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Special Publication No. 182

LEVELING IN NEW HAMPSHIRE AND VERMONT

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LEVELING IN NEW HAMPSHIRE AND VERMONT

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GENERAL STATEMENT

This publication contains the descriptions and elevations of bench marks in the States of New Hampshire and Vermont, the elevations of which have been determined by first-order leveling executed by the Coast and Geodetic Survey.

Approximately 500 miles of first-order leveling have been run within the limits of these two States, as follows: New Hampshire, 100 miles; Vermont, 400 miles.

The several lines are listed below together with the years in which the field work was done:

Line 1, Rouses Point, N.Y., to Portland, Maine (part).....	1922
Line 2, Portland, Maine, to Boston, Mass. (part).....	1923
Line 3, Chicopee, Mass., to Bellows Falls, Vt. (part).....	1927
Line 4, Bellows Falls, Vt., to Whitehall, N.Y. (part).....	1927
Line 5, Bellows Falls to Thetford, Vt.....	1927
Line 6, St. Johnsbury to Thetford, Vt.....	1927

A short paragraph descriptive of each line will be found at the beginning of the list of descriptions and elevations of the bench marks along the line.

INSTRUMENTS AND FIELD METHODS

The first-order leveling by the Coast and Geodetic Survey in New Hampshire and Vermont was all run with instrumental equipment either exactly like, or very similar to, that described in Coast and Geodetic Survey Special Publication No. 129, Geodetic Level and Rod. The field work was done in accordance with instructions and specifications given in Coast and Geodetic Survey Special Publication No. 140, Manual of First-order Leveling.

COMPUTATIONS AND ADJUSTMENTS

The office computation of the leveling done by this Bureau in New Hampshire and Vermont was carried out in accordance with the instructions given in Special Publication No. 140, Manual of First-order Leveling. Rod and temperature corrections were applied to the observed differences and, in cases where it was necessary, the level corrections and the corrections for index errors of the rods were also applied.

These corrections, with modern leveling equipment, especially with well-graduated invar rods, are exceedingly small and usually are of small moment except in mountainous country where large differences in elevation are encountered.

The computations and corrections were carried to four decimal places in meters until the final elevations were derived, when they were rounded off to the nearest millimeter for publication. The elevations in feet were determined by converting the metric elevations, using the factor, 1 meter = 3.2808333 feet.

At the time of the 1912 adjustment of the precise level net in the United States, the only precise leveling in New England which could be included in the adjustment was the Van Orden line from Boston, Mass., to Albany, N.Y. This line was included in the adjustment, but the details of the line as then adjusted were never published by the Coast and Geodetic Survey.

In 1928, in order to furnish consistent elevations throughout the New England area to engineers and others who would have need of the data, the New England preliminary adjustment was made, and the descriptions of bench marks with the elevations based on that adjustment were issued in the form of ditto copies of the manuscript lists.

THE 1929 GENERAL ADJUSTMENT

By 1929, so much additional leveling had been run throughout the United States that a new general adjustment was needed. It was believed that the net would be considerably strengthened by the introduction of the first-order leveling of Canada. Upon request, the Geodetic Survey of Canada kindly placed at the disposal of this Bureau, the results of some 20,000 miles of first-order leveling in the Dominion of Canada. This leveling combined with about 40,000 miles of leveling in the United States, was all adjusted in a single least-squares adjustment in which mean sea level was held at zero, as observed at 26 tidal stations (21 in the United States and 5 in Canada). The elevations resulting from the general adjustment are the best elevations obtainable from the data available at the time of the adjustment. All of the leveling included in this publication was

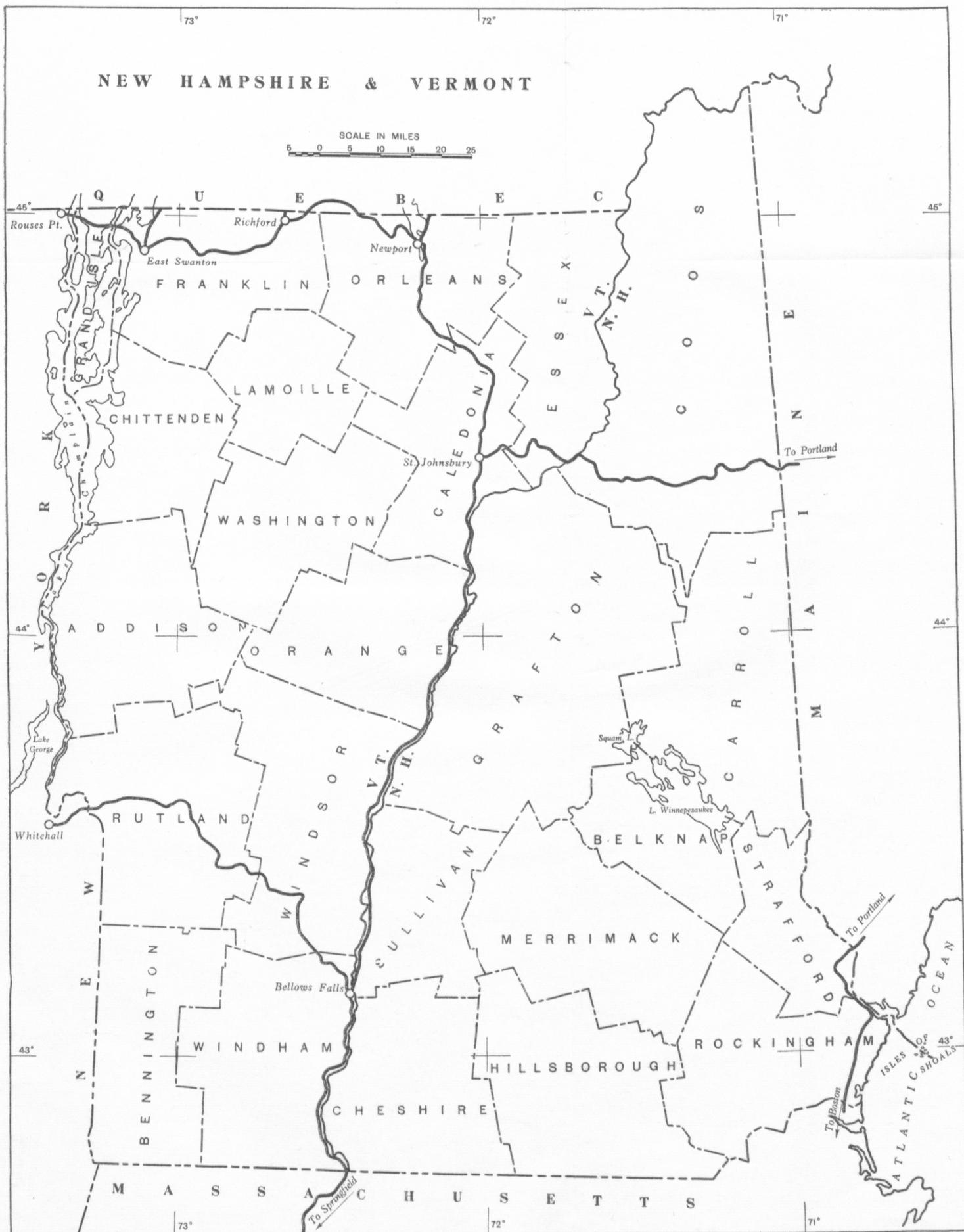


FIGURE 1.—Index map, showing leveling in New Hampshire and Vermont.

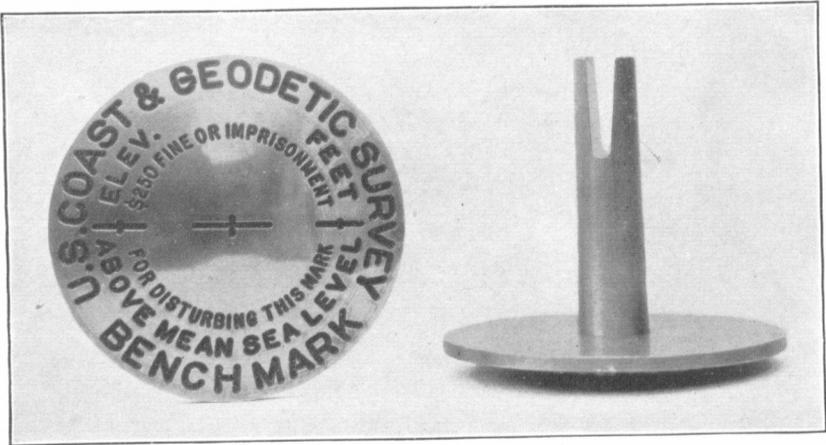


FIGURE 3.—STANDARD BENCH MARK DISK, SHOWING SHANK BY WHICH IT IS FASTENED IN PLACE.

included in the 1929 general adjustment, and the elevations given in this publication are the direct result of fitting the various lines to the elevations of the junction bench marks as determined by that adjustment.

ORTHOMETRIC CORRECTION

Owing to the fact that the earth is an oblate spheroid, level surfaces at different elevations are not parallel but tend to converge slightly toward the poles of the earth. This necessitates the application of an orthometric correction to the observed differences of elevation in order that the resulting elevations of the bench marks may represent their true height above the sea-level surface. The orthometric correction and the methods used in computing it are discussed in detail in Special Publication No. 140, Manual of First-order Leveling.

The orthometric correction reaches a maximum on north-and-south lines run at high elevations, and it is zero on east-and-west lines. The orthometric correction has been applied to the leveling included in this publication. In order that persons using this publication may form an idea as to the order of size of the orthometric correction, the following example is cited:

The difference in elevation between two bench marks at about the latitude of St. Johnsbury, Vt., in such locations that their geographic latitudes would differ by 2 minutes and the average elevation of the line of levels connecting them would be 500 feet, would require an orthometric correction of 0.0015 foot. This correction varies directly with the average elevation and with the difference in latitude between the marks and depends slightly upon the latitude. Tables for use in computing the orthometric correction are given in Special Publication No. 140.

BENCH MARKS

The standard bench-mark disk now used by the Coast and Geodetic Survey is shown in figures 2 and 3. These disks are set in existing structures, in concrete posts cast in place for the special purpose, and in outcrops of rock where such outcrops are available. The concrete posts extend deep enough below the surface of the ground to be reasonably free from disturbance by frost action. They usually project a few inches above the ground to aid in their recovery.

In this publication will be found the descriptions and elevations for many points not marked with the standard disks of this Bureau. The United States Geological Survey established many of the bench marks which are included in the publication and a standard disk, somewhat similar to that used by the Coast and Geodetic Survey, forms the standard type of mark used by that bureau. In all other cases, the character of the mark is given with the description.

In starting new leveling, difficulty is sometimes encountered by field parties in connecting with bench marks which are disks set vertically in walls or which are small chiseled squares with the elevations referred to the bottoms of the holes. The wall bench marks present no difficulty if the levelman uses a tape instead of a rod in taking the sight on the bench mark. If the mark is high on the wall, a tape can be allowed to hang down from the mark, giving a "minus backsight" or a "plus foresight."

In connecting with the bottom of a chiseled square which is too small to admit the foot of an ordinary level rod, a small block can be put in the hole. The rod is held on it for the backsight and the same block is carried forward and placed on the first turning point while the foresight is being taken. Then, if the block is removed from the first turning point before the next backsight is taken, the elevation carried forward will be the same as if the rod had been held directly on the bottom of the square. A $\frac{3}{4}$ -inch length of $\frac{1}{2}$ - or $\frac{5}{8}$ -inch dowel stick, or a similar piece of metal rod, makes an excellent block for use in small chiseled squares.

COOPERATION IN THE PRESERVATION OF BENCH MARKS

A bench mark is useful only as long as it is recoverable. When changes occur, as they often do, in the surrounding natural and

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 685
Ed. Oct., 1929

R

REPORT ON CONDITION OF BENCH MARK

Designation of mark F 14 State Texas County Mitchell
 Mark searched for or recovered by—(Name) Robert Muldrow
 Date June 14, 1929 (Occupation) Engineer
 (Address) Mims Bldg., Abilene, Tex.
 Present condition of the mark Good
 Letters or numbers found stamped on (not cast in) the mark None

Use the following space for reporting upon the thoroughness of the search in case mark was not recovered, or for suggesting needed changes in the published description, if the mark was recovered

This mark in good condition and has not been disturbed. The railroad station mentioned in the description has been moved one and one-half miles east.

