.).....	44 44 45.4	74 15 20.8	.....
Lake Titus, at north end of, 40 feet east to store; three corners (mag- netic declination, 10° 18' W.).....	44 44 31.6	74 17 19.0	.....

## PENNSYLVANIA.

### TRIANGULATION STATIONS.

#### Carnegie quadrangle.

#### ALLEGHENY COUNTY.

For the purpose of testing the accuracy of distances between triangulation stations in southwestern Pennsylvania established by the United States Geological Survey in 1899 and 1900 (see Bulletin 181), a check base was measured in the spring of 1914 near Carnegie and expanded to stations Hickman, McDonald, and Union Church. All of the observations were made independently by two observers, S. S. Gannett and G. T. Hawkins. The base, 7,000 feet in length, was measured twice along a tangent of the Wabash Railroad southeast of Carnegie using United States Geological Survey invar tape 3 T. The two measurements uncorrected for temperature differed by 0.02 foot, and allowing for difference of temperature the discrepancy was 0.001 foot. Angles at all stations were measured at least 10 times by Mr. Hawkins, using 8-inch theodolite No. 424, reading by micrometers to 2 seconds of arc, and were also measured independently 10 times or more by Mr. Gannett, using 8-inch micrometer theodolite No. 435. In making a final computation all these angles were combined and a least-square figure adjustment made, 7 stations in the scheme forming two figures.

The tape as compared at the Bureau of Standards, Washington, D. C., April 20, 1914, was found to be 299.98 feet in length. After the work was completed it was tested again on May 20, 1914, by the Bureau of Standards and found to be 299.9796 feet in length—that is, practically no change had been made in the length of the tape by use in measurement.

Each end of the base is in a deep cut and in order to expand to the triangulation stations it was necessary to transfer the north end to the embankment 65 feet west of the track and to transfer the south end to the embankment 32 feet east of the track. An iron post  $3\frac{1}{2}$  inches in diameter and 4 feet in length was set as a permanent mark on the bank at each end as thus transferred and a tripod signal erected exactly over center of each post.

The distance measured along the track was then computed, using value of tape 299.98 feet as follows:

	Feet.
23½ tapes $\times$ 299.98 feet.....	6,999.530
Reduction to horizontal.....	— .120
Reduction to sea level.....	— .300
Correction for temperature, reduction to 62° F.....	+ .053
Length of base on track reduced to sea level.....	6,999.163

The distance from signal to signal was then computed allowing for the offset at each end of base, the result obtained being 6,999.824 feet, log. meters = 3.3291030.

Using the latter value in log. meters, distances were computed from the base through 10 triangles to lines of the old triangulation Hickman-McDonald, Hickman-Union United Presbyterian Church and McDonald-Union United Presbyterian Church, the new values for these distances being shorter than the old ones by one part in 16,000, or less than 4 inches in a mile, thus proving the error in the old work smaller than one would expect in triangulation extended for topographic control and not for geodetic purposes.

In 1900 a check on distance derived from the Hillside base was made on the line St. Clair-Morley, near the Pennsylvania-West Virginia State line; the value from Hillside base being long by 1 foot in 9,222. In 1901 another check on distance was made in the line Palmer-McCoy in Indiana County, the value from Hillside base being long by 1 foot in 9,600. In Allegheny County the distances which have been used are therefore much nearer correct than those between stations further removed from the Hillside base.

#### CARNEGIE NORTH BASE, ALLEGHENY COUNTY, PA.

Situated 0.1 mile north of Wabash-Pittsburgh Terminal Station at Carnegie, on bank of cut west of railroad, 65.5 feet west of west rail.

Signal: A lumber tripod over center.

Station mark: An iron bench-mark post set  $3\frac{1}{2}$  feet in ground.

Reference marks: 14.15 feet west to curb inside line on east side of paved street; southeast corner of two-story house 139.8 feet true azimuth  $178^{\circ} 59'$ ; south end of straight curb line 137 feet on west side of paved street, true azimuth  $38^{\circ} 26'$ .

