



NOAA Technical Memorandum NOS NGS-44

---

BLUE RIDGE GRAVIMETER CALIBRATION BASE LINE,  
ESTABLISHED 1985

Claude W. Wessells

Rockville, MD  
December 1985

---

**U.S. DEPARTMENT OF  
COMMERCE**

National Oceanic and  
Atmospheric Administration

National Ocean  
Service

## NOAA TECHNICAL PUBLICATIONS

### National Ocean Service/National Geodetic Survey subseries

The National Geodetic Survey (NGS), Office of Charting and Geodetic Services, the National Ocean Service (NOS), NOAA, establishes and maintains the basic national horizontal, vertical, and gravity networks of geodetic control, and provides Government-wide leadership in the improvement of geodetic surveying methods and instrumentation, coordinates operations to assure network development, and provides specifications and criteria for survey operations by Federal, State, and other agencies.

NGS engages in research and development for the improvement of knowledge of the figure of the Earth and its gravity field, and has the responsibility to procure geodetic data from all sources, process these data, and make them generally available to users through a central data base.

NOAA geodetic publications and relevant geodetic publications of the former U.S. Coast and Geodetic Survey are sold in paper form by the National Geodetic Information Center. To obtain a price list or to place an order, contact:

National Geodetic Information Center (N/CG17x2)  
Charting and Geodetic Services  
National Ocean Service  
National Oceanic and Atmospheric Administration  
Rockville, MD 20852

When placing an order, make check or money order payable to: National Geodetic Survey. Do not send cash or stamps. Publications can also be charged to Visa, Master Card, or prepaid Government Printing Office Deposit Account. Telephone orders are accepted (area code 301 443-8316).

Publications can also be purchased over the counter at the National Geodetic Information Center, 11400 Rockville Pike, Room 14, Rockville, MD. (Do not send correspondence to this address.)

An excellent reference source for all Government publications is the National Depository Library Program, a network of about 1,300 designated libraries. Requests for borrowing Depository Library material may be made through your local library. A free listing of libraries in this system is available from the Library Division, U.S. Government Printing Office, 5236 Eisenhower Ave., Alexandria, VA 22304 (area code 703 557-9013).



NOAA Technical Memorandum NOS NGS-44

BLUE RIDGE GRAVIMETER CALIBRATION BASE LINE,  
ESTABLISHED 1985

Claude W. Wessells  
National Geodetic Survey

Rockville, MD  
December 1985

**UNITED STATES  
DEPARTMENT OF COMMERCE**  
Malcolm Baldrige, Secretary

**National Oceanic and  
Atmospheric Administration**  
Anthony J. Calio,  
Administrator

National Ocean Service  
Paul M. Wolff, Asst. Administrator

Charting and Geodetic Services  
R. Adm. John D. Bossler, Director

## PREFACE

A new short-range, gravimeter calibration line was established in 1985 in the Mideastern United States. Data from the Blue Ridge Gravimeter Calibration Base Line (BRGCBL) have been entered into the National Geodetic Survey gravity data base, and as more measurements are made on this line gravity values for the stations will be updated.

For the most current data contact:

National Geodetic Information Center (N/CG174)  
National Oceanic and Atmospheric Administration  
Rockville, MD 20852  
(telephone: 301 443-8631)

## CONTENTS

Preface . . . . .	ii
Abstract. . . . .	1
Introduction. . . . .	1
Description . . . . .	2
Station selection . . . . .	2
Monumentation . . . . .	4
Horizontal and vertical control . . . . .	4
Survey procedures . . . . .	4
Data reduction and adjustment . . . . .	6
Acknowledgment. . . . .	7
References. . . . .	7
Appendix A. Final adjusted gravity values and intervals between base line stations . . . . .	9
Appendix B. Station descriptions . . . . .	11
Appendix C. Bench mark locations . . . . .	33

Mention of a commercial company or product does not constitute an endorsement by the National Oceanic and Atmospheric Administration. Use for publicity or advertising purposes of information from this publication concerning proprietary products or the tests of such products is not authorized.

BLUE RIDGE GRAVIMETER CALIBRATION  
BASE LINE, ESTABLISHED 1985

Claude W. Wessells  
National Geodetic Survey  
Charting & Geodetic Services  
National Ocean Service, NOAA  
Rockville, MD 20852

ABSTRACT. As with almost all scientific instrumentation, some method of calibration is necessary to achieve optimum results in a given investigation. The same holds true for gravimeters. The Blue Ridge Gravimeter Calibration Base Line provides the user with an overall 310-mgal gravity range (10-mgal intervals) for calibration of gravimeters reading to  $\pm 0.01$  mgal and a 10-mgal range (1-mgal interval) for the more sensitive gravimeters, reading to  $\pm 0.001$  mgal. This line will enable the user to determine scale constants for each interval as well as circular error contributions for their gravimeters. In addition to gravity values and station descriptions for length of the line, observational and adjustment procedures are included in this report.

INTRODUCTION

Over the years a number of gravity observation programs have been undertaken between the Washington, DC , area and the Blue Ridge Mountains of Virginia for the purpose of establishing a gravimetric calibration base range. As early as 1955, the Geodesy Division of the U.S. Coast and Geodetic Survey (USC&GS), now the National Geodetic Survey (NGS) within the National Ocean Service, National Oceanic and Atmospheric Administration (NOAA), had established a gravity line beginning at the pendulum site in the Commerce Building in Washington, DC, and ending at the monumented USC&GS vertical bench mark, T 95, at Luray, VA. The stations of this line consisted of seven USC&GS vertical bench marks, two U.S. Geological Survey (USGS) bench marks, and three USC&GS gravity base station bench marks. In 1970, the Defense Mapping Agency (DMA) established a test range consisting of eleven stations between Herndon, VA, and the Blue Ridge Mountains in the Shenandoah National Park, VA (DMA 1970). This range had a gravity difference of 326 mgal and an elevation difference of 1039 m.

In the late 1970's, the U.S. Gravity Base Coordinating Committee was created in response to recommendations of the NGS and DMA to coordinate all Federal activities dealing with absolute gravimetry and gravity calibration base lines. In 1979, the committee, comprised of representatives from the DMA, USGS, and NOAA, set forth criteria for the establishment of several short-range calibration lines. Each agency agreed to establish a short-range calibration line in a predesignated area of the United States. NOAA assumed responsibility for establishing one in the eastern region.

In 1982, using criteria adopted by the U.S. Gravity Base Coordinating Committee, NGS completed measurements along the Blue Ridge Gravimeter Calibration Base Line. The site now provides a standard, high-accuracy, short-range gravimeter calibration line in the eastern United States. This line may be used by government agencies as well as the private sector for the determination of gravimeter performance.

The new line is referenced to the absolute gravity station, WASHINGTON AA, located at the National Bureau of Standards, in Gaithersburg, MD (Zumberge et al. 1982). The measurements consisted of 770 observations (30 loops) on 42 monumented stations, yielding an rms error of 0.017 mgal.

This report briefly describes the station selection process, the observations, and the data reduction and adjustment procedures. Appendix A lists the stations, their gravity values, and expected accuracies. Appendix B gives their geographic positions, elevations, and descriptions, while Appendix C shows the station locations plotted on USGS topographic sheets.

#### DESCRIPTION

The Blue Ridge Gravimeter Calibration Base Line consists of 41 stations located between Reston, VA, and the Virginia portion of the Blue Ridge Mountains. It has a maximum gravity difference of 310 mgal, a maximum elevation difference of 1026 m, and a maximum latitude difference of 22 minutes of arc. The line begins at WASHINGTON R, a station of the International Gravity Standardization Network (Morelli 1971) located at Dulles International Airport, and continues westerly along highway U.S. 211 to Skyline Drive, then southerly to station SKYLAND B, located in the Skyland recreational area of Shenandoah National Park in the Blue Ridge Mountains (fig. 1).

#### STATION SELECTION

Two criteria were established in selecting stations for the Blue Ridge Gravimeter Calibration Base Line:

1. Stations should be easily accessible from existing roads for reobservations without being affected by local traffic. Further, travel time to each station should be kept to a minimum to allow completion of an observational loop within 10 to 12 hours.
2. Successive stations need to possess a gravity difference of approximately 10 mgal.

Based on the second criterion, 30 new stations were established between WASHINGTON R and SKYLAND B. In addition, to allow for the circular error determination of the more sensitive LaCoste & Romberg Model D gravimeter, nine additional stations were established between two adjacent stations from the new set of thirty. This provided approximately a 1-mgal gravity difference between a pair of stations in the 10-mgal range.

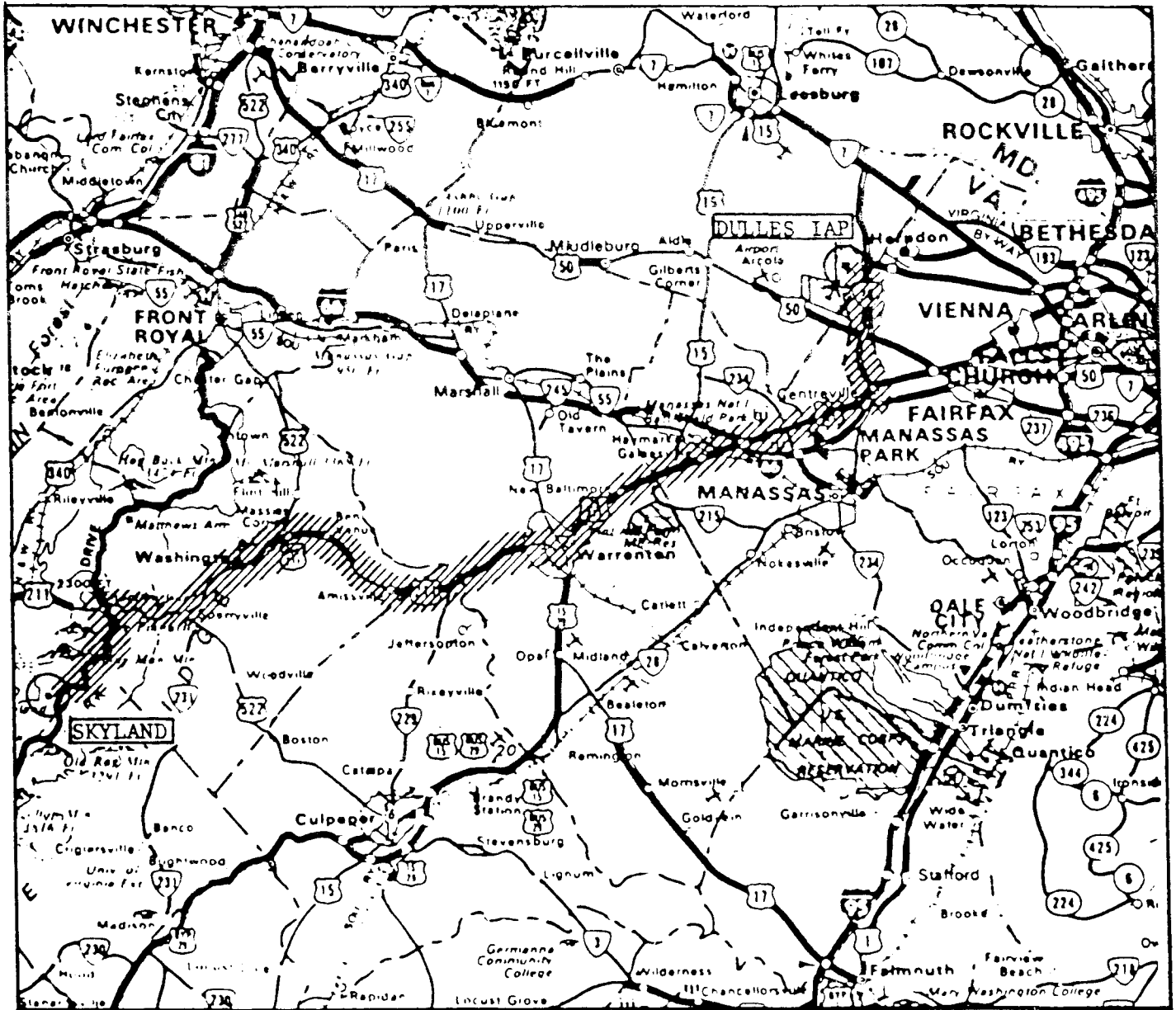


Figure 1.--Hatched line indicates route of the Blue Ridge Gravimeter Calibration Base Line, extending from Dulles International Airport in northern Virginia to Skyland in the Shenandoah National Park.



## MONUMENTATION

The 39 new stations of the Blue Ridge Gravimeter Calibration Line were permanently monumented by a mark-setting team of the NGS Operations Branch. Station pads were constructed according to specifications established by the U.S. Gravity Base Coordinating Committee. The concrete pads have a dimension of 0.5 m (see fig. 2) and were emplaced in bedrock wherever possible, with two or three rebars securing the pad to the bedrock. When only soil was available, a 0.5-meter hole was prepared first, into which rebars were driven until resistance was felt. The bottom of the hole was then filled with sand (about 10 cm). On top of the sand a 0.5-meter-high pad was constructed. The portion of the pad above ground is about 10 cm. The NGS mark-setting team documented the description of each new bench mark in accordance with specifications published in Input Formats and Specifications of the National Geodetic Survey Data Base, volume III: Gravity control data (Dewhurst 1985). Appendix B contains the 39 station descriptions.