U. S. GOVERNMENT PRINTING OFFICE: 1929

Signed Robert Muldrow

FIGURE 4.—Facsimile of Form 685, Report on Condition of Bench Mark.

cultural features with relation to which the mark is described, it becomes increasingly difficult to find the mark by means of the published description. Engineers and others who have occasion to visit any bench marks established by this Bureau or other Government organizations will be doing a public service if they will report the condition of the marks and make suggestions as to needed changes in the descriptions.

Form 685, Report on Condition of Bench Mark (see fig. 4) is a 5- by 8-inch card with blanks to be filled in regarding the condition of a mark. Copies of this form will be furnished on request to anyone who may have occasion to visit any of these marks. Envelopes addressed to the Director, United States Coast and Geodetic Survey, Washington, D.C., and requiring no postage, will also be furnished for returning these reports.

The Coast and Geodetic Survey proposes to issue from time to time, probably in the form of mimeographed sheets, supplements to this publication and to other State leveling publications, in which will be given such changes in description as may be reported to this

office by engineers and others who have visited any of the marks and found the descriptions to be in need of revision. Persons or organizations who have copies of this publication and who wish to receive the supplements as they are issued should write to the Director, United States Coast and Geodetic Survey, Washington, D.C., stating the title and number of the publication for which supplements are desired.

DESCRIPTIONS AND ELEVATIONS OF BENCH MARKS

LINE I, ROUSES POINT, N.Y., TO PORTLAND, MAINE (PART)

[*First-order leveling*]

This line enters Vermont in the vicinity of Alburgh and follows the Central Vermont Railway to Swanton, the St. Johnsbury & Lake Champlain Railroad to Sheldon Junction, the Central Vermont Railway to Richford, the Canadian Pacific Railway, through Newport, to St. Johnsbury, the Maine Central Railroad, through Lunenburg, Vt., to Whitefield, N.H., the Boston & Maine Railroad to Gorham, and the Grand Trunk Railway, through Shelburne, N.H., toward Portland, Maine. Three spur lines were run, from East Swanton, Vt., to St. Armand, Quebec, from Richford, Vt., to Abercorn, Quebec, and from Newport, Vt., to Stanstead, Quebec, to connect with leveling by the Geodetic Survey of Canada. The field work on the portion of the line from Rouses Point, N.Y., to Richford, Vt., was done, during the summer of 1922, by a party in charge of H. G. Avers, mathematician. The remainder of the field work was done, during the summer and fall of 1922, by a party in charge of D. B. Pheley, junior engineer.

A 1=124 (U.S.G.S.).—At **Alburgh**, Grand Isle County, about 500 feet east of the Central Vermont Railway station, north across the tracks from the tanks of the Standard Oil Co., in a boulder. A United States Geological Survey standard disk, stamped "124." (37.737 meters or 123.809 feet.)

B 1.—About 2 miles west along the Central Vermont Railway from **East Alburgh**, Grand Isle County, at a road crossing, 50 feet north of the track, and 20 feet west of the road, in a large boulder. A standard disk, stamped "B 1 1922." (32.416 meters or 106.351 feet.)

C 1=117 (U.S.G.S.).—At **East Alburgh**, Grand Isle County, at Hayden and Hayden's store, in the lower concrete step. A United States Geological Survey standard disk, stamped "117." (35.449 meters or 116.302 feet.)

D 1.—About 1 mile east along the Central Vermont Railway from **East Alburgh**, Grand Isle County, at the station at **Lakewood**, about 5 feet east of a road, and 30 feet north of the track, at the fence line. A standard disk, stamped "D 1 1922" and set in the top of a concrete post. (32.202 meters or 105.649 feet.)

DX 1=102 (U.S.G.S.).—About 4 miles northwest along the Central Vermont Railway from **Swanton**, Franklin County, about 375 feet southeast of milepost 11, and 5 feet west of the track, in a small boulder. A United States Geological Survey standard disk, stamped "102." (30.905 meters or 101.394 feet.)

E 1.—About 3½ miles northwest along the Central Vermont Railway from **Swanton**, Franklin County, about ½ mile south of milepost 11, at the approach of the river road to the railroad, 5 feet east of the track, near the fence line. A standard disk, stamped "E 1 1922" and set in the top of a concrete post. (31.291 meters or 102.661 feet.)

F 1.—At **Swanton**, Franklin County, about 1,200 feet northwest of the Central Vermont Railway station, across the road from an elevator, at the east fence line. A standard disk, stamped "F 1 1922" and set in the top of a concrete post. (40.843 meters or 133.999 feet.)

G 1=137 (U.S.G.S.).—At **Swanton**, Franklin County, at the southwest corner of the Central Vermont Railway station, in the concrete platform. A United States Geological Survey standard disk, stamped "137." (41.819 meters or 137.201 feet.)

H 1.—At **Swanton**, Franklin County, at the high school building, at the right of the entrance, and about 4 feet higher than the ground. A standard disk, stamped "H 1 1922" and set vertically. (47.844 meters or 156.968 feet.)

J 1.—At **East Swanton**, Franklin County, opposite the Central Vermont Railway station, at the junction of the Central Vermont Railway and the St. Johnsbury & Lake Champlain Railroad, 50 feet west of the track of the former, and 20 feet south of the track of the latter. A standard disk, stamped "J 1 1922" and set in the top of a concrete post. (46.698 meters or 153.208 feet.)

Spur line to St. Armand, Quebec, Canada.

K 1.—About 2 miles north along the Central Vermont Railway from **East Swanton**, Franklin County, 20 feet south of a road crossing, and 10 feet east of the track. A standard disk, stamped "K 1 1922" and set in the top of a concrete post. (48.537 meters or 159.242 feet.)

L 1=135 (U.S.G.S.).—About 3 miles north along the Central Vermont Railway from **East Swanton**, Franklin County, and about 350 feet south of milepost 30, in the west end of a culvert. A United States Geological Survey standard disk, stamped "135." (41.254 meters or 135.347 feet.)

M 1.—At **Highgate Springs**, Franklin County, on the Central Vermont Railway, at the first road crossing north of the station, 10 feet west of the track, and 5 feet north of the road. A standard disk, stamped "M 1 1922" and set in the top of a concrete post. (36.003 meters or 118.120 feet.)

O 1.—About $3\frac{1}{2}$ miles north along the Central Vermont Railway from **Highgate Springs**, Franklin County, and 50 feet west of the track, in the concrete base of United States-Canada Boundary Monument 627 A. A standard disk, stamped "O 1 1922." (35.062 meters or 115.033 feet.)

For additional bench marks in this vicinity, see Geodetic Survey of Canada Publication No. 17, "Precise Levelling in Quebec South of St. Lawrence River."

End of the spur line.

P 1.—Destroyed. (68.720 meters or 225.459 feet.)

Q 1=308 (U.S.G.S.).—At **Highgate**, Franklin County, at the high-school building, at the rear entrance, in the top concrete step. A United States Geological Survey standard disk, stamped "308." (93.928 meters or 308.162 feet.)

R 1.—About 2 miles east along the St. Johnsbury & Lake Champlain Railroad from **Highgate**, Franklin County, and about 250 feet west of a road crossing, in the south end of a culvert. A standard disk, stamped "R 1 1922." (97.301 meters or 319.228 feet.)

S 1=316 (U.S.G.S.).—About $\frac{1}{2}$ mile northwest along the St. Johnsbury & Lake Champlain Railroad from **East Highgate**, Franklin County, and 10 feet south of the track, in the east end of a culvert under a road. A United States Geological Survey standard disk, stamped "316." (96.441 meters or 316.407 feet.)

T 1.—About $1\frac{1}{2}$ miles southeast along the St. Johnsbury & Lake Champlain Railroad from **East Highgate**, Franklin County, at a road crossing, 10 feet south of the track, and 10 feet east of the road. A standard disk, stamped "T 1 1922" and set in the top of a concrete post. (119.007 meters or 390.442 feet.)

U 1.—Destroyed. (107.010 meters or 351.082 feet.)

V 1.—At **Sheldon Junction**, Franklin County, 75 feet east of the track of the Central Vermont Railway, and 50 feet north of the track of the St. Johnsbury & Lake Champlain Railroad, near a pole. A standard disk, stamped "V 1 1922" and set in the top of a concrete post. (105.776 meters or 347.033 feet.)

W 1=P 3 (U.S.G.S.).—About 0.4 mile east along the Central Vermont Railway from **North Sheldon**, Franklin County, about 0.2 mile east of a road crossing, about 110 feet northeast of milepost 15, about 180 feet northwest of a trestle, and 25 feet north of a fence, in a field, in the south side of a boulder about 6 feet in diameter. A United States Geological Survey standard disk, stamped "P 3 1922 VT." (114.395 meters or 375.311 feet.)

X 1=P 4 (U.S.G.S.).—About $1\frac{1}{2}$ miles west along the Central Vermont Railway from **Enosburg Falls**, Franklin County, about 125 feet north of the track, and $1\frac{1}{2}$ feet north of the north fence line, in the smooth top of a boulder about 20 feet long and 10 feet wide. A United States Geological Survey standard disk, stamped "P 4 1922 VT." (118.850 meters or 389.927 feet.)

Y 1=P 5 (U.S.G.S.).—At **Enosburg Falls**, Franklin County, at the corner of Main and School Streets, 8 feet south of the entrance to the post office, in the

first concrete step above the sidewalk. A United States Geological Survey standard disk, stamped "P 5 1922 VT." (128.768 meters or 422.466 feet.)

Z 1=P 6 (U.S.G.S.).—About 2 miles east along the Central Vermont Railway from **Enosburg Falls**, Franklin County, about 1,300 feet west of milepost 8, beside the public road, 18 feet south of the south fence line, in the top of a granite boulder about 10 feet long and 6 feet wide. A United States Geological Survey standard disk, stamped "P 6 1922 VT." (131.694 meters or 432.066 feet.)

A 2=P 12 (U.S.G.S.).—At **East Berkshire**, Franklin County, at the entrance to the public school building, in the top concrete step. A United States Geological Survey standard disk, stamped "P 12 1922." (134.185 meters or 440.239 feet.)

B 2=P 13 (U.S.G.S.).—About 2 miles south along the Central Vermont Railway from **Richford**, Franklin County, 0.4 mile south of milepost 2, on the east side of the track, 1½ feet east of the right-of-way fence, in a cleared field, in the top of a granite boulder about 6½ feet long and 5½ feet wide. A United States Geological Survey standard disk, stamped "P 13 1922 VT." (131.344 meters or 430.918 feet.)

C 2=P 14 (U.S.G.S.).—At **Richford**, Franklin County, at the town hall, at the front entrance, 16 feet north of the door, in the top concrete step. A United States Geological Survey standard disk, stamped "P 14 1922 VT." (145.461 meters or 477.233 feet.)

Spur line to Abercorn, Quebec, Canada.

D 2.—Destroyed. (143.514 meters or 470.846 feet.)

55 (G.S.C.).—About 1 mile south along the Canadian Pacific Railway from **Abercorn**, Quebec, at mileage 25.8, and about 250 feet north of the crossing of the Waterloo-Newport highway, in the center of the east face of a concrete culvert. A copper bolt, stamped "G.S.C.B.M." (150.327 meters or 493.198 feet.)

For additional bench marks in this vicinity, see Geodetic Survey of Canada Publication No. 17, "Precise Levelling in Quebec South of St. Lawrence River."

End of the spur line.

E 2.—Destroyed. (151.316 meters or 496.443 feet.)

F 2.—At **Missisquoi**, Franklin County, about 300 feet south of the Canadian Pacific Railway station, at a railroad water tank, in the west face of the south-west concrete pier. A standard disk, stamped "F 2 1922." (156.801 meters or 514.438 feet.)

G 2.—At **Missisquoi**, Franklin County, about 300 feet north of the Canadian Pacific Railway station, and about 20 feet west of the track, in United States-Canada Boundary Monument 596. A standard disk, stamped "G 2 1922." (155.815 meters or 511.203 feet.)

