DEPARTMENT OF THE INTERIOR
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HON. W. J. ROCHE, *Minister*. W. W. CORY, C.M.G., *Deputy Minister*.

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Precise Levelling

BY

F. B. REID, D.L.S.

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BY F. B. REID, D.L.S.

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DEPARTMENT OF THE INTERIOR,
OTTAWA, CANADA,
February 16th, 1914.

C. A. BIGGER, ESQ., D.L.S.,
Assistant Superintendent,
Geodetic Survey of Canada,
Ottawa.

Sir,—

I have the honour to make the following report giving further results of precise levelling done by the Geodetic Survey. Two publications have already been issued—Appendix No. 5 to the Chief Astronomer's report for 1910 and our 1913 publication on precise levelling; the present publication is a continuation of these and is arranged in the same general form with the results of the levelling set forth in three tables.

Table I indicates the routes followed between terminal points and gives complete descriptions of all bench-marks established along these routes.

Table II shows in the first two columns the numbers of the bench-marks; in the third and fourth columns the approximate distance (in miles) between bench-marks, and from the initial bench-mark of the line; the fifth and sixth columns (headed "Discrepancy") give the difference (in feet) between the forward levelling and the backward levelling for each section between bench-marks and the accumulated difference from the initial bench-mark. The seventh column gives the elevations of the bench-marks shown in the second column; for convenience, these bench-mark numbers are repeated (in the eighth column) in order that the number of any bench-mark and its elevation may be in adjoining columns. In this table are shown also the elevations determined by the Geodetic Survey for certain bench-marks established by other surveys and connected with our levelling.

Table III shows the elevations at railway stations and at crossings of intersecting railways; on those lines most recently levelled the elevation was also

taken on the bridges over rivers and lakes and the more important streams. Rail elevations were in all cases taken on top of the rail, in front of the telegraph office at telegraph stations and opposite the shelter or platform at flag stations.

The results are given for the following lines:—

1. Grand Falls, N.B., to Moncton, N.B.
2. Ottawa, Ont., to Whitefish Lake, Que.
3. Finch, Ont., to Cornwall, Ont.
4. Finch, Ont., to Ottawa, Ont.
5. Lucan Crossing, Ont., to Chatham, Ont.
6. Bala, Ont., to Sudbury, Ont.
7. Emerson, Man., to Fort Frances, Ont.
8. Girvin, Sask., to Prince Albert, Sask.
9. Moosejaw, Sask., to Maple Creek, Sask.

Line 1 forms a connecting link between the previously published St. Stephen—Rivière-du-Loup and St. Stephen—Moncton lines; the elevation of the initial bench-mark, 47–B, is the one originally determined by levelling from St. Stephen; at Moncton the closing error of the line is 0.236 feet, the length of the circuit—St. Stephen—Grand Falls—Moncton—being about 525 miles.

Line 2 is a continuation of the line from Kempton to Ottawa, which was embodied in our 1913 publication. Lines 3 and 4 are branches from the main line of levels from Rouse Point to Toronto; at Ottawa, line 4 is terminated at bench-mark 124–A of the Kempton—Ottawa line and exhibits a closing error of 0.117 feet; it is to be noted that this line acts merely as a check on the elevations at Ottawa; the elevations along line 2 are based, not upon the results of the new levelling, but upon those previously carried from Kempton. Line 5 commences at bench-mark 337 on the Owen Sound—Hyde Park line and is closed on the Toronto—Windsor line. Line 6 is a continuation of the line from Bolton to Bala. Line 7 commences at bench-mark 3–C on the Stephen—Regina line, the elevations of which were carried from the United States Coast and Geodetic

Survey bench-mark at Stephen, Minnesota. Line 8 is a continuation of the line from Regina to Girvin. Line 9 commences at bench-mark 94–C on the above mentioned Stephen—Regina line.

All the elevations given are instrumental and have had no adjustments applied to them, consequently changes may be made in the future; it should be noted, however, that in all cases where circuits have been closed, the closing errors are quite small.

The standard bench-mark adopted consists of a copper bolt, ¾ inch in diameter and 4 inches long, stamped on the end with the letters "G.S.C., B.M." (Geodetic Survey of Canada, Bench-Mark). The bolt is sunk horizontally in rock or masonry so that only the circular end is visible; the number of the bench-mark is stamped on this end as well as the letters mentioned above, and a horizontal chisel line is cut, upon which the elevation is taken. At certain points concrete bench-mark piers have been built; these project from 6 inches to 1 foot above the ground and extend below the frost line; the copper bolt upon which the elevation is taken is placed horizontally as in other cases, and is about 9 inches below the top of the pier.

I have the honour to be, Sir,

Your obedient servant,

F. B. Reid,

Inspector of Levelling.

TABLE I.

BENCH-MARKS BETWEEN GRAND FALLS AND MONCTON, NEW BRUNSWICK, VIA GRAND TRUNK PACIFIC RAILWAY.

Note.—These descriptions are written with the assumption that the railway runs in a southeasterly direction from Grand Falls to Moncton.

289–B In concrete foundation wall at west corner of Grand Trunk Pacific station-house at Grand Falls. This bench-mark has been rendered inaccessible by a wooden platform constructed around the building.

290–B In northwest face of north concrete retaining wall of steel trestle viaduct over Little river, 2 miles southeast of Grand Falls station.

291–B In northwest end of northeast face—5 feet 10 inches below top—of southwest concrete abutment of highway bridge over Grand Trunk Pacific railway, 3¼ miles southeast of Grand Falls station.

292–B In southwest face of small concrete arch culvert under Grand Trunk Pacific railway, 750 feet southeast of Drummond.

293–B In southwest face of west concrete retaining wall—4 feet 9 inches above bridge-seat—of steel trestle viaduct over Little Salmon river, 2 miles southeast of Drummond.

294–B In southeast face of south concrete retaining wall of steel trestle viaduct on Grand Trunk Pacific railway, 5¼ miles southeast of Drummond and at mileage 181.3 from Moncton.

295–B In northwest face of west concrete retaining wall of steel trestle viaduct on Grand Trunk Pacific railway, at mileage 180.3 from Moncton.

296–B In concrete foundation—3 inches below woodwork and directly beneath the spout—of Grand Trunk Pacific water-tank, 0.4 mile northwest of Blue Bell station.

297–B In northwest face of northeast face-wall—16 inches below top—of large concrete arch culvert under Grand Trunk Pacific railway, at mileage 174.2 from Moncton.

298–B In southwest face of square concrete culvert under Grand Trunk Pacific railway, at fourth telegraph pole southeast of mile post 171 from Moncton.

299–B In southwest face of square concrete culvert under Grand Trunk Pacific railway, 750 feet southeast of a highway crossing and between fifth and sixth telegraph poles northwest of mile post 169 from Moncton.

300–B In northwest end of northeast face of concrete arch culvert under Grand Trunk Pacific railway, 2¼ miles northwest of Plaster Rock and at mileage 167.6 from Moncton.

301–B In southwest end of southeast face of concrete retaining wall behind northwest abutment—28 inches above bridge-seat — of subway under Grand Trunk Pacific railway, 720 feet southeast of Plaster Rock station.

302–B In northeast end of northwest face—11 inches below top—of concrete retaining wall behind northwest abutment of Grand Trunk Pacific railway bridge over Tobique river and Canadian Pacific railway, ½ mile southeast of Plaster Rock station.

303–B In southeast end of northeast face of concrete arch culvert under Grand Trunk Pacific railway, 3¼ miles northwest of Longley and at mileage 162.25 from Moncton.

304–B In concrete foundation—4 inches below woodwork and 8 feet to the right of the spout—of Grand Trunk Pacific water-tank at Longley.

305–B In northwest end of southwest face of square concrete culvert under Grand Trunk Pacific railway, 1½ miles southeast of Longley and at mileage 157.75 from Moncton.

306–B In southwest face of square concrete culvert under Grand Trunk Pacific railway, at third telegraph pole northwest of mile post 155 from Moncton.

307–B In northwest face of northeast face-wall of concrete arch culvert under Grand Trunk Pacific railway at mileage 152.8 from Moncton.

308–B In northeast face of small concrete arch culvert under Grand Trunk Pacific railway at mileage 150.75 from Moncton.

309–B In northeast end of southeast face of concrete retaining wall behind northwest abutment—1 foot above bridge-seat—of plate-girder bridge on Grand Trunk Pacific railway, 3¼ miles northwest of Summit.

310–B In concrete foundation—6 inches below woodwork and 8 feet to the right of the spout—of Grand Trunk Pacific water-tank at Summit.

311–B In southeast face of southwest face-wall of concrete arch culvert under Grand Trunk Pacific railway, 1½ miles southeast of Summit and at mileage 144.5 from Moncton.

312–B In southwest face-wall of concrete tile culvert under Grand Trunk Pacific railway at mileage 141.8 from Moncton.

313–B In northwest face of southwest face-wall of concrete arch culvert under Grand Trunk Pacific railway, at sixteenth telegraph pole southeast of mile post 139 from Moncton.

314–B In southwest face of concrete coping on southwest end of concrete tile culvert under Grand Trunk Pacific railway, at mileage 136.25 from Moncton.

315–B In southwest end of northwest face of concrete retaining wall behind southeast abutment—15 inches above bridge-seat—of Grand Trunk Pacific railway bridge over Juniper brook, ½ mile northwest of Juniper.

316–B In southwest end of southeast face of concrete retaining wall behind northwest abutment—2 feet 10 inches above bridge-seat—of Grand Trunk Pacific railway bridge over southwest branch of Miramichi river, ½ mile southeast of Juniper.

317–B In northwest face of northeast face-wall of concrete arch culvert under Grand Trunk Pacific railway, at mileage 130.25 from Moncton.

318–B In northwest end of southwest face-wall of concrete arch culvert under Grand Trunk Pacific railway, 3 miles northwest of Riverdale and at mileage 128.5 from Moncton.

319–B In south face of west wing-wall—2 feet 10 inches below top—of concrete arch culvert under Grand Trunk Pacific railway, ¾ mile northwest of Riverdale.

320–B In southwest end of northwest face of concrete retaining wall behind southeast abutment—27 inches above bridge-seat—of Grand Trunk Pacific railway bridge over southwest branch of Miramichi river, 1 mile southeast of Riverdale.

321–B In northwest end of southwest face of square concrete culvert under Grand Trunk Pacific railway at mileage 122.75 from Moncton.

322–B In southwest face of concrete coping on southwest end of concrete tile culvert under Grand Trunk Pacific railway, 2¾ miles northwest of Napadogan and 200 feet northwest of mile post 120 from Moncton.

323–B In northerly part of circular concrete retaining wall of Grand Trunk Pacific turn-table at Napadogan; the bench-mark is in inside face and 10 inches below top of concrete.

324–B In concrete foundation—4 inches below woodwork and 8 feet to the left of the northerly spout—of Grand Trunk Pacific water-tank at Napadogan.

325–B In south face of west wing-wall—4 feet 9 inches below top—of concrete arch culvert under Grand Trunk Pacific railway, 2 miles southeast of Napadogan and at mileage 115.25 from Moncton.

326–B In southeast face of northeast face-wall of concrete tile culvert under Grand Trunk Pacific railway, at mileage 112.75 from Moncton.

327–B In southwest face—10 inches above top of west wing-wall—of concrete arch culvert under Grand Trunk Pacific railway, at mileage 110.8 from Moncton.

328–B In northeast face-wall of concrete tile culvert under Grand Trunk Pacific railway, 210 feet northwest of Maple Grove station.

329–B In southwest face-wall of concrete tile culvert under Grand Trunk Pacific railway, 3 miles southeast of Maple Grove and at mileage 105.4 from Moncton.

330–B In southwest face-wall of concrete tile culvert under Grand Trunk Pacific railway, at third telegraph pole northwest of mile post 103 from Moncton.

331–B In southwest face of concrete coping on southwest end of concrete tile culvert under Grand Trunk Pacific railway, at mileage 101.5 from Moncton.

332–B In northwest face of northeast face-wall of small concrete arch culvert under Grand Trunk Pacific railway, 2¼ miles northwest of McGivney Junction and at mileage 98.5 from Moncton.

333–B In concrete foundation—4 inches below woodwork and 7 feet to the left of the spout—of Grand Trunk Pacific water-tank at McGivney Junction.

334–B In northwest end of southwest face of small concrete arch culvert under Grand Trunk Pacific railway, 2½ miles southeast of McGivney Junction and at mileage 93.8 from Moncton.

335–B In northwest face of southwest face-wall of concrete arch culvert under Grand Trunk Pacific railway, 230 feet northwest of mile post 92 from Moncton.

336–B In northwest face of southwest face-wall of concrete arch culvert under Grand Trunk Pacific railway, 2¼ miles northwest of North Cains and at mileage 90.5 from Moncton.

337–B In northwest face of southwest face-wall of concrete arch culvert under Grand Trunk Pacific railway, ½ mile southeast of North Cains.

338–B In southeast face of southwest face-wall of concrete arch culvert under Grand Trunk Pacific railway, at mileage 85.25 from Moncton.

339–B In northwest face of southwest face-wall of concrete arch culvert under Grand Trunk Pacific railway, at mileage 82.3 from Moncton.

340–B In southwest end of northwest face—6 inches below top—of concrete retaining wall behind northwest abutment of plate-girder bridge over Cains river, 1¼ miles northwest of Bantalor.

341–B In centre of south face of west retaining wall—5 feet below top—of concrete arch culvert under Grand Trunk Pacific railway, ½ mile southeast of Bantalor.

342–B In northwest end of southwest face of concrete arch culvert under Grand Trunk Pacific railway, at mileage 77.7 from Moncton.

343–B In southwest face of concrete coping on southwest end of concrete tile culvert under Grand Trunk Pacific railway, at mileage 75.8 from Moncton.

344–B In northwest face of southwest face-wall of large concrete arch culvert under Grand Trunk Pacific railway, ½ mile northwest of Sunbury and at mile post 74 from Moncton.

345–B In northwest face of concrete coping on northeast end of concrete tile culvert under Grand Trunk Pacific railway, 1½ miles southeast of Sunbury and 300 feet southeast of mile post 72 from Moncton.

346–B In northwest end of southwest face of square concrete culvert under Grand Trunk Pacific railway, 340 feet southeast of mile post 70 from Moncton.

347–B In southeast face of east concrete retaining wall of steel trestle bridge over Newcastle stream, ¾ mile northwest of Canton.

348–B In northeast face of concrete coping on northeast end of concrete tile culvert under Grand Trunk Pacific railway, 60 feet northwest of a private crossing at mileage 63.7 from Moncton.

349–B In southeast end of northeast face of small concrete arch culvert under Grand Trunk Pacific railway, 200 feet northwest of a highway crossing at mileage 62.2 from Moncton.

350–B In southeast end of southwest face of concrete arch culvert under Grand Trunk Pacific railway, 2¾ miles northwest of Chipman and at tenth telegraph pole northwest of mile post 59 from Moncton.

351–B In northeast end of northwest face of concrete retaining wall behind southeast abutment—15 inches above bridge-seat—of subway under Grand Trunk Pacific railway, ¾ mile northwest of Chipman.

352–B In southwest end of northwest face of concrete retaining wall behind southeast abutment—20 inches above bridge-seat—of Grand Trunk Pacific railway bridge over Salmon river, 900 feet northwest of Chipman station.