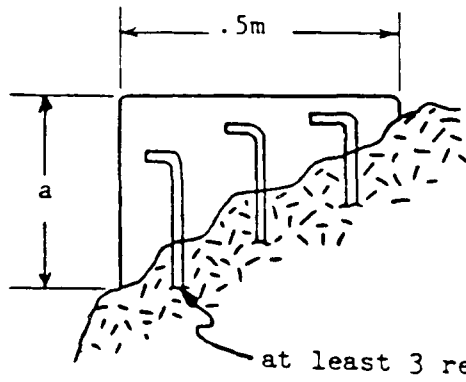
## HORIZONTAL AND VERTICAL CONTROL

All stations were plotted on 7-1/2 minute USGS topographic quadrangles, and the geographic position and the elevation of each were scaled. The only exceptions to this procedure were WASHINGTON AA, WASHINGTON R, and SKYLAND B, which were obtained from existing documentation. The listed positions and elevations of those scaled stations are only temporary. NGS will carry out horizontal and vertical control measurements to at least second-order accuracy for these stations at a later date.

## SURVEY PROCEDURES

Using criterion 1 under Station Selection, highway U.S. 211 was selected for the general location of the calibration line. All available gravity values in the vicinity of this line were plotted on 7-1/2 minute USGS topographic quadrangles, which provided a guide in estimating the location of the 10-mgal incremental gravity values along the proposed route of the calibration line.

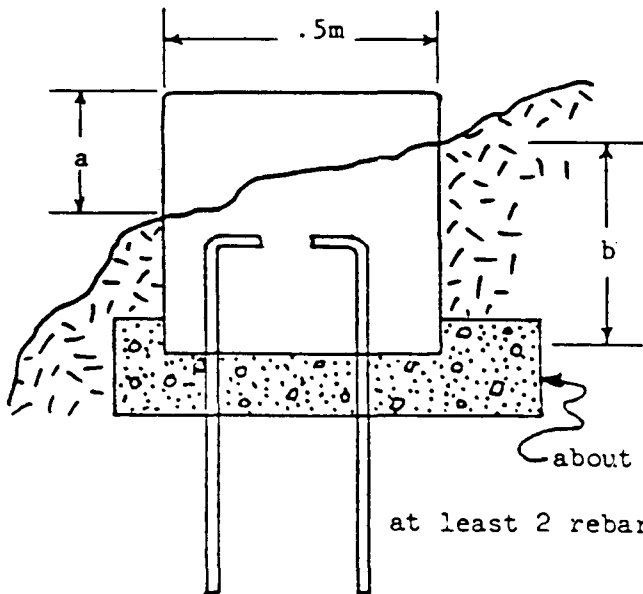
Two LaCoste & Romberg model G gravimeters were used on each day of the survey. The crew began the field observations by using the known gravity value at WASHINGTON R, and continued along the line at approximately 10-mgal increments. To establish a new station, observations were made by using one gravimeter at a point along the road where the estimated gravity difference from the previous station was 10 mgal based on the gravity maps. The observation point then was moved along the road until a 10-mgal difference from the previous station was actually obtained. Then the second meter was read as a check. The meter readings necessary to obtain the desired 10-mgal values were precomputed from the internal calibration factor of each gravimeter, taking also into account the Earth tide values at the time of the measurements. Once the proper point was located, it was monumented. After completion of the station selection process, all subsequent loops were observed in either ladder sequences or modified ladder sequences and with few exceptions were closed within 1 day.



"a" dimension at least 30 cm

at least 3 rebars

Installation into bedrock



"a" dimension 10 cm  
 "b" dimension 0.5 m

about 10 cm of sand

at least 2 rebars driven to resistance

Installation into soil

Figure 2.--Typical installation for gravity bench marks.

## DATA REDUCTION AND ADJUSTMENT

Datum for the calibration line is absolute station WASHINGTON AA (Zumberge et al. 1982), with a gravity value of 980,103.259 mgal. The primary base station was WASHINGTON R; the secondary base station was SKYLAND B.

Table 1 lists the gravimeters used, their scale factors, and the source of gravity factor determinations. Meters G 111 and G 6 were used only for base ties between WASHINGTON R and WASHINGTON AA.

Table 1.--Gravimeters used for establishment of the  
Blue Ridge Gravimeter Calibration Base Line

Gravimeter	Scale factor	*Source
L&R G 81	1.000372	MCCL 1978
L&R G 157	1.000193	MCCL 1978
L&R D 17	1.3665	Factory 1978
L&R D 43	1.238864	MCCL 1980
L&R G 6	1.002058	BRCL 1964
L&R G 111	0.994584	NGSGN 1975

\*MCCL - Mid-Continental Calibration Line  
 BRCL - Blue Ridge Calibration Line, 1964  
 NSGSN - National Geodetic Survey gravity network

All data reductions and adjustments were performed according to standard NGS procedures (Chin 1980). The adjustment program used the 486 term model of Cartwright and Tayler (1971), as corrected by Cartwright and Edden (1973), for the computation of lunar-solar gravitational attraction. Linear drift corrections were applied to all observations based on loop closures, and least squares network adjustments were performed until convergence was achieved.

From the adjustment of 770 observations, the rms error of a single observation was 0.017 mgal. The mean standard error of the gravity value at a given station was 0.007 mgal, which allows a first-order, class I designation for the stations of the calibration base line (FGCC 1984), provided later results verify station stability. The maximum standard error for a station was 0.010 mgal.

#### ACKNOWLEDGMENT

The author extends his sincere appreciation to Dr. George Peter, Lt. Warren Dewhurst, and Mr. William Strange for their suggestions. A special word of thanks goes to Mr. Lewis M. Johnson, Chief, Gravity Party G52, whose diligent efforts in the field operations made this report possible.

#### REFERENCES

- Cartwright, D. E. and Edden, A. C., 1973: Corrected tables of tidal harmonics, Geophys. J. R. Astr. Soc., 33, 253-264.
- Cartwright, D. E. and Tayler, R. J., 1971: New computations of the tide-generating potential, Geophys. J. R. Astr. Soc., 23, 45-74.
- Chin, M., 1980: Adjustment of LaCoste & Romberg Gravity Observations, abstract, American Geophysical Union, EOS, vol. 61, No. 17, p. 209.
- Defense Mapping Agency, 1980: DMA Technical Manual, Land gravity surveys, DMA TM 80-002, 31 pp.
- Defense Mapping Agency, 1970: Blue Ridge Gravimeter Test Range and Herndon Training Area, Report No. 7, 31 pp.
- Dewhurst, W. T., 1983, rev. 1985: Input Formats and Specifications of the National Geodetic Survey Data Base, volume III: Gravity control data. Federal Geodetic Control Committee. National Geodetic Information Center, NOAA, Rockville, MD, 163 pp.
- Federal Geodetic Control Committee, 1984: Standards and Specifications for Geodetic Control Networks, National Geodetic Information Center, NOAA, Rockville, MD, 29 pp.
- Morelli, C., 1971: The International Gravity Standardization Net, 1971, International Association of Geodesy, Special Publication 4, 194 pp.
- Zumberge, M. A., Faller, J. E., and Gschwind, J., 1982: Results From a U.S. absolute gravity survey, Joint Institute for Laboratory Astrophysics, National Bureau of Standards, Boulder, Colorado (unpublished report), 17 pp.

APPENDIX A.--FINAL ADJUSTED GRAVITY VALUES AND INTERVALS  
BETWEEN BASE LINE STATIONS

Table 1 A.--Gravity values for Blue Ridge Gravimeter Calibration Base Line

Station	*Adj. Gravity	Std. Error	**Interval
WASHINGTON AA	980 103.259	0.000	
WASHINGTON R	980 078.428	0.010	-24.831
BRCL 010	980 068.418	0.008	-10.010
BRCL 020	980 058.397	0.008	-10.021
BRCL 030	980 048.411	0.007	-9.986
BRCL 040	980 038.427	0.007	-9.984
BRCL 050	980 028.418	0.007	-10.009
BRCL 060	980 018.422	0.007	-9.996
BRCL 070	980 008.472	0.007	-9.950
BRCL 080	979 998.424	0.007	-10.048
BRCL 090	979 988.415	0.007	-10.009
BRCL 100	979 978.392	0.007	-10.023
BRCL 110	979 968.389	0.007	-10.003
BRCL 120	979 958.387	0.007	-10.002
BRCL 130	979 948.380	0.007	-10.007
BRCL 140	979 938.336	0.007	-10.044
BRCL 150	979 928.321	0.007	-10.015
BRCL 160	979 918.321	0.008	-10.000
BRCL 170	979 908.333	0.007	-9.988
BRCL 180	979 898.319	0.007	-10.014
BRCL 190	979 888.293	0.007	-10.026
BRCL 191	979 887.284	0.007	-1.009
BRCL 192	979 886.263	0.007	-1.021
BRCL 193	979 885.255	0.007	-1.008
BRCL 194	979 884.262	0.007	-0.993
BRCL 195	979 883.272	0.008	-0.990
BRCL 196	979 882.211	0.008	-1.061
BRCL 197	979 881.226	0.008	-0.985
BRCL 198	979 880.197	0.008	-1.029
BRCL 199	979 879.156	0.007	-1.041
BRCL 200	979 878.142	0.007	-1.014
BRCL 210	979 868.300	0.006	-9.842
BRCL 220	979 858.309	0.007	-9.991
BRCL 230	979 848.381	0.008	-9.928
BRCL 240	979 838.298	0.007	-10.083
BRCL 250	979 828.323	0.007	-9.975
BRCL 260	979 818.308	0.007	-10.015
BRCL 270	979 808.295	0.007	-10.013
BRCL 280	979 798.281	0.007	-10.014
BRCL 290	979 788.295	0.007	-9.986
BRCL 300	979 778.263	0.007	-10.032
SKYLAND B	979 767.954	0.007	-10.309

\*Adjusted gravity value current to August 1, 1985.

\*\*Interval with respect to preceding station.

APPENDIX B.--BLUE RIDGE GRAVIMETER CALIBRATION BASE LINE  
STATION DESCRIPTIONS

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 10 STATE--VA COUNTY--PRINCE WILLIAM  
 QUAD--N38077412 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 2.6 KM (1.6 MI) ENE OF GROVETON  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 10 1982 OTHER CONTROL--G  
 LATITUDE = 384912N LONGITUDE = 0773124W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 0.4 KM (0.25 MI) EAST ALONG U.S. HIGHWAY 29 AND 211 FROM THE JUNCTION  
 WITH STATE HIGHWAY 234, 26.7 METERS (87.5 FT) WEST OF A TWIN TRUNKED  
 DOGWOOD TREE, 22.2 METERS (73.0 FT) SOUTH OF TELEPHONE NUMBER 7, 10.8  
 METERS (35.6 FT) SOUTH OF THE APPROXIMATE CENTER OF U.S. HIGHWAY 29  
 AND 211. A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6  
 CENTIMETERS. BELOW HIGHWAY. 1.01 METERS NORTHEAST FROM A WITNESS  
 POST.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 20 STATE--VA COUNTY--PRINCE WILLIAM  
 QUAD--N38077412 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 3.2 KM (2 MI) ENE OF GAINESVILLE  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 20 1982 OTHER CONTROL--G  
 LATITUDE = 384848N LONGITUDE = 0773430W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 0.2 KM (0.1 MI) WEST ALONG U.S. HIGHWAY 29 AND 211 FROM THE JUNCTION  
 WITH COUNTY HIGHWAY 705, 14.17 METERS (46.5 FT) SOUTH OF CENTERLINE OF  
 EASTBOUND LANE OF HIGHWAY 29 AND 211, 13.72 METERS (45.0 FT) EAST-  
 NORTHEAST OF POWER POLE NUMBER 43-14-2, 7.01 METERS (23.0 FT) EAST  
 FROM A VIRGINIA DEPARTMENT OF HIGHWAYS MARKER. A DISK SET INTO THE  
 TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS. BELOW HIGHWAY.



ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 30 STATE--VA COUNTY--FAUQUIER  
 QUAD--N38077413 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 2.7 KM (1.7 MI) ENE OF NEW BALTIMORE  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 30 1982 OTHER CONTROL--G  
 LATITUDE = 384648N LONGITUDE = 0774024W

..... ORIGINAL DESCRIPTION .....

AT THE SOUTHEAST CORNER OF THE JUNCTION OF U.S. HIGHWAYS 15, 29, 211 AND STATE HIGHWAY 215, 12.53 METERS (41.1 FT) SOUTH OF THE CENTERLINE OF THE EASTBOUND LANE OF THE U.S. HIGHWAYS, 12.44 METERS (40.8 FT) EAST OF THE CENTERLINE OF HIGHWAY 215 AND 3.05 METERS (10.0 FT) WEST OF POWER POLE NUMBER C 155. A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS. ABOVE HIGHWAY. 3.14 METERS WEST-SOUTHWEST FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 40 STATE--VA COUNTY--FAUQUIER  
 QUAD--N38077431 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- WARRENTON  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 40 1982 OTHER CONTROL--G  
 LATITUDE = 384254N LONGITUDE = 07748124

..... ORIGINAL DESCRIPTION .....