H 2.—At **North Troy**, Orleans County, about 500 feet west of the Canadian Pacific Railway station, 20 feet east of a water tank, and 8 feet south of the track, in the top of the south head wall of a concrete culvert. A standard disk, stamped "H 2 1922." (184.458 meters or 605.176 feet.)

NOTE.—A report dated April 21, 1932, stated that the top of the head wall had heaved up about 2 inches on one end and about ½ inch on the other. The elevation of the bench mark has probably changed.

J 2.—About 1 mile east along the Canadian Pacific Railway from **North Troy**, Orleans County, at a steel girder bridge over a highway, in the top of the north end of the east abutment. A standard disk, stamped "J 2 1922." (187.532 meters or 615.261 feet.)

K 2.—About 3 miles northwest along the Canadian Pacific Railway from **Center**, Orleans County, at a grade crossing, 30 feet north of the center line of the road, and 10 feet east of the track, in the top of the north end of the east head wall of a concrete culvert. A standard disk, stamped "K 2 1922." (206.952 meters or 678.975 feet.)

L 2.—At **Center**, Orleans County, about 800 feet southeast of the Canadian Pacific Railway station, at a large concrete arch culvert, in the top of the west end of the south spandrel wall. A standard disk, stamped "L 2 1922." (236.678 meters or 776.501 feet.)

M 2.—At **Center**, Orleans County, on the Canadian Pacific Railway, about 500 feet south of the crossroads in the town, at a steel girder bridge over the main highway, in the top of the south end of the east abutment. A standard disk, stamped "M 2 1922." (241.514 meters or 792.367 feet.)

N 2.—About $\frac{1}{2}$ mile northeast along the Canadian Pacific Railway from **Center**, Orleans County, at a grade crossing, about 100 feet south of the center line of the road, in the top of the south end of the west head wall of a concrete culvert. A standard disk, stamped "N 2 1922." (251.146 meters or 823.968 feet.)

O 2.—About 2 miles northeast along the Canadian Pacific Railway from **Center**, Orleans County, about 200 feet west of the station at **Summit** siding, at a road crossing, 15 feet west of the track, and 15 feet south of the center line of the road, in a granite boulder. A standard disk, stamped "O 2 1922." (281.630 meters or 923.981 feet.)

P 2.—About 2 miles west along the Canadian Pacific Railway from **Newport**, Orleans County, at an overhead highway bridge, in the southwest concrete pier. A standard disk, stamped "P 2 1922." (232.732 meters or 763.555 feet.)

Q 2 = **MMCCCXXXIII (C.P.W.D.)**.—At **Newport**, Orleans County, at the steamer wharf on Lake Memphremagog, in the concrete base of the lighthouse. A copper bolt. (208.456 meters or 683.909 feet.)

Spur line to Stanstead, Quebec, Canada.

MMCCCXXXI (C.P.W.D.).—About $2\frac{1}{2}$ miles north along the Quebec Central Railway from **Newport**, Orleans County, in the west head wall of a concrete culvert. A copper bolt, with "MMCCCXXXI" cut in the concrete. (211.036 meters or 692.374 feet.)

NOTE.—This culvert was reported in 1922 as having been filled by frost action.

MMCCCXXXIV (C.P.W.D.).—About 850 feet west along the Quebec Central Railway from the station at **Beebe Junction**, Quebec, about 100 feet east of a road crossing, in the north head wall of an iron-pipe culvert, about 3 feet lower than the track. A copper bolt, with "MMCCCXXXIV" cut in the concrete. (225.811 meters or 740.848 feet.)

For additional bench marks in this vicinity, see Geodetic Survey of Canada Publication No. 17, "Precise Levelling in Quebec South of St. Lawrence River."

End of the spur line.

R 2.—At **Newport**, Orleans County, in the north wall of the post office, midway between the entrance and the northeast corner. A standard disk, stamped "R 2 1922" and set vertically. (220.387 meters or 723.053 feet.)

S 2.—About $1\frac{1}{2}$ miles south along the Canadian Pacific Railway from **Newport**, Orleans County, at a concrete culvert, in the east retaining wall. A standard disk, stamped "S 2 1922." (210.946 meters or 692.079 feet.)

NOTE.—A report dated July 28, 1932, stated that the east retaining wall of the culvert was about 1 foot out of plumb. The elevation of this mark has probably changed.

T 2.—About $4\frac{1}{2}$ miles north along the Canadian Pacific Railway from **Orleans**, Orleans County, and about 400 feet west of **Coventry** station, at the north side of the road to Coventry, in a boulder. A standard disk, stamped "T 2 1922." (220.355 meters or 722.948 feet.)

U 2.—About 2 miles north along the Canadian Pacific Railway from **Orleans**, Orleans County, and about $\frac{1}{4}$ mile south of a road crossing, in the west end of the south abutment of girder bridge 79. A standard disk, stamped "U 2 1922." (213.101 meters or 699.149 feet.)

V 2.—About 1 mile north along the Canadian Pacific Railway from **Orleans**, Orleans County, and about 100 yards north of the first road crossing north of Orleans, at a concrete culvert, in the south end of the west head wall. A standard disk, stamped "V 2 1922." (213.052 meters or 698.988 feet.)

W 2.—At **Orleans**, Orleans County, at the Central Savings Bank and Trust Co. building, at the north corner, in the foundation. A standard disk, stamped "W 2 1922." (225.548 meters or 739.985 feet.)

X 2.—At **Orleans**, Orleans County, about 200 yards south of the Canadian Pacific Railway station, at a steel girder bridge, in the north end of the west abutment. A standard disk, stamped "X 2 1922." (225.720 meters or 740.550 feet.)

Y 2.—About 2 miles south along the Canadian Pacific Railway from **Orleans**, Orleans County, just south of a road crossing, at a culvert, in the granite capstone on the west side of the track. A standard disk, stamped "Y 2 1922." (234.059 meters or 767.909 feet.)

Z 2.—About 1 mile northwest along the Canadian Pacific Railway from **Barton**, Orleans County, and about 300 feet south of a cut on a curve, at a heavy

concrete culvert, in the north end of the west head wall. A standard disk, stamped "Z 2 1922." (267.247 meters or 876.793 feet.)

A 3.—At **Barton**, Orleans County, on the Canadian Pacific Railway, at the first undergrade crossing north of the station, in the west end of the south abutment. A standard disk, stamped "A 3 1922." (283.853 meters or 931.274 feet.)

B 3.—At **Barton**, Orleans County, on the Canadian Pacific Railway, about 500 feet south of the station, just north of the outlet of Crystal Lake, in the granite wall. A standard disk, stamped "B 3 1922." (290.206 meters or 952.118 feet.)

C 3.—About 2 miles southeast along the Canadian Pacific Railway from **Barton**, Orleans County, at a cinder fill, at culvert 67 A, in the south head wall. A standard disk, stamped "C 3 1922." (303.552 meters or 995.904 feet.)

D 3.—At **Kimball**, Orleans County, 40 feet north of the Canadian Pacific Railway station, and 30 feet east of the track, in a boulder. A standard disk, stamped "D 3 1922." (351.054 meters or 1,151.750 feet.)

E 3.—At **Summit**, Caledonia County, 30 feet north of the Canadian Pacific Railway station, and 30 feet west of the track, in a boulder. A standard disk, stamped "E 3 1922." (375.869 meters or 1,233.164 feet.)

F 3.—About 0.5 mile southeast along the Canadian Pacific Railway from the station at **Sutton**, Caledonia County, at a large concrete arch culvert, in the north end of the west head wall. A standard disk, stamped "F 3 1922." (314.124 meters or 1,030.588 feet.)

G 3.—About $\frac{3}{4}$ mile south along the Canadian Pacific Railway from **West Burke**, Caledonia County, about 200 feet south of a highway crossing, in the north end of the west head wall of a concrete culvert. A standard disk, stamped "G 3 1922." (273.493 meters or 897.285 feet.)

H 3.—About $3\frac{1}{2}$ miles south along the Canadian Pacific Railway from **West Burke**, Caledonia County, and about 200 feet south of a grade crossing, at steel girder bridge 56, in the east end of the north abutment. A standard disk, stamped "H 3 1922." (240.955 meters or 790.533 feet.)

J 3.—At **Lyndonville**, Caledonia County, at the Lyndonville Savings Bank & Trust Co. building, in the north side of the steps at the entrance. A standard disk, stamped "J 3 1922." (217.332 meters or 713.030 feet.)

K 3.—At **Lyndonville**, Caledonia County, one block west of the Canadian Pacific Railway station, at the post office, in the southeast corner of the building. A standard disk, stamped "K 3 1922." (217.556 meters or 713.765 feet.)

L 3.—About 1 mile south along the Canadian Pacific Railway from **Lyndon**, Caledonia County, and about 200 yards south of a grade crossing, at bridge 47, in the east end of the north abutment. A standard disk, stamped "L 3 1922." (210.240 meters or 689.762 feet.)

M 3.—About 1 mile north along the Canadian Pacific Railway from **Center-vale**, Caledonia County, near block signal 645, at a highway bridge over Passumpsic River, in the south end of the west abutment. A standard disk, stamped "M 3 1922." (183.319 meters or 601.439 feet.)

N 3.—At **Centerville**, Caledonia County, at the highway bridge over Passumpsic River, in the north end of the east abutment. A standard disk, stamped "N 3 1922." (180.295 meters or 591.518 feet.)

O 3.—At **St. Johnsbury**, Caledonia County, at the Citizen's Bank building, at the right of the entrance to the bank, in the foundation wall. A standard disk, stamped "O 3 1922" and set vertically. (179.265 meters or 588.139 feet.)

P 3.—At **St. Johnsbury**, Caledonia County, at the Canadian Pacific Railway station, about 12 feet west of the northeast corner of the building, in the foundation. A standard disk, stamped "P 3 1922" and set vertically. (175.736 meters or 576.561 feet.)

For additional bench marks in the vicinity of St. Johnsbury, see page 20.

Q 3.—At **East St. Johnsbury**, Caledonia County, about 300 feet south of the Maine Central Railroad station, at a steel girder bridge, in the west end of the north abutment. A standard disk, stamped "Q 3 1922." (241.250 meters or 791.501 feet.)

R 3.—At **East St. Johnsbury**, Caledonia County, about 150 feet south of the Maine Central Railroad station, 50 feet west of the track, and 20 feet south of the east abutment of a highway bridge, in a rock ledge. A standard disk, stamped "R 3 1922." (240.983 meters or 790.625 feet.)

S 3.—About $2\frac{1}{2}$ miles west along the Maine Central Railroad from **Concord**, Essex County, and about 400 feet west of a road crossing, at a concrete culvert,

in the east end of the south head wall. A standard disk, stamped "S 3 1922." (249.074 meters or 817.170 feet.)

T 3.—About $2\frac{1}{4}$ miles west along the Maine Central Railroad from Concord, Essex County, and about 300 feet east of a road crossing, at a concrete box culvert, in the southwest wing wall. A standard disk, stamped "T 3 1922." (248.146 meters or 814.126 feet.)

U 3.—At Concord, Essex County, about 100 feet east of the Maine Central Railroad station, at a culvert, in the west end of the granite capstone at the north end of the culvert. A standard disk, stamped "U 3 1922." (261.884 meters or 859.198 feet.)

V 3.—About 2 miles northeast along the Maine Central Railroad from Concord, Essex County, 30 feet south of a highway crossing, and 20 feet east of the track, in a boulder. A standard disk, stamped "V 3 1922." (309.296 meters or 1,014.749 feet.)

W 3.—About $1\frac{1}{2}$ miles southeast along the Maine Central Railroad from North Concord, Essex County, at a road crossing, 60 feet north of the track, and 40 feet east of the road, in a large granite boulder. A standard disk, stamped "W 3 1922." (319.129 meters or 1,047.009 feet.)

X 3.—At Miles Pond, Essex County, about 100 feet east of the Maine Central Railroad station, and 60 feet north of the track, in a large granite boulder. A standard disk, stamped "X 3 1922." (313.526 meters or 1,028.627 feet.)