353–B In southwest end of southeast face of concrete retaining wall behind northwest abutment—2 feet above bridge-seat—of subway under Grand Trunk Pacific railway, 2 miles southeast of Chipman.

354–B In southwest face of square concrete culvert under Grand Trunk Pacific railway, at mileage 52.7 from Moncton.

355–B In northwest face of northeast face-wall of concrete arch culvert under Grand Trunk Pacific railway, 50 feet southeast of southeasterly switch at Bronson passing track.

356–B In northwest face of southwest face-wall of concrete arch culvert under Grand Trunk Pacific railway, at third telegraph pole southeast of mile post 46 from Moncton.

357–B In northwest face of southwest face-wall of concrete arch culvert under Grand Trunk Pacific railway, at sixth telegraph pole northwest of mile post 43 from Moncton.

358–B In centre of south face of west wing-wall of large concrete arch culvert under Grand Trunk Pacific railway, 1¼ miles northwest of Pangburn and at mile post 41 from Moncton.

359–B In northwest face of southwest concrete face-wall of iron pipe culvert under Grand Trunk Pacific railway, at mileage 37.4 from Moncton.

360–B In northwest face of southwest face-wall of concrete arch culvert under Grand Trunk Pacific railway, 2 miles northwest of Alward and at mileage 35.4 from Moncton.

361–B In southeast end of northeast face of square concrete culvert under Grand Trunk Pacific railway, 400 feet southeast of Alward.

362–B In northwest end of southwest face-wall—beyond juncture of westerly wing-wall—of concrete arch culvert under Grand Trunk Pacific railway, at mileage 30.3 from Moncton.

363–B In southeast face of northeast face-wall of concrete arch culvert under Grand Trunk Pacific railway, at mileage 28.8 from Moncton.

364–B In southeast face of northeast face-wall of square concrete culvert under Grand Trunk Pacific railway, 1¾ miles northwest of North Branch and 260 feet northwest of mile post 25 from Moncton.

365–B In southeast end of northeast face of square concrete culvert under Grand Trunk Pacific railway, ½ mile southeast of North Branch and at mileage 22.8 from Moncton.

366–B In southwest end of southeast face of concrete retaining wall behind northwest abutment—3 feet above bridge-seat—of steel trestle bridge over Canaan river, 1½ miles southeast of North Branch.

367–B In northwest face of southwest face-wall of large concrete arch culvert under Grand Trunk Pacific railway, at mileage 17.4 from Moncton.

368–B In southwest concrete face-wall of iron pipe culvert under Grand Trunk Pacific railway, 370 feet northwest of northwesterly switch at Segawa passing track.

369–B In concrete foundation—4 inches below woodwork and 12 feet to the right of the spout—of Grand Trunk Pacific water-tank at mile post 11 from Moncton.

370–B In northeast end of northwest face of concrete retaining wall behind southeast abutment—1 foot above bridge-seat—of subway under Grand Trunk Pacific railway, at mileage 8.3 from Moncton.

371–B In southwest concrete face-wall of iron pipe culvert under Grand Trunk Pacific railway, 300 feet southeast of mile post 5 from Moncton.

372–B In south concrete foundation wall of Grand Trunk Pacific roundhouse near Moncton, 10 inches below brickwork and between first and second windows from southeast corner of building.

373–B In east face of concrete coping on east end of small culvert under Cornhill street, Moncton, immediately south of crossing of Intercolonial railway—Montreal line.

374–B In sixth course of stonework below brickwork, in east end of south wall of southwesterly (or 1911) wing of Intercolonial railway general offices at Moncton.

132–B In stone water-table course, at south end of east wall of Intercolonial station-house at Moncton.

BENCH-MARKS BETWEEN OTTAWA, ONTARIO, AND WHITEFISH LAKE, QUEBEC, VIA CANADIAN PACIFIC RAILWAY TO GRACEFIELD AND HIGHWAYS TO WHITEFISH LAKE.

459 In fourth course of stonework below top, in north end of northwest retaining wall of "Prince of Wales" bridge—on Canadian Pacific railway—over north channel of Ottawa river, between Ottawa and Hull.

460 In second course of stonework below brickwork, in south wall—5 feet from southwest corner—of Canadian Pacific station-house, Maniwaki Junction.

461 In north face of concrete coping—directly above northeast retaining wall—of concrete highway bridge over Brewery creek, 125 feet west of Canadian Pacific railway track and 0.4 mile north of Maniwaki Junction.

462 In east face of most southerly buttress on east wall of cement storehouse at Canada Cement works; this is a large concrete building immediately west of Canadian Pacific railway track and 1 mile north of Maniwaki Junction.

463 In west end of north face of south abutment of square concrete culvert under Canadian Pacific railway, 2.6 miles north of Maniwaki Junction.

464 In second course of stonework below woodwork, in west wall—11 feet 6 inches from northwest corner—of Chelsea public school, immediately southeast of Chelsea station.

465 In south face of exposed rock surface—15 feet east of Canadian Pacific railway track and 2 feet below rail—at south end of curved rock cut, ¾ mile south of Kirk Ferry and 40 feet north of culvert at mileage 9.45 from Maniwaki Junction.

466 In south face of west face-wall of square concrete culvert under Canadian Pacific railway, ½ mile north of Kirk Ferry and at mileage 10.76 from Maniwaki Junction.

467 In south end of east face of square concrete culvert under Canadian Pacific railway, 0.4 mile south of Cascades and at mileage 13.59 from Maniwaki Junction.

468 In east face—directly above southeast retaining wall—of concrete arch culvert under Canadian Pacific railway, 1¼ miles north of Farm Point and at mileage 17.27 from Maniwaki Junction.

469 In north foundation wall of Presbyterian church, Wakefield—14 inches below brickwork and 8 feet 5 inches east of most easterly basement window.

470 In second course of stonework below coping, in north face of northwest retaining wall of Canadian Pacific railway bridge over Pêche river, in Wakefield village.

471 In east face of exposed rock surface—10 feet west of Canadian Pacific railway track and at rail level—1 mile north of Wakefield station and 150 feet north of culvert at mileage 20.85 from Maniwaki Junction.

472 In north face of east face-wall of concrete arch culvert under Canadian Pacific railway, 400 feet south of Alcove station.

473 In south face of east face-wall of square concrete culvert under Canadian Pacific railway, 1 mile north of Alcove and at mileage 24.04 from Maniwaki Junction.

474 In south end of east face of west face-wall of concrete arch culvert under Canadian Pacific railway, at mileage 25.6 from Maniwaki Junction.

475 In west side of rock cut on Canadian Pacific railway—1 foot above rail and 65 feet south of north end of cut—about 500 feet north of culvert at mileage 29.23 from Maniwaki Junction.

475–A In concrete bench-mark pier, 4 feet west of east line of Canadian Pacific railway right-of-way, ¼ mile north of Brennan and 185 feet north of a concrete culvert at mileage 31.66 from Maniwaki Junction.

476 In first course of stonework below coping, in north end of northwest retaining wall of plate-girder bridge on Canadian Pacific railway, ¾ mile south of Low.

477 In east concrete face-wall of 30 inch concrete tile culvert under Canadian Pacific railway, 2½ miles south of Venosta and at mileage 36.75 from Maniwaki Junction.

478 In west concrete face-wall of triangular concrete tile culvert under Canadian Pacific railway, 1½ miles north of Venosta and at mileage 40.86 from Maniwaki Junction.

479 In first course of stonework below coping, in north end of west face of northwest retaining wall of Canadian Pacific railway bridge over Kazabazua river, ½ mile south of Kazabazua station.

480 In south face of west face-wall of concrete arch culvert under Canadian Pacific railway, 1 mile north of Aylwin and 200 feet south of mile post 48 from Maniwaki Junction.

481 In south face of east face-wall of square concrete culvert under Canadian Pacific railway, 3¼ miles south of Gracefield and at mileage 54.4 from Maniwaki Junction.

482 In concrete bench-mark pier, 3 feet 6 inches east of west line of Canadian Pacific railway right-of-way, 190 feet north of north end of bridge over Pickanock river and 1¾ miles south of Gracefield.

483 In third course of stonework below coping, in north face of northwest retaining wall of Canadian Pacific railway bridge over Pickanock river, 1¾ miles south of Gracefield.

484 In west face of corner stone—first course below water-table course—at northwest corner of Gracefield Roman Catholic church.

485 In southeast face of mass of rock—13 feet by 14 feet—about 60 feet north of Gracefield-Whitefish road, at outlet of Victoria lake and 30 feet east of flume from lake to saw-mill near McBean post office.

486 In south face of exposed mass of rock immediately north of Gracefield-Whitefish road—1 foot above road surface— and 100 feet southeast of branch road leading to Rat lake, 1½ miles east of McBean post office.

487 In concrete bench-mark pier situated about 3½ miles easterly from McBean post office, at the brow of a small hill and at the eastern extremity of the first clearing reached after coming in sight of Little Whitefish lake; the pier is on the property of Onesime Lafrenière, about 30 feet south of the centre of Gracefield-Whitefish road and 10 feet north of a rail fence.

488 In north face of boulder, 18 feet west of westerly shore line of Catfish lake, at south end of piece of bush at the northern extremity of Oliver Lafrenière's property, 174 feet north of a rail fence and about 900 feet north of source of Catfish creek.

BENCH-MARKS BETWEEN FINCH AND CORNWALL, ONTARIO, VIA OTTAWA AND NEW YORK RAILWAY.

495 In west end of south concrete foundation wall of Finch Methodist church, 13 inches below water-table course of concrete blocks.

494 In south end of west concrete foundation wall—10 inches below woodwork—of frame residence of Wm. Arbuthnot at Northfield station.

493 In north end of east face of north concrete wing-wall—8 inches below bridge-seat—of bridge on Ottawa and New York railway 1,600 feet northwest of Black River station.

492 In concrete bench-mark pier, 4 feet southwest of northeast line of Ottawa and New York railway right-of-way, 130 feet northwest of culvert 53–A and 2 miles northwest of Cornwall Junction.

491 In west face of buttress—10 inches above water-table course—at southwest corner of south transept of Trinity Anglican church, Cornwall.

490 In second course of stonework below water-table course, in south wall of Cornwall post office, 32 inches west of west wall of clock tower.

489 In fourth course of stonework below water-table course, in south wall of most southerly section of Cornwall court house, 5 feet from southeast corner.

BENCH-MARKS BETWEEN FINCH AND OTTAWA, ONTARIO, VIA OTTAWA AND NEW YORK RAILWAY.

Note.—These levels were carried along the Ottawa and New York railway to the village of Hurdman, on the Rideau river, thence southwesterly along the Canadian Northern railway to the Ottawa-Prescott line of the Canadian Pacific railway, and thence along the latter to close on bench-mark 124-A.

496 In northeast end of northwest face of retaining wall behind southeast concrete abutment—3 feet 2 inches above bridge-seat—of Ottawa and New York railway bridge over South Nation river at Crysler.

497 In north face of northeast retaining wall of large concrete arch highway culvert, 200 feet north of Ottawa and New York railway track, opposite mile post 26 from Ottawa and 2½ miles southeast of Embrun.

498 In second course of stonework below water-table course, in west face of westerly buttress at southwest corner of Embrun Roman Catholic church.

499 In concrete bench-mark pier, 4 feet northeast of southwest line of Ottawa and New York railway right-of-way, ¾ mile northwest of Russell station and 420 feet southeast of intersection of east fence of a highway with southwest fence of right-of-way.

500 In stone foundation of north wall—6 inches below woodwork and 19 feet from northwest corner—of St. James Anglican church, ½ mile southeast of Edwards and immediately west of Ottawa and New York railway track.

501 In second course of stonework below brickwork, 10 inches from northeast corner of front wall of Alex. McLaughlin's (red brick) residence, 1¼ miles northwest of Piperville and immediately east of Ottawa and New York railway track.

502 In concrete bench-mark pier, between tracks of Grand Trunk railway and Ottawa and New York railway, 52 feet northeast of former and 48 feet southwest of latter track, 255 feet southeast of mile post 130 from Alburgh Junction, opposite mile post 5 from Ottawa and ½ mile northwest of diamond crossing at Hawthorne.

503 In east face of square concrete culvert under Canadian Pacific railway (Sussex street spur line) at south side of Ottawa-Russell road and at mileage 3.5 from Chaudière Junction.

504 In northwest face—1 foot below top—of concrete retaining wall behind northeast abutment of Bank street subway under Canadian Northern railway at Billings Bridge village.

124-A In third course of stonework below coping, in north end of west face of northwest retaining wall of bridge over Rideau river, on Prescott subdivision of Canadian Pacific railway, at mileage 2.65 from Ottawa.

BENCH-MARKS BETWEEN LUCAN CROSSING AND CHATHAM, ONTARIO, VIA GRAND TRUNK RAILWAY TO SARNIA AND PERE MARQUETTE RAILROAD TO CHATHAM.

342 In east face—12 feet south of centre of track and 8 inches below top of concrete—of east abutment of open culvert under Grand Trunk railway, 1½ miles west of Lucan Crossing and ¼ mile west of mile post 117 from Toronto.

343 In north end of east face of concrete retaining wall behind west abutment—2 feet above bridge-seat—of Grand Trunk railway bridge over Aux Sables river, 0.3 mile west of Ailsa Craig.

344 In fourth course of stonework below seat of I-beams, in west face—12 feet south of north end—of east abutment of open culvert under Grand Trunk railway, 1,800 feet west of mile post 124 from Toronto.

345 In west face of concrete coping (9 feet north of centre of track) on west abutment of open culvert under Grand Trunk railway, 2 miles east of Parkhill and ¼ mile west of mile post 126 from Toronto.

346 In first course of stonework below water-table course, in north wall of Parkhill post office, 14 feet from northeast corner.

347 In first course of stonework below seat of I-beams, in south end of west face of east abutment of open culvert under Grand Trunk railway, 2¾ miles west of Parkhill and 300 feet east of mile post 131 from Toronto.

348 In east end of south face—3 feet 6 inches below top—of southeast (stone and concrete) retaining wall of Grand Trunk railway bridge over Aux Sables river, 2¼ miles east of Thedford.

349 In first course of stonework below concrete coping, in south end of east face of east abutment of open culvert under Grand Trunk railway, 1 mile west of Thedford and at mile post 138 from Toronto.

350 In fourth course of stonework below seat of I-beams, in east face of southwest retaining wall of open culvert under Grand Trunk railway, ¼ mile west of mile post 142 from Toronto.

351 In south end of east face—5 inches below top—of east concrete abutment of plate-girder bridge on Grand Trunk railway, 1,000 feet west of Forest station.

352 In third course of stonework below seat of I-beams, in south end of east face of west abutment of open culvert under Grand Trunk railway, 3¾ miles west of Forest and ½ mile west of mile post 149 from Toronto.

353 In south end of west face of concrete retaining wall behind east abutment—22 inches above bridge-seat—of plate-girder bridge on Grand Trunk railway, 1,500 feet west of mile post 153 from Toronto.
NOTE.—The copper bolt is almost concealed by a new bridge-floor which has been laid since the establishment of the bench-mark.

354 In south face of second stone below southwest cap-stone of open culvert under Grand Trunk railway—at a highway crossing—1¼ miles west of Camlachie and 600 feet west of mile post 156 from Toronto.