[Latitude  $40^{\circ} 24' 21.58''$ . Longitude  $80^{\circ} 04' 39.48''$ .]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Feet.
Carnegie South Base.....	21 20 35.37	201 20 14.03	3.3291030	6,999.82
Hickman.....	41 54 42.46	221 52 03.48	3.9380110	28,444.30
Ewing.....	96 17 25.65	276 15 48.83	3.5493665	11,623.87

#### CARNEGIE SOUTH BASE, ALLEGHENY COUNTY, PA.

Situated 1.3 miles south of Carnegie railroad station, Wabash-Pittsburgh Terminal, 31 feet east of track, 5 feet east of edge of steep bank of railroad cut and about 100 feet south of the south end of tangent.

Signal: A tripod over center.

Station mark: An iron bench-mark post set in ground; top projects 6 inches above surface.

Reference marks: Center of oil well, 121.5 feet distant, true azimuth  $8^{\circ} 46'$ ; nail in blaze in maple tree, 102.5 feet distant, azimuth  $250^{\circ} 43'$ .

[Latitude  $40^{\circ} 23' 17.15''$ . Longitude  $80^{\circ} 05' 12.40''$ .]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Feet.
Hickman.....	48 18 56.53	228 16 38.91	3.8269992	22,028.42
Ewing.....	130 51 52.40	310 50 36.94	3.5599303	11,910.07
Carnegie North Base.....	201 20 14.03	21 20 35.37	3.3291030	6,999.82

## EWING, ALLEGHENY COUNTY, PA.

A station in the base expansion, on a cleared ridge 2 miles west of Carnegie, on land owned by Mr. Ewing, 400 yards southwest of his house, occupied by a renter.

Signal: A lumber tripod over center.

Station mark: An iron bench-mark post set 3 feet in ground.

Reference marks: (1) Nail in dead cedar tree on southwest side of hill, 45.0 feet distant, true azimuth  $41^{\circ} 13'$ ; (2) nail in cherry tree on northeast side of hill, 163.3 feet distant, true azimuth  $199^{\circ} 59'$ .

[Latitude  $40^{\circ} 24' 34.14''$ . Longitude  $80^{\circ} 07' 08.84''$ .]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Feet.
Hickman.....	18 19 48.79	198 18 46.57	3.8577430	23,644.34
Oakdale.....	56 51 33.76	236 49 30.47	3.7291087	17,583.00
Union United Presbyterian Church.....	145 28 25.97	325 27 14.09	3.6636188	15,121.78
Carnegie North Base.....	276 15 48.83	96 17 25.65	3.5493665	11,623.87
Carnegie South Base.....	310 50 36.94	130 51 52.40	3.5599303	11,910.07

## OAKDALE, ALLEGHENY COUNTY, PA.

In a cultivated field on a cleared ridge 1.5 miles south of Oakdale, and 0.25 mile southeast of house of Mr. Watters. The land is owned by the Boys' Industrial Home.

Signal: A quadripod of sawed lumber over center of mark.

Station mark: An iron bench-mark post set 3.2 feet in ground.

Reference mark: Nail in tree 63.9 feet distant, true azimuth  $217^{\circ} 37'$ . Wire fence is 7.2 feet northwest.

[Latitude  $40^{\circ} 22' 59.11''$ . Longitude  $80^{\circ} 10' 19.08''$ .]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Feet.
McDonald.....	62 59 10.54	242 57 01.99	3.7206852	17,245.25
Union United Presbyterian Church.....	195 32 27.66	15 33 19.14	3.8440840	22,012.26
Ewing.....	236 49 30.47	56 51 33.76	3.7291087	17,583.00
Hickman.....	330 22 30.99	150 23 32.00	3.6530044	14,756.67

## HICKMAN, ALLEGHENY COUNTY, PA.

On a bald hill in South Fayette Township,  $2\frac{1}{2}$  miles southwest of Bridgeville, on land belonging to William Hickman, who lives on south side of hill.

Station mark: A sandstone post 30 by 12 by 12 inches, set 28 inches in the ground, in the center of top of which is cemented a bronze tablet marked "U. S. Geological Survey—Pennsylvania."