0.5 KM (0.3 MI) EAST ON U.S. HIGHWAY 211 BUSINESS FROM THE JUNCTION WITH U.S. HIGHWAYS 15, 17, AND 29, ON THE SOUTH SIDE OF WARRENTON JUNIOR HIGH SCHOOL GROUNDS, 14.93 METERS (49.0 FT) EAST FROM THE EAST EDGE OF THE WALK TO A BASEBALL DIAMOND, 11.43 METERS (37.5 FT) NORTH OF THE EAST AND WEST FENCE, 2.59 METERS (8.5 FT) SOUTH FROM THE SOUTH EDGE OF PARKING LOT. A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS. ABOVE HIGHWAY.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 50 STATE--VA COUNTY--FAUQUIER  
 QUAD--N38077431 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 5.6 KM (3.5 MI) WEST OF WARRENTON  
 MONUMENT BY--NJS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 50 1982 OTHER CONTROL--G  
 LATITUDE = 384212N LONGITUDE = 0775154W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 5.0 KM (3.1 MI) WESTERLY ALONG U.S. HIGHWAY 211 FROM THE JUNCTION WITH  
 U.S. HIGHWAY 29, 25.6 METERS (84.0 FT) SOUTH OF THE JUNCTION OF THE  
 EASTBOUND LANE AND A FIELD ROAD, 4.57 METERS (15.0 FT) EAST OF THE  
 EAST GATE POST, JUST NORTH OF A FENCE LINE. A DISK SET INTO THE TOP  
 OF A CONCRETE POST PROJECTING 6 CENTIMETERS. BELOW HIGHWAY. 0.46  
 FEET WEST-SOUTHWEST FROM A WITNESS POST.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 60 STATE--VA COUNTY--CULPEPER  
 QUAD--N38077434 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 8.0 KM (5.0 MI) EAST OF AMISSVILLE  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 60 1982 OTHER CONTROL--G  
 LATITUDE = 384054N LONGITUDE = 0775424W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 0.4 KM (0.25 MI) WEST ON U.S. HIGHWAY 211 FROM A BRIDGE OVER THE  
 RAPPAHANNOCK RIVER, 10.97 METERS (36.0 FT) NORTH FROM THE CENTERLINE  
 OF THE WESTBOUND LANE OF HIGHWAY 211, 2.13 METERS (7.0 FT) EAST-  
 SOUTHEAST OF A CEDAR TREE, 1.43 METERS (4.7 FT) SOUTH OF A WIRE FENCE.  
 A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS.  
 ABOVE HIGHWAY. 1.04 METERS SOUTH-SOUTHWEST FROM A WITNESS POST.

ACRNE: ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 70 STATE--VA COUNTY--CULPEPER

QUAD--N38077434 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.

LOCATION-- 5.6 KM (3.5 MI) EAST OF AMISSVILLE

MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK

SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C

STAMPING--GRAVITY BRCL 70 1982 OTHER CONTROL--G

LATITUDE = 384030N LONGITUDE = 0775554W

..... ORIGINAL DESCRIPTION .....

1.2 KM (0.75 MI) WEST ALONG U.S. HIGHWAY 211 FROM THE JUNCTION WITH STATE ROAD 229, 23.16 METERS (76.0 FT) EAST OF A TWIN-TRUNKED 45 CM IN DIAMETER HICKORYNUT TREE, 14.75 METERS (48.4 FT) WEST OF THE WEST END OF A HIGHWAY GUARDRAIL, 11.7 METERS (38.4 FT) NORTH OF THE CENTER-LINE OF THE WESTBOUND LANE OF HIGHWAY 211. A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS. BELOW HIGHWAY. 0.74 METERS SOUTH-SOUTHWEST FROM A WITNESS POST.

ACRNE: ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 80 STATE--VA COUNTY--CULPEPER

QUAD--N38077434 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.

LOCATION-- 3.1 KM (2.2 MI) EAST OF AMISSVILLE

MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK

SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C

STAMPING--GRAVITY BRCL 80 1982 OTHER CONTROL--G

LATITUDE = 384024N LONGITUDE = 0775718W

..... ORIGINAL DESCRIPTION .....

ABOUT 0.5 KM (0.3 MI) EAST ALONG U.S. HIGHWAY 211 FROM THE JUNCTION WITH COUNTY ROAD 621, 33.53 METERS (110.0 FT) WEST OF THE APPROXIMATE CENTERLINE OF A DRIVEWAY, 16.46 METERS (54.0 FT) WEST FROM THE EAST END OF A GUARDRAIL, 12.86 METERS (42.2 FT) NORTH OF THE WESTBOUND LANE OF HIGHWAY 211. A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS. ABOUT LEVEL WITH HIGHWAY.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 90 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--3N3807812 QSN--1 LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 1.6 KM (1.0 MI) SE OF BEN VENUE  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 90 1982 OTHER CONTROL--G  
 LATITUDE = 384218N LONGITUDE = 0780248W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 ABOUT 0.3 KM (0.2 MI) WEST ALONG U.S. HIGHWAY 211 FROM THE WEST  
 INTERSECTION OF THE JUNCTION WITH STATE ROAD 678, (THIS IS 678 SOUTH)  
 28.19 METERS (92.5 FT) SOUTHWEST FROM A MAILBOX MARKED M. CALL IN, BOX  
 Q5, 14.6 METERS (48.0 FT) WEST OF THE CENTERLINE OF A CROSSOVER,  
 13.38 METERS (43.9 FT) NORTH OF THE EASTBOUND LANE, 12.15 METERS (40.0  
 FT) SOUTH OF THE WESTBOUND LANE. A DISK SET INTO THE TOP OF A  
 CONCRETE POST PROJECTING 6 CENTIMETERS. BELOW HIGHWAY.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 100 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078121 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 4.0 KM (2.5 MI) WNW OF BEN VENUE  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 100 1982 OTHER CONTROL--G  
 LATITUDE = 384324N LONGITUDE = 0780648W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 AT THE JUNCTION OF U.S. HIGHWAYS 211 AND 522N, 49.07 METERS (161.0 FT)  
 EAST OF THE INTERSECTION OF THE TWO HIGHWAYS, WESTBOUND LANE, 15.70  
 METERS (51.5 FT) NORTH OF THE CENTERLINE OF THE WESTBOUND LANE OF  
 HIGHWAY 211, 7.92 METERS (26.0 FT) EAST OF THE WEST CORNER POST OF A  
 FENCE. A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6  
 CENTIMETERS. BELOW HIGHWAY. 0.46 METERS NORTHWEST FROM A WITNESS  
 POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 110 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078124 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 2.6 KM (1.6 MI) SW OF WASHINGTON  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAY STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 110 1982 OTHER CONTROL--G  
 LATITUDE = 384142N LONGITUDE = 0781006W

..... ORIGINAL DESCRIPTION .....

1.8 KM (1.1 MI) SOUTHWEST ALONG U.S. HIGHWAY 211 FROM THE JUNCTION WITH COUNTY ROAD 626, 29.87 METERS (98.0 FT) NORTHEAST OF THE NORTHWEST END OF A BRIDGE ABUTMENT, 10.88 METERS (35.7 FT) NORTHWEST OF THE CENTERLINE OF HIGHWAY 211, 5.79 METERS (19.0 FT) SOUTHWEST OF THE NORTHEAST GATEPOST OF A FIELD ROAD. A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS. ABOUT LEVEL WITH HIGHWAY. 1.62 METERS NORTHWEST FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 120 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078124 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 1.1 KM (0.7 MI) WEST OF SPERRYVILLE  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAY STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 120 1982 OTHER CONTROL--G  
 LATITUDE = 383924N LONGITUDE = 0781412W

..... ORIGINAL DESCRIPTION .....

1.0 KM (0.65 MI) WEST ALONG U.S. HIGHWAY 211 FROM THE JUNCTION OF U.S. HIGHWAY 522S IN SPERRYVILLE, 12.34 METERS (40.5 FT) WEST OF A SPEED LIMIT SIGN, 8.69 METERS (28.5 FT) NORTH OF THE CENTERLINE OF HIGHWAY 211, 5.31 METERS (17.5 FT) SOUTHWEST OF UTILITY POLE 23. A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS. ABOUT LEVEL WITH HIGHWAY. 1.34 METERS WEST-SOUTHWEST FROM A WITNESS POST.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 130 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 2.6 KM (1.65 MI) WEST OF SPERRYVILLE  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 130 1982 OTHER CONTROL--G  
 LATITUDE = 383900N LONGITUDE = 0781524W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 2.6 KM (1.65 MI) WEST ALONG U.S. HIGHWAY 211 FROM THE JUNCTION WITH  
 522S, 16.46 METERS (54.0 FT) EAST FROM THE NORTH CORNER OF A WOODEN  
 BRIDGE, 14.02 METERS (46.0 FT) NORTHEAST FROM A POWER POLE WITH  
 TRANSFORMER, 12.19 METERS (40.0 FT) SOUTHEAST OF THE CENTERLINE OF  
 HIGHWAY 211, 10.67 METERS (35.0 FT) SOUTHWEST OF A 61 CM IN DIAMETER  
 PIPE CULVERT.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--FRCL 140 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 4.4 KM (2.75 MI) WEST OF SPERRYVILLE  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 140 1982 OTHER CONTROL--G  
 LATITUDE = 383912N LONGITUDE = 0781616W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 4.4 KM (2.75 MI) WEST ALONG U.S. HIGHWAY 211 FROM THE JUNCTION WITH  
 U.S. HIGHWAY 522S, 0.2 KM (0.1 MI) EAST OF THE SHENANDOAH NATIONAL  
 PARK BOUNDARY SIGN, 29.57 METERS (97.0 FT) EAST OF A CULVERT, 19.81  
 METERS (65.0 FT) NORTHWEST OF A (MAXIMUM SAFE SPEED 30 MPH) SIGN,  
 11.43 METERS (37.5 FT) NORTH OF THE CENTERLINE OF HIGHWAY 211. A DISK  
 SET INTO THE TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS ABOVE  
 HIGHWAY. 0.46 METERS SOUTH-SOUTHWEST FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 150 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 5.3 KM (3.3 MI) WEST OF SPERRYVILLE  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 150 1982 OTHER CONTROL--G  
 LATITUDE = 383936N LONGITUDE = 0781706W

..... ORIGINAL DESCRIPTION .....  
 5.7 KM (3.55 MI) WEST ALONG U.S. HIGHWAY 211 FROM THE JUNCTION WITH  
 U.S. HIGHWAY 522S, 0.2 KM (0.1 MI) EAST OF A TURNOUT, 0.2 KM (0.1 MI)  
 WEST FROM A (MAXIMUM SAFE SPEED 30 MPH) SIGN, 29.87 METERS (98.0 FT)  
 WEST OF A CULVERT, 7.62 METERS (25.0 FT) NORTH OF THE CENTERLINE OF  
 HIGHWAY 211, 1.68 METERS (5.5 FT) NORTH OF THE APPROXIMATE CENTER OF A  
 DITCH THAT RUNS ALONG THE HIGHWAY. A DISK SET INTO THE TOP OF A  
 CONCRETE POST PROJECTING 6 CENTIMETERS. ABOVE HIGHWAY. 0.73 METERS  
 SOUTH-SOUTHWEST FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 160 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 5.9 KM (3.7 MI) WNW OF SPERRYVILLE  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BCL 160 1982 OTHER CONTROL--G  
 LATITUDE = 383554N LONGITUDE = 0781724W

..... ORIGINAL DESCRIPTION .....  
 7.2 KM (4.5 MI) WEST ALONG U.S. HIGHWAY 211 FROM THE JUNCTION WITH  
 U.S. HIGHWAY 522S, ABOUT 42.0 METERS (138.0 FT) NORTH OF A 46 CM IN  
 DIAMETER PIPE CULVERT, 30.33 (99.5 FT) SOUTH OF THE SOUTH END OF A  
 GUARDRAIL, 5.94 METERS (191.5 FT) WEST FROM THE CENTER OF THE DOUBLE  
 LINE OF HIGHWAY 211. A DISK SET INTO THE TOP OF A CONCRETE POST  
 PROJECTING 6 CENTIMETERS. ABOUT LEVEL WITH HIGHWAY. 5.29 METERS  
 SOUTH-SOUTHWEST FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 170 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATION-- 6.1 KM (3.8 MI) WNW OF SPERRYVILLE  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 170 1982 OTHER CONTROL--G  
 LATITUDE = 384000N LONGITUDE = 0781736W

..... ORIGINAL DESCRIPTION .....