355 Destroyed.

356 In concrete bench-mark pier, 8 feet west of east line of Grand Trunk railway right-of-way, on top of a small knoll in the middle of a long curve, 2 miles southwest of Blackwell and 904 feet south of mile post 165 from Toronto.

357 In tenth course of stonework below top, in east face—1 foot from north end—of southeast face-wall (at Sarnia end) of St. Clair tunnel.

358 In south end of west face-wall of square concrete culvert under Grand Trunk railway, on branch line from Sarnia Tunnel station to Sarnia wharf and 20 feet south of crossing of Confederation street.

359 In south wall of clock tower of Sarnia post office, 18 inches above concrete sidewalk and 20 inches west of front wall of building.

360 In west concrete foundation wall of Père Marquette station-house at Sarnia, 7 feet below woodwork and 20 inches from southwest corner.

361 In second course of concrete blocks below woodwork, in east wall—3 feet from northeast corner—of English church at Corunna.

362 In second altar-step below top, in east face of southeast concrete retaining wall of plate-girder bridge on Père Marquette railroad, ¼ mile south of Mooretown.

363 In southwest face—3 feet 6 inches below top—of northwest retaining wall of square concrete culvert under Père Marquette railroad, ¼ mile south of Courtright.

364 In second altar-step below top, in southeast face of southeast concrete retaining wall of plate-girder bridge on Père Marquette railroad, 2¼ miles north of Sombra.

365 In west end of north face of concrete retaining wall behind south abutment—18 inches above seat of I-beams—of open culvert under Père Marquette railroad, 2¼ miles south of Sombra and 90 feet north of mile post 51 from Rondeau.

366 In west end of south face of concrete retaining wall behind north abutment—20 inches above bridge-seat—of plate-girder bridge on Père Marquette railroad, immediately north of Whitebread.

367 In eleventh course of stonework below brickwork, in west wall of Wallaceburg public library, 27 inches south of doorway leading to basement.

368 In twelfth course of brickwork below water-table, in north wall—32 inches from northeast corner—of brick school house, 700 feet south of Père Marquette railroad and 3 miles east of Wallaceburg.

369 In west end of north face of concrete retaining wall behind south abutment—2 feet above bridge-seat—of (swing) highway bridge over Sydenham river at Tupperville.

370 In second course of stonework above concrete sidewalk, in south wall of Dresden post office, 30 inches east of east wall of tower.

371 In north face of concrete coping on east end of square concrete culvert under Père Marquette railroad, 1½ miles south of Ennett and 1,500 feet north of mile post 26 from Rondeau.

372 In north face of concrete coping on east end of square concrete culvert under Père Marquette railroad, 150 feet south of Darrell.

373 In east end of south face of concrete retaining wall behind north abutment—28 inches above bridge-seat—of Père Marquette railroad bridge over Thames river in Chatham, ½ mile north of diamond crossing of Canadian Pacific railway.

247 In southwest face of cap-stone on west retaining wall of Grand Trunk railway bridge over Thames river, ¼ mile northeast of Chatham Junction.

BENCH-MARKS BETWEEN BALA AND SUDBURY, ONTARIO, VIA CANADIAN PACIFIC RAILWAY.

409 In exposed rock surface at east side of Canadian Pacific railway track, facing small lake, 140 feet north of a whistle post, 1½ miles north of Bala and about 2,100 feet north of mile post 116 from West Toronto.

410 In west side of rock cut—at south end—43 feet west of Canadian Pacific railway main line and 300 feet south of north switch of passing track at Roderick.

411 In fourth course of stonework below bridge-seat, in east end of south face of north abutment of Canadian Pacific railway bridge over Roderick lake, 3 miles north of Roderick and at mileage 122.2 from West Toronto.

412 In concrete bench-mark pier, 38 feet east of Canadian Pacific railway track, 1½ miles south of Muskoka and 2,100 feet north of mile post 125 from West Toronto.

413 In centre of rock cut on west side of Canadian Pacific railway track, 1,500 feet north of mile post 2 from Muskoka.

414 In centre of rock cut on west side of Canadian Pacific railway track, 420 feet south of mile post 8 from Muskoka.

415 In north face of east face-wall of concrete arch culvert under Canadian Pacific railway, 1 mile south of Black Road and at mileage 12.4 from Muskoka.

416 In south end of rock cut on west side of Canadian Pacific railway track, 1 mile north of Black Road and 250 feet north of culvert at mileage 14.5 from Muskoka.

417 In west side of rock cut on Canadian Pacific railway, 225 feet south of a highway crossing, ½ mile south of Dockmure and 860 feet north of mile post 17 from Muskoka.

418 In east end of south face—3 feet 8 inches below bridge-seat—of north concrete abutment of subway by which Grand Trunk railway passes under Canadian Pacific railway, 3¼ miles south of Parry Sound.

419 In east end of north face—4 feet above bridge-seat—of concrete retaining wall behind south abutment of Parry Sound viaduct—on Canadian Pacific railway.

420 In east face—16 inches below bridge-seat—of south concrete abutment of subway under Canadian Pacific railway, 800 feet south of Parry Sound station.

421 In east face of concrete arch culvert under Canadian Pacific railway, 1¼ miles south of Ambo and at mileage 28.6 from Muskoka.

421-A In north face of concrete coping on east end of concrete arch culvert under Canadian Pacific railway, ¾ mile north of Ambo and at mileage 30.7 from Muskoka.

422 In north end of east face of concrete arch culvert under Canadian Pacific railway, ¾ mile north of Carling and at mileage 35.9 from Muskoka.

423 In north end of east face of concrete arch culvert under Canadian Pacific railway, 1¾ miles south of Shawanaga and at mileage 39.1 from Muskoka.

424 In northwest face of southwest concrete retaining wall—17 feet below bridge-seat—of Canadian Pacific railway bridge over Shawanaga river, 3½ miles north of Shawanaga.

425 In east end of north face of concrete retaining wall behind south abutment—4 feet above bridge-seat—of Canadian Pacific railway bridge, 270 feet north of Pointe-au-Baril station.

426 In south face of north concrete abutment—8 feet below bridge-seat and 1 foot west of east face of abutment—of plate-girder bridge on Canadian Pacific railway, 2¾ miles south of Naiscoot and at mileage 52.6 from Muskoka.

427 In east face—20 inches below bridge-seat—of north concrete abutment of Canadian Pacific railway bridge over south branch of Naiscootyong river, ¼ mile south of Naiscoot.

428 In east end of north face of concrete retaining wall behind south abutment—22 inches above bridge-seat—of Canadian Pacific railway bridge over north branch of Naiscootyong river, ¾ mile north of Naiscoot.

429 In east side of shallow rock cut on Canadian Pacific railway, 3 miles south of Byng Inlet and 220 feet south of mile post 59 from Muskoka.

430 In east side—near centre—of long curved rock cut on Canadian Pacific railway, 1 mile south of Dunlop and about 1,500 feet south of mile post 64 from Muskoka.

431 In west face—2 feet 8 inches below bridge-seat—of south concrete abutment of Canadian Pacific railway bridge over Still river, 1 mile north of Dunlop and at mileage 65.4 from Muskoka.

432 In centre of rock cut on west side of Canadian Pacific railway track at seventeenth telegraph pole south of mile post 71 from Muskoka.

433 In east face of south concrete abutment—28 inches below bridge-seat and 15 inches from north face of abutment—of subway by which Canadian Northern railway passes under Canadian Pacific railway, 2 miles south of Pakesley and at mileage 72.6 from Muskoka.

434 In centre of rock cut on west side of Canadian Pacific railway track, 1¼ miles north of Pakesley and 12 feet south of mile post 76 from Muskoka.

435 In west side of first rock cut on Canadian Pacific railway (about 1 mile) south of Pickerel, 50 feet south of north end of cut and 2,040 feet north of mile post 78 from Muskoka.

436 In west side of rock cut on Canadian Pacific railway, 120 feet south of north end of cut and 860 feet north of Pickerel Landing.

437 In southwest face of northwest retaining wall—4 feet 6 inches above bridge-seat—of Canadian Pacific railway bridge over French river, ¼ mile south of French flag station.

438 In east side of rock cut on Canadian Pacific railway, 70 feet south of north end of cut, 1¼ miles north of Bigwood and 60 feet north of mile post 86 from Muskoka.

439 In west side of rock cut on Canadian Pacific railway, 1.4 miles south of Rutter and 870 feet north of mile post 89 from Muskoka.

440 In centre of rock cut on west side of Canadian Pacific railway track—30 inches above rail—1.3 miles north of Rutter and 600 feet south of mile post 92 from Muskoka.

441 In exposed rock surface at west side of Canadian Pacific railway track, between second and third telegraph poles north of mile post 94 from Muskoka.

442 In west side of rock cut on Canadian Pacific railway, near south end, 1 mile north of Delamere and 700 feet south of mile post 97 from Muskoka.

442–A In south face of concrete coping on east end of concrete arch culvert under Canadian Pacific railway, 2 miles north of Delamere and at mileage 97.7 from Muskoka.

443 In east side of rock cut on Canadian Pacific railway, 80 feet south of north end, 0.6 mile south of Paget and 260 feet south of mile post 100 from Muskoka.

444 In south face of east face-wall of square concrete culvert under Canadian Pacific railway, 2½ miles north of Paget and at mileage 103.0 from Muskoka.

445 In west side of rock cut on Canadian Pacific railway—15 feet from south end and 3 feet above rail—2¾ miles south of Burwash and about midway between mile posts 104 and 105 from Muskoka.

446 In exposed rock surface 27 feet east of Canadian Pacific railway track and 960 feet south of order board at Burwash station

447 In west side of rock cut on Canadian Pacific railway, 420 feet north of mile post 110 from Muskoka.

448 In east face of north concrete abutment—3 feet 3 inches below bridge-seat—of Canadian Pacific railway bridge over Wanapitei river, 0.2 mile north of diamond crossing of Canadian Northern railway and at mileage 112.7 from Muskoka.

449 In west side of rock cut on Canadian Pacific railway—35 feet south of north end of cut—immediately south of a long deep fill and 990 feet south of mile post 115 from Muskoka.

450 In west side—near south end—of small rock cut on Canadian Pacific railway, 300 feet north of mile post 118 from Muskoka.

451 In south end of west face of square concrete culvert under Canadian Pacific railway, 1½ miles southeasterly from Romford Junction and at mileage 120.4 from Muskoka.

452 In exposed rock surface at south side of Canadian Pacific railway track, 97 feet east of sign "Romford Jct. 1 mile" and between eighteenth and nineteenth telegraph poles west of mile post 73 from North Bay.

453 In concrete bench-mark pier, 19 feet south of north line of Canadian Pacific railway right-of-way, 3¼ miles east of Sudbury and 740 feet east of mile post 76 from North Bay.

454 In third course below top in northwest face of northwest wing-wall of large stone arch culvert under Canadian Pacific railway, 900 feet west of Sudbury station.

454–A In tenth course of stonework below brickwork, in east wall of Sudbury court house, 9 feet from northeast corner of building.

455 In southeast face of southwest face-wall of square concrete culvert under Canadian Pacific railway, 1¾ miles northwest of Sudbury and at mileage 80.7 from North Bay.

456 In exposed rock surface 30 feet south of Canadian Pacific railway track, 130 feet southeast of southeasterly switch at Murray passing track, and between sixteenth and seventeenth telegraph poles southeast of mile post 83 from North Bay.

457 In southeast face of concrete coping on northeast end of concrete arch culvert under Canadian Pacific railway, 0.6 mile southeast of Azilda and at mileage 85.66 from North Bay.

458 In southwest face of square concrete culvert under Canadian Pacific railway, 2 miles northwest of Azilda and at mileage 88.3 from North Bay.

BENCH-MARKS BETWEEN EMERSON, MANITOBA, AND FORT FRANCES, ONTARIO, VIA CANADIAN NORTHERN RAILWAY.

1–E In concrete bench-mark pier, 4 feet north of south line of Canadian Northern railway right-of-way, 688 feet west of a highway crossing and 510 feet west of sign "Ridgeville, 1 mile"—west of station.

2–E In southeast face of large flat boulder, 15 feet north of south line of Canadian Northern railway right-of-way, 1¼ miles west of Tolstoi and 25 feet west of fourth telegraph pole east of mile post 53 from South Junction.

3–E In large boulder 15 feet north of south line of Canadian Northern railway right-of-way, 1 mile east of Tolstoi and 20 feet east of seventh telegraph pole east of mile post 51 from South Junction.

4–E In south face of flat boulder—7 feet square—20 feet south of north line of Canadian Northern railway right-of-way, 4 miles east of Stuartburn, and between seventh and eighth telegraph poles west of mile post 42 from South Junction.

5–E In concrete bench-mark pier, 42 feet south of Canadian Northern railway track, 2.3 miles west of Sundown and 30 feet west of mile post 27 from South Junction.

6–E In concrete bench-mark pier, 43 feet south of Canadian Northern railway track, 4 miles west of Piney and 23 feet east of mile post 15 from South Junction.

7–E In boulder 20 feet north of south line of Canadian Northern railway right-of-way and between second and third telegraph poles west of mile post 6 from South Junction.

8–E In east face of small half-buried boulder, 10 feet south of north line of Canadian Northern railway right-of-way, 170 feet west of a highway crossing and opposite fifth telegraph pole east of mile post 5 from South Junction.

9–E In concrete bench-mark pier, 36 feet south of Canadian Northern railway track, 4 miles west of Sprague and 1,625 feet west of mile post 347 from Port Arthur.

10–E In north face of northeasterly concrete footing under Canadian Northern railway water-tank at Sprague.

11–E In concrete bench-mark pier, 37 feet south of Canadian Northern railway track, 3½ miles west of International Boundary and 1,130 feet west of mile post 334 from Port Arthur.

12–E In west foundation wall of Warroad post office, 5 inches below concrete blocks and 6 feet 3 inches from southwest corner of building. This is a concrete block building on the north side of Lake street about 400 feet east of the Canadian Northern railway.

13–E In west concrete foundation wall of Roosevelt public school, 26 feet 6 inches from northwest corner.

14–E In west face of boulder, 22 feet south of Canadian Northern railway track, ¼ mile east of Graceton and between fourteenth and fifteenth telegraph poles west of mile post 298 from Port Arthur.

15–E In concrete bench-mark pier, 3 feet north of south line of Canadian Northern railway right-of-way, 238 feet east of east end of trestle over Winter Road river and at seventh telegraph pole east of mile post 292 from Port Arthur.

16–E In south end of west face of concrete retaining wall behind east abutment—30 inches above bridge seat—of Canadian Northern railway bridge over Rainy river, 1 mile west of Rainy River station.

17–E In north concrete foundation wall of Rainy River public school, 3 feet 9 inches below brickwork and 5 feet 7 inches from northwest corner of building.

18–E In concrete bench-mark pier, 4 feet north of south line of Canadian Northern railway right-of-way, 570 feet east of east line of a highway crossing and opposite sign "Rainy River, 1 mile"—east of station.

19–E In south face of exposed rock surface, 27 feet north of Canadian Northern railway track, 4¾ miles east of Rainy River station and about 640 feet west of mile post 281 from Port Arthur.

20–E In north face of exposed rock surface at south side of Canadian Northern railway track—in middle of shallow cut—½ mile west of Pinewood.