Y 3.—At East Concord, Essex County, about 50 feet southeast of the Maine Central Railroad station, 50 feet south of the track, and 10 feet east of a road, in a granite boulder. A standard disk, stamped "Y 3 1922." (267.368 meters or 877.190 feet.)

Z 3.—About 900 feet west of the Maine Central Railroad station at Gilman, Essex County, and 15 feet north of the track, in a flat boulder. A standard disk, stamped "Z 3 1922." (267.385 meters or 877.246 feet.)

A 4.—At Gilman, Essex County, at the plant of the Gilman Paper Co., in the north side of the octagonal foundation of the stack. A standard disk, stamped "A 4 1922." (255.308 meters or 837.623 feet.)

B 4=846 W (U.S.G.S.).—About 600 feet east along the Maine Central Railroad from the station at Lunenburg, Essex County, at the bridge over Connecticut River, in the south end of the west abutment. A copper bolt, stamped "846 W." (258.801 meters or 849.083 feet.)

The line continues into New Hampshire.

A 1.—In Coos County, N.H., about $\frac{1}{4}$ mile east along the Maine Central Railroad from Lunenburg, Essex County, Vt., at the bridge over Connecticut River, in the north end of the east abutment, 6 feet lower than the track. A standard disk, stamped "A 1 1922." (258.409 meters or 847.797 feet.)

B 1.—At Scott, Coos County, on the Maine Central Railroad, about 500 feet west of the junction, in the south end of the east abutment of a bridge. A standard disk, stamped "B 1 1922." (259.934 meters or 852.800 feet.)

C 1=952 (U.S.G.S.).—At Whitefield, Coos County, at the McKean Block, at the northwest corner of the building, in the foundation. A United States Geological Survey standard disk, stamped "952." (291.338 meters or 955.831 feet.)

D 1.—At Whitefield, Coos County, about 300 feet east of the Maine Central Railroad station, in the south end of the east abutment of a bridge. A standard disk, stamped "D 1 1922." (289.874 meters or 951.028 feet.)

E 1.—About $2\frac{1}{2}$ miles east along the Boston & Maine Railroad from Whitefield, Coos County, about 500 feet west of the station at Hazens, and 30 feet south of the center line of the track, in a boulder. A standard disk, stamped "E 1 1922." (317.482 meters or 1,041.606 feet.)

F 1.—At Cherry Mountain, Coos County, on the Boston & Maine Railroad, about 200 feet east of a water tank, at the bridge over Israel Brook, in the south end of the east abutment. A standard disk, stamped "F 1 1922." (343.028 meters or 1,125.418 feet.)

G 1.—At Highlands, Coos County, about 200 feet east of the Boston & Maine Railroad station, at a culvert, in the west end of the granite capstone at the south end. A standard disk, stamped "G 1 1922." (358.888 meters or 1,177.452 feet.)

H 1.—At Boy Mountain, Coos County, about 300 feet east of the Boston & Maine Railroad station, at the bridge over Israel River, in the north end of the east abutment. A standard disk, stamped "H 1 1922." (413.585 meters or 1,356.903 feet.)

J 1.—At **Bowman**, Coos County, on the Boston & Maine Railroad, about 50 feet east of the water tank near the station, and about 40 feet north of the track, in a rock ledge. A standard disk, stamped “J 1 1922.” (457.084 meters or 1,499.616 feet.)

K 1.—At **Appalachia**, Coos County, about 50 feet east of the Boston & Maine Railroad station, and 10 feet south of the track, in a small boulder. A standard disk, stamped “K 1 1922.” (399.713 meters or 1,311.392 feet.)

L 1.—Destroyed. (376.945 meters or 1,236.694 feet.)

M 1.—About 1 mile southwest along the Boston & Maine Railroad from the Boston & Maine Railroad station at **Gorham**, Coos County, about 300 feet south of a road crossing, and about 20 feet west of the track, in a ledge of rock. A standard disk, stamped “M 1 1922.” (297.197 meters or 975.054 feet.)

N 1.—About 1½ miles northwest of the Grand Trunk Railway station at **Gorham**, Coos County, and about ½ mile east of the Boston & Maine Railroad station, at the crossing of the Boston & Maine Railroad over the Grand Trunk Railway, in the southwest pier of the bridge. A standard disk, stamped “N 1 1922.” (249.150 meters or 817.420 feet.)

O 1.—At **Gorham**, Coos County, about 100 feet north of the Grand Trunk Railway station, in the south wall of the city hall, about 20 feet east of the southwest corner. A standard disk, stamped “O 1 1922.” (244.007 meters or 800.546 feet.)

P 1 = **781 (U.S.G.S.)**.—Destroyed. (238.156 meters or 781.350 feet.)

Q 1.—About 2 miles west along the Grand Trunk Railway from **Shelburne**, Coos County, and about 300 feet west of a road crossing, on the south side of the track, in a small ledge of rock. A standard disk, stamped “Q 1 1922.” (226.587 meters or 743.394 feet.)

R 1.—Destroyed. (223.078 meters or 731.882 feet.)

S 1 = **705 (U.S.G.S.)**.—About ¼ mile east along the Grand Trunk Railway from **Shelburne**, Coos County, at the bridge over Clement Brook, in the north end of the west abutment. A United States Geological Survey standard disk. (214.873 meters or 704.962 feet.)

T 1.—About 3 miles southeast along the Grand Trunk Railway from **Shelburne**, Coos County, at the bridge over Connor Branch, in the south end of the west abutment. A standard disk, stamped “T 1 1922.” (212.184 meters or 696.140 feet.)

The line continues into Maine.

LINE 2, PORTLAND, MAINE, TO BOSTON, MASS. (PART)

[First-order leveling]

This line enters New Hampshire in the vicinity of Salmon Falls and follows the Boston & Maine Railroad through Dover, Dover Point, Portsmouth, Hampton, and Atlantic, toward Boston, Mass. The field work was done, during the fall of 1923, by a party in charge of E. B. Roberts, junior hydrographic and geodetic engineer.

U 1.—At **Salmon Falls**, Strafford County, on the Western Division of the Boston & Maine Railroad, 9½ rails north of the station, at the interstate bridge, in the top of the west end of the south abutment, 7 feet west of the west rail. A standard disk, stamped “U 1 1923.” (32.166 meters or 105.531 feet.)

106.7 (U.S.G.S.).—At **Salmon Falls**, Strafford County, in the Boston & Maine Railroad bridge. A bolt, marked “106.7 feet.” (33.581 meters or 110.174 feet.)

V 1.—Destroyed. (35.255 meters or 115.666 feet.)

W 1.—Destroyed. (23.027 meters or 75.548 feet.)

Y 1.—At **Dover**, Strafford County, at the post office, in the foundation course of the east wall, 5 feet south of the entrance, and 1½ feet higher than the ground. A standard disk, stamped “Y 1 1923.” (17.237 meters or 56.552 feet.)

Z 1.—About 3 miles southeast along the Dover Branch of the Boston & Maine Railroad from **Dover**, Strafford County, 93 feet north of the east end of the station at **Cushings**, 75 feet north of the north rail, in line with a row of poles, and 5 feet south of the fence. A standard disk, stamped “Z 1 1923” and set in the top of a concrete post. (11.142 meters or 36.555 feet.)

Tidal 1.—At **Dover Point**, Strafford County, south of the Dover Point Hotel, about 60 feet south of the intersection of the high-water mark and the pier on the southeast side of the point, and 6 feet from the northeast one of two willow trees just above the high-water mark, in the rock about 6 inches below the

high-water mark. A copper bolt, lettered "USC&GS B.M. 1 1913." (0.924 meter or 3.031 feet.)

NOTE.—In 1926, the mark was reported as being covered with mud.

Tidal 2.—At **Dover Point**, Strafford County, on the shore line north of the Dover Point Hotel, about 600 feet northwest of the tidestaff, in the only rock ledge in sight. A copper bolt. (2.213 meters or 7.260 feet.)

A 2.—About 2 miles northwest along the Dover Branch of the Boston & Maine Railroad from **Portsmouth**, Rockingham County, 22½ rails west of the station at **Piscataqua**, 4¾ rails west of the switch block at the west end of the freight tracks, and 10 feet south of the south rail, in a boulder. A standard disk stamped "A 2 1923." (7.799 meters or 25.587 feet.)

Tidal 1.—Near **Portsmouth**, Rockingham County, in the Atlantic Corporation Shipyard on the Piscataqua River, in the east face of the concrete foundation of brick building no. 2, near the northeast corner, and near the southeast corner of the plate shop. A standard disk, stamped "1." (8.379 meters or 27.490 feet.)

Tidal 2.—Near **Portsmouth**, Rockingham County, in the Atlantic Corporation Shipyard on Piscataqua River, on the bluff about 175 yards west of the old wharf north of the shipways, 30 feet northwest of a white cottage, and 2 yards north of a road leading from the old wharf toward the plant building, in the top of the circular granite curbing of a well. A standard disk, stamped "2." (12.608 meters or 41.365 feet.)

Tidal 3.—Near **Portsmouth**, Rockingham County, in the Atlantic Corporation Shipyard on Piscataqua River, at the foot of the bluff, about 50 yards west of the old wharf just north of the shipways, 15 feet north of a break in the bluff through which a road leads to a point north of a white cottage, in a small clump of birch trees, 15 feet lower than the road, in a small ledge of rock projecting about 6 inches above ground. A standard disk, stamped "3." (4.828 meters or 15.840 feet.)

30 (U.S.G.S.)—At **Portsmouth**, Rockingham County, at the federal building or customhouse, on the north side of the building, in the granite sill of the second window from Court Street. A United States Geological Survey standard disk, stamped "30 CONCORD." (9.133 meters or 29.964 feet.)

B 2.—At **Portsmouth**, Rockingham County, on the Eastern Division of the Boston & Maine Railroad, 15 rails south of the station, 10 rails south of milepost B57-P51, opposite the Littlefield Lumber Co., 8 feet east of the east rail, and 5 feet higher than the track, in a rock ledge. A standard disk, stamped "B 2 1923." (6.197 meters or 20.331 feet.)

C 2.—About 1¼ miles south along the Eastern Division of the Boston & Maine Railroad from **Portsmouth**, Rockingham County, 8½ rails south of milepost B55-P53, at bridge 66, 4 feet west of the west rail, in the west abutment, about 1½ feet higher than the track. A standard disk, stamped "C 2 1923." (16.379 meters or 53.737 feet.)

D 2.—About ½ mile north along the Eastern Division of the Boston & Maine Railroad from **Breakfast Hill**, Rockingham County, 16 poles north of bridge A 65, 24 rails south of milepost B52-P56, and 50 feet east of the east rail, in a wooded lot, in a rock ledge. A standard disk, stamped "D 2 1923." (18.408 meters or 60.394 feet.)

E 2.—About 0.3 mile north along the Eastern Division of the Boston & Maine Railroad from **North Hampton**, Rockingham County, 24 rails north of milepost B49-P59, 166 yards west of the west rail, in a field, in the side of a large boulder, about 2 feet above ground. A standard disk, stamped "E 2 1923." (18.731 meters or 61.453 feet.)

F 2.—At **Hampton**, Rockingham County, on the Eastern Division of the Boston & Maine Railroad, at the bridge just north of the station, at the north end of the west abutment, in the bottom course, 6 feet west of the west rail. A standard disk, stamped "F 2 1923." (17.018 meters or 55.833 feet.)

G 2.—About 2 miles south along the Eastern Division of the Boston & Maine Railroad from **Hampton**, Rockingham County, 81 feet north of the north end of the station at **Hampton Falls**, 50 feet west of the west rail, in line with a row of poles, 12 feet north of a pole, and 8 feet east of a fence. A standard disk, stamped "G 2 1923" and set in the top of a concrete post. (2.549 meters or 8.363 feet.)

H 2.—At **Atlantic**, Rockingham County, on the Eastern Division of the Boston & Maine Railroad, 23 rails south of the station, 15¼ rails south of bridge 54, 8¾ rails south of signal 415, and 12 feet east of the east rail, in the rock wall of a cut. A standard disk, stamped "H 2 1923." (17.559 meters or 57.608 feet.)

The line continues into Massachusetts.