7.5 KM (4.7 MI) WESTERLY ALONG U.S. HIGHWAY 211 FROM THE JUNCTION WITH  
 U.S. HIGHWAY 522S, 0.1 KM (0.05 MI) SOUTH OF A SIGN SHOWING (SKYLINE  
 DRIVE 2 MILES), 18.9 METERS (62.0 FT) SOUTH OF THE 1ST WARNING ARROW  
 ON THE EAST SIDE OF THE HIGHWAY AND SOUTH OF THE ABOVE MENTIONED SIGN,  
 5.33 METERS (17.5 FT) EAST FROM THE CENTER OF THE DOUBLE LINE OF  
 HIGHWAY 211, 5.18 (17.0 FT) NORTH OF THE SECOND WARNING ARROW ON THE  
 EAST SIDE OF THE HIGHWAY AND SIGN OF THE SIGN. A DISK SET INTO THE  
 TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS. ABOUT LEVEL WITH  
 HIGHWAY. 0.85 METERS SOUTH-SOUTHWEST FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 180 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 180 1982 OTHER CONTROL--G  
 LATITUDE = 383954N LONGITUDE = 0781754W

..... ORIGINAL DESCRIPTION .....

6.3 KM (5.2 MI) WESTERLY ALONG U.S. HIGHWAY 211 FROM THE JUNCTION WITH  
 U.S. HIGHWAY 522S, 13.87 METERS (45.5 FT) WEST OF THE WEST END OF A  
 GUARDRAIL, 7.01 METERS (23.0 FT) SOUTH OF THE CENTER OF THE DOUBLE  
 LINE OF HIGHWAY 211. A DISK SET INTO THE TOP OF A CONCRETE POST  
 PROJECTING 6 CENTIMETERS. ABOUT LEVEL WITH HIGHWAY. 1.22 METERS  
 NORTHEAST FROM A WITNESS POST.



ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 190 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--RGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 190 1982 OTHER CONTROL--G  
 LATITUDE = 383942N LONGITUDE = 0781830W

..... ORIGINAL DESCRIPTION .....

2.0 KM (1.25 MI) EASTERLY ALONG U.S. HIGHWAY 211 FROM THE JUNCTION  
 WITH SKYLINE DRIVE OVERPASS ACROSS HIGHWAY 211, 16.76 METERS (55.0 FT)  
 WEST AND ACROSS THE HIGHWAY FROM THE SOUTH END OF A GUARD-RAIL 10.97  
 METERS (36.0 FT) WEST OF THE DOUBLE LINE AND IN THE MIDDLE OF AN (S)  
 CURVE. A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6  
 CENTIMETERS. ABOUT LEVEL WITH HIGHWAY. 0.88 METERS NORTHEAST FROM A  
 WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 191 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--RGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 191 1982 OTHER CONTROL--G  
 LATITUDE = 383936N LONGITUDE = 0781830W

..... ORIGINAL DESCRIPTION .....

1.9 KM (1.2 MI) EASTERLY ALONG U.S. HIGHWAY 211 FROM THE SKYLINE DRIVE  
 OVERPASS ACROSS HIGHWAY 211, 16.46 METERS (54.0 FT) NORTHEAST FROM THE  
 END OF A GUARDRAIL, 9.75 METERS (32.0 FT) SOUTHWEST FROM THE SECOND  
 DIRECTIONAL ARROW, NORTHEAST FROM THE END OF THE GUARDRAIL, 6.86  
 METERS (22.5 FT) SOUTHEAST FROM THE CENTER OF THE DOUBLE LINE. A DISK  
 SET INTO THE TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS. ABOUT  
 LEVEL WITH HIGHWAY. 0.64 METERS NORTH-NORTHWEST FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--ERCL 192 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 192 1982 OTHER CONTROL--G  
 LATITUDE = 383936N LONGITUDE = 0781836W

..... ORIGINAL DESCRIPTION .....

1.8 KM (1.15 MI) EASTERLY ALONG U.S. HIGHWAY 211 FROM THE SKYLINE  
 DRIVE OVERPASS ACROSS HIGHWAY 211, 17.53 METERS (57.5 FT) NORTH-  
 NORTHWEST FROM THE CENTER OF THE DOUBLE LINE OF HIGHWAY 211, 5.18  
 METERS (17.0 FT) SOUTH OF THE APPROXIMATE CENTER OF THE OLD ROAD. A  
 DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS.  
 ABOVE HIGHWAY. 1.04 METERS NORTH-NORTHWEST FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--ERCL 193 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 193 1982 OTHER CONTROL--G  
 LATITUDE = 383936N LONGITUDE = 0781836W

..... ORIGINAL DESCRIPTION .....

1.8 KM (1.1 MI) EASTERLY ALONG U.S. HIGHWAY 211 FROM THE SKYLINE DRIVE  
 OVERPASS ACROSS HIGHWAY 211, 6.4 METERS (21.0 FT) SOUTH FROM THE  
 CENTER OF DOUBLE LINE OF HIGHWAY 211, 3.96 METERS (13.0 FT) FROM A  
 (CURVE AHEAD 30 MPH) SIGN, 1.37 METERS (4.5 FT) SOUTH OF THE GUARD-  
 RAIL, 1.22 METERS (4.0 FT) EAST FROM THE SECOND GUARD RAIL SUPPORT  
 WEST OF THE SIGN. A DISK SET INTO THE TOP OF A CONCRETE POST  
 PROJECTING 6 CENTIMETERS. ABOUT LEVEL WITH HIGHWAY. 1.49 METERS  
 SOUTHEAST FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 194 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 194 1982 OTHER CONTROL--G  
 LATITUDE = 383936N LONGITUDE = 0781842W

..... ORIGINAL DESCRIPTION .....

1.6 KM (1.0 MI) EASTERLY ALONG U.S. HIGHWAY 211 FROM THE SKYLINE DRIVE  
 OVERPASS ACROSS HIGHWAY 211, 16.15 METERS (53.0 FT) EAST AND ACROSS  
 THE HIGHWAY FROM THE NORTH END OF A GUARDRAIL, 10.82 METERS (35.5 FT)  
 EAST FROM THE CENTER OF THE DOUBLE LINE OF HIGHWAY 211, 4.42 METERS  
 (14.5 FT) WEST-NORTHWEST OF A 20 CM IN DIAMETER PERSIMMON TREE. A  
 DISK SET INTO THE TOP OF A CONCRETE POST FLUSH WITH THE GROUND. ABOUT  
 LEVEL WITH HIGHWAY. 1.66 METERS SOUTHEAST FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION-- BRCL 195 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 195 1982 OTHER CONTROL--G  
 LATITUDE = 383942N LONGITUDE = 0781842W

..... ORIGINAL DESCRIPTION .....

1.5 KM (0.95 MI) EASTERLY ALONG U.S. HIGHWAY 211 FROM THE SKYLINE  
 DRIVE OVERPASS ACROSS HIGHWAY 211, 16.46 METERS (54.0 FT) SOUTHEAST  
 FROM THE THE FIRST SAFETY ARROW ON THE NORTH SIDE OF HIGHWAY 211,  
 13.41 METERS (44.0 FT) SOUTHEAST FROM THE CENTER OF THE DOUBLE LINE OF  
 HIGHWAY 211. ABOVE HIGHWAY. 2.35 METERS WEST-NORTHWEST FROM A  
 WITNESS POST.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 196 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--BGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 196 1982 OTHER CONTROL--G  
 LATITUDE = 383912N LONGITUDE = 0781836W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 1.4 KM (0.9 MI) EASTERLY ALONG U.S. HIGHWAY 211 FROM THE SKYLINE DRIVE  
 OVERPASS ACROSS HIGHWAY 211, 15.54 METERS (51.0 FT) SOUTHEAST FROM THE  
 FIRST SAFETY ARROW BEFORE A CURVE IN THE ROAD, 14.93 METERS (49.0 FT)  
 SOUTHWEST FROM THE SECOND SAFETY ARROW BEFORE THE CURVE, 12.19 METERS  
 (40.0 FT) SOUTHEAST FROM THE CENTER OF THE DOUBLE LINE OF HIGHWAY 211.  
 A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS.  
 ABOUT LEVEL WITH HIGHWAY. 2.01 METERS NORTH-NORTHWEST FROM A WITNESS  
 POST.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 197 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--AGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 197 1982 OTHER CONTROL--G  
 LATITUDE = 363942N LONGITUDE = 0781836W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 1.3 KM (0.8 MI) EASTERLY ALONG U.S. HIGHWAY 211 FROM THE SKYLINE DRIVE  
 OVERPASS ACROSS HIGHWAY 211, 30.5 METERS (100.0 FT) SOUTHEAST AND  
 ACROSS THE HIGHWAY FROM A CULVERT MARKER POST, 24.36 METERS (80.0 FT)  
 NORTH FROM THE SECOND NORTHERNMOST SAFETY ARROW OF THE C CURVE, 9.14  
 METERS (30.0 FT) EAST OF THE CENTER OF THE DOUBLE LINE OF HIGHWAY 211,  
 4.27 METERS (14.0 FT) SOUTH OF THE NORTHERNMOST SAFETY ARROW OF THE  
 CURVE. A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6  
 CENTIMETERS. ABOUT LEVEL WITH HIGHWAY. 2.01 METERS NORTH-NORTHWEST  
 FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 198 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--AGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 198 1982 OTHER CONTROL--G  
 LATITUDE = 383948N LONGITUDE = 0781836W

..... ORIGINAL DESCRIPTION .....

1.2 KM (0.75 MI) EASTERLY ALONG U.S. HIGHWAY 211 FROM THE SKYLINE  
 DRIVE OVERPASS ACROSS HIGHWAY 211, 53.0 METERS (174.0 FT) SOUTHWEST  
 AND ACROSS THE HIGHWAY FROM THE SOUTH END OF A GUARDRAIL, 38.1 METERS  
 (15.0 FT) NORTH OF A CURVE SIGN (25 MPH), 11.89 METERS (39.0 FT) WEST  
 OF THE CENTER OF THE DOUBLE LINE OF HIGHWAY 211. A DISK SET INTO THE  
 TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS. ABOUT LEVEL WITH  
 HIGHWAY. 1.37 METERS NORTH-NORTHWEST FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 199 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 199 1982 OTHER CONTROL--G  
 LATITUDE = 383949N LONGITUDE = 0781836W

..... ORIGINAL DESCRIPTION .....

1.1 KM (0.7 MI) EASTERLY ALONG U.S. HIGHWAY 211 FROM THE SKYLINE DRIVE  
 OVERPASS ACROSS HIGHWAY 211, 21.03 METERS (69.0 FT) WEST AND ACROSS  
 THE HIGHWAY FROM THE NORTHWEST END OF A GUARDRAIL, 20.73 METERS (68.0  
 FT) EAST-SOUTHEAST FROM THE SECOND SAFETY ARROW NORTHWEST FROM THE  
 NORTHWEST END OF THE GUARDRAIL, 9.75 METERS (32.0 FT) SOUTHWEST FROM  
 THE CENTER OF THE DOUBLE LINE OF HIGHWAY 211. A DISK SET INTO THE TOP  
 OF A CONCRETE POST PROJECTING 6 CENTIMETERS. ABOUT LEVEL WITH  
 HIGHWAY. 2.55 METERS EAST-NORTHEAST FROM A WITNESS POST.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 200 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 200 1982 OTHER CONTROL--G  
 LATITUDE = 382954N LONGITUDE = 0781836W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 1.0 KM (0.6 MI) EASTERLY ALONG U.S. HIGHWAY 211 FROM THE SKYLINE DRIVE  
 OVERPASS ACROSS HIGHWAY 211, 89.0 METERS (292.0 FT) WEST-NORTHWEST OF  
 THE NORTH END OF A GUARDRAIL ON THE INSIDE OF THE LAST HAIRPIN CURVE  
 BEFORE SKYLINE DRIVE, 17.98 METERS (59.0 FT) NORTHEAST OF A 61 CM IN  
 DIAMETER PINE TREE, 10.67 METERS (35.0 FT) SOUTH OF THE CENTER OF THE  
 DOUBLE LINE OF HIGHWAY 211. A DISK SET INTO THE TOP OF A CONCRETE  
 POST PROJECTING 6 CENTIMETERS ABOVE HIGHWAY. 4.63 METERS  
 EAST-NORTHEAST FROM A WITNESS POST.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 210 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 210 1982 OTHER CONTROL--G  
 LATITUDE = 382942N LONGITUDE = 0781900W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 0.3 KM (0.2 MI) EASTERLY ALONG U.S. HIGHWAY 211 FROM THE SKYLINE DRIVE  
 OVERPASS ACROSS HIGHWAY 211, 19.96 METERS (65.5 FT) EAST OF THE SIGN  
 SHOWING DIRECTIONS TO LUKAY, NEW MARKET, AND SKYLINE DRIVE, 14.63  
 METERS (48.0 FT) NORTH OF THE CENTERLINE OF THE MEDIAN STRIP OF  
 HIGHWAY 211. A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6  
 CENTIMETERS ABOUT LEVEL WITH HIGHWAY. 2.53 METERS EAST-NORTHEAST  
 FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 220 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 220 1982 OTHER CONTROL--G  
 LATITUDE = 383930N LONGITUDE = 078190EW

..... ORIGINAL DESCRIPTION .....