21–E In southeast face of boulder 53 feet north of Canadian Northern railway track, 3½ miles east of Pinewood and at third telegraph pole east of mile post 270 from Port Arthur.

22–E In concrete bench-mark pier, 5 feet north of south line of Canadian Northern railway right-of-way, 585 feet west of west end of bridge over Little Sturgeon river and ¼ mile west of mile post 260 from Port Arthur.

23–E In north concrete foundation wall of Tompkin's hardware store at Emo, 1 foot 6 inches from northeast corner of building.

24–E In east foundation wall of Emo public school, 1 foot 6 inches from southeast corner of building.

25–E In south face of mass of rock, 100 feet north of north line of Canadian Northern railway right-of-way, 25 feet southeast of southeast corner of George Hawe's residence and 600 feet west of mile post 248 from Port Arthur.

26–E In north side of shallow rock cut on Canadian Northern railway, 15 feet east of fourth telegraph pole west of mile post 246 from Port Arthur.

27–E In second course of stonework below woodwork, in south end of west wall of Devlin Presbyterian church.

28–E In concrete bench-mark pier, 4 feet north of south line of Canadian Northern railway right-of-way, ¾ mile east of Crozier and 66 feet east of ninth telegraph pole east of mile post 237 from Port Arthur.

29–E In first course of stonework above concrete sidewalk, in north end of east wall of Canadian Bank of Commerce at Fort Frances.

30–E In north end of east stone foundation wall of Fort Frances town hall, 2 feet 8 inches below brickwork.

BENCH-MARKS BETWEEN GIRVIN AND PRINCE ALBERT, SASKATCHEWAN, VIA CANADIAN NORTHERN RAILWAY.

Note.—These descriptions are written with the assumption that the railway runs in a northwesterly direction from Girvin to Hanley, thence northerly to Hague and thence northeasterly to Prince Albert.

18–D In southeast concrete foundation wall of Davidson town hall, 4 inches below brickwork and 7 inches from east corner of building.

19–D In southwest end of southeast stone foundation wall — 14 inches below brickwork — of Bladworth public school.

20–D In concrete bench-mark pier, 15 feet southwest of northeast line of Canadian Northern railway right-of-way, 48 feet northwest of a farm crossing, 5 miles southeast of Kenaston and between seventh and eighth telegraph poles southeast of mile post 106 from Regina.

21–D In southwest concrete foundation wall of frame Roman Catholic church at Kenaston, 3 feet below woodwork, and 1 foot northwest of south corner of building.

22–D In concrete bench-mark pier, 14 feet southwest of northeast line of Canadian Northern railway right-of-way, 383 feet southeast of southeast end of bridge over a creek, 4½ miles southeast of Hanley and between fourth and fifth telegraph poles southeast of mile post 118 from Regina.

23–D In fifth course of stonework below brickwork, in southwest wall of Hanley public school, 4 feet 3 inches from west corner of building.

24–D In southeast face of flat limestone boulder—12 feet x 15 feet—lying on line of west right-of-way fence of Canadian Northern railway, 2 miles south of Indi and between fifth and sixth telegraph poles north of mile post 129 from Regina.

25–D In east stone foundation wall of Moravian church at Dundurn, 1 foot 4 inches below woodwork and 9 feet 3 inches north of most northerly basement window.

26–D In west face of octagonal concrete foundation of Canadian Northern railway water-tank, 5 miles north of Dundurn; the bench-mark is 13 inches below top of foundation and 8 inches south of northwest corner.

27–D In concrete bench-mark pier, 6 feet west of east line of Canadian Northern railway right-of-way, 2 miles north of Haultain and 630 feet north of mile post 149 from Regina.

28–D In east concrete foundation wall—7 inches below woodwork and 13 inches from northeast corner—of signal tower at diamond crossing of Canadian Northern and Grand Trunk Pacific railways, 3 miles south of Saskatoon.

29–D In west face—15 inches below top—of concrete retaining wall behind south abutment of Canadian Northern railway bridge over South Saskatchewan river at Saskatoon.

30–D In second course of stonework below brickwork, in west end of south wall of Canadian Northern station-house at Saskatoon.

31–D In third course of stonework below water-table course, in south wall of Saskatoon post office, 27 inches west of easterly basement window.

32–D In second course of stonework below brickwork, in west wall—14 feet 6 inches from northwest corner—of Land Titles building, Twenty First street east, Saskatoon.

33–D In northeast concrete foundation wall—3 inches below woodwork and 2 feet from east corner—of signal tower at diamond crossing of Canadian Northern and Canadian Pacific railways, 1 mile north of Saskatoon.

34–D In concrete bench-mark pier, 4 feet west of east line of Canadian Northern railway right-of-way, 1½ miles south of Clark Crossing and 9 feet north of sixth telegraph pole north of mile post 167 from Regina.

35–D In south end of east stone foundation wall—6 inches below woodwork—of frame public school at Warman.

36–D In first course of stonework below woodwork, in west foundation wall—5 feet from northwest corner—of frame house owned by J. S. Grant, immediately northeast of Osler station.

37–D In concrete bench-mark pier, 10 feet west of east line of Canadian Northern railway right-of-way, about ¼ mile north of a highway crossing, 4½ miles south of Hague and 13 feet south of ninth telegraph pole north of mile post 184 from Regina.

38–D In northeast end of southeast face—8 inches below top—of octagonal concrete foundation of Canadian Northern railway water-tank at Hague.

39–D In third course of stonework below woodwork, in north end of west foundation wall of frame farm house owned by Adolph Marquette, 400 feet east of Canadian Northern railway track, 4¾ miles southwest of Rosthern and opposite eighth telegraph pole northeast of mile post 195 from Regina.

40–D In concrete foundation of south wall of Rosthern town hall, 5 inches below brickwork and 1 foot west of pilaster at southeast corner of building.

41–D In west concrete foundation wall—8 inches from northwest corner and 8 inches below top—of engine house of C. C. Turner Company's grain elevator at Leckford.

42–D In east concrete foundation wall of frame Roman Catholic church at Duck Lake, 2 feet 4 inches from southeast corner and 5 inches below woodwork.

43–D In east face of octagonal concrete foundation of Canadian Northern railway water-tank, 5½ miles northeast of Duck Lake; the bench-mark is 3 inches below top and 2 feet 6 inches north of southeast corner.

44–D In south face of parapet on south side—16 inches west of southeast wing-wall—of concrete highway bridge, 220 feet west of Canadian Northern railway track and ¾ mile southwest of Macdowall.

45–D In concrete bench-mark pier, 38 feet southeast of centre line of Canadian Northern railway track, 4½ miles northeast of Macdowall and 115 feet northeast of mile post 233 from Regina.

46–D In concrete foundation of north wall of brick house, 200 feet east of Canadian Northern railway track at Clouston siding; the bench-mark is 6 inches below brickwork and 10 inches east of northwest corner.

46–D–2 In concrete bench-mark pier, 4 feet northwest of southeast line of Canadian Northern railway right-of-way, 5¼ miles southwest of Prince Albert and 85 feet northeast of mile post 242 from Regina.

47–D In third course of concrete blocks above concrete sidewalk, in west wall of Prince Albert post office, between second and third basement windows from southwest entrance.

48–D In first course of stonework above ground, in west end of south wall of Prince Albert city hall, at southeast corner of Tenth street and Central avenue

49–D In east face—3 feet 4 inches below top and 10 inches back from north face—of south concrete abutment of Canadian Northern railway and highway bridge over North Saskatchewan river at Prince Albert.

BENCH-MARKS BETWEEN MOOSEJAW AND MAPLE CREEK, SASKATCHEWAN, VIA CANADIAN PACIFIC RAILWAY.

Note.—At the time this levelling was done double track had been laid from Moosejaw to Parkbeg only; the subsequent extension of the double track has undoubtedly destroyed a few of the bench-marks and rendered the descriptions of others inapplicable.

103–C In first course of stonework above concrete platform, in west wall of Canadian Pacific station-house at Moosejaw, 1 foot 10 inches south of northerly doorway.

104–C In south end of west face—1 foot 8 inches below bridge-seat—of east concrete abutment of plate-girder bridge on Canadian Pacific railway, 3.7 miles west of Moosejaw.

105–C In south end of west face—12 inches below seat of I–beams—of east concrete abutment of open culvert under Canadian Pacific railway, 5 miles west of Moosejaw.

106–C In north face of east concrete abutment—8 inches below bridge-seat—of small plate-girder bridge on Canadian Pacific railway, ¼ mile west of Boharm and at mileage 8.4 from Moosejaw.

107–C In south end of west face—1 foot 3 inches above seat of I–beams—of concrete retaining wall behind east abutment of open culvert under Canadian Pacific railway, 4½ miles east of Caron and at mileage 11.8 from Moosejaw.

108–C In north concrete foundation wall of Caron public school, 3 feet 10 inches below brickwork and 11 inches from northwest corner of building.

109–C In southwest concrete foundation wall—2 feet 10 inches below brickwork and 8 inches from south corner—of Moosejaw water works pump-house, immediately north of Canadian Pacific railway and 3½ miles west of Caron.

110–C In west face of concrete foundation—2 feet 4 inches below brickwork—of pilaster at southwest corner of Mortlach public school.

111–C In east end of south face of concrete coping on south end of concrete arch culvert under Canadian Pacific railway, ¼ mile east of Parkbeg.

112–C In west end of north concrete foundation wall of frame school house, 1,000 feet south of Canadian Pacific railway, 4¼ miles west of Secretan and ¼ mile west of mile post 49 from Moosejaw.

113–C In concrete bench-mark pier, 5 feet north of south line of Canadian Pacific railway right-of-way, 1 mile west of Chaplin and 1,320 feet east of mile post 55 from Moosejaw

114–C In south concrete foundation wall—3 inches below woodwork and 8 feet 6 inches from southeast corner —of frame school house, 300 yards north of Canadian Pacific railway and 5 miles west of Chaplin.

115–C In north concrete foundation wall of Leland hotel at Ernfold, 33 feet from northwest corner of building. This bench-mark has been rendered inaccessible by a wooden sidewalk constructed along the front of the hotel.

116–C In south end of west face—2 feet 10 inches below bridge-seat—of east concrete abutment of plate-girder bridge on Canadian Pacific railway, ¼ mile east of Morse.

117–C In south concrete foundation wall of Morse town hall, 18 inches below woodwork and 8 inches from southwest corner of building.

118–C In south concrete foundation wall of Herbert public school, 12 inches below brickwork and 9 inches from southeast corner of building.

119–C Destroyed.

120–C In south end of west face of concrete retaining wall behind east abutment—9 inches above bridge-seat—of subway under Canadian Pacific railway, ¾ mile east of Rush Lake station and at mileage 89.3 from Moosejaw.

121–C In northerly face—4 inches below top—of concrete gasoline tank, projecting slightly above ground, 75 feet south of Canadian Pacific railway track, 4¼ miles east of Waldeck and at sixth telegraph pole west of Notman water-tank.

122–C In south end of west face of concrete retaining wall behind east abutment—17 inches above seat of I–beams—of open culvert under Canadian Pacific railway, 1¼ miles east of Waldeck, and at mileage 98.2 from Moosejaw.

123–C In south face—6 inches below top—of concrete retaining wall behind west abutment of plate-girder bridge on Canadian Pacific railway, 1¾ miles west of Waldeck and at mileage 101.2 from Moosejaw.

124–C In south end of west face of concrete retaining wall behind east abutment—15 inches above seat of I–beams—of open culvert under Canadian Pacific railway, ½ mile west of Aikins and at mileage 105.1 from Moosejaw.

125–C Destroyed.

126–C In east concrete foundation wall of Canadian Pacific station-house at Swift Current, 5 inches below brickwork and 9 inches from southeast corner of building.

127–C In second course of stonework below concrete water-table, in south wall of Swift Current public school, 15 inches east of concrete stairway leading to southerly doorway.

128–C In south face—2 feet below top—of square concrete culvert under Canadian Pacific railway, 1¼ miles west of Swift Current.

129–C In east end of south face of square concrete culvert under Canadian Pacific railway, 0.3 mile west of Beverley and at third telegraph pole west of mile post 9 from Swift Current.

130–C In west face of concrete coping on south end of concrete arch culvert under Canadian Pacific railway, ¼ mile west of Seward.

131–C In west face of south face-wall of concrete arch culvert under Canadian Pacific railway, 3¼ miles east of Webb and between ninth and tenth telegraph poles east of mile post 18 from Swift Current.

132–C In south concrete foundation wall of public school at Webb, 2 feet 2 inches below brickwork and 1 foot 3 inches from southwest corner of building.

133–C In west face of concrete coping on south end of concrete arch culvert under Canadian Pacific railway, 2 miles west of Webb and at mile post 23 from Swift Current.

134–C In west face of concrete coping on south end of concrete arch culvert under Canadian Pacific railway, 2½ miles west of Antelope and between second and third telegraph poles east of mile post 30 from Swift Current.

135–C In south face of west concrete abutment—10 inches below bridge-seat—of plate-girder bridge on Canadian Pacific railway, 1½ miles east of Gull Lake and at mileage 33.7 from Swift Current

136–C In south face of east concrete abutment—10 inches below bridge-seat—of plate-girder bridge on Canadian Pacific railway, ½ mile west of Gull Lake and at mileage 35.6 from Swift Current.

137–C In concrete bench-mark pier, 7 feet north of south line of Canadian Pacific railway right-of-way, 495 feet east of first highway crossing east of Carmichael and 43 feet west of mile post 43 from Swift Current.

138–C In north concrete foundation wall of Canadian Pacific railway section-house, 2,100 feet east of Tompkins; the bench-mark is 7 inches below woodwork and 16 inches from northwest corner.

139–C In north concrete foundation wall of Canadian Pacific railway section-house at Sidewood, 9 inches below woodwork and 15 inches from northwest corner.

140–C In south face of east concrete abutment—1 foot below bridge-seat—of plate-girder bridge on Canadian Pacific railway, 3¼ miles west of Sidewood and at mileage 60.2 from Swift Current.

141–C In west face of concrete coping on south end of double concrete arch culvert under Canadian Pacific railway, ½ mile west of Piapot.

142–C In south concrete foundation wall of Canadian Pacific railway section-house, 1,000 feet west of Cross; the bench-mark is 7 inches below woodwork and 16 inches from southwest corner.

143–C In south concrete foundation wall of Canadian Pacific railway section-house at Cardell, 6 inches below woodwork and 27 inches from southeast corner.

144–C In west face of concrete coping on south end of double concrete arch culvert under Canadian Pacific railway, 5¼ miles east of Maple Creek and at third telegraph pole west of mile post 79 from Swift Current.

145–C In second course of stonework below brickwork, in north end of east wall of Maple Creek post office.

146–C In south face of concrete retaining wall behind west abutment—4 feet above bridge-seat—of plate-girder bridge on Canadian Pacific railway, 0.4 mile west of Maple Creek and at mileage 84.9 from Swift Current.

TABLE II.

RESULTS OF PRECISE LEVELLING.

GRAND FALLS TO MONCTON, N.B.