[Latitude  $40^{\circ} 20' 52.33''$ . Longitude  $80^{\circ} 08' 44.87''$ .]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	Log. meters.	Feet.
Oakdale.....	150 23 32.00	330 22 30.99	3.6530044	14,756.67
Ewing.....	198 18 46.57	18 19 48.79	3.8577430	23,644.33
Carnegie North Base.....	221 52 03.48	41 54 42.46	3.9380110	28,444.30
Carnegie South Base.....	228 16 38.91	48 18 56.53	3.8269992	22,028.42
Canonsburg <sup>a</sup> .....	14 35 39.2	194 34 17.5	4.0737263	
McDonald <sup>a</sup> .....	102 26 54.8	282 23 45.3	3.8495728	23,203.69
			<sup>b</sup> 3.8495456	23,202.24
Union United Presbyterian Church <sup>a</sup> .....	178 07 14.0	358 07 04.4	4.0271348	34,923.60
			<sup>b</sup> 4.0271076	34,921.41
Shannon <sup>a</sup> .....	262 57 02.4	85 01 46.0	4.0175377	

<sup>a</sup> From Hillside base.

<sup>b</sup> From Carnegie base.

## McDONALD, WASHINGTON COUNTY, PA.

In a field at the highest part of a hill half a mile south of McDonald, on land owned by Mr. William F. Wood, who lives on the southeast side of hill.

Station mark: A sandstone post 31 by 7 by 7 inches, set 55 inches in the ground, in the center of top of which is cemented a bronze triangulation tablet marked "U. S. Geological Survey—Pennsylvania."

Reference marks: A large black-oak line tree at the north boundary fence, 275 feet distant. A large white-oak line tree at the west boundary fence, 303 feet distant.

[Latitude 40° 21' 41.66". Longitude 80° 13' 37.56".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	<i>Log. meters.</i>	<i>Feet.</i>
Oakdale.....	242 57 01.99	62 59 10.54	3.7206852	17,245.25
Union United Presbyterian Church.....	215 40 45.6	35 43 45.7	4.0503035	36,837.31
Hickman.....	282 23 45.3	102 26 54.8	b4.0502763	36,835.00
Garrett <sup>a</sup> .....	27 46 53.9	207 43 09.8	3.8495728	23,203.69
Dickson <sup>a</sup> .....	162 21 09.3	342 18 57.4	b3.8495456	23,202.24
Shannon <sup>a</sup> .....	270 46 02.6	90 53 55.8	4.2450948	
Canonsburg <sup>a</sup> .....	343 09 24.7	161 11 12.3	4.1985263	
			4.2365717	
			4.1326119	

<sup>a</sup> From Hillside base.

<sup>b</sup> From Carnegie base.

## UNION UNITED PRESBYTERIAN CHURCH, ALLEGHENY COUNTY, PA.

A brick church with a square tower on its northeast corner, situated on a hill 1 mile west of Remington, on the Steubenville pike.

Station mark: Center of tower.

[Latitude 40° 26' 37.25". Longitude 80° 08' 59.69".]

To station—	Azimuth.	Back azimuth.	Distance.	
	° ' "	° ' "	<i>Log. meters.</i>	<i>Feet.</i>
Oakdale.....	15 33 19.14	195 32 27.66	3.8440840	22,912.26
Ewing.....	325 27 14.09	145 28 25.97	3.6636188	15,121.78
McDonald <sup>a</sup> .....	35 43 45.7	215 40 45.6	4.0503035	36,837.31
Hickman <sup>a</sup> .....	358 07 04.4	178 07 14.0	b4.0502763	36,835.00
Dickson <sup>a</sup> .....	117 40 04.8	297 34 52.5	4.0271348	34,923.60
Weir <sup>a</sup> .....	173 11 33.3	353 10 40.1	b4.0271076	34,921.41
Greentree <sup>a</sup> .....	243 05 13.9	63 10 18.2	4.1070426	
Calhoun <sup>a</sup> .....	294 06 16.4	114 14 59.9	4.2101067	
Shannon <sup>a</sup> .....	311 13 32.8	131 18 26.2	4.0926886	
			4.3196701	
			4.1524041	

<sup>a</sup> From Hillside base.

<sup>b</sup> From Carnegie base.