0.3 KM (0.2 MI) SOUTH ALONG SKYLINE DRIVE FROM THE OVERPASS ACROSS  
 U.S. HIGHWAY 211, 26.21 METERS (86.0 FT) SOUTHEAST OF AND ACROSS THE  
 ROAD FROM A SIGN (DIVIDED HIGHWAY 25 MPH), 5.75 METERS (19.0 FT)  
 SOUTHWEST OF THE CENTER OF THE DOUBLE LINE OF THE ROAD. A DISK SET  
 INTO THE TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS. ABOUT  
 LEVEL WITH ROAD. 1.22 METERS EAST-NORTHEAST FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 230 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 230 1982 OTHER CONTROL--G  
 LATITUDE = 383924N LONGITUDE = 0781848W

..... ORIGINAL DESCRIPTION .....

0.9 KM (0.55 MI) SOUTHERLY ALONG SKYLINE DRIVE FROM THE OVERPASS  
 ACROSS U.S. HIGHWAY 211, ABOUT 0.1 KM (0.05 MI) EAST FROM MILE MARKER  
 32, 63.09 METERS (207.0 FT) NORTHWEST FROM A SIGN (GAS AND FOOD, 0.8  
 KM, 0.5 MI), 6.10 METERS (20.0 FT) NORTH FROM THE CENTER OF THE DOUBLE  
 LINE OF THE SKYLINE DRIVE, 0.61 METERS (2.0 FT) NORTH OF THE ROCK  
 GUARDWALL. A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6  
 CENTIMETERS. ABOUT LEVEL WITH ROAD. 1.83 METERS EAST-NORTHEAST FROM  
 A WITNESS POST.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 240 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- CN SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NJS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 240 1982 OTHER CONTROL--G  
 LATITUDE = 383900N LONGITUDE = 078183EW

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 1.8 KM (1.1 MI) SOUTHERLY ALONG SKYLINE DRIVE FROM THE OVERPASS ACROSS  
 U.S. HIGHWAY 211, ABOUT 0.2 KM (0.15 MI) SOUTHWEST OF THE TUNNEL  
 PARKING OVERLOOK, 6.4 METERS (21.0 FT) SOUTHWEST FROM THE CENTER OF  
 THE DOUBLE LINE OF SKYLINE DRIVE, 5.49 METERS (18.0 FT) NORTHWEST FROM  
 A CULVERT, 2.44 METERS (8.0 FT) NORTHWEST OF A 36 CM IN DIAMETER TREE.  
 A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS.  
 ABOUT LEVEL WITH ROAD. 2.28 METERS EAST-NORTHEAST FROM A WITNESS  
 POST.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 250 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NJS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 250 1982 OTHER CONTROL--G  
 LATITUDE = 383836N LONGITUDE = 0781830W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 3.1 KM (1.95 MI) SOUTHERLY ALONG SKYLINE DRIVE FROM THE OVERPASS  
 ACROSS U.S. HIGHWAY 211, 54.41 METERS (178.5 FT) NORTHEAST FROM THE  
 NORTHERNMOST (HAZEL MTN. OVERLOOK) SIGN, 48.31 METERS (158.5 FT)  
 NORTHEAST FROM MILEPOST 33, 9.91 METERS (32.5 FT) SOUTHEAST AND ACROSS  
 THE ROAD FROM A CULVERT, 4.88 METERS (16.0 FT) SOUTHEAST FROM THE  
 CENTER OF THE DOUBLE LINE OF SKYLINE DRIVE. A DISK SET INTO THE TOP  
 OF A CONCRETE POST PROJECTING 6 CENTIMETERS. ABOUT LEVEL WITH ROAD.  
 0.61 METERS EAST-NORTHEAST FROM A WITNESS POST.



ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--ERCL 260 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAY STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 260 1982 OTHER CONTROL--G  
 LATITUDE = 383812N LONGITUDE = 076190W

..... ORIGINAL DESCRIPTION .....

3.8 KM (2.35 MI) SOUTHERLY ALONG SKYLINE DRIVE FROM THE OVERPASS  
 ACROSS U.S. HIGHWAY 211, 95.70 METERS (314.0 FT) EAST AND ACROSS THE  
 ROAD FROM A LEFT CURVE SIGN, 73.30 METERS (240.5 FT) WEST AND ACROSS  
 THE ROAD FROM A CULVERT, 5.33 METERS (17.5 FT) SOUTH FROM THE CENTER  
 OF THE DOUBLE LINE OF THE ROAD, 2.74 METERS (9.0 FT) EAST FROM THE  
 CENTER OF A CULVERT UNDER A ROCK WALL. A DISK SET INTO THE TOP OF A  
 CONCRETE POST PROJECTING 6 CENTIMETERS. ABOUT LEVEL WITH ROAD. 1.04  
 METERS EAST-NORTHEAST FROM A WITNESS POST.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--ERCL 270 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAY STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 270 1982 OTHER CONTROL--G  
 LATITUDE = 361800N LONGITUDE = 076191E

..... ORIGINAL DESCRIPTION .....

4.5 KM (2.8 MI) SOUTHERLY ALONG SKYLINE DRIVE FROM THE OVERPASS ACROSS  
 U.S. HIGHWAY 211, 17.37 METERS (57.0 FT) EAST OF AND ACROSS THE ROAD  
 FROM THE EAST END OF A ROCK GUARDWALL, 6.1 METERS (20.0 FT) NORTH FROM  
 THE CENTER OF THE DOUBLE LINE OF SKYLINE DRIVE. A DISK SET INTO THE  
 TOP OF A CONCRETE POST PROJECTING 6 CENTIMETERS. ABOUT LEVEL WITH  
 ROAD. 2.56 METERS EAST-NORTHEAST FROM A WITNESS POST.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 280 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078131 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 280 1982 OTHER CONTROL--G  
 LATITUDE = 383742N LONGITUDE = 078191EW

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 5.1 KM (3.2 MI) SOUTHERLY ALONG SKYLINE DRIVE FROM THE OVERPASS ACROSS  
 U.S. HIGHWAY 211, ABOUT 1.0 KM (0.6 MI) SOUTHERLY FROM MILEPOST 34,  
 20.42 METERS (67.0 FT) NORTHEAST AND ACROSS THE ROAD FROM A DRAIN,  
 10.36 METERS (34.0 FT) EAST FROM THE APPROXIMATE CENTER OF A 4.3 METER  
 ROCK CUT ON THE WEST SIDE OF THE ROAD, 4.88 METERS (16.0 FT) EAST-  
 SOUTHEAST OF THE CENTER OF THE DOUBLE LINE. A DISK SET INTO THE TOP  
 OF A CONCRETE POST PROJECTING 6 CENTIMETERS. ABOUT LEVEL WITH ROAD.  
 0.70 METERS NORTHWEST FROM A WITNESS POST.

ACRN= \*\*\*\*\* BENCH MARK DESCRIPTION \*\*\*\*\*  
 DESIGNATION--BRCL 290 STATE--VA COUNTY--RAPPAHANNOCK  
 QUAD--N38078132 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.  
 LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK  
 MONUMENT BY--NGS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK  
 SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C  
 STAMPING--GRAVITY BRCL 290 1982 OTHER CONTROL--G  
 LATITUDE = 383724N LONGITUDE = 0781924W

\*\*\*\*\* ORIGINAL DESCRIPTION \*\*\*\*\*  
 6.4 KM (4.0 MI) SOUTHERLY ALONG SKYLINE DRIVE FROM THE OVERPASS ACROSS  
 U.S. HIGHWAY 211, ABOUT 0.5 KM (0.3 MI) NORTHWESTERLY ON THE WINDING  
 ROAD FROM PINNACLE OVERLOOK, 29.17 METERS (97.0 FT) NORTHEAST AND  
 ACROSS THE ROAD FROM THE WEST END OF A ROCK GUARDWALL, 7.62 METERS  
 (25.0 FT) NORTH OF THE CENTER OF THE DOUBLE LINE OF SKYLINE DRIVE,  
 4.57 METERS (15.0 FT) EAST FROM A DRAIN. A DISK SET INTO THE TOP OF A  
 CONCRETE POST PROJECTING 6 CENTIMETERS. ABOVE ROAD.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--BRCL 300 STATE--VA COUNTY--MADISON

QUAD--N38078132 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.

LOCATED IN THE CITY OR TOWN OF-- ON SHENANDOAH NATIONAL PARK

MONUMENT BY--NCS YR--1982 CP--VDN MARK TYPE--GRAV STA DISK

SPECIFIC SETTING--CONCRETE POST MONUMENTATION CODE--C

STAMPING--GRAVITY BRCL 300 1982 OTHER CONTROL--G

LATITUDE = 363524N LONGITUDE = 0762218W

..... ORIGINAL DESCRIPTION .....

15.8 KM (9.85 MI) SOUTHERLY ALONG SKYLINE DRIVE FROM THE OVERPASS  
ACROSS U.S. HIGHWAY 211, ABOUT 1.4 KM (0.85 MI) SOUTHWESTERLY OF  
THOROFARE MTN OVERLOOK, 5.18 METERS (17.0 FT) SOUTHWEST FROM THE  
CENTER OF THE DOUBLE LINE, 5.0 METERS (16.4 FT) NORTH OF A 80 CM IN  
DIAMETER OAK TREE, 0.51 METERS (1.8 FT) SOUTHWEST OF THE ROCK  
RETAINING WALL. A DISK SET INTO THE TOP OF A CONCRETE POST PROJECTING  
6 CENTIMETERS. ABOUT LEVEL WITH ROAD.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--WASHINGTON AA USAF STATE--MD COUNTY--MONTGOMERY

ALIAS--CSS 116 B 01 USAF

QUAD--N39077224 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.

LOCATION-- 2.4 KM (1.5 MI) SW OF GAITHERSBURG

MONUMENT BY--USAF YR--1981 CP-- MARK TYPE--OTHER

SPECIFIC SETTING--CONCRETE PIER MONUMENTATION CODE--E

STAMPING-- OTHER CONTROL--NG

LATITUDE = 390736N LONGITUDE = 0771318W

..... ORIGINAL DESCRIPTION .....

THE STATION IS ABOUT 2.4 KM (1.5 MI) SOUTHWEST OF GAITHERSBURG AT THE  
NATIONAL BUREAU OF STANDARDS (NBS). TO REACH THE STATION FROM THE  
QUINCE ORCHARD ROAD INTERCHANGE OF INTERSTATE 270, GO SOUTH ON QUINCE  
ORCHARD ROAD (MARYLAND ROUTE 124) 1.9 KM (1.2 MI) TO THE NBS GATE 4.  
TURN LEFT AND GO EAST THROUGH THE GATE 0.5 KM (0.3 MI) ON SOUTH DRIVE  
TO CENTER DRIVE. TURN RIGHT ON CENTER DRIVE AND GO SOUTH 0.5 KM (0.3  
MI) TO BLDG. 235. TURN RIGHT AND GO SOUTHWEST 0.3 KM (0.2 MI) TO THE  
END OF THE DRIVEWAY AND THE NON-MAGNETIC LABORATORY AREA. THE STATION  
IS IN BLDG. 238, GROUND FLOOR, IN THE LASER ROOM, AT THE CENTER OF THE  
1-METER BY 1.5-METER CONCRETE PIER WHICH IS FLUSH WITH THE FLOOR. THE  
APPROXIMATE ELEVATION IS 123.3 METERS.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--WASHINGTON R STATE--VA COUNTY--

QUAD--N38077144 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.

LOCATED IN THE CITY OR TOWN OF-- HERNDON

MONUMENT BY--USAF YR-- CP-- MARK TYPE--GRAV STA DISK

SPECIFIC SETTING--ON COLUMN MONUMENTATION CODE--A

STAMPING-- OTHER CONTROL--G

LATITUDE = 385710N LONGITUDE = 0772650W

..... ORIGINAL DESCRIPTION .....

THE STATION IS LOCATED IN THE TERMINAL BUILDING OF THE JOHN FOSTER DULLES INTERNATIONAL AIRPORT, ON THE NORTH SIDE OF THE BUILDING, ON THE WEST SIDE OF THE FOURTH COLUMN FROM THE EAST END OF THE BUILDING.

ACRN= ..... BENCH MARK DESCRIPTION .....

DESIGNATION--SKYLAND B STATE--VA COUNTY--

QUAD--N38078133 QSN-- LINE-- AREA--BLUE RIDGE GRAVITY CALIB.

LOCATED IN THE CITY OR TOWN OF-- LURAY

MONUMENT BY-- YR-- CP-- MARK TYPE--

SPECIFIC SETTING--FOOT OF DISPLAY CASE MONUMENTATION CODE--C

STAMPING-- OTHER CONTROL--

LATITUDE = 383533N LONGITUDE = 0782239W

..... ORIGINAL DESCRIPTION .....

STATION LOCATED AT APPROXIMATELY MILE 42 OF SKYLINE DRIVE IN SHENANDOAH NATIONAL PARK IN THE PARKING AREA FOR STONEY MOUNTAIN NATURE TRAIL. THE PARKING AREA IS OFF THE ROAD WHICH IS THE NORTH ENTRANCE TO SKYLAND. STATION IS AT FOOT OF WEST LEG OF PARK DISPLAY CASE AT ENTRANCE TO NATURE TRAIL.

APPENDIX C.--BENCH MARK LOCATIONS OF BLUE RIDGE GRAVIMETER  
CALIBRATION BASE LINE

See figure 1, page 3, for entire route of travel of the Blue Ridge Gravimeter Calibration Base Line.