Bench-Mark.		Distance between successive bench-marks.	Distance from bench-mark 47–B.	Discrepancy.		Elev. above mean sea level.	Bench-Mark.
From	To			Partial.	Total.		
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
	47–B					467·698	47–B
47–B	289–B	2·3	2·3	−·018	−·018	574·094	289–B
289–B	290–B	2·0	4·3	−·018	−·036	608·452	290–B
290–B	291–B	1·3	5·6	−·003	−·039	649·492	291–B
291–B	292–B	3·8	9·4	−·040	−·079	626·552	292–B
292–B	293–B	2·0	11·4	+·001	−·078	612·596	293–B
293–B	294–B	3·2	14·6	+·017	−·061	670·219	294–B
294–B	295–B	1·0	15·6	−·002	−·063	689·907	295–B
295–B	296–B	3·0	18·6	+·024	−·039	741·961	296–B
296–B	297–B	3·1	21·7	+·001	−·038	644·488	297–B
297–B	298–B	3·4	25·1	−·025	−·063	568·824	298–B
298–B	299–B	1·7	26·8	−·028	−·091	517·197	299–B
299–B	300–B	1·5	28·3	−·022	−·113	469·955	300–B
300–B	301–B	2·4	30·7	−·001	−·114	463·858	301–B
301–B	302–B	0·4	31·1	·006	−·120	458·131	302–B
302–B	303–B	2·6	33·7	+·003	−·117	461·148	303–B
303–B	304–B	3·2	36·9	−·020	−·137	529·533	304–B
304–B	305–B	1·4	38·3	+·007	−·130	597·399	305–B
305–B	306–B	2·7	41·0	−·017	−·147	739·753	306–B
306–B	307–B	2·1	43·1	−·021	−·168	852·890	307–B
307–B	308–B	2·2	45·3	+·002	−·166	973·417	308–B
308–B	309–B	1·4	46·7	−·017	−·183	1,055·114	309–B
309–B	310–B	3·4	50·1	+·004	−·179	1,195·173	310–B
310–B	311–B	1·3	51·4	−·001	−·180	1,156·791	311–B
311–B	312–B	2·9	54·3	+·002	−·178	1,068·186	312–B
312–B	313–B	3·0	57·3	−·012	−·190	975·929	313–B
313–B	314–B	2·4	59·7	+·010	−·180	903·976	314–B
314–B	315–B	2·3	62·0	−·011	−·191	838·103	315–B
315–B	316–B	1·0	63·0	·000	−·191	826·323	316–B
316–B	317–B	2·6	65·6	−·015	−·206	822·392	317–B
317–B	318–B	1·8	67·4	−·022	−·228	815·855	318–B
318–B	319–B	2·2	69·6	+·027	−·201	799·136	319–B
319–B	320–B	1·8	71·4	−·016	−·217	791·777	320–B
320–B	321–B	1·7	73·1	−·002	−·219	808·970	321–B
321–B	322–B	2·7	75·8	+·009	−·210	851·700	322–B
322–B	323–B	2·8	78·6	−·024	−·234	897·223	323–B
323–B	324–B	0·1	78·7	·000	−·234	899·517	324–B
324–B	325–B	1·9	80·6	−·022	−·256	857·753	325–B
325–B	326–B	2·4	83·0	−·005	−·261	897·763	326–B
326–B	327–B	2·0	85·0	−·020	−·281	881·084	327–B
327–B	328–B	2·4	87·4	−·016	−·297	817·433	328–B
328–B	329–B	2·9	90·3	−·005	−·302	727·503	329–B
329–B	330–B	2·4	92·7	−·016	−·318	661·874	330–B

RESULTS OF PRECISE LEVELLING.

GRAND FALLS TO MONCTON, N.B.—*Continued.*

Bench-Mark. From	Bench-Mark. To	Distance between successive bench-marks.	Distance from bench-mark 47–B.	Discrepancy. Partial.	Discrepancy. Total.	Elev. above mean sea level.	Bench-Mark.
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
330–B	331–B	1·5	94·2	+·001	−·317	616·461	331–B
331–B	332–B	3·0	97·2	−·002	−·319	580·354	332–B
332–B	333–B	2·2	99·4	−·017	−·336	571·695	333–B
333–B	334–B	2·6	102·0	−·021	−·357	547·736	334–B
334–B	335–B	1·7	103·7	+·001	−·356	512·422	335–B
335–B	336–B	1·6	105·3	+·004	−·352	541·693	336–B
336–B	337–B	2·6	107·9	+·009	−·343	525·910	337–B
337–B	338–B	2·6	110·5	−·024	−·367	499·993	338–B
338–B	339–B	2·9	113·4	+·018	−·349	444·265	339–B
339–B	340–B	0·7	114·1	−·017	−·366	440·338	340–B
340–B	341–B	1·8	115·9	−·013	−·379	444·848	341–B
341–B	342–B	2·3	118·2	+·008	−·371	486·241	342–B
342–B	343–B	1·9	120·1	+·008	−·363	516·879	343–B
343–B	344–B	1·8	121·9	−·004	−·367	497·566	344–B
344–B	345–B	2·1	124·0	+·014	−·353	470·483	345–B
345–B	346–B	2·0	126·0	+·002	−·351	414·791	346–B
346–B	347–B	2·8	128·8	−·018	−·369	333·515	347–B
347–B	348–B	3·5	132·3	+·012	−·357	244·975	348–B
348–B	349–B	1·5	133·8	−·009	−·366	186·440	349–B
349–B	350–B	2·9	136·7	−·017	−·383	106·144	350–B
350–B	351–B	1·9	138·6	+·001	−·382	59·161	351–B
351–B	352–B	0·6	139·2	−·007	−·389	61·027	352–B
352–B	353–B	2·1	141·3	−·010	−·399	104·495	353–B
353–B	354–B	2·0	143·3	−·010	−·409	147·733	354–B
354–B	355–B	3·5	146·8	−·023	−·432	180·580	355–B
355–B	356–B	3·3	150·1	−·009	−·441	223·863	356–B
356–B	357–B	2·8	152–9	−·025	−·466	274·707	357–B
357–B	358–B	2·2	155·1	−·006	−·472	318·866	358–B
358–B	359–B	3·6	158·7	−·015	−·487	317·233	359–B
359–B	360–B	2·0	160·7	+·006	−·481	321·612	360–B
360–B	361–B	2·0	162·7	+·002	−·479	338·207	361–B
361–B	362–B	3·3	166·0	+·015	−·464	311·430	362–B
362–B	363–B	1·5	167·5	−·016	−·480	303·425	363–B
363–B	364–B	3·8	171·3	−·011	−·491	255·497	364–B
364–B	365–B	2·2	173·5	+·010	−·481	256·620	365–B
365–B	366–B	1·2	174·7	+·014	−·467	233·925	366–B
366–B	367–B	4·3	179·0	−·012	−·479	319·108	367–B
367–B	368–B	2·6	181·6	+·017	−·462	371·877	368–B
368–B	369–B	4·0	185·6	−·009	−·471	279·881	369–B
369–B	370–B	2·6	188·2	−·034	−·505	276·135	370–B
370–B	371–B	3·5	191·7	−·021	−·526	179·710	371–B
371–B	372–B	3·7	195·4	−·028	−·554	86·461	372–B
372–B	373–B	1·2	196·6	+·011	−·543	55·287	373–B
373–B	374–B	0·4	197·0	+·010	−·533	52·540	374–B
374–B	132–B*	0·2	197·2	+·006	−·527	51·177	132–B*

*The elevation of bench-mark 132–B given on page 73, 1913 publication, is 51·413; hence, to reduce all Moncton bench-marks to the same datum, 0·236 feet should be added to the elevations given above for bench-marks 373–B, 374–B, 132–B.

RESULTS OF PRECISE LEVELLING.

OTTAWA, ONT., TO WHITEFISH LAKE, QUE.

Bench-Mark. From	Bench-Mark. To	Distance between successive bench-marks.	Distance from bench-mark 125–A.	Discrepancy. Partial.	Discrepancy. Total.	Elev. above mean sea level.	Bench-Mark.
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
	125–A					277·639	125–A
125–A	459	3·0	3·0	−·013	−·013	186·575	459
459	460	1·3	4·3	−·004	−·017	168·269	460
460	461	0·4	4·7	−·007	−·024	153·850	461
461	462	0·6	5·3	−·007	−·031	163·315	462
462	463	1·7	7·0	−·006	−·037	170·609	463
463	464	3·8	10·8	+·022	−·015	363·393	464
464	465	3·0	13·8	−·014	−·029	301·720	465
465	466	1·3	15·1	−·015	−·044	296·484	466
466	467	2·8	17·9	−·007	−·051	315·084	467
467	468	3·6	21·5	+·014	−·037	326·204	468
468	469	2·0	23·5	−·012	−·049	332·018	469
469	470	0·2	23·7	+·006	−·043	329·923	470
470	471	1·3	25·0	−·001	−·044	342·977	471
471	472	2·1	27·1	+·023	−·021	332·816	472
472	473	1·1	28·2	−·017	−·038	339·984	473
473	474	1·6	29·8	−·004	−·042	333·614	474
474	475	3·8	33·6	−·003	−·045	354·431	475
475	475–A	2·3	35·9	−·008	−·053	358·331	475–A
475–A	476	0·9	36·8	−·017	−·070	346·662	476
476	477	4·1	40·9	−·001	−·071	461·715	477
477	478	4·1	45·0	+·011	−·060	558·431	478
478	479	4·0	49·0	+·013	−·047	561·958	479
479	480	3·1	52·1	−·012	−·059	497·753	480
480	481	6·4	58·5	+·028	−·031	506·402	481
481	482	1·5	60·0	−·012	−·043	508·098	482
482	483	0·1	60·1	·000	−·043	506·830	483
483	484	2·0	62·1	+·004	−·039	503·940	484
484	485	4·7	66·8	−·007	−·046	493·598	485
485	486	1·4	68·2	+·012	−·034	502·811	486
486	487	2·1	70·3	−·009	−·043	494·369	487
487	488	1·2	71·5	+·023	−·020	479·371	488

Connection with Public Works Dept's levels:—

B.M.—CCCCLXVI—C.P.R. Broad st. station, Ottawa, Elev. 184·06

B.M.—CCCCLXV—C.P.R. "Prince of Wales" bridge, Ottawa, Elev. 184·89

RESULTS OF PRECISE LEVELLING.

FINCH TO CORNWALL, ONT.

Bench-Mark.		Distance between successive bench-marks.	Distance from bench-mark 105.	Discrepancy.		Elev. above mean sea level.	Bench-Mark.
From	To			Partial.	Total.		
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
	105					275·786	105
105	495	0·3	0·3	−·004	−·004	279·105	495
495	494	7·0	7·3	+·011	+·007	336·052	494
494	493	4·0	11·3	−·017	−·010	249·874	493
493	492	5·3	16·6	−·030	−·040	195·470	492
492	491	4·6	21·2	+·005	−·035	194·932	491
491	490	0·2	21·4	+·007	−·028	194·246	490
490	489	0·2	21·6	+·001	−·027	181·660	489

Connection with Public Works Dept's levels:—
B.M.—DLXXX—G.T.R. culvert at Cornwall Jct., Elev. 196·02

RESULTS OF PRECISE LEVELLING.

FINCH TO OTTAWA, ONT.

Bench-Mark.		Distance between successive bench-marks.	Distance from bench-mark 105.	Discrepancy.		Elev. above mean sea level.	Bench-Mark.
From	To			Partial.	Total.		
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
	105					275·786	105
105	496	6·3	6·3	+·002	+·002	222·899	496
496	497	5·2	11·5	+·026	+·028	213·968	497
497	498	3·2	14·7	−·002	+·026	226·426	498
498	499	5·0	19·7	−·034	−·008	237·931	499
499	500	5·5	25·2	+·006	−·002	255·646	500
500	501	4·5	29·7	−·035	−·037	265·783	501
501	502	4·1	33·8	−·012	−·049	220·423	502
502	503	3·7	37·5	−·032	−·081	196·257	503
503	504	2·0	39·5	−·011	−·092	237·382	504
504	124–A*	1·8	41·3	−·008	−·100	211·622	124–A*

*The elevation of bench-mark 124–A given on page 78, 1913 publication, is 211·505; hence, to reduce all Ottawa bench-marks to the same datum, 0·117 feet should be subtracted from the elevations given above for bench-marks 503, 504, 124–A.

RESULTS OF PRECISE LEVELLING.

LUCAN CROSSING TO CHATHAM, ONT.

Bench-Mark. From	Bench-Mark. To	Distance between successive bench-marks.	Distance from bench-mark 337.	Discrepancy. Partial.	Discrepancy. Total.	Elev. above mean sea level.	Bench-Mark.
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
	337					864·945	337
337	342	1·4	1·4	−·012	−·012	836·379	342
342	343	3·8	5·2	+·009	−·003	745·860	343
343	344	3·3	8·5	+·006	+·003	776·342	344
344	345	2·0	10·5	−·010	−·007	715·360	345
345	346	2·0	12·5	−·007	−·014	663·596	346
346	347	2·7	15·2	+·008	−·006	631·687	347
347	348	3·7	18·9	−·024	−·030	616·490	348
348	349	3·4	22·3	+·016	−·014	687·993	349
349	350	4·2	26·5	−·016	−·030	718·650	350
350	351	3·8	30·3	−·004	−·034	704·624	351
351	352	3·5	33·8	·000	−·034	666·769	352
352	353	3·8	37·6	+·010	−·024	648·149	353
353	354	2·9	40·5	+·008	−·016	633·160	354
354	355	5·3	45·8	+·016	·000	594·433	355
355	356	3·6	49·4	+·010	+·010	605·621	356
356	357	6·0	55·4	+·016	+·026	549·059	357
357	358	1·6	57·0	−·007	+·019	592·925	358
358	359	0·6	57·6	+·006	+·025	600·293	359
358	360	0·4	57·4	−·004	+·015	590·520	360
360	361	5·5	62·9	+·032	+·047	613·107	361
361	362	4·4	67·3	+·010	+·057	590·972	362
362	363	1·4	68·7	−·002	+·055	595·141	363
363	364	5·2	73·9	+·008	+·063	588·320	364
364	365	4·5	78·4	+·008	+·071	582·884	365
365	366	4·5	82·9	+·008	+·079	582·921	366
366	367	5·4	88·3	−·007	+·072	584·637	367
367	368	3·0	91·3	−·006	+·066	582·766	368
368	369	3·0	94·3	+·012	+·078	589·607	369
369	370	6·4	100·7	−·026	+·052	598·809	370
370	371	4·6	105·3	+·006	+·058	595·198	371
371	372	3·3	108·6	−·024	+·034	594·367	372
372	373	4·5	113·1	−·025	+·009	594·590	373
373	247*	1·0	114·1	−·004	+·005	596·978	247*

*The elevation of bench-mark 247 given on page 81, 1913 publication, is 597·094; hence, to reduce all Chatham elevations to the same datum, 0·116 feet should be added to the elevations given above for bench-marks 373 and 247.

RESULTS OF PRECISE LEVELLING.

BALA TO SUDBURY, ONT.