LINE 3, CHICOPEE, MASS., TO BELLOWS FALLS, VT. (PART)

[First-order leveling]

This line enters Vermont in the vicinity of East Northfield, Mass., and follows the Central Vermont Railway, through Vernon, to Brattleboro, and the Boston & Maine Railroad, through Dummerston and Westminster, to Bellows Falls. The field work was done, during the summer of 1927, by a party in charge of John Bowie, Jr., junior hydrographic and geodetic engineer.

C 4.—In Windham County, Vt., about 300 yards north of the Boston & Maine Railroad station at **East Northfield**, Franklin County, Mass., about 100 yards north of the water tank, and 135 feet east of the east rail of the main track. A standard disk, stamped "C 4 1927" and set in the top of a concrete post. (79.918 meters or 262.198 feet.)

D 4.—About $1\frac{1}{2}$ miles south along the Central Vermont Railway from **Vernon**, Windham County, opposite a farmhouse, 26.2 feet west of the west rail, in a large boulder. A standard disk, stamped "D 4 1927." (91.715 meters or 300.902 feet.)

E 4.—About $1\frac{1}{2}$ miles north along the Central Vermont Railway from **Vernon**, Windham County, 37 feet north of the center line of an old road, and 17.9 feet west of the west rail. A standard disk, stamped "E 4 1927" and set in the top of a concrete post. (82.995 meters or 272.293 feet.)

F 4.—About $1\frac{1}{2}$ miles south along the Central Vermont Railway from **Brattleboro**, Windham County, at a bridge over a connection between the Connecticut River and a small body of water located west of the tracks, in the west end of the north abutment, and 21.9 feet west of the west rail. A standard disk, stamped "F 4 1927." (69.446 meters or 227.841 feet.)

G 4.—At **Brattleboro**, Windham County, in the southeast corner of the railroad station, 2.4 feet above the ground. A standard disk, stamped "G 4 1927" and set vertically. (73.080 meters or 239.763 feet.)

H 4.—About $2\frac{1}{2}$ miles north along the Boston & Maine Railroad from **Brattleboro**, Windham County, 165 yards south of semaphore 629, 27.3 feet west of the west rail, and 8 feet south of the center line of a private road leading to the farmhouse of C. B. Crowell. A standard disk, stamped "H 4 1927" and set in the top of a concrete post. (89.689 meters or 294.255 feet.)

T.B.M. 61.—About 1 mile south along the Boston & Maine Railroad from **Dummerston**, Windham County, at semaphore 647, on the southwest corner of the concrete base. A chiseled point. (75.982 meters or 249.284 feet.)

T.B.M. 62.—About $\frac{1}{2}$ mile south along the Boston & Maine Railroad from **Dummerston**, Windham County, at semaphore 652, on a corner of the concrete base. A chiseled point. (78.194 meters or 256.541 feet.)

J 4.—At **Dummerston**, Windham County, about 50 yards south of the Boston & Maine Railroad station, on the east end of the north abutment of a granite bridge, 18 feet east of the east rail of the main track. A standard disk, stamped "J 4 1927." (80.022 meters or 262.539 feet.)

T.B.M. 63.—About $\frac{3}{4}$ mile north along the Boston & Maine Railroad from **Dummerston**, Windham County, at semaphore 663, on the southwest corner of the concrete base. A chiseled point. (74.464 meters or 244.304 feet.)

T.B.M. 66.—About $\frac{1}{2}$ mile southwest along the Boston & Maine Railroad from **Putney**, Windham County, at semaphore 686, on the northeast corner of the concrete base. A chiseled point. (72.171 meters or 236.781 feet.)

K 4.—At **Putney**, Windham County, opposite the Boston & Maine Railroad station, 60.3 feet east of the east rail, near a fence. A standard disk, stamped "K 4 1927" and set in the top of a concrete post. (77.144 meters or 253.097 feet.)

T.B.M. 67.—About $\frac{3}{4}$ mile northeast along the Boston & Maine Railroad from **Putney**, Windham County, at semaphore 698, on a corner of the concrete base. A chiseled point. (83.603 meters or 274.288 feet.)

L 4.—At **East Putney**, Windham County, on the Boston & Maine Railroad, 39 feet north of semaphore 719, at an overhead bridge, in the south end of the wing wall of the east abutment. A standard disk, stamped "L 4 1927." (89.246 meters or 292.801 feet.)

T.B.M. 70.—About $\frac{3}{4}$ mile north along the Boston & Maine Railroad from **East Putney**, Windham County, at semaphore 726, on the northeast corner of the concrete base. A chiseled point. (82.246 meters or 269.835 feet.)

M 4.—About 3 miles north along the Boston & Maine Railroad from **East Putney**, Windham County, about 225 yards south of semaphore 744, 18.4 feet west of the west rail, and 16 feet from the center line of a private road leading to the farmhouse of C. K. Loomas. A standard disk, stamped "M 4 1927" and set in the top of a concrete post. (74.354 meters or 243.943 feet.)

T.B.M. 73.—About $2\frac{1}{4}$ miles south along the Boston & Maine Railroad from **Westminster**, Windham County, at semaphore 757, on the southwest corner of the concrete base. A chiseled point. (75.470 meters or 247.604 feet.)

T.B.M. 74.—About $2\frac{1}{4}$ miles south along the Boston & Maine Railroad from **Westminster**, Windham County, at semaphore 762, on the northeast corner of the concrete base. A chiseled point. (76.211 meters or 250.036 feet.)

N 4.—About 2 miles south along the Boston & Maine Railroad from **Westminster**, Windham County, about 100 yards south of semaphore 765, 21.9 feet west of the west rail, and 9 feet north of a private road back of the farmhouse owned by John Trybutski. A standard disk, stamped "N 4 1927" and set in the top of a concrete post. (75.543 meters or 247.844 feet.)

T.B.M. 75.—About $1\frac{1}{4}$ miles south along the Boston & Maine Railroad from **Westminster**, Windham County, at semaphore 772, on a corner of the concrete base. A chiseled point. (76.616 meters or 251.364 feet.)

T.B.M. 78.—About 1 mile south of **Westminster**, Windham County, on the Boston & Maine Railroad, at semaphore 790, on the northeast corner of the concrete base. A chiseled point. (75.965 meters or 249.229 feet.)

Q 4.—At **Westminster**, Windham County, about 100 yards south of the Boston & Maine Railroad station, 132 yards north of semaphore 800, on the south end of the east abutment of an underpass, 4.4 feet east of the east rail. A standard disk, stamped "Q 4 1927." (79.019 meters or 259.248 feet.)

T.B.M. 81.—About $1\frac{1}{4}$ miles south along the Boston & Maine Railroad from **Bellows Falls**, Windham County, at semaphore 821, on a corner of the concrete base. A chiseled point. (76.695 meters or 251.624 feet.)

R 4.—About 1 mile south along the Boston & Maine Railroad from **Bellows Falls**, Windham County, about 100 yards north of semaphore 829, at the bridge over Saxton River, in the west end of the south abutment, 5.4 feet west of the west rail. A standard disk, stamped "R 4 1927." (84.290 meters or 276.541 feet.)

NOTE.—This mark was reset, in 1930, in approximately the same location but at an elevation 0.550 foot higher, making the elevation of the mark, in its new position, 277.091 feet.

T 4.—At **Bellows Falls**, Windham County, about 100 yards north of the Boston & Maine Railroad station, at the bridge over Connecticut River, in the west end of the south abutment, 5.4 feet west of the west rail. A standard disk, stamped "T 4 1927." (91.769 meters or 301.079 feet.)

For additional bench marks in the vicinity of Bellows Falls, see below and page 17.

LINE 4, BELLOWS FALLS, VT., TO WHITEHALL, N.Y. (PART)

[*First-order leveling*]

This line follows the Rutland Railroad from Bellows Falls to Rutland, and the Delaware and Hudson Railroad from Rutland, through Fair Haven, Vt., toward Whitehall, N.Y. The field work was done, during the autumn of 1927, by a party in charge of John Bowie, Jr., junior hydrographic and geodetic engineer.

For additional bench marks in the vicinity of Bellows Falls, see above and page 17.

S 4.—At **Bellows Falls**, Windham County, in the northwest wall of the railroad station, under the window sill, and about 2 feet above the concrete walk. A standard disk, stamped "S 4 1927." (92.621 meters or 303.874 feet.)

U 4.—At **Bellows Falls**, Windham County, about $\frac{1}{4}$ mile west along the Rutland Railroad from the station, 20 feet west of a section tool house, and 15.8 feet north of the north rail. A standard disk, stamped "U 4 1927" and set in the top of a concrete post. (91.515 meters or 300.245 feet.)

V 4.—About 2 miles north along the Rutland Railroad from the station at **Bellows Falls**, Windham County, 23 feet north of the center line of a private road leading to the home of E. F. Shattuck, opposite an old deserted house, and

28 feet west of the west rail. A standard disk, stamped "V 4 1927" and set in the top of a concrete post. (89.525 meters or 293.717 feet.)

W 4.—At **Rockingham**, Windham County, on the Rutland Railroad, at the undergrade crossing of the Rockingham-Springfield road, in the south side of the east abutment, 6.9 feet south of the south rail. A standard disk, stamped "W 4 1927." (108.426 meters or 355.728 feet.)

X 4.—About $1\frac{1}{2}$ miles south along the Rutland Railroad from **Bartonsville**, Windham County, at bridge 111 over Williams River, in the north end of the west abutment, 4.5 feet north of the north rail. A standard disk, stamped "X 4 1927" and set in the top of a concrete post. (141.021 meters or 462.666 feet.)

Y 4.—About $2\frac{1}{4}$ miles southeast along the Rutland Railroad from **Chester**, Windsor County, 440 yards west of bridge 114, 402 yards west of milepost "Bellows Falls 11", 18 feet east of the center line of a gravel road, and 13.2 feet south of the south rail. A standard disk, stamped "Y 4 1927" and set in the top of a concrete post. (163.161 meters or 535.304 feet.)

Z 4.—At **Chester**, Windsor County, 572 feet southeast of the Rutland Railroad station, 5.6 feet west of a section tool house, 28.4 feet south of the south rail of the main track, and 3 feet north of a fence. A standard disk, stamped "Z 4 1927" and set in the top of a concrete post. (181.980 meters or 597.046 feet.)

A 5.—About 1 mile south along the Rutland Railroad from **Gassets**, Windsor County, on the hillside opposite a private-road crossing at the rear of the farmhouse owned in 1930 by W. W. Goodrich, 45.5 feet west of the west rail, in a rock outcrop. A standard disk, stamped "A 5 1927." (208.131 meters or 682.843 feet.)

B 5.—About $\frac{3}{4}$ mile northwest along the Rutland Railroad from **Gassets**, Windsor County, about $\frac{1}{4}$ mile north of an overhead highway bridge, at bridge 125, on the west end of the south abutment, 15.5 feet west of the west rail. A standard disk, stamped "B 5 1927." (233.058 meters or 764.624 feet.)

C 5.—About 1 mile southeast along the Rutland Railroad from **Cavendish**, Windsor County, about 0.3 mile north of an undergrade crossing, at a road crossing, 149 feet northwest of a 12-inch maple tree on the southeast side of the road, 6 feet northwest of the center line of the road, and 34.4 feet west of the west rail, in a rock outcrop. A standard disk, stamped "C 5 1927." (281.976 meters or 925.116 feet.)

D 5.—About $\frac{1}{2}$ mile west along the Rutland Railroad from **Proctorsville**, Windsor County, at bridge 132 over Black River, in the north end of the east abutment, 4.6 feet north of the north rail. A standard disk, stamped "D 5 1927." (286.686 meters or 940.569 feet.)

F 5.—At **Ludlow**, Windsor County, about 110 yards west of the Rutland Railroad station, at bridge 135 over Depot Street, in the south end of the west abutment, 5.6 feet south of the south rail. A standard disk, stamped "F 5 1927." (325.179 meters or 1,066.858 feet.)

G 5.—About $2\frac{1}{2}$ miles northwest along the Rutland Railroad from **Ludlow**, Windsor County, at bridge 139 over a small mountain stream, on the southwest corner of the bridge, 5.4 feet west of the west rail. A standard disk, stamped "G 5 1927." (379.186 meters or 1,244.046 feet.)