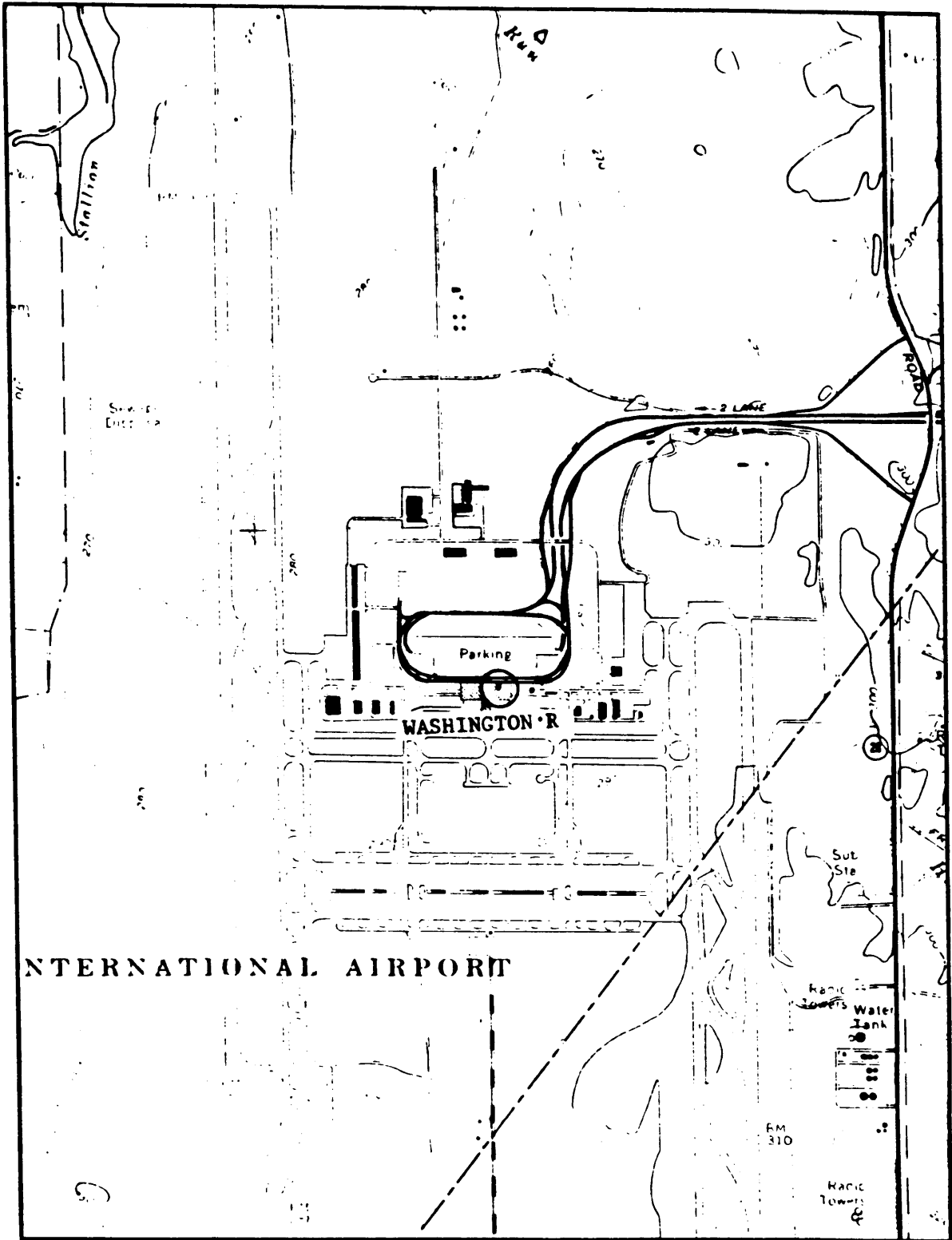


Figure 1C.--Location (Dulles International Airport) of gravity bench mark WASHINGTON R, Blue Ridge Gravimeter Calibration Base Line.

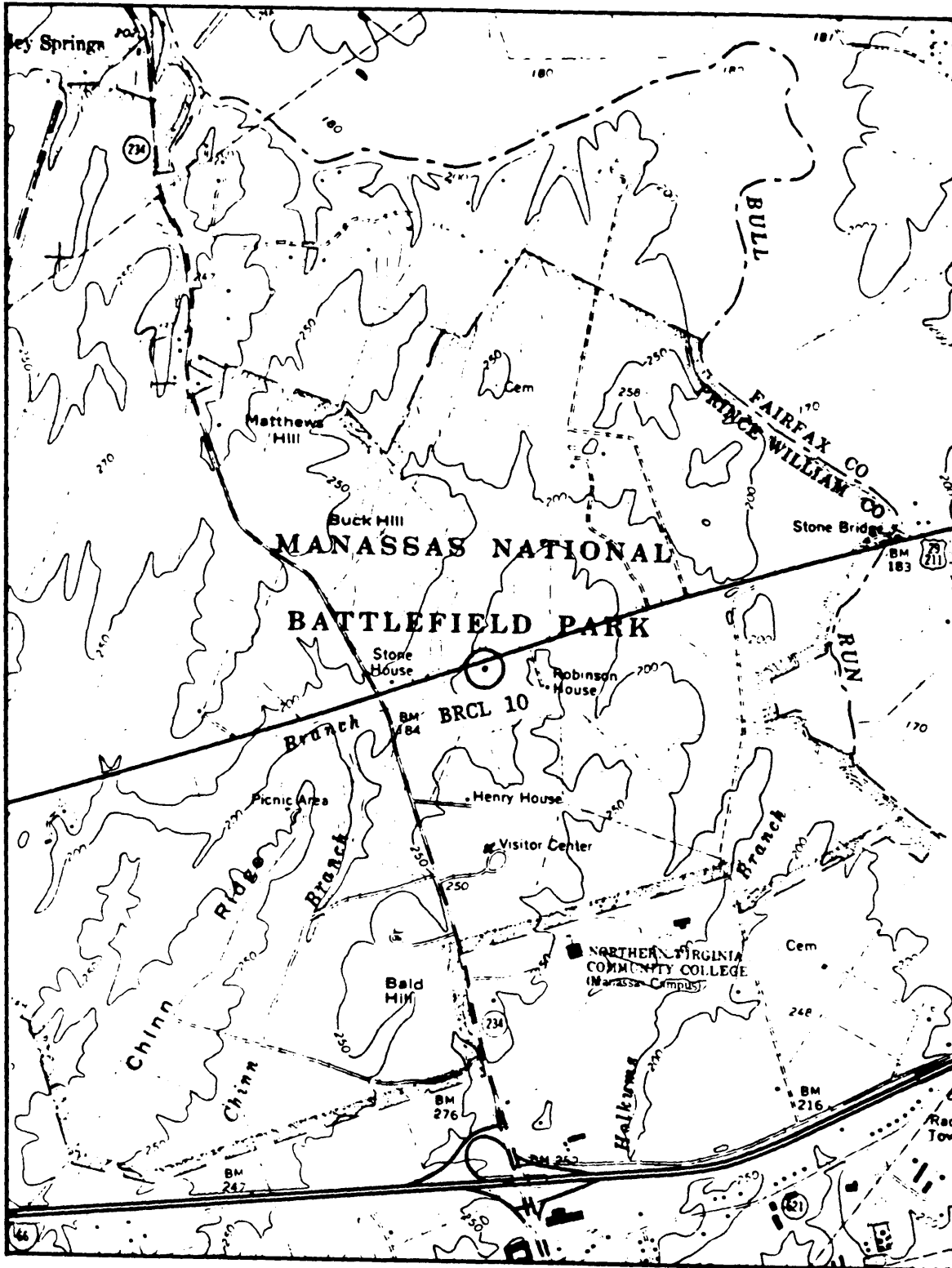


Figure 2C.--Location of gravity bench mark BRCL 10  
Blue Ridge Gravimeter Calibration Base Line.

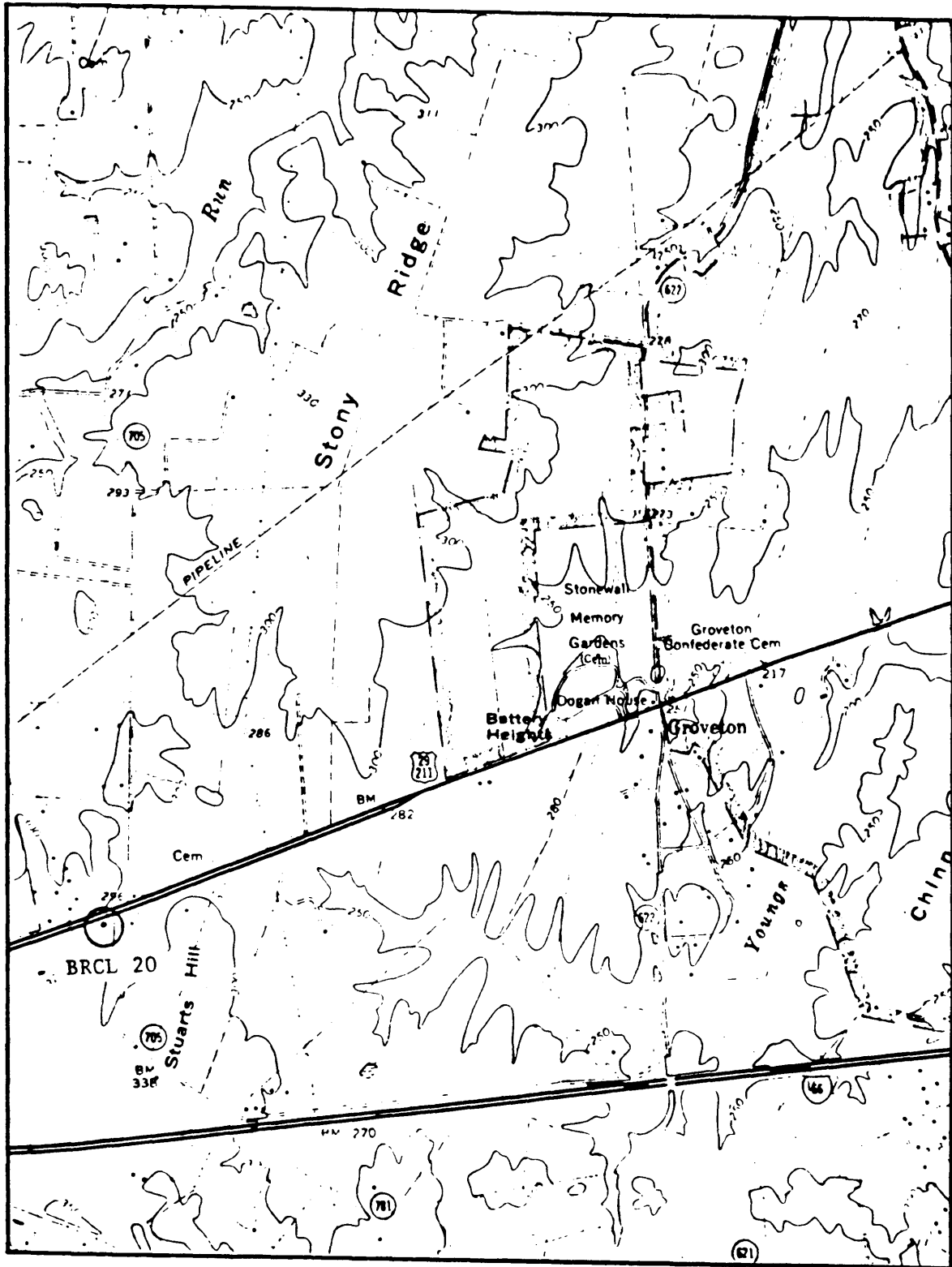


Figure 3C.--Location of gravity bench mark BRCL 20,  
Blue Ridge Gravimeter Calibration Base Line.