Bench-Mark. From	Bench-Mark. To	Distance between successive bench-marks.	Distance from bench-mark 260.	Discrepancy. Partial.	Discrepancy. Total.	Elev. above mean sea level.	Bench-Mark.
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
	408		98·0		+·116	742·706	408
408	409	1·8	99·8	−·006	+·110	771·898	409
409	410	3·3	103·1	−·007	+·103	790·231	410
410	411	2·5	105·6	+·001	+·104	760·707	411
411	412	3·1	108·7	−·009	+·095	778·573	412
412	413	3·8	112·5	−·023	+·072	807·217	413
413	414	5·6	118·1	−·013	+·059	810·604	414
414	415	4·5	122·6	−·005	+·054	753·126	415
415	416	2·1	124·7	+·015	+·069	754·909	416
416	417	2·6	127·3	+·011	+·080	724·223	417
417	418	2·8	130·1	+·006	+·086	674·930	418
418	419	2·6	132·7	+·014	+·100	684·578	419
419	420	0·5	133·2	+·007	+·107	680·582	420
420	421	5·7	138·9	−·002	+·105	611·586	421
421	421–A	2·0	140·9	−·010	+·095	658·455	421–A
421–A	422	5·1	146·0	−·021	+·074	660·100	422
422	423	3·0	149·0	−·007	+·067	676·868	423
423	424	5·5	154·5	−·017	+·050	654·334	424
424	425	4·2	158·7	−·018	+·032	638·833	425
425	426	3·9	162·6	−·021	+·011	603·469	426
426	427	2·5	165·1	+·004	+·015	604·235	427
427	428	1·0	166·1	−·008	+·007	614·438	428
428	429	3·0	169·1	+·023	+·030	636·858	429
429	430	4·8	173·9	+·012	+·042	604·954	430
430	431	2·0	175·9	−·002	+·040	587·465	431
431	432	4·8	180·7	−·028	+·012	629·302	432
432	433	2·2	182·9	−·007	+·005	613·326	433
433	434	3·3	186·2	+·001	+·006	659·884	434
434	435	2·4	188·6	+·016	+·022	651·732	435
435	436	3·1	191·7	+·002	+·024	628·052	436
436	437	1·6	193·3	+·007	+·031	627·434	437
437	438	2·9	196·2	+·012	+·043	647·007	438
438	439	3·1	199·3	+·021	+·064	675·056	439
439	440	2·7	202·0	+·005	+·069	670·532	440
440	441	2·1	204·1	−·010	+·059	652·530	441
441	442	2·9	207·0	+·018	+·077	648·317	442
442	442–A	1·1	208·1	+·010	+·087	623·008	442–A
442–A	443	2·0	210·1	+·007	+·094	684·165	443
443	444	3·0	213·1	+·011	+·105	698·048	444
444	445	1·5	214·6	+·014	+·119	723·113	445
445	446	2·6	217·2	+·015	+·134	731·658	446

RESULTS OF PRECISE LEVELLING.

BALA TO SUDBURY, ONT.—*Continued.*

Bench-Mark.		Distance between successive bench-marks.	Distance from bench-mark 260.	Discrepancy.		Elev. above mean sea level.	Bench-Mark.
From	To			Partial.	Total.		
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
446	447	3·0	220·2	−·018	+·116	745·070	447
447	448	2·8	223·0	+·006	+·122	735·830	448
448	449	1·9	224·9	−·002	+·120	754·239	449
449	450	3·2	228·1	−·006	+·114	794·710	450
450	451	2·3	230·4	−·004	+·110	821·915	451
451	452	2·5	232·9	−·007	+·103	861·418	452
452	453	2·0	234·9	+·020	+·123	850·256	453
453	454	3·7	238·6	+·014	+·137	845·151	454
454	454–A	0·6	239·2	+·009	+·146	883·091	454–A
454–A	455	1·4	240·6	+·011	+·157	910·767	455
455	456	1·9	242·5	+·014	+·171	999·969	456
456	457	3·1	245·6	−·014	+·157	881·041	457
457	458	2·7	248·3	+·011	+·168	893·320	458

RESULTS OF PRECISE LEVELLING.

EMERSON, MAN., TO FORT FRANCES, ONT.

Bench-Mark.		Distance between successive bench-marks.	Distance from bench-mark 3–C.	Discrepancy.		Elev. above mean sea level.	Bench-Mark.
From	To			Partial.	Total.		
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
	3–C					787·361	3–C
3–C	1–E	9·5	9·5	−·004	−·004	801·851	1–E
1–E	2–E	9·4	18·9	+·026	+·022	945·428	2–E
2–E	3–E	2·2	21·1	+·002	+·024	961·150	3–E
3–E	4–E	7·0	28·1	+·037	+·061	976·392	4–E
4–E	5–E	15·3	43·4	+·001	+·062	1,049·106	5–E
5–E	6–E	12·0	55·4	+·035	+·097	1,117·695	6–E
6–E	7–E	8·9	64·3	+·043	+·140	1,156·009	7–E
7–E	8–E	1·3	65·6	−·008	+·132	1,179·187	8–E
8–E	9–E	6·7	72·3	−·001	+·131	1,141·628	9–E
9–E	10–E	4·0	76·3	+·016	+·147	1,071·066	10–E
10–E	11–E	9·1	85·4	−·039	+·108	1,091·455	11–E
11–E	*	3·6	89·0	−·012	+·096	1,073·104	*
*	12–E	7·1	96·1	+·024	+·120	1,070·087	12–E
12–E	13–E	12·3	108·4	+·044	+·164	1,162·857	13–E
13–E	14–E	13·0	121·4	+·053	+·217	1,134·409	14–E
14–E	15–E	6·8	128·2	+·040	+·257	1,094·940	15–E
15–E	16–E	4·9	133·1	−·037	+·220	1,080·042	16–E
16–E	17–E	1·4	134·5	−·008	+·212	1,081·540	17–E
17–E	18–E	1·2	135·7	−·004	+·208	1,096·873	18–E
18–E	19–E	3·3	139·0	+·009	+·217	1,118·255	19–E
19–E	20–E	7·1	146·1	+·021	+·238	1,096·102	20–E
20–E	21–E	4·1	150·2	+·005	+·243	1,109·355	21–E
21–E	22–E	9·6	159·8	+·041	+·284	1,115·220	22–E
22–E	23–E	9·3	169·1	−·003	+·281	1,104·565	23–E
23–E	24–E	0·5	169·6	+·003	+·284	1,119·925	24–E
24–E	25–E	3·0	172·6	−·017	+·267	1,161·724	25–E
25–E	26–E	2·0	174·6	−·001	+·266	1,172·036	26–E
26–E	27–E	2·8	177·4	+·011	+·277	1,164·985	27–E
27–E	28–E	7·8	185·2	−·024	+·253	1,161·776	28–E
28–E	29–E	6·0	191·2	+·039	+·292	1,119·617	29–E
29–E	30–E	0·2	191·4	−·001	+·291	1,120·066	30–E

*Metal elevation plate on base of International Boundary Monument, beside C.N.R. track, between Sprague Man., and Warroad, Minn.

Connections with U.S. Geological Survey levels in Minnesota:—

B.M.—303—At Warroad, Elev. 1,066·140
B.M.—1,069—At Warroad, Elev. 1,068·048
B.M.—1,085—At Swift, Elev. 1,084·439
B.M.—1,163—At Roosevelt, Elev. 1,162·622
B.M.—1,181—Between Roosevelt and Williams, Elev. 1,180·178.
B.M.—No number—At Williams, Elev. 1,153·571
B.M.—1,110—Near Pitt, Elev. 1,108·805.
B.M.—1,084—Near Beaudette, Elev. 1,082·727
B.M.—1,126—At International Falls, Elev. 1,124·242
B.M.—1,121—At International Falls, Elev. 1,120·107

Connection with International Joint Commission's bench-mark in Warroad school grounds, Elev. 1,068·977

RESULTS OF PRECISE LEVELLING.

GIRVIN TO PRINCE ALBERT, SASK.

Bench-Mark		Distance between successive bench-marks.	Distance from bench-mark 1-D.	Discrepancy.		Elev. above mean sea level.	Bench-Mark.
From	To			Partial.	Total.		
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
	17-D		84·4		+·116	1,973·169	17-D
17-D	18-D	8·2	92·6	−·020	+·096	2,026·745	18-D
18-D	19-D	9·5	102·1	−·013	+·083	2,084·143	19-D
19-D	20-D	6·1	108·2	+·007	+·090	2,072·954	20-D
20-D	21-D	4·9	113·1	+·017	+·107	2,032·886	21-D
21-D	22-D	7·1	120·2	−·041	+·066	1,975·038	22-D
22-D	23-D	4·4	124·6	−·013	+·053	1,952·407	23-D
23-D	24-D	6·6	131·2	−·043	+·010	1,728·983	24-D
24-D	25-D	7·2	138·4	+·010	+·020	1,732·668	25-D
25-D	26-D	4·8	143·2	−·009	+·011	1,683·052	26-D
26-D	27-D	8·0	151·2	+·012	+·023	1,662·941	27-D
27-D	28-D	8·2	159·4	−·035	−·012	1,651·349	28-D
28-D	29-D	2·7	162·1	−·010	−·022	1,587·314	29-D
29-D	30-D	0·5	162·6	−·001	−·023	1,593·141	30-D
30-D	31-D	.....	162·6	−·001	−·024	1,590·397	31-D
31-D	32-D	.....	162·6	+·004	−·020	1,589·418	32-D
30-D	33-D	1·2	163·8	−·004	−·027	1,606·284	33-D
33-D	34-D	5·9	169·7	+·023	−·004	1,625·668	34-D
34-D	35-D	6·9	176·6	+·006	+·002	1,679·886	35-D
35-D	36-D	4·5	181·1	+·005	+·007	1,687·858	36-D
36-D	37-D	6·6	187·7	−·003	+·004	1,700·994	37-D
37-D	38-D	4·6	192·3	+·007	+·011	1,678·990	38-D
38-D	39-D	6·4	198·7	+·002	+·013	1,677·094	39-D
39-D	40-D	5·3	204·0	+·003	+·016	1,671·761	40-D
40-D	41-D	6·1	210·1	+·028	+·044	1,657·549	41-D
41-D	42-D	5·4	215·5	+·002	+·046	1,657·928	42-D
42-D	43-D	6·1	221·6	+·024	+·070	1,637·698	43-D
43-D	44-D	10·6	232·2	+·008	+·078	1,551·229	44-D
44-D	45-D	5·0	237·2	−·022	+·056	1,517·365	45-D
45-D	46-D	5·0	242·2	+·008	+·064	1,500·711	46-D
46-D	46-D-2	4·0	246·2	−·010	+·054	1,528·612	46-D-2
46-D-2	47-D	5·2	251·4	+·021	+·075	1,411·172	47-D
47-D	48-D	0·2	251·6	+·003	+·078	1,410·078	48-D
48-D	49-D	0·5	252·1	+·003	+·081	1,399·733	49-D

Connections at Prince Albert with bench-marks of Topographical Surveys Branch, Department of the Interior:—

B.M.—A-2—On step of post office, Elev. 1,411·74

B.M.—A-3—C.N.R. bridge over North Saskatchewan river, Elev. 1,403·09

RESULTS OF PRECISE LEVELLING.

MOOSEJAW TO MAPLE CREEK, SASK.

Bench-Mark. From	Bench-Mark. To	Distance between successive bench-marks.	Distance from bench-mark 94–C.	Discrepancy. Partial.	Discrepancy. Total.	Elev. above mean sea level.	Bench-Mark.
No.	No.	Miles.	Miles.	Feet.	Feet.	Feet.	No.
	94–C					1,786·091	94–C
94–C	103–C	0·2	0·2	+·002	+·002	1,779·876	103–C
103–C	104–C	3·7	3·9	−·040	−·038	1,793·556	104–C
104–C	105–C	1·3	5·2	+·003	−·035	1,793·561	105–C
105–C	106–C	3·4	8·6	+·010	−·025	1,800·308	106–C
106–C	107–C	3·3	11·9	+·009	−·016	1,822·736	107–C
107–C	108–C	5·0	16·9	+·014	−·002	1,877·459	108–C
108–C	109–C	3·4	20·3	+·018	+·016	1,886·418	109–C
109–C	110–C	6·6	26·9	−·018	−·002	2,002·279	110–C
110–C	111–C	8·9	35·8	−·021	−·023	2,055·850	111–C
111–C	112–C	15·0	50·8	−·008	−·031	2,223·360	112–C
112–C	113–C	5·4	56·2	−·018	−·049	2,210·247	113–C
113–C	114–C	4·3	60·5	+·020	−·029	2,219·859	114–C
114–C	115–C	7·3	67·8	−·006	−·035	2,374·969	115–C
115–C	116–C	7·0	74·8	+·011	−·024	2,280·293	116–C
116–C	117–C	0·5	75·3	+·009	−·015	2,291·506	117–C
117–C	118–C	9·0	84·3	+·018	+·003	2,322·045	118–C
118–C	119–C	5·1	89·4	+·029	+·032	2,299·373	119–C
119–C	120–C	2·4	91·8	+·020	+·052	2,329·051	120–C
120–C	121–C	5·8	97·6	+·014	+·066	2,397·627	121–C
121–C	122–C	3·1	100·7	−·015	+·051	2,366·378	122–C
122–C	123–C	2·9	103·6	+·018	+·069	2,394·125	123–C
123–C	124–C	3·9	107·5	−·033	+·036	2,409·258	124–C
124–C	125–C	4·5	112·0	+·031	+·067	2,424·054	125 C
125–C	126–C	0·8	112·8	+·015	+·082	2,433·679	126–C
126–C	127–C	.....	112·8	−·001	+·081	2,443·602	127–C
126–C	128–C	1·1	113·9	−·004	+·078	2,430·544	128–C
128–C	129–C	8·0	121·9	+·027	+·105	2,479·411	129–C
129–C	130–C	5·1	127·0	+·013	+·118	2,479·931	130–C
130–C	131–C	3·6	130·6	+·017	+·135	2,507·737	131–C
131–C	132–C	3·4	134·0	+·009	+·144	2,581·791	132–C
132–C	133–C	2·3	136·3	−·026	+·118	2,549·564	133–C
133–C	134–C	7·1	143·4	+·008	+·126	2,537·977	134–C
134–C	135–C	3·6	147·0	−·012	+·114	2,560·694	135–C
135–C	136–C	1·9	148·9	+·012	+·126	2,567·413	136–C
136–C	137–C	7·4	156·3	+·031	+·157	2,648·287	137–C
137–C	138–C	6·6	162·9	−·040	+·117	2,642·822	138–C
138–C	139–C	7·4	170·3	−·003	+·114	2,527·094	139–C
139–C	140–C	3·2	173·5	+·003	+·117	2,488·826	140–C
140–C	141–C	7·4	180·9	−·024	+·093	2,479·742	141–C
141–C	142–C	4·5	185·4	+·008	+·101	2,548·940	142–C
142–C	143–C	4·9	190·3	+·005	+·106	2,571·846	143–C
143–C	144–C	2·3	192·6	−·018	+·088	2,530·754	144–C
144–C	145–C	5·6	198·2	−·012	+·076	2,510·386	145–C
145–C	146–C	0·6	198·8	−·006	+·070	2,505·817	146–C

TABLE III.

RAIL ELEVATIONS, GRAND FALLS TO MONCTON, N.B.

(Elevations taken in 1912).

		FEET
Grand Trunk Pacific Railway—	Grand Falls	574·9
"	Plaster Rock	466·6
"	Longley	528·8
"	Juniper	837·2
"	Riverdale	796·5
"	Napadogan	899·2
"	Maple Grove	821·7
"	McGivney Jct	571·7
"	Intercolonial Railway (diamond crossing)	571·5
"	North Cains	534·9
"	Bantalor	459·9
"	Sunbury	497·7
"	Canton	333·2
"	Chipman	71·0
"	Bronson	188·9
"	Pangburn	342·8
"	Alward	340·4
"	North Branch	259·1
"	Lutesville	213·0
Intercolonial Railway	Moncton	49·9

RAIL ELEVATIONS, OTTAWA, ONT., TO GRACEFIELD, QUE.