H 5.—At **Healdville**, Rutland County, about 45 yards west of the Rutland Railroad station, 35 feet east of the center line of an earth road leading to Belmont, and 12.7 feet north of the north rail. A standard disk, stamped "H 5 1927" and set in the top of a concrete post. (436.774 meters or 1,432.983 feet.)

J 5.—About $\frac{3}{4}$ mile northwest along the Rutland Railroad from **Summit**, Rutland County, about 594 yards west of the west switch at a siding, west of the first curve west of the station, at the base of a bank about 25 feet high, and 18.6 feet north of the north rail. A standard disk, stamped "J 5 1927" and set in the top of a concrete post. (450.234 meters or 1,477.143 feet.)

K 5.—About 1 mile west of **Mount Holly**, Rutland County, on the Rutland Railroad, about 539 yards east of a county-road crossing, at bridge 143 over Bowlville Brook, in the south end of the east abutment, 6.9 feet south of the south rail. A standard disk, stamped "K 5 1927." (409.626 meters or 1,343.915 feet.)

L 5.—About 1 mile north along the Rutland Railroad from **East Wallingford**, Rutland County, at bridge 145 over a State highway and Mill River, in the west end of the south abutment, 5.1 feet west of the west rail. A standard disk, stamped "L 5 1927." (354.697 meters or 1,163.702 feet.)

E 5.—About 1 mile northwest along the Rutland Railroad from **Cuttingsville**, Rutland County, opposite Peter's Haven, at the rear of a farmhouse owned by J. G. Kelley, at the foot of a bank about 25 feet high, opposite a meadow about

35 feet lower than the railroad, about 8.7 feet north of the north rail, in a rock outcrop. A standard disk, stamped "E 5 1927." (302.243 meters or 991.609 feet.)

M 5.—About $\frac{3}{4}$ mile east along the Rutland Railroad from **East Clarendon**, Rutland County, 71 feet south of the center of a State highway crossing, and 21.1 feet east of the east rail. A standard disk, stamped "M 5 1927" and set in the top of a concrete post. (264.910 meters or 869.126 feet.)

N 5.—About $1\frac{1}{4}$ miles southeast along the Rutland Railroad from **North Clarendon**, Rutland County, about 50 yards northwest of milepost "Bellows Falls 48—Rutland 4", 48 feet west of the west rail, and 15.9 feet south of the right-of-way fence, in a large black boulder. A standard disk, stamped "N 5 1927." (227.158 meters or 745.268 feet.)

N 1-5.—About 1 mile southeast along the Rutland Railroad from **North Clarendon**, Rutland County, in a cut, 385 yards northwest of milepost "Bellows Falls 48—Rutland 4", and 28.1 feet west of the west rail, in a small rock. A standard disk, stamped "N 1-5 1927." (228.054 meters or 748.207 feet.)

NOTE.—The permanence of this mark is questionable, since the rock apparently does not extend below the frost line. See N 5.

Q 5.—At **Rutland**, Rutland County, at the South Main Street crossing of the Rutland Railroad, about 118 feet west of the highway, 30 feet west of a corner of the right-of-way fence, and 10 feet north of the north rail. A standard disk, stamped "Q 5 1927" and set in the top of a concrete post. (172.186 meters or 564.914 feet.)

R 5.—At **Rutland**, Rutland County, in the south wall of the Rutland Railroad station, 20.8 feet east of the southwest corner, and 2.4 feet above the sidewalk. A standard disk, stamped "R 5 1927" and set vertically. (171.397 meters or 562.325 feet.)

S 5.—At **Rutland**, Rutland County, on the Delaware & Hudson Railroad, at bridge 100.77 over Otter Creek and Lovers Lane, in the south end of the west abutment, 5 feet south of the south rail. A standard disk, stamped "S 5 1927." (167.967 meters or 551.072 feet.)

T 5.—About $\frac{1}{2}$ mile east along the Delaware & Hudson Railroad from **West Rutland**, Rutland County, 36.5 feet east of a State highway crossing, 18.5 feet south of the south rail, and 11.3 feet north of the right-of-way fence. A standard disk, stamped "T 5 1927" and set in the top of a concrete post. (151.854 meters or 498.208 feet.)

U 5.—About 2 miles west along the Delaware & Hudson Railroad from **West Rutland**, Rutland County, about 1 mile west of the Whipple Hollow crossing, at bridge R-95 over Hanleys Brook, in the south end of the west abutment, 7.2 feet south of the south rail. A standard disk, stamped "U 5 1927." (146.703 meters or 481.308 feet.)

8 (D. & H. R.R.).—About 3.8 miles east along the Delaware & Hudson Railroad from **Castleton**, Rutland County, at bridge R-94.67, on the south side of the east abutment. The southwest corner of the back wall. (144.810 meters or 475.097 feet.)

V 5.—About 1 mile east along the Delaware & Hudson Railroad from **Castleton**, Rutland County, near a farmhouse owned by C. E. Cramton, 35.5 feet east of the center of a road crossing, and 18.7 feet south of the south rail. A standard disk, stamped "V 5 1927" and set in the top of a concrete post. (136.553 meters or 448.008 feet.)

7 (D. & H. R.R.).—At **Castleton**, Rutland County, on the Delaware & Hudson Railroad, at bridge W-90.91, at the north end of the east abutment, on the northwest corner of the bridge seat. A chiseled square. (133.500 meters or 437.991 feet.)

W 5.—About 1.6 miles east along the Delaware & Hudson Railroad from **Hydeville**, Rutland County, 143 yards west of a State highway crossing, at bridge R-89.34 over Castleton River, on the south end of the east abutment, 4.4 feet south of the south rail. A standard disk, stamped "W 5 1927." (120.062 meters or 393.903 feet.)

6 (D. & H. R.R.).—About 1.1 miles east along the Delaware & Hudson Railroad from **Hydeville**, Rutland County, at an overhead highway crossing, on the southeast corner of the third course from the north side. A chiseled square. (115.231 meters or 378.054 feet.)

5 (D. & H. R.R.).—At **Hydeville**, Rutland County, at the east end of the Delaware & Hudson Railroad station, on the northeast corner of the concrete platform. A chiseled square. (123.400 meters or 404.855 feet.)

X 5.—About 250 yards east along the Delaware & Hudson Railroad from the station at **Fair Haven**, Rutland County, at bridge R-86.08 over Blissville Road,

in the north end of the east abutment, 7.7 feet north of the north rail. A standard disk, stamped "X 5 1927." (114.783 meters or 376.584 feet.)

4 (D. & H. R.R.).—At **Fair Haven**, Rutland County, on the Delaware & Hudson Railroad, at the River Street bridge, in the northwest corner of the northeast pedestal of the east abutment. A chiseled square. (114.569 meters or 375.882 feet.)

Y 5.—About $1\frac{3}{4}$ miles west along the Delaware & Hudson Railroad from **Fair Haven**, Rutland County, at bridge R-84.09 over Poultney River, in the south end of the east abutment, 5.2 feet south of the south rail. A standard disk, stamped "Y 5 1927." (105.850 meters or 347.276 feet.)

The line continues into New York.

LINE 5, BELLOWS FALLS TO THETFORD, VT.

[*First-order leveling*]

This line follows the Boston & Maine Railroad from Bellows Falls, Vt., through Charlestown, N.H., and Claremont Junction, N.H., to Windsor, Vt., the Central Vermont Railway to White River Junction, Vt., and the Boston & Maine Railroad to Thetford, Vt. The field work was done, during the fall of 1927, by a party in charge of John Bowie, Jr., junior hydrographic and geodetic engineer.

For bench marks in Bellows Falls and vicinity, see page 14.

333.4 (U.S.G.S.).—In Cheshire County, N.H., about 1.5 miles north along the Boston & Maine Railroad from **Bellows Falls**, Windham County, Vt., 565 feet south of semaphore 856, and 10 feet east of the track, on a rock outcrop. A chiseled circle. (101.674 meters or 333.575 feet.)

T.B.M. 3.—About 1 mile south along the Boston & Maine Railroad from **South Charlestown**, Sullivan County, at semaphore 859, on a corner of the concrete base. A chiseled point. (100.995 meters or 331.348 feet.)

J 2.—About $\frac{1}{2}$ mile south along the Boston & Maine Railroad from **South Charlestown**, Sullivan County, about 330 yards north of semaphore 862, at bridge D 81 over State Highway 12, in the west end of the south abutment, 7.8 feet west of the west rail. A standard disk, stamped "J 2 1927." (93.590 meters or 307.053 feet.)

MAC NO. 20. (U.S.G.S.).—At **South Charlestown**, Sullivan County, about 520 feet south of the Boston & Maine Railroad station, at the south end of a masonry retaining wall, in the lower course of stone, 8 feet east of the track. A United States Geological Survey standard disk, stamped "MAC NO. 20-1925." (91.986 meters or 301.791 feet.)

T.B.M. 4.—About $\frac{1}{4}$ mile north along the Boston & Maine Railroad from **South Charlestown**, Sullivan County, at semaphore 872, on a corner of the concrete base. A chiseled point. (91.416 meters or 299.921 feet.)

325.6 (U.S.G.S.).—About 1.1 miles north along the Boston & Maine Railroad from **South Charlestown**, Sullivan County, at milepost S 88, 8 feet west of the track, on the concrete base of semaphore 880. A chiseled square. (99.320 meters or 325.852 feet.)

K 2.—About $1\frac{1}{4}$ miles south along the Boston & Maine Railroad from **Charlestown**, Sullivan County, about 110 yards south of semaphore 895, near the tanks of the Sinclair Oil Co., 10 feet south of the center of a private-road crossing, and 10.1 feet east of the east rail. A standard disk, stamped "K 2 1927" and set in the top of a concrete post. (102.766 meters or 337.158 feet.)

T.B.M. 6.—About $1\frac{1}{4}$ miles south along the Boston & Maine Railroad from **Charlestown**, Sullivan County, at semaphore 898, on a corner of the concrete base. A chiseled point. (103.533 meters or 339.675 feet.)

MAC NO. 19 (U.S.G.S.).—About 0.6 mile south along the Boston & Maine Railroad from **Charlestown**, Sullivan County, on the south side of an undergrade crossing, 8 feet west of the track, in a masonry wing wall. A United States Geological Survey standard disk, stamped "MAC NO. 19-1925." (107.144 meters or 351.522 feet.)

T.B.M. 9.—About $1\frac{1}{4}$ miles north along the Boston & Maine Railroad from **Charlestown**, Sullivan County, at semaphore 921, on the southwest corner of the concrete base. A chiseled point. (113.217 meters or 371.446 feet.)

MAC NO. 18 (U.S.G.S.).—About 1.7 miles north along the Boston & Maine Railroad from **Charlestown**, Sullivan County, about 840 feet south of a road

crossing, and 11 feet west of the track, in a concrete block formerly used as the base of a semaphore. A United States Geological Survey standard disk, stamped "MAC NO. 18-1925." (111.948 meters or 367.283 feet.)

L 2.—About $\frac{1}{4}$ miles north along the Boston & Maine Railroad from **Charlestown**, Sullivan County, 33.7 feet southeast of crossing signal 159 located opposite semaphore 926, 45.5 feet south of the center line of a county road, and, 26.4 feet east of the east rail. A standard disk, stamped "L 2 1927" and set in the top of a concrete post. (111.332 meters or 365.262 feet.)

T.B.M. 10.—About $\frac{2}{2}$ miles north along the Boston & Maine Railroad from **Charlestown**, Sullivan County, at semaphore 934, on a corner of the concrete base. A chiseled point. (97.732 meters or 320.642 feet.)

320.2 (U.S.G.S.).—About $\frac{2}{4}$ miles south along the Boston & Maine Railroad from **North Charlestown**, Sullivan County, at milepost S 94, on the concrete base of a semaphore. A chiseled square. (97.662 meters or 320.413 feet.)

T.B.M. 12.—About 1 mile south along the Boston & Maine Railroad from **North Charlestown**, Sullivan County, at semaphore 952, on the northeast corner of the concrete base. A chiseled point. (114.332 meters or 375.104 feet.)