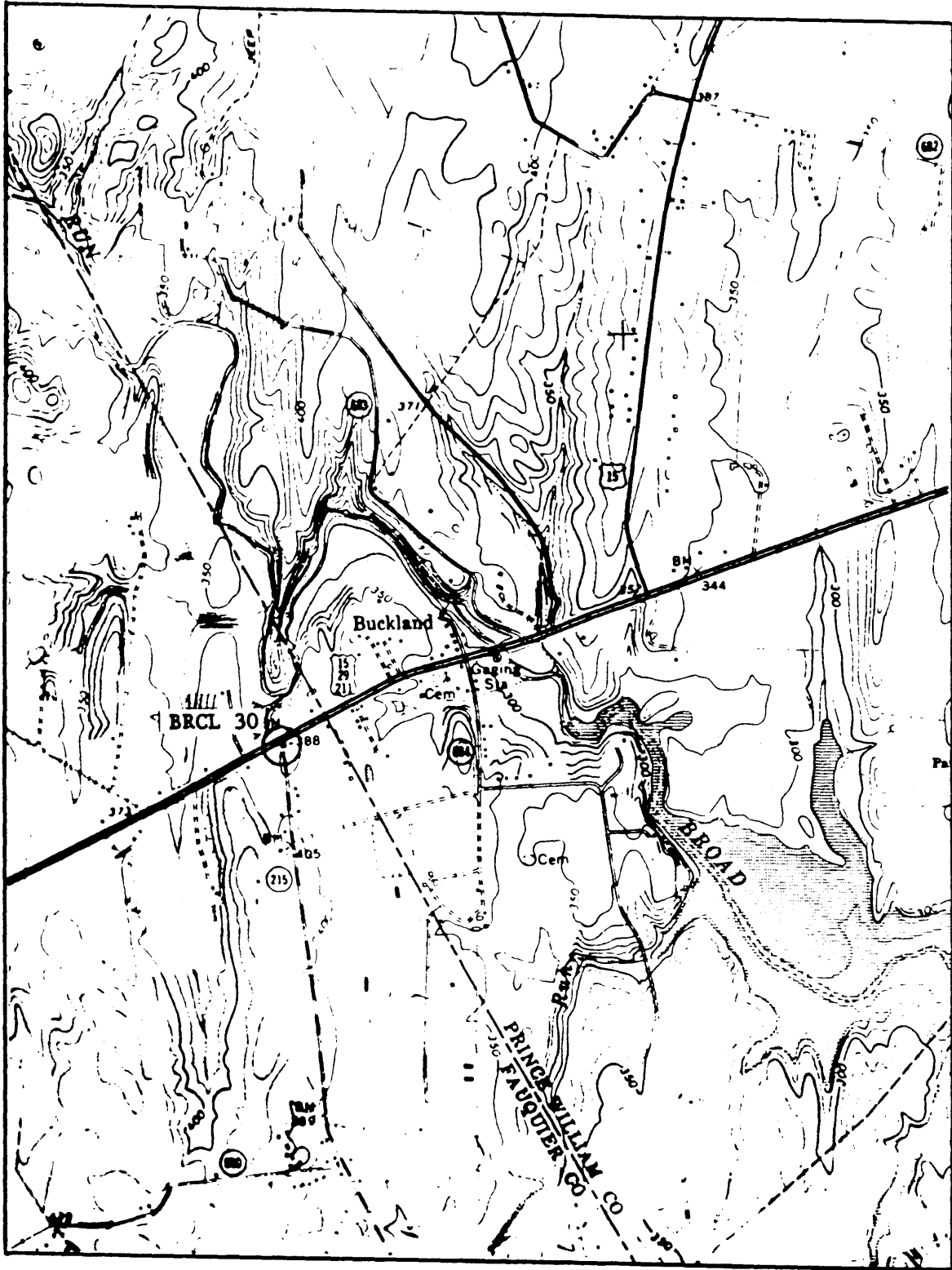


Figure 4C.--Location of gravity bench mark BRCL 30,  
Blue Ridge Gravimeter Calibration Base Line.

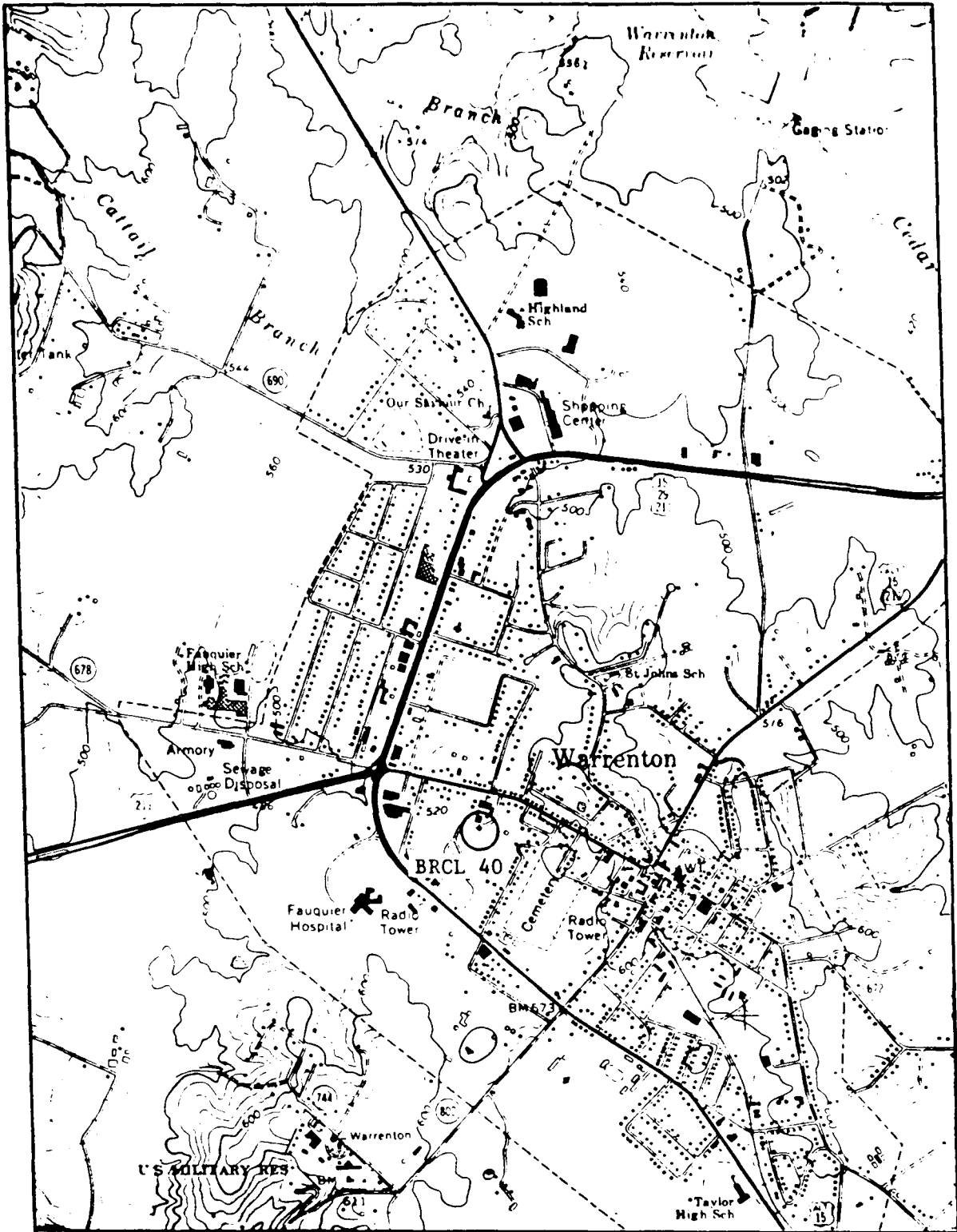


Figure 5C.--Location of gravity bench mark BRCL 40, Blue Ridge Gravimeter Calibration Base Line.

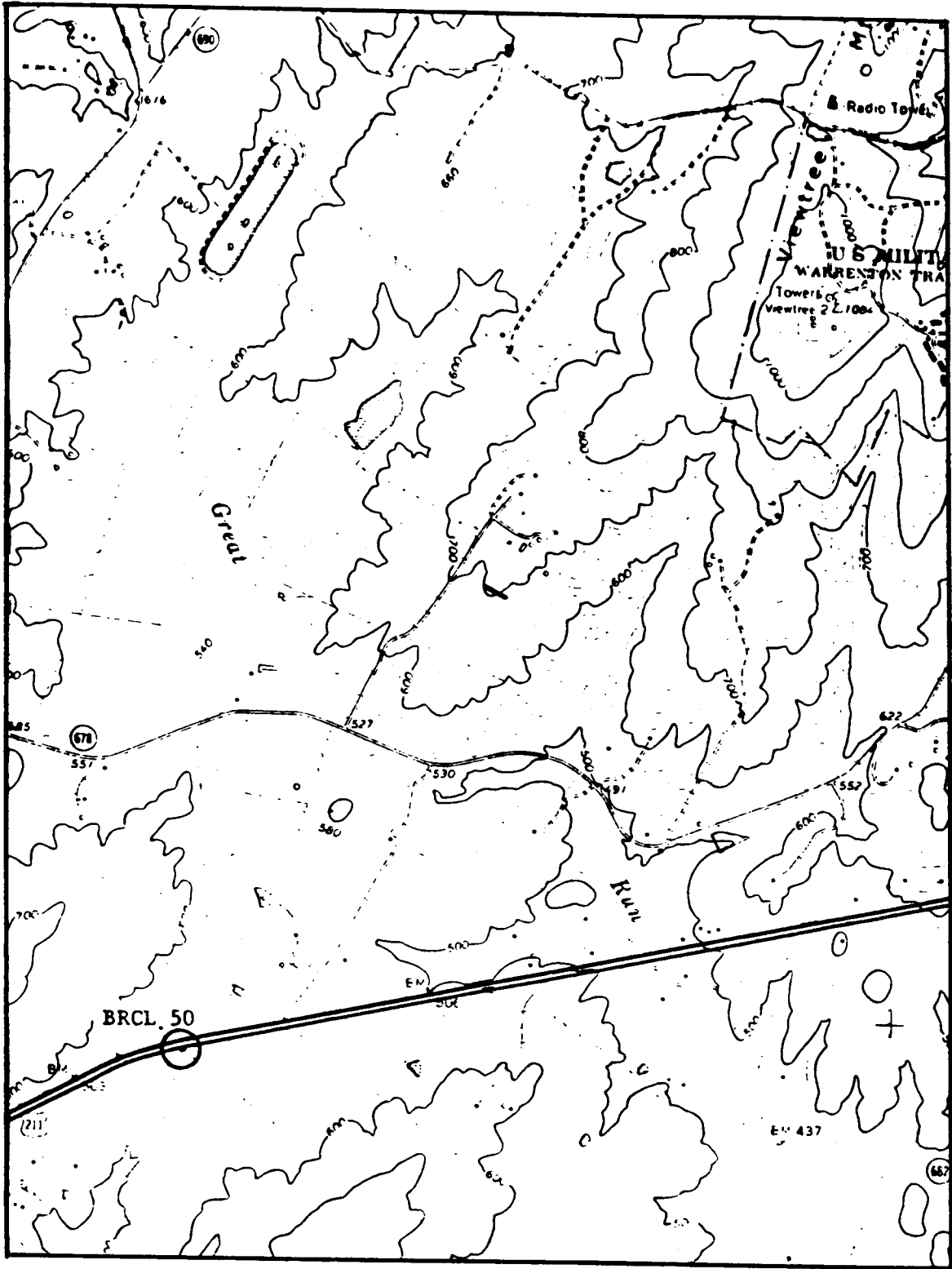


Figure 6C.--Location of gravity bench mark BRCL 50,  
Blue Ridge Gravimeter Calibration Base Line.

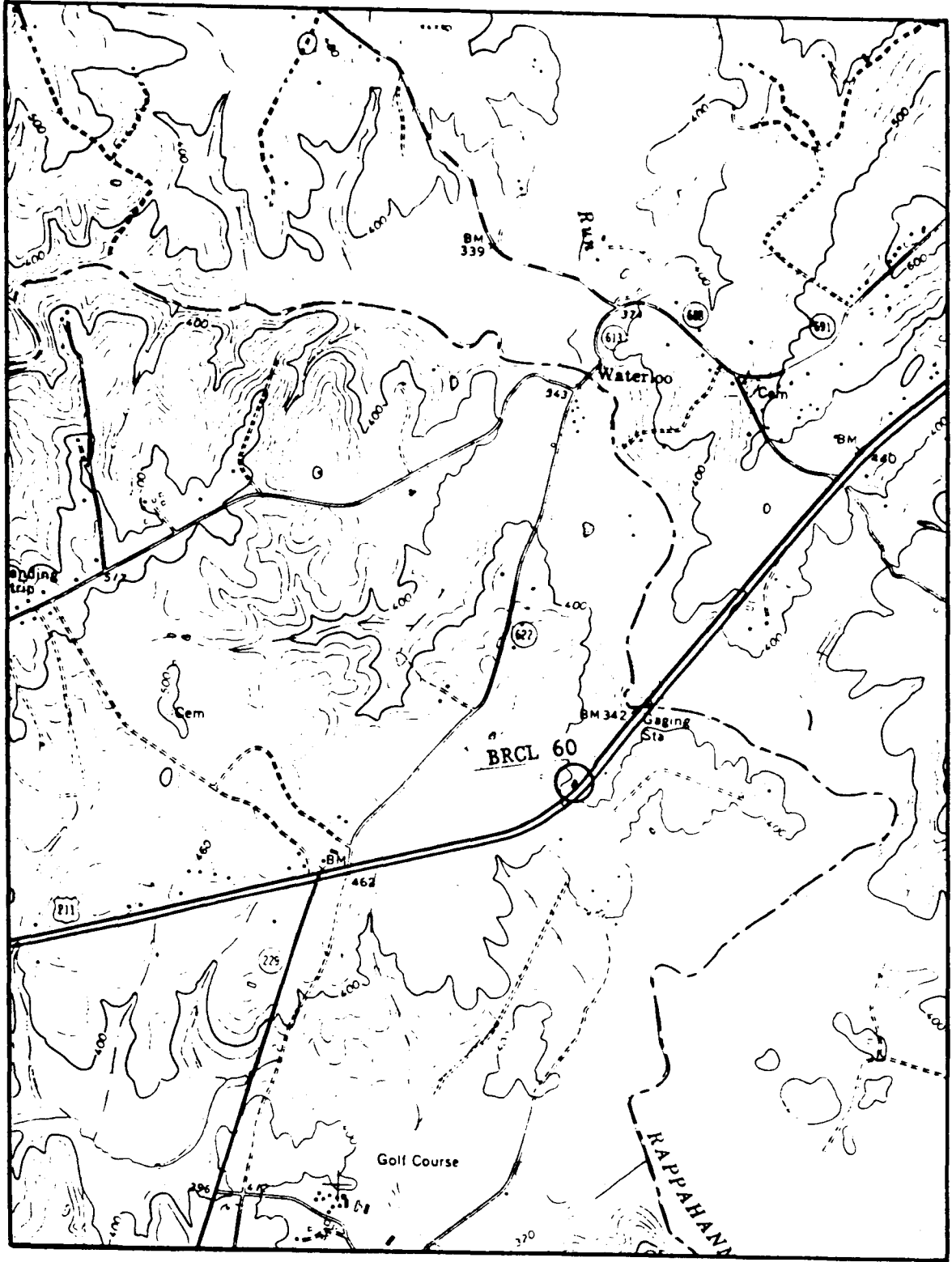


Figure 7C.--Location of gravity bench mark BRCL 60,  
Blue Ridge Gravimeter Calibration Base Line.