(Elevations taken in 1913).

		FEET
Canadian Pacific Railway—	Ottawa (Broad street station)	181·0
"	Hull	190·9
"	Maniwaki Jct	167·0
"	North Shore line, C.P.Ry. (overhead crossing) rail 177·5; Maniwaki line, rail	151·7
"	Ironside	185·1
"	Chelsea	368·5
"	Tenaga	295·9
"	Kirk Ferry	297·3
"	Cascades	306·9
"	Farm Point	326·6
"	Rockhurst	330·3
"	Wakefield	329·6
"	Alcove	337·6
"	Poupore	361·4
"	Farrelton	345·3
"	Brennan	367·9
"	Low	411·9
"	Venosta	548·9
"	Sully	589·4
"	Kazabazua	600·5
"	Aylwin	496·5
"	Marks	596·3
"	Gracefield	509·0

RAIL ELEVATIONS, CORNWALL TO OTTAWA, ONT.

(Elevations taken in 1913).

		FEET
Ottawa and New York Ry—	Cornwall	216·3
"	Grand Trunk railway (diamond crossing at Cornwall Jct.)	201·6
"	Black River	254·4
"	Harrison	296·5
"	Northfield	333·8
"	Newington	322·3
"	Canadian Pacific railway (diamond crossing at Finch)	274·9
"	Berwick	244·5
"	Crysler	223·9
"	South Nation river; water, July 17, 1913, 199·8; rail	224·2
"	Cambridge	229·2
"	Castor brook, 0·2 mile southeast of Embrun, water, July 24, 1913, 191·5; rail	223·0
"	Embrun	224·9
"	Russell	237·1
"	Pana	247·3
"	Edwards	258·9
"	Piperville	261·7
"	Ramsayville	241·4
"	Grand Trunk railway (diamond crossing at Hawthorne)	220·9
Canadian Pacific Railway—	Canadian Pacific railway, Sussex street spur line (diamond crossing)	197·1
"	Canadian Northern railway, Toronto–Ottawa line (diamond crossing)	197·1
Canadian Northern Railway—	Grand Trunk railway (diamond crossing)	198·5
"	Canadian Pacific railway, Ottawa–Prescott line (diamond crossing)	251·6

RAIL ELEVATIONS, LUCAN CROSSING TO CHATHAM, ONT.

(Elevations taken in 1911).

		FEET
Grand Trunk Railway—	Ailsa Craig	754·3
"	Parkhill	662·4
"	Cameron and Beck's siding	646·7
"	Thedford	682·4
"	Forest	711·9
"	Aberarder	664·5
"	Camlachie	648·9
"	Perch	594·1
"	Blackwell	600·8
"	Sarnia	611·8
Père Marquette Railroad—	Corunna	628·7
"	Mooretown	603·8
"	Courtright	601·1
"	Michigan Central railway (diamond crossing)	606·1
"	Watson	602·2
"	Sombra	587·6
"	Port Lambton	583·0
"	Bellevue	582·1
"	Whitebread	585·0
"	Chatham and Wallaceburg railway (diamond crossing)	583·1
"	Wallaceburg	579·9
"	Tupperville	591·6
"	Dresden	601·4
"	Ennett	598·7
"	Eberts	598·7
"	Darrell	599·1
"	Canadian Pacific railway (diamond crossing)	596·6
"	Grand Trunk railway (diamond crossing at Chatham Jct.)	598·0

RAIL ELEVATIONS, BALA TO SUDBURY, ONT.

(Elevations taken in 1912).

		FEET
Canadian Pacific Railway—	Bala (summer station)	754·1
"	Bala (winter station)	755·4
"	Roderick	793·8
"	Muskoka	790·4
"	Barnesdale	809·8
"	Gordon Bay	810·7
"	Brignall	797·4
"	Rankins Pit	766·3
"	Black Road	755·4
"	Dockmure	719·6
"	Parry Sound	686·2
"	Ambo	670·6
"	Carling	698·2
"	Shawanaga	704·8
"	Pointe-au-Baril	643·1
"	Naiscoot	612·4
"	Byng Inlet	624·6
"	Dunlop	596·9
"	Still	608·2
"	Bekanon	619·4
"	Pakesley	646·0
"	Pickerel	649·9
"	Pickerel Landing	624·9
"	French	629·8
"	Bigwood	634·9
"	Rutter	682·8
"	Delamere	654·6
"	Paget	689·3
"	Burwash	729·9
"	Canadian Northern railway (diamond crossing)	741·9
"	Dill	786·5
"	Romford Jct	845·8
"	Sudbury	856·6
"	Murray	1,001·9
"	Azilda	892·7

RAIL ELEVATIONS, EMERSON, MAN., TO FORT FRANCES, ONT.

(Elevations taken in 1913).

		FEET
Canadian Northern Railway—	Emerson	790·6
"	Great Northern junction	792·4
"	Canadian Pacific railway (diamond crossing)	792·8
"	Fredensthal	795·3
"	Ridgeville	821·0
"	Tolstoi	958·3
"	Stuartburn	980·9
"	Vita	991·1
"	Caliento	1,031·5
"	Sundown	1,064·3
"	Menisino	1,114·9
"	Piney	1,086·5
"	Stream, 1·7 miles east of Piney; water, June 12, 1913, 1,075·4; rail	1,084·5

RAIL ELEVATIONS, EMERSON, MAN., TO FORT FRANCES, ONT.—*Continued.*

(Elevations taken in 1913).

		FEET
Canadian Northern Railway—	Wampum	1,162·9
"	South Jct	1,143·7
"	Stream, 0·3 mile west of Sprague; water, June 24, 1913, 1,058·2; rail	1,072·1
"	Sprague	1,072·6
"	Stream, 0·8 mile east of Sprague; water, June 23, 1913, 1,058·8; rail	1,072·5
"	Longworth	1,082·1
"	Great Northern railway (diamond crossing)	1,070·0
"	Warroad	1,070·7
"	Warroad river; water, July 8, 1913, 1,060·8; rail	1,070·8
"	Swift	1,086·6
"	Roosevelt	1,163·8
"	Stream, immediately west of Williams; water, July 16, 1913, 1,135·3; rail.	1,152·2
"	Williams	1,154·0
"	Graceton	1,140·0
"	Pitt	1,113·9
"	Winter Road river; water, July 28, 1913, 1,076·3; rail	1,098·2
"	Beaudette	1,084·3
"	Rainy river; water, July 31, 1913, 1,061·5; rail	1,083·9
"	Rainy River (station)	1,088·6
"	Stream, 1 mile east of Rainy River station; water, July 30, 1913, 1,062·0; rail	1,097·7
"	Sleeman	1,103·0
"	Pine river, water, Aug. 11, 1913, 1,061·2; rail	1,092·1
"	Pinewood	1,085·5
"	Stratton	1,123·6
"	Sturgeon river, water, Aug. 18, 1913, 1,082·4; rail	1,118·3
"	Barwick	1,108·7
"	Stream, ½ mile west of Emo; water, Aug. 20, 1913, 1,069·4; rail	1,106·9
"	Emo	1,106·1
"	Stream, 1 mile east of Emo; water, Aug. 21, 1913, 1,071·1; rail	1,115·8
"	Devlin	1,149·6
"	La Vallée	1,134·1
"	La Vallée river, water, Aug. 27, 1913, 1,120·9; rail	1,133·7
"	Stream, 1 mile west of Crozier; water, Sept. 1, 1913, 1,146·4; rail	1,157·3
"	Crozier	1,164·5
"	Fort Frances	1,122·3

RAIL ELEVATIONS, GIRVIN TO PRINCE ALBERT, SASKATCHEWAN.

(Elevations taken in 1912).

		FEET
Canadian Northern Railway—	Girvin	1,974·7
"	Davidson	2,030·4
"	Bladworth	2,076·9
"	Kenaston	2,019·1
"	Hanley	1,946·8
"	Indi	1,790·4
"	Dundurn	1,736·6
"	Strehlow	1,688·0
"	Haultain	1,684·3
"	Grand Trunk Pacific railway (diamond crossing)	1,652·9
"	Nutana	1,660·4

RAIL ELEVATIONS, GIRVIN TO PRINCE ALBERT, SASKATCHEWAN.—*Continued.*

(Elevations taken in 1912.)

		FEET.
Canadian Northern Railway—	Saskatoon	1,589·7
"	Canadian Pacific railway (diamond crossing)	1,607·5
"	Clark Crossing	1,645·8
"	Canadian Northern railway (diamond crossing, Warman)	1,676·1
"	Osler	1,689·3
"	Hague	1,677·7
"	Rosthern	1,672·5
"	Leckford	1,661·0
"	Duck Lake	1,660·6
"	Roddick	1,623·4
"	Adamson	1,598·4
"	Macdowall	1,558·0
"	Clouston	1,498·7
"	Prince Albert	1,413·3

RAIL ELEVATIONS, MOOSEJAW TO MAPLE CREEK, SASKATCHEWAN.

(Elevations taken in 1912).

		FEET
Canadian Pacific Railway—	Moosejaw	1,778·7
"	Boharm	1,802·7
"	Caron	1,850·4
"	Mortlach	1,987·8
"	Parkbeg	2,076·1
"	Secretan	2,276·7
"	Chaplin	2,208·0
"	Uren	2,220·1
"	Ernfold	2,368·9
"	Morse	2,283·2
"	Herbert	2,319·8
"	Twain	2,327·9
"	Rush Lake	2,336·6
"	Notman	2,403·8
"	Waldeck	2,377·7
"	Aikins	2,411·5
"	Swift Current	2,432·0
"	Hypatia	2,467·7
"	Beverley	2,475·9
"	Seward	2,485·8
"	Webb	2,593·7
"	Antelope	2,564·1
"	Premier	2,539·7
"	Gull Lake	2,567·9
"	Roscommon	2,608·4
"	Carmichael	2,648·8
"	Tompkins	2,641·3
"	Leghorn	2,571·4
"	Crane Lake	2,526·2
"	Piapot	2,501·5
"	Cross	2,541·8
"	Cardell	2,573·4
"	Tannahill	2,524·6
"	Maple Creek	2,507·0

INDEX.

ALPHABETICAL LIST OF CITIES, TOWNS AND VILLAGES AT, OR NEAR WHICH, BENCH-MARKS HAVE BEEN ESTABLISHED.

Note.—Under "Year of Publication," 1910 refers to Appendix No. 5 to the Chief Astronomer's Report for 1910, 1913 refers to Vol. I, No. 3, on Precise Levelling, 1914 refers to the present publication.

Place.	B.M. Number.	Year of Publication.	Description.	Elevation.
			Page.	Page.
	A.			
Abercorn, Que	54	1910	454	464
Adamsville, Que	59	1910	452	463
Ailsa Craig, Ont	343	1914	220	236
Alameda, Sask	57–C	1913	69	88
Alcove, Que	472	1914	218	234
Allenford, Ont	292	1913	60	83
Alliston, Ont	382, 383	1913	64	86
Andover, N.B	40–B	1910	448	461
Antigonish, N.S	172–B, 173–B	1913	47	74
Apohaqui, N.B	115–B	1913	44	73
Appin, Ont	240	1913	56	81
Apple Hill, Ont	100	1910	457	466
Aroostook Jct., N.B	41–B	1910	448	461
Atwood, Ont	309	1913	61	83
Avondale, N.S	167–B	1913	47	74
Avonmore, Ont	103	1910	457	466
Ayers Cliff, Que	28–A–2, 29	1913	48	75
Aylesbury, Sask	14–D	1913	72	90
Azilda, Ont	457	1914	225	238
	B.			
Bala, Ont	408	1913	66	86
Bath, N.B.	35–B	1910	448	461
Bayfield, N.S	177–B	1913	48	75
Beamsville, Ont	204	1913	63	85
Beaudette, Minn	16–E	1914	226	239
Bedford, Que	66	1910	453	464

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Belgrave, Ont	316	1913	61	83
Belle River, Ont	252	1913	57	81
Belleville, Ont	156, 157	1910	459	467
Benton, N.B.	18–B	1910	447	460
Bethune, Sask	9–D	1913	71	90
Bienfait, Sask	61–C	1913	69	88
Bladworth, Sask	19–D	1914	227	240
Bloomfield, N.B	111–B	1913	44	73
Bluevale, Ont	313	1913	61	83
Blyth, Ont	317	1913	61	83
Boharm, Sask	106–C	1914	229	241
Boissevain, Man	31–C, 32–C	1913	67	87
Bolton, Ont	260	1913	58	82, 86
Bothwell, Ont	243	1913	57	81
Boundary Creek, N.B	128–B	1913	45	73
Bowmanville, Ont	177	1913	54	79
Brantford, Ont	219, 220	1913	55	80
Bridgeburg, Ont	215–A	1913	64	85
Brierly Brook, N.S	170–B	1913	47	74
Brigham Jct., Que	60	1910	452	463
Brighton, Ont	163	1910	460	467
Bristol, N.B	34–B	1910	448	461
Brockville, Ont	123	1910	458	466
Brome, Que	50	1910	454	464
Brucefield, Ont	329	1913	62	84
Brunswick Jct., N.B	6–B	1910	446	460
Brussels, Ont	312	1913	61	83
Burlington Jct., Ont	196	1913	55	80
Bury, Que	13–A–2	1913	49	76
	C.			
Calais, Maine	1–B	1910	446	460
Caledon, Ont	265	1913	58	82
Canterbury, N.B	16–B	1910	447	460
Capelton, Que	26	1913	48	75
Carievale, Sask	49–C	1913	68	88
Carnduff, Sask	50–C	1913	68	88
Caron, Sask	108–C	1914	229	241
Cartwright, Man	20–C	1913	67	87
Cascades, Que	467	1914	218	234
Chamberlain, Sask	12–D	1913	72	90
Chaplin, Sask	113–C	1914	229	241
Chatham, Ont	246–A, 247, 247–A	1913	57	81
" "	373	1914	222	236