M 2.—Destroyed. (126.330 meters or 414.468 feet.)

T.B.M. 14.—About $\frac{3}{4}$ mile north along the Boston & Maine Railroad from **North Charlestown**, Sullivan County, at semaphore 972, on the northeast corner of the concrete base. A chiseled point. (133.360 meters or 437.532 feet.)

T.B.M. 17.—About $\frac{2}{4}$ miles south along the Boston & Maine Railroad from **Claremont Junction**, Sullivan County, at semaphore 990, on the northeast corner of the concrete base. A chiseled point. (141.744 meters or 465.038 feet.)

T.B.M. 18.—About 1.5 miles south along the Boston & Maine Railroad from **Claremont Junction**, Sullivan County, at semaphore 995, on the southwest corner of the concrete base. A chiseled point. (138.729 meters or 455.147 feet.)

N 2.—About 1 mile south along the Boston & Maine Railroad from **Claremont Junction**, Sullivan County, 14.5 feet north of the center line of a private-road crossing the railroad and leading to the rear of the farmhouse owned by W. Putnam, and 27.4 feet east of the east rail. A standard disk, stamped "N 2 1927" and set in the top of a concrete post. (140.477 meters or 460.882 feet.)

T.B.M. 19.—About 0.7 mile south along the Boston & Maine Railroad from **Claremont Junction**, Sullivan County, at semaphore 1005, on the southwest corner of the concrete base. A chiseled point. (137.716 meters or 451.823 feet.)

478 (U.S.G.S.).—At **Claremont Junction**, Sullivan County, about 480 feet north of the Boston & Maine Railroad station, and 30 feet east of the track, in the top of milepost S-101 which is half-way up the bank in a cut and leaning toward the tracks. A United States Geological Survey standard disk, stamped "478 ADJ." (145.888 meters or 478.634 feet.)

T.B.M. 21.—About $\frac{1}{4}$ miles south along the Boston & Maine Railroad from **West Claremont**, Sullivan County, at semaphore 1017, on the southwest corner of the concrete base. A chiseled point. (142.700 meters or 468.175 feet.)

T.B.M. 22.—About 0.6 mile south along the Boston & Maine Railroad from **West Claremont**, Sullivan County, at semaphore 1022, on the northeast corner of the concrete base. A chiseled point. (131.812 meters or 432.453 feet.)

Q 2.—At **West Claremont**, Sullivan County, on the Boston & Maine Railroad, at bridge 89 over the State highway and Sugar River, 10.3 feet south of the northwest corner of the bridge, between the ties, 1.4 feet west of the west rail. A standard disk, stamped "Q 2 1927." (122.054 meters or 400.439 feet.)

T.B.M. 23.—About $\frac{3}{4}$ mile north along the Boston & Maine Railroad from **West Claremont**, Sullivan County, at semaphore 1034, on the northeast corner of the concrete base. A chiseled point. (114.330 meters or 375.098 feet.)

T.B.M. 25.—About $\frac{3}{4}$ mile south along the Boston & Maine Railroad from **Balloch**, Sullivan County, at semaphore 1047, on the southwest corner of the concrete base. A chiseled point. (110.981 meters or 364.110 feet.)

R 2.—At **Balloch**, Sullivan County, about 100 yards north of the Boston & Maine Railroad station, 12.2 feet east of the east rail, and 17 feet west of the center line of the State highway. A standard disk, stamped "R 2 1927" and set in the top of a concrete post. (111.501 meters or 365.816 feet.)

S 2.—Destroyed. (105.752 meters or 346.955 feet.)

The line enters Vermont.

T.B.M. 29.—About $\frac{1}{4}$ mile south along the Boston & Maine Railroad from **Windsor**, Windsor County, at semaphore 1064, on the northeast corner of the concrete base. A chiseled point. (101.898 meters or 334.310 feet.)

354 (U.S.G.S.).—At **Windsor**, Windsor County, at the corner of South Main and Dursley Avenues, in the west wall of the Methodist Episcopal Church, 15 feet from the north corner, and 2 feet above the ground. A United States Geological Survey standard disk, stamped "354 ADJ." (107.957 meters or 354.189 feet.)

Z 5.—At **Windsor**, Windsor County, in the east wall of the railroad station, 7.8 feet south of the door leading to the waiting room in the north end of the building, and 3.3 feet higher than the concrete platform. A standard disk, stamped "Z 5 1927" and set vertically. (100.954 meters or 331.213 feet.)

A 6.—About 1.5 miles south along the Central Vermont Railway from **Hartland**, Windsor County, 74 feet south of the crossing of a private road leading to the rear of the farmhouse owned by Ralph Burnham, and 40.4 feet west of the west rail. A standard disk, stamped "A 6 1927" and set in the top of a concrete post. (110.118 meters or 361.279 feet.)

B 6.—Destroyed. (135.392 meters or 444.199 feet.)

B 6 RESET (V.S.H.D.).—About 2 miles north along the Central Vermont Railway from **Hartland**, Windsor County, at an overhead bridge, in the top of the north wing wall of the west abutment, 13 feet north of the center line of the road. A standard disk, stamped "B 6 1927." (470.70 feet.)

NOTE.—This bench mark was set and its elevation determined by the Vermont State Highway Department in December 1930.

C 6.—At **Evarts**, Windsor County, about 150 yards east of the Central Vermont Railway station, at the bridge over Ottauquechee River, in the west end of the south abutment, 20.9 feet west of the west rail. A standard disk, stamped "C 6." (111.419 meters or 365.547 feet.)

D 6.—About 2½ miles south along the Central Vermont Railway from **White River Junction**, Windsor County, 11 feet north of the crossing of a private road at the farmhouse of John Eastman, and 22.7 feet east of the east rail. A standard disk, stamped "D 6 1927" and set in the top of a concrete post. (106.155 meters or 348.277 feet.)

T.B.M. 46.—About ¼ mile south along the Central Vermont Railway from the station at **White River Junction**, Windsor County, at a double semaphore, on a corner of the concrete base. A chiseled point. (110.405 meters or 362.220 feet.)

M 6.—At **White River Junction**, Windsor County, on the Boston & Maine Railroad, about ¼ mile east of the station, at bridge 117 over Connecticut River, 30.6 feet west of the west end of the bridge, and 27.8 feet south of the south rail of the main track, in the granite abutment. A standard disk, stamped "M 6 1927." (112.970 meters or 370.636 feet.)

E 6.—At **White River Junction**, Windsor County, about 115 yards north of the Boston & Maine Railroad station, at the bridge over White River, in the west end of the south abutment, 4.2 feet west of the west rail. A standard disk, stamped "E 6 1927." (111.439 meters or 365.613 feet.)

T.B.M. 47.—At **White River Junction**, Windsor County, about ¼ mile north along the Boston & Maine Railroad from the station, at a double semaphore, on the southeast corner of the concrete base. A chiseled point. (112.461 meters or 368.966 feet.)

U 6.—At **White River Junction**, Windsor County, about ¼ mile north along the Boston & Maine Railroad from the station, at the bridge over Maple Street, in the west end of the south abutment, 8.8 feet west of the west rail. A standard disk, stamped "U 6 1927." (111.216 meters or 364.881 feet.)

387 (U.S.G.S.).—About ¾ mile north along the Boston & Maine Railroad from the station at **White River Junction**, Windsor County, at semaphore 12, on the southeast corner of the concrete base. A chiseled square. (117.793 meters or 386.459 feet.)

F 6.—At **Wildier**, Windsor County, opposite the Boston & Maine Railroad station, 24.6 feet east of the east rail of the main track. A standard disk, stamped "F 6 1927" and set in the top of a concrete post. (124.299 meters or 407.804 feet.)

T.B.M. 51.—About ½ mile south along the Boston & Maine Railroad from **Norwich**, Windsor County, at semaphore 37, on a corner of the concrete base. A chiseled point. (125.130 meters or 410.531 feet.)

G 6.—At **Norwich**, Windsor County, about 119 yards north of the Boston & Maine Railroad station, about 151 yards north of an overhead bridge, and 27.7 feet west of the west rail of the main track. A standard disk, stamped "G 6 1927" and set in the top of a concrete post. (122.130 meters or 400.688 feet.)

400 (U.S.G.S.).—About 3¼ miles southeast along the Boston & Maine Railroad from **Pompanoosuc**, Windsor County, about 200 yards south of semaphore 64, and 25 feet east of the track. A United States Geological Survey standard cap,

stamped "400" and riveted on the top of a 3½-inch iron pipe. (122.004 meters or 400.275 feet.)

NOTE—In 1927 this pipe was loose in the ground.

T.B.M. 54.—About ¾ miles southeast along the Boston & Maine Railroad from **Pompanoosuc**, Windsor County, at semaphore 64, on the northeast corner of the concrete base. A chiseled point. (122.007 meters or 400.285 feet.)

H 6.—About 2¼ miles southeast along the Boston & Maine Railroad from **Pompanoosuc**, Windsor County, about ¼ mile south of semaphore 75, opposite the north end of a long narrow island in Connecticut River, 33 feet west of the west rail. A standard disk, stamped "H 6 1927" and set in the top of a concrete post. (121.947 meters or 400.088 feet.)

T.B.M. 55.—About 1½ miles southeast along the Boston & Maine Railroad from **Pompanoosuc**, Windsor County, at semaphore 78, on a corner of the concrete base. A chiseled point. (120.687 meters or 395.954 feet.)

392 (U.S.G.S.).—About 0.3 mile south along the Boston & Maine Railroad from **Pompanoosuc**, Windsor County, at bridge 7, in the west end of the north abutment. A United States Geological Survey standard disk, stamped "392." (119.654 meters or 392.565 feet.)

J 6.—At **Pompanoosuc**, Windsor County, opposite the Boston & Maine Railroad station, 34 feet east of the east rail. A standard disk stamped "J 6 1927" and set in the top of a concrete post. (119.420 meters or 391.797 feet.)

T.B.M. 57.—About ¾ mile northeast along the Boston & Maine Railroad from **Pompanoosuc**, Windsor County, at semaphore 103, on a corner of the concrete base. A chiseled point. (120.632 meters or 395.773 feet.)

T.B.M. 58.—About 1¼ miles northeast along the Boston & Maine Railroad from **Pompanoosuc**, Windsor County, at semaphore 58, on a corner of the concrete base. A chiseled point. (120.487 meters or 395.298 feet.)

T.B.M. 59.—About 2½ miles south along the Boston & Maine Railroad from **Thetford**, Orange County, at semaphore 115, on a corner of the concrete base. A chiseled point. (124.029 meters or 406.918 feet.)

K 6.—See page 22.

LINE 6, ST. JOHNSBURY TO THETFORD, VT.

[First-order leveling]

This line follows the Canadian Pacific Railway from St. Johnsbury to Wells River, and the Boston & Maine Railroad from Wells River to Thetford. The field work was done, during the fall of 1927, by a party in charge of Byron Williams, junior hydrographic and geodetic engineer.

For additional bench marks in the vicinity of St. Johnsbury, see page 9.

A 8.—About ½ mile south along the Canadian Pacific Railway from **St. Johnsbury**, Caledonia County, 264 feet north of the north end of bridge 43, and 9.6 feet west of the west rail. A standard disk, stamped "A 8 1927" and set in the top of a concrete post. (169.216 meters or 555.169 feet.)

B 8.—At **Passumpsic**, Caledonia County, on the Canadian Pacific Railway, just east of the post office, 13 feet north of the center of a road crossing, and 8.8 feet east of the east rail, at the southwest corner of a stone retaining wall. A standard disk, stamped "B 8 1927" and set in the top of a concrete post. (160.408 meters or 526.272 feet.)

517.4 (C.P.Ry.).—About ¼ mile south along the Canadian Pacific Railway from **Passumpsic**, Caledonia County, at the first bridge south of **Passumpsic**, on the east end of the south abutment. A chiseled square. (157.707 meters or 517.410 feet.)

512.6 (C.P.Ry.).—About ¼ mile south along the Canadian Pacific Railway from **Passumpsic**, Caledonia County, at bridge 39, on the west end of the south abutment. A chiseled square. (156.252 meters or 512.637 feet.)