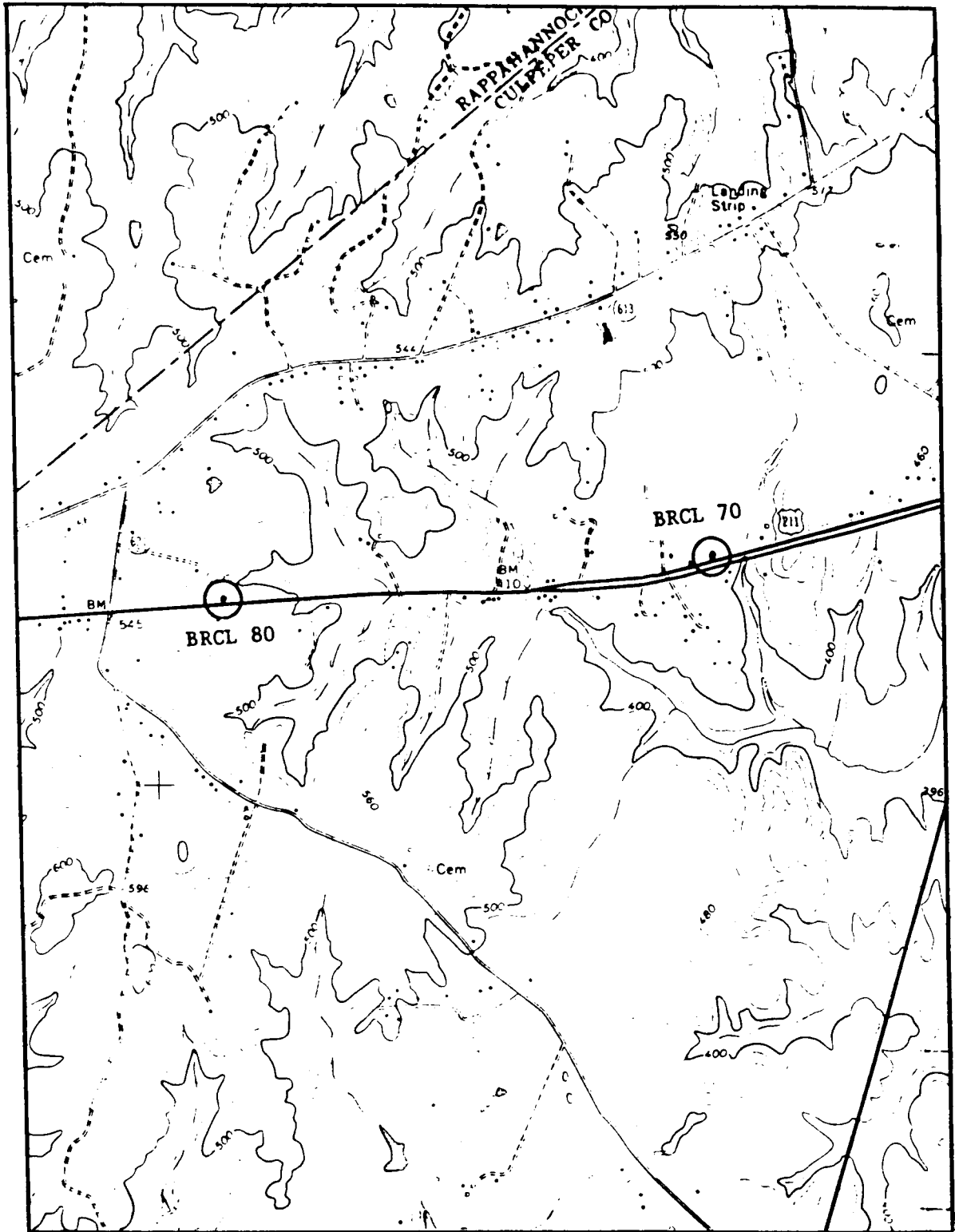


Figure 8C.--Locations of gravity bench marks BRCL 70 and BRCL 80, Blue Ridge Gravimeter Calibration Base Line.

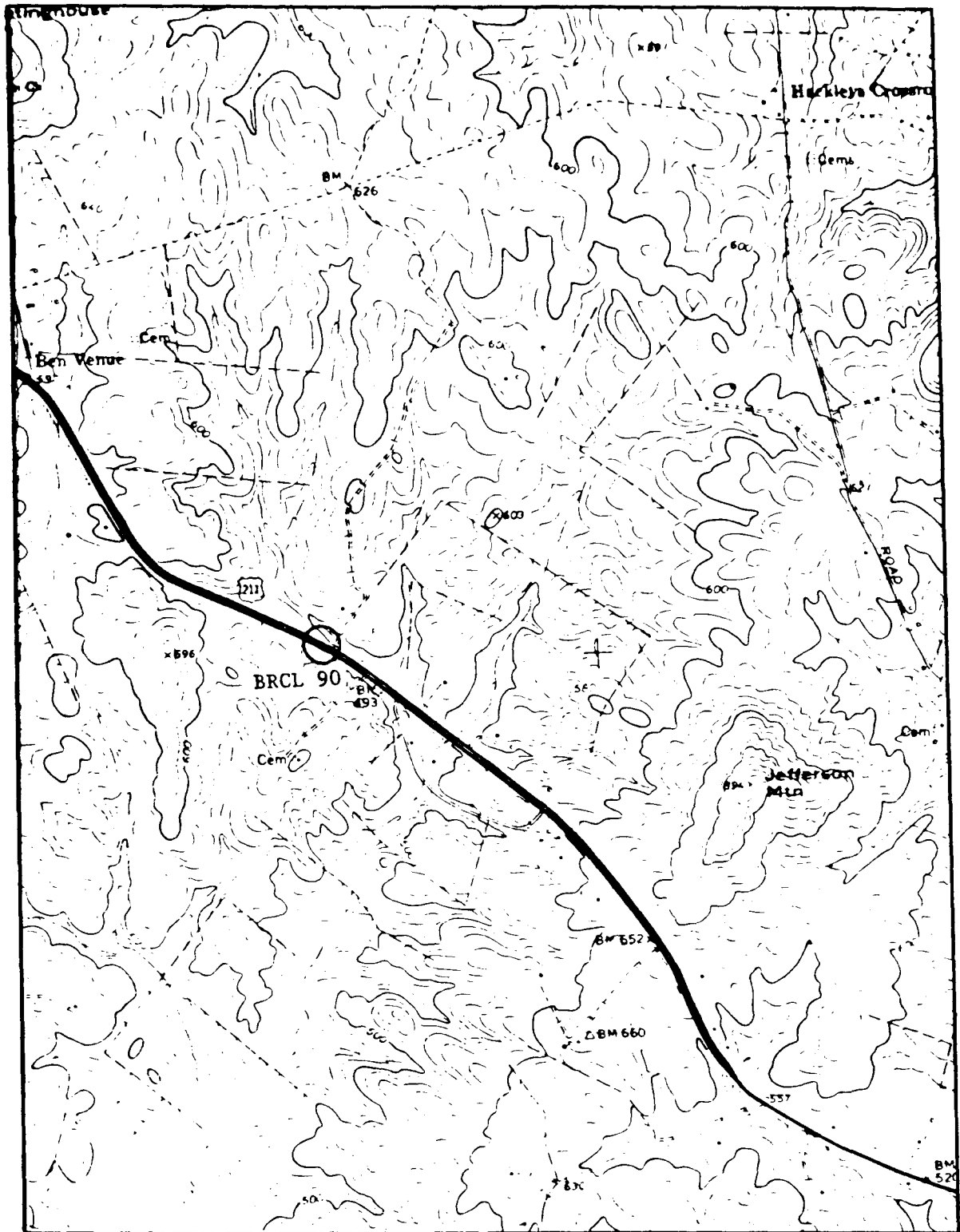


Figure 9C.--Location of gravity bench mark BRCL 90,  
Blue Ridge Gravimeter Calibration Base Line.

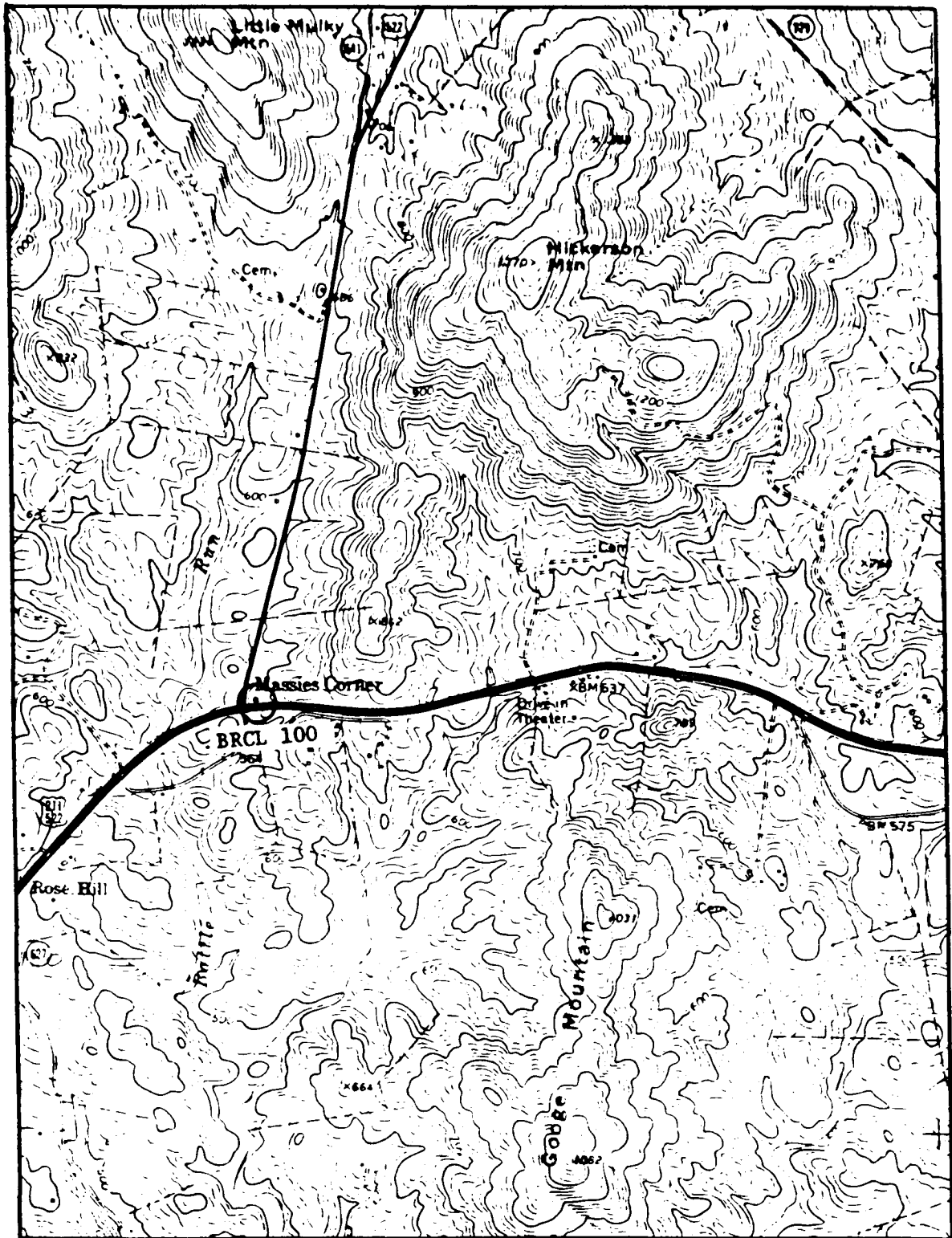


Figure 10C.--Location of gravity bench mark BRCL 100,  
Blue Ridge Gravimeter Calibration Base Line.