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Chelsea, Que.	464	1914	218	234
Chesley, Ont.	295, 296	1913	60	83
Chesterville, Ont.	107	1910	457	466
Chipman, N.B.	352–B	1914	216	233
Clarkson, Ont.	192	1913	55	80
Clinton, Ont.	320, 321	1913	62	83
Coaticook, Que.	14, 15, 16	1910	455	465
Cobourg, Ont.	171	1913	53	79
Colborne, Ont.	166	1910	460	467
Coldwater, Ont.	399–A	1913	65	86
Collins Bay, Ont.	144	1910	459	467
Compton, Que.	10	1910	455	465
Condie, Sask.	5–D	1913	71	90
Conn Mills, N.S.	139–B	1913	46	74
Cookshire, Que.	10–A–3, 11–A	1913	49	76
Copetown, Ont.	216–A	1913	55	80
Corbetton, Ont.	273	1913	59	82
Cornwall, Ont.	489, 490, 491	1914	219	235
Corunna, Ont.	361	1914	221	236
Coteau Jct., Que.	90	1910	456	466
Courtright, Ont.	363	1914	222	236
Craighurst, Ont.	392	1913	65	86
Craik, Sask.	16–D	1913	72	90
Crysler, Ont.	496	1914	220	235
Crystal City, Man.	16–C	1913	67	87
	D.			
Dalhousie Mills, Ont.	95	1910	456	466
Davidson, Sask.	18–D	1914	227	240
Debec Jct., N.B.	20–B	1910	447	460
Deloraine, Man.	36–C	1913	68	88
Denfield, Ont.	338	1913	62	84
Denmark, N.S.	149–B	1913	46	74
Devlin, Ont.	27–E	1914	226	239
Disley, Sask.	8–D	1913	71	90
Dobbinton, Ont.	294	1913	60	83
Dresden, Ont.	370	1914	222	236
Drinkwater, Sask.	91–C	1913	70	89
Drummondville Jct., Que.	51	1910	454	464
Duck Lake, Sask.	42–D	1914	228	240
Dundalk, Ont.	274	1913	59	82
Dundas, Ont.	215	1913	55	80
Dundurn, Sask.	25–D	1914	227	240

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	E.			
Eady, Ont	398	1913	65	86
Eastman Jct., Que	44	1910	452	463
Eastwood, Ont	225	1913	55	80
Edmundston, N.B	58–B, 59–B, 60–B	1910	449	461
Elmwood, Ont	297	1913	60	83
Elva, Man	44–C	1913	68	88
Embrun, Ont	498	1914	220	235
Emerson, Man	3–C	1913	66	87
Emo, Ont	23–E, 24–E	1914	226	239
Ernestown, Ont	146	1910	459	467
Ernfold, Sask	115–C	1914	229	241
Estevan, Sask	62–C, 63–C	1913	69	88
Exeter, Ont	332, 333	1913	62	84
	F.			
Fairville, N.B	96–B	1910	451	462
Farnham, Que	62	1910	452	464
" "	63, 64	1910	453	464
Finch, Ont	105	1910	457	466
" "	495	1914	219	235
Findlater, Sask	11–D	1913	72	90
Flesherton, Ont	277	1913	59	82
Forest, Ont	351	1914	221	236
Fort Erie, Ont	215–A	1913	64	85
Fort Frances, Ont	29–E, 30–E	1914	226	239
Foster, Que	47	1910	452	463
Frobisher, Sask	58–C	1913	69	88
Fulford, Que	56	1910	452	463
	G.			
Gainsborough, Sask	47–C	1913	68	88
Girvin, Sask	17–D	1913	72	90
Glencoe, Ont	241, 241–A	1913	56	81
Glen Ewen, Sask	52–C	1913	68	88
Goderich, Ont	325, 326, 327	1913	62	83, 84
Goodlands, Man	38–C	1913	68	88
Gracefield, Que	484	1914	219	234
Graceton, Minn	14–E	1914	226	239
Grafton, Ont	168	1913	53	79
Grand Coulée, Sask	101–C	1913	71	89
Grand Falls, N.B	46–B	1910	448	461
Grand Ligne, Que	78	1910	456	463
Green River, N.B	54–B	1910	449	461
Green Valley, Ont	97	1910	456	466
Gretna, Man	4–C	1913	66	87
Grimsby, Ont	203	1913	63	85
Gull Lake, Sask	136–C	1914	230	241

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Hallock, Minn.	2–C	1913	66	87
Hamilton, Ont.	198, 199, 200	1913	63	85
Hampton, N.B.	109–B	1913	44	73
Hanley, Sask.	23–D	1914	227	240
Hanover, Ont.	298, 299	1913	60	83
Harlaka Jct., Que.	219–B	1913	52	77
Harriston, Ont.	303, 304	1913	61	83
Hartland, N.B.	31–B	1910	448	461
Henfryn, Ont.	310	1913	61	83
Herbert, Sask.	118–C	1914	230	241
Hillhurst, Que.	13	1910	455	465
Holland Centre, Ont.	281	1913	59	82
Holmesville, Ont.	322	1913	62	83
Holmfield, Man.	22–C	1913	67	87
Howick Jct., Que.	87	1910	456	466
Hull, Que.	459, 460	1914	217	234
Hyde Park Jct., Ont.	341	1913	63	84
	I.			
Iberville, Que.	74	1910	452	463
Ilderton, Ont.	339	1913	63	84
Ingersoll, Ont.	229, 230	1913	56	80
Inkerman, Ont.	110	1910	457	466
	J.			
James River, N.S.	169–B	1913	47	74
Jeannette, Ont.	249–A	1913	57	81
Jordan, Ont.	205	1913	63	85
	K.			
Kazabazua, Que.	479	1914	218	234
Kempton, Ont.	113	1910	457	466
Kemptville, Ont.	113–A	1913	52	78
Kenaston, Sask.	21–D	1914	227	240
Kilburn, N.B.	37–B	1910	448	461
Killarney, Man.	25–C	1913	67	87
Kingston, Ont.	139, 141, 141–A, 142	1910	459	467
Kippen, Ont.	330	1913	62	84

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Knowlton, Que.	49	1910	454	464
Komoka, Ont.	237–A	1913	56	80
	L.			
Lansdowne, Ont.	130, 131	1910	458	466
Leckford, Sask.	41–D	1914	228	240
Lennoxville, Que.	6	1910	454	465
Lepreau, N.B.	89–B	1910	451	462
Levis, Que.	221–B, 222–B.	1913	52	77
Listowel, Ont.	307, 308	1913	61	83
Londesborough, Ont.	318	1913	61	83
London, Ont.	235, 236	1913	56	80
Longwood, Ont	239–A	1913	56	81
Low, Que.	476	1914	218	234
Lucan Crossing, Ont.	337	1913	62	84
Lumsden, Sask.	7–D	1913	71	90
Lyn, Ont.	125	1910	458	466
Lynden, Ont.	217	1913	55	80
Lyon Brook, N.S.	156–B	1913	47	74
	M.			
Macoun, Sask.	69–C	1913	69	89
Magog, Que.	40, 41, 41–A	1910	453	463
Maitland, Ont.	121	1910	458	466
Malagash, N.S.	144–B	1913	46	74
Mallorytown, Ont.	128	1910	458	466
Manitou, Man.	11–C, 12–C	1913	66	87
Maple Creek, Sask.	145–C, 146–C	1914	231	241
Markdale, Ont.	279	1913	59	82
Marysville, Ont.	152	1910	459	467
Massawippi, Que.	28–A	1913	48	75
Mather, Man.	17–C	1913	67	87
McAdam Jct., N.B.	11–B	1910	447	460
McGivney Jct., N.B.	333–B	1914	215	233
Meadowville, N.S.	153–B	1913	46	74
Medora, Man.	40–C	1913	68	88
Megantic, Que.	21–A–2, 22–A	1913	50	76
Melancthon, Ont.	271–A, 272	1913	59	82
Melita, Man.	42–C, 43–C	1913	68	88
Merigomish, N.S.	164–B	1913	47	74

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Midale, Sask.	71–C	1913	69	89
Midhurst, Ont.	390	1913	65	86
Milan, Que.	18–A–2	1913	50	76
Milestone, Sask.	85–C	1913	70	89
Monckland, Ont.	102	1910	457	466
Moncton, N.B.	132–B, 133–B, 134–B	1913	45	73
" "	373–B, 374–B	1914	217	233
Mooretown, Ont.	362	1914	221	236
Moosejaw, Sask.	94–C, 95–C, 96–C	1913	71	89
" "	103–C	1914	229	241
Morden, Man.	7–C, 8–C	1913	66	87
Morse, Sask.	116–C, 117–C	1914	229	241
Mortlach, Sask.	110–C	1914	229	241
Mountain, Ont.	111	1910	457	466
Mulgrave, N.S.	185–B	1913	48	75
Muniac, N.B.	37–B	1910	448	461
Musquash, N.B.	91–B, 92–B	1910	451	462
Mystic, Que.	65	1910	453	464
	N.			
Napadogan, N.B.	323–B, 324–B	1914	215	232
Napanee, Ont.	149, 150	1910	459	467
Napinka, Man.	41–C	1913	68	88
Nauwigewauk, N.B.	107–B	1913	44	73
Newbury, Ont.	242	1913	56	81
Newcastle, Ont.	176	1913	53	79
New Glasgow, N.S.	160–B	1913	47	74
Ninga, Man.	29–C	1913	67	87
Northfield, Ont.	494	1914	219	235
North Portal, Sask.	*	1913	88	88
Northwood, Ont.	245	1913	57	81
Norton, N.B.	113–B	1913	44	73
Norton Mills, Vermont	23, 24, 25	1910	455	465
Notre-Dame-du-Lac, Que.	64–B	1910	449	461
	O.			
Oak Bay, N.B.	4–B	1910	446	460
Oakville, Ont.	193	1913	55	80
Orangeville, Ont.	267	1913	58	82
Osgoode, Ont.	117–A, 118–A	1913	52	78

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Ottawa, Ont.	125-A	1913	53	78
" "	503, 504	1914	220	235
Owen Sound, Ont.	286, 287, 288	1913	60	82
Oxbow, Sask.	55-C	1913	69	88
Oxford, Ont.	114	1910	457	466
Oxford, N.S.	136-B	1913	46	74
Oxford Jct., N.S.	135-B	1913	45	74
	P.			
Palgrave, Ont.	376	1913	64	86
Palmerston, Ont.	305	1913	61	83
Paris, Ont.	222	1913	55	80
Parkbeg, Sask.	111-C	1914	229	241
Park Head Jct., Ont.	291	1913	60	83
Parkhill, Ont.	346	1914	221	236
Parry Sound, Ont.	419, 420	1914	223	237
Pasqua, Sask.	93-C	1913	71	89
Pense, Sask.	99-C	1913	71	89
Perth, N.B.	39-B	1910	448	461
Petitcodiac, N.B.	123-B	1913	45	73
Piapot, Sask.	141-C	1914	231	241
Pickering, Ont.	180-A-2	1913	54	79
Piedmont, N.S.	165-B	1913	47	74
Pierson, Man.	46-C	1913	68	88
Pike Creek, Ont.	253	1913	57	81
Pilot Mound, Man.	15-C	1913	67	87
Pinewood, Ont.	20-E	1914	226	239
Pinto, Sask.	67-C	1913	69	88
Plaster Rock, N.B.	301-B, 302-B	1914	213	232
Pomquet, N.S.	176-B	1913	48	74
Port Hope, Ont.	172, 172-A, 173	1913	53	79
Port Robinson, Ont.	212	1913	63	85
Port Union, Ont.	182	1913	54	79
Prescott, Ont.	119	1910	458	466
Prince Albert, Sask.	47-D, 48-D, 49-D	1914	228	240
Princeton, Ont.	224	1913	55	80
	R.			
Rainy River, Ont.	17-E	1914	226	239
Regina, Sask.	1-D, 2-D, 3-D	1913	71	90
River Glade, N.B.	125-B	1913	45	73

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Rock Island, Que	33–A	1913	49	75
Roosevelt, Minn	13–E	1914	226	239
Rosthern, Sask	40–D	1914	228	240
Rothesay, N.B	103–B, 104–B	1913	44	73
Rouleau, Sask	88–C, 89–C	1913	70	89
Rush Lake, Sask	120–C	1914	230	241
Russell, Ont	499	1914	220	235
	S.			
Sarnia, Ont	357, 358, 359, 360	1914	221	236
Saskatoon, Sask	29–D, 30–D, 31–D, 32–D, 33–D	1914	227,228	240
Scotstown, Que	16–A–2	1913	49	76
Shallow Lake, Ont	290	1913	60	83
Shannonville, Ont	154	1910	459	467
Shelburne, Ont	271	1913	59	82
Sherbrooke, Que	1, 2, 3	1910	454	465
" "	35, 36	1910	453	463
Sigas, N.B	51–B	1910	449	461
South Stukely, Que	45	1910	452	463
Sprague, Man	10–E	1914	225	239
Springhill, Que	19–A–2, 20–A	1913	50	76
Stanbridge, Que	67	1910	453	464
Stanstead, Que	34	1913	49	75
Stephen, Minnesota	1–C	1913	66	87
Stickney, N.B	32–B	1910	448	461
Stoney Creek, Ont	201	1913	63	85
Stoney Point, Ont	250	1913	57	81
Stottsville, Que	79	1910	456	463
Sudbury, Ont	454, 454–A	1914	225	238
Sussex, N.B	117–B	1913	44	73
Sutton, Que	52	1910	454	464
Swift Current, Sask	126–C, 127–C	1914	230	241
	ST.			
St. Anselme, Que	214–B	1913	52	77
St. Armand, Que	68, 69, 70	1910	453	464
St. Catharines, Ont	207, 208	1913	63	85
St. Evariste, Que	195–B, 196–B	1913	51	77
St. George, N.B	83–B	1910	451	462

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St. Honoré, Que.	70–B	1910	450	461
St. John, N.B.	97–B, 98–B, 99–B, 100–B	1910	452	462
St. Johns, Que.	75	1910	452	463
" "	76	1910	455	463
St. Joseph-de-Lévis, Que.	220–B	1913	52	77
St. Louis, Que. (Beauharnois County)	88	1910	456	466
St. Mary, Que.	209–B	1913	51	77
St. Polycarpe Jct., Que.	92	1910	456	466
Ste. Rose, Que. (Temiscouata County)	62–B	1910	449	461
St. Stephen, N.B.	2–B, 3–B	1910	446	460
	T.			
Tara, Ont.	293	1913	60	83
Tatamagouche, N.S.	147–B	1913	46	74
Thamesville, Ont.	243–A	1913	57	81
Thedford, Ont.	349	1914	221	236
Thornhill, Man.	9–C	1913	66	87
Thorold, Ont.	210, 211	1913	63	85
Tompkins, Sask.	138–C	1914	231	241
Toronto, Ont.	185, 186, 187, 188, 188–A, 189	1913	54	79
Tottenham, Ont.	377–A	1913	64	86
Trenton, Ont.	161	1910	460	467
Tring Jct., Que.	204–B	1913	51	77
Tupperville, Ont.	369	1914	222	236
	U.			
Utopia, Ont.	387	1913	65	86
	V.			
Valleyfield, Que.	89	1910	456	466
Valley Jct., Que.	207–B	1913	51	77
Versailles, Que.	72	1910	452	463

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Wallaceburg, Ont	367	1914	222	236
Warman, Sask	35–D	1914	228	240
Warroad, Minn	12–E	1914	226	239
Waterville, Que	9	1910	455	465
Webb, Sask	132–C	1914	230	241
Welland, Ont	213	1913	64	85
Welland Jct., Ont	214	1913	64	85
West Merigomish, N.S	163–B	1913	47	74
Weston, Ont	256–A	1913	58	82
Weyburn, Sask	80–C, 81–C	1913	70	89
Whitby, Ont	180–A	1913	54	79
Whitewater, Man	35–C	1913	68	88
Wilcox, Sask	86–C, 87–C	1913	70	89
Winchester, Ont	109	1910	457	466
Windsor, Ont	255	1913	57	81
Wingham, Ont	314	1913	61	83
Winona, Ont	202	1913	63	85
Woodstock, Ont	226, 227	1913	55	80
Woodstock, N.B	25–B, 26–B, 27–B	1910	447	460
	Y.			
Yellow Grass, Sask	83–C	1913	70	89