C 8.—About 1¼ miles north along the Canadian Pacific Railway from **Inwood**, Caledonia County, at bridge 37 over **Passumpsic** River, in the east side of the north abutment. A standard disk, stamped "C 8 1927." (154.581 meters or 507.154 feet.)

D 8.—At **Inwood**, Caledonia County, about 550 feet south of the road crossing at the Canadian Pacific Railway station, 17.7 feet west of the west rail, in a conspicuous ledge of bedrock, about 2 feet higher than the track. A standard disk, stamped "D 8 1927." (151.934 meters or 498.470 feet.)

E 8.—At **Barnet**, Caledonia County, 270 feet north of the north end of the Canadian Pacific Railway station, 30.7 feet north of a private-road crossing, and 13.2 feet east of the east rail. A standard disk, stamped "E 8 1927" and set in the top of a concrete post. (139.987 meters or 459.274 feet.)

T.B.M. 8.—About $\frac{3}{4}$ mile south along the Canadian Pacific Railway from **Barnet**, Caledonia County, on the concrete base of semaphore 503. A chiseled square. (139.691 meters or 458.303 feet.)

T.B.M. 9.—About 1.6 miles south along the Canadian Pacific Railway from **Barnet**, Caledonia County, on the concrete base of semaphore 495. A chiseled square. (138.894 meters or 455.688 feet.)

F 8.—At **McIndoes**, Caledonia County, in front of the Canadian Pacific Railway station, and 20.9 feet east of the east rail. A standard disk, stamped "F 8 1927" and set in the top of a concrete post. (147.734 meters or 484.691 feet.)

T.B.M. 10.—About $\frac{1}{2}$ mile south along the Canadian Pacific Railway from **McIndoes**, Caledonia County, on the concrete base of semaphore 478. A chiseled square. (148.331 meters or 486.649 feet.)

G 8.—About 1.3 miles south along the Canadian Pacific Railway from **McIndoes**, Caledonia County, at Staples Crossing, 32 feet south of the center line of the road, and 19 feet east of the east rail. A standard disk, stamped "G 8 1927" and set in the top of a concrete post. (150.104 meters or 492.466 feet.)

T.B.M. 11.—About 1.7 miles north along the Canadian Pacific Railway from **East Ryegate**, Caledonia County, on the concrete base of semaphore 461. A chiseled square. (153.811 meters or 504.628 feet.)

H 8.—At **East Ryegate**, Caledonia County, at the Canadian Pacific Railway passenger station, at the south end of the platform, 13 feet west of the west rail. A standard disk, stamped "H 8 1927" and set in the top of a concrete post. (143.741 meters or 471.590 feet.)

T.B.M. 13.—About 0.6 mile south along the Canadian Pacific Railway from **East Ryegate**, Caledonia County, on the concrete base of semaphore 437. A chiseled square. (135.514 meters or 444.599 feet.)

J 8.—About 1.4 miles south along the Canadian Pacific Railway from **East Ryegate**, Caledonia County, 10 feet west of the west rail, in a conspicuous ledge of bedrock, about 3 feet higher than the track. A standard disk, stamped "J 8 1927." (134.436 meters or 441.062 feet.)

T.B.M. 15.—In Caledonia County, about 1 mile north along the Canadian Pacific Railway from **Wells River**, Orange County, on the concrete base of semaphore 414. A chiseled square. (139.812 meters or 458.700 feet.)

K 8.—At **Wells River**, Orange County, on the Canadian Pacific Railway, 675 feet north of the north end of the station, at Randall Crossing, 20 feet south of the center line of the road, and 8 feet west of the west rail. A standard disk, stamped "K 8 1927" and set in the top of a concrete post. (140.440 meters or 460.760 feet.)

MAC NO. 13 (U.S.G.S.).—Near **Woodsville**, Grafton County, N.H., about 950 feet north of the Boston & Maine Railroad station, at the railroad bridge over the Connecticut River, in the top of the abutment at the southeast corner of the bridge. A United States Geological Survey standard disk, stamped "MAC NO. 13—1925." (138.352 meters or 453.910 feet.)

L 8.—About 2.3 miles south along the Boston & Maine Railroad from **Wells River**, Orange County, and 36.6 feet west of the west rail. A standard disk, stamped "L 8 1927" and set in the top of a concrete post. (125.556 meters or 411.928 feet.)

T.B.M. 18.—About 2.9 miles south along the Boston & Maine Railroad from **Wells River**, Orange County, on the concrete base of semaphore 378. A chiseled square. (126.248 meters or 414.199 feet.)

M 8.—About $\frac{1}{4}$ mile north along the Boston & Maine Railroad from **Newbury**, Orange County, 37 feet north of the center of a road crossing, and 16.6 feet east of the east rail, in a corner formed by the junction of the right-of-way fences of the railroad and highway. A standard disk, stamped "M 8 1927" and set in the top of a concrete post. (129.462 meters or 424.743 feet.)

N 8.—About 1.3 miles north along the Boston & Maine Railroad from **Conicut**, Orange County, in the west end of a concrete culvert, 8 feet west of the west rail. A standard disk, stamped "N 8 1927." (123.626 meters or 405.596 feet.)

T.B.M. 22.—About 0.7 mile north along the Boston & Maine Railroad from Conicut, Orange County, on the concrete base of semaphore 328. A chiseled square. (124.041 meters or 406.958 feet.)

P 8.—At Conicut, Orange County, directly opposite the Boston & Maine Railroad station, 14.3 feet west of the west rail. A standard disk, stamped "P 8 1927" and set in the top of a concrete post. (124.459 meters or 408.329 feet.)

Q 8.—About 1.7 miles north along the Boston & Maine Railroad from Bradford, Orange County, about 0.1 mile north of milepost 30, 14 feet south of the center of a private-road crossing, and 26.6 feet west of the west rail. A standard disk, stamped "Q 8 1927" and set in the top of a concrete post. (122.711 meters or 402.594 feet.)

406 (U.S.G.S.).—About 1.3 miles north along the Boston & Maine Railroad from Bradford, Orange County, 660 feet north of semaphore 298, and 12.3 feet east of the east rail, in a rock outcrop. A United States Geological Survey standard disk, stamped "406." (123.735 meters or 405.954 feet.)

T 6.—At Bradford, Orange County, about 25 yards north of the Boston & Maine Railroad station, and 18.9 feet west of the west rail. A standard disk, stamped "T 6 1927" and set in the top of a concrete post. (123.217 meters or 404.254 feet.)

S 6.—At Piermont, Orange County, about 100 yards north of the Boston & Maine Railroad station, and 18.8 feet west of the west rail. A standard disk, stamped "S 6 1927" and set in the top of a concrete post. (130.757 meters or 428.992 feet.)

R 6.—About 2½ miles north along the Boston & Maine Railroad from Fairlee, Orange County, near the crossing of a private road leading to the house owned by George Foot, 27 feet north of the center line of the road, and 7.5 feet east of the east rail. A standard disk, stamped "R 6 1927" and set in the top of a concrete post. (133.998 meters or 439.625 feet.)

441 (U.S.G.S.).—About 2.4 miles north along the Boston & Maine Railroad from Fairlee, Orange County, 430 feet south of a private-road crossing, and 9.5 feet west of the west rail, in a rock outcrop, about 2 feet higher than the track. A United States Geological Survey standard disk, stamped "441." (134.355 meters or 440.796 feet.)

Q 6.—At Fairlee, Orange County, opposite the Boston & Maine Railroad station, and 27.4 feet east of the east rail. A standard disk, stamped "Q 6 1927" and set in the top of a concrete post. (132.964 meters or 436.233 feet.)

N 6.—At Ely, Orange County, 141 yards north of the Boston & Maine Railroad station, 28 feet east of the center line of the State highway, and 13.1 feet west of the west rail. A standard disk, stamped "N 6 1927" and set in the top of a concrete post. (131.545 meters or 431.577 feet.)

L 6.—About ¼ mile south along the Boston & Maine Railroad from Northboro, Orange County, 73 feet south of the center line of the road crossing the track and passing in front of the house owned by C. K. Hosford, 18.5 feet north of semaphore 162, and 9.7 feet east of the east rail. A standard disk, stamped "L 6 1927" and set in the top of a concrete post. (120.441 meters or 395.147 feet.)

K 6.—About 1 mile south along the Boston & Maine Railroad from Thetford, Orange County, 33 feet south of milepost 13, 47 yards south of the center of a highway crossing, and 8.9 feet west of the west rail. A standard disk, stamped "K 6 1927" and set in the top of a concrete post. (123.157 meters or 404.058 feet.)

For additional bench marks in this vicinity, see page 20.

RAIL ELEVATIONS

The elevations in the following list were determined during the course of the leveling and refer to the top of the rail opposite the railroad station. These elevations are approximate only, since the track does not accurately maintain a constant elevation for any great length of time.

Table of rail elevations

Place	Railroad	Elevation	Place	Railroad	Elevation
		<i>Feet</i>			<i>Feet</i>
Alburgh, Vt.	C. V. Ry.	120.4	McIndoes, Vt.	C. P. Ry.	487.3
Atlantic, N.H.	B. & M. R.R.	53.8	Miles Pond, Vt.	M. C. R.R.	1,029.9
Barnet, Vt.	C. P. Ry.	461.6	Missisquoi, Vt.	C. P. Ry.	501.8
Barton, Vt.	do.	948.6	Mt. Holly, Vt.	Rut. R.R.	1,362.6
Bellows Falls, Vt.	B. & M. R.R.	301.0	Newington, N.H.	B. & M. R.R.	16.2
Brattleboro, Vt.	do.	237.4	North Concord, Vt.	M. C. R.R.	1,077.2
Breakfast Hill, N.H.	do.	73.6	North Hampton, N.H.	B. & M. R.R.	78.5
Center, Vt.	C. P. Ry.	778.9	North Sheldon, Vt.	C. V. Ry.	386.3
Chester, Vt.	Rut. R.R.	597.4	North Troy, Vt.	C. P. Ry.	604.0
Cushings, N.H.	B. & M. R.R.	35.6	Orleans, Vt.	do.	738.5
Dover, N.H.	do.	77.2	Piermont, Vt.	B. & M. R.R.	430.4
Dover Point, N.H.	do.	15.9	Portsmouth, N.H.	do.	13.4
Dummerston, Vt.	do.	263.5	Proctorsville, Vt.	Rut. R.R.	928.3
East Alburgh, Vt.	C. V. Ry.	112.6	Putney, Vt.	B. & M. R.R.	254.8
East Berkshire, Vt.	do.	431.7	Rollinsford, N.H.	do.	120.3
East Clarendon, Vt.	Rut. R.R.	844.3	St. Johnsbury, Vt.	C. P. Ry.	574.9
East Concord, Vt.	M. C. R.R.	883.5	Salmon Falls, N.H.	B. & M. R.R.	107.7
East Ryegate, Vt.	C. P. Ry.	471.4	Sawyer, N.H.	do.	84.5
East St. Johnsbury, Vt.	M. C. R.R.	798.6	Seabrook, N.H.	do.	35.0
East Wallingford, Vt.	Rut. R.R.	1,235.2	South Franklin, Vt.	C. V. Ry.	373.7
Enosburgh Falls, Vt.	C. V. Ry.	427.3	Summit, Caledonia County, Vt.	C. P. Ry.	1,227.5
Gassetts, Vt.	Rut. R.R.	733.0	Summit, Rutland County, Vt.	Rut. R.R.	1,518.5
Gilman, Vt.	M. C. R.R.	570.1	Sutton, Vt.	C. P. Ry.	1,057.6
Hampton, N.H.	B. & M. R.R.	52.1	Swanton, Vt.	C. V. Ry.	136.5
Hampton Falls, N.H.	do.	9.4	West Burke, Vt.	C. P. Ry.	930.0
Hanover, Vt.	do.	402.4	Westminster, Vt.	B. & M. R.R.	260.8
Kimball, Vt.	C. P. Ry.	1,154.4	West Rutland, Vt.	D. & H. R.R.	491.1
Lakewood, Vt.	C. V. Ry.	107.8			
Ludlow, Vt.	Rut. R.R.	1,065.0			
Lyndonville, Vt.	C. P. Ry.	714.7			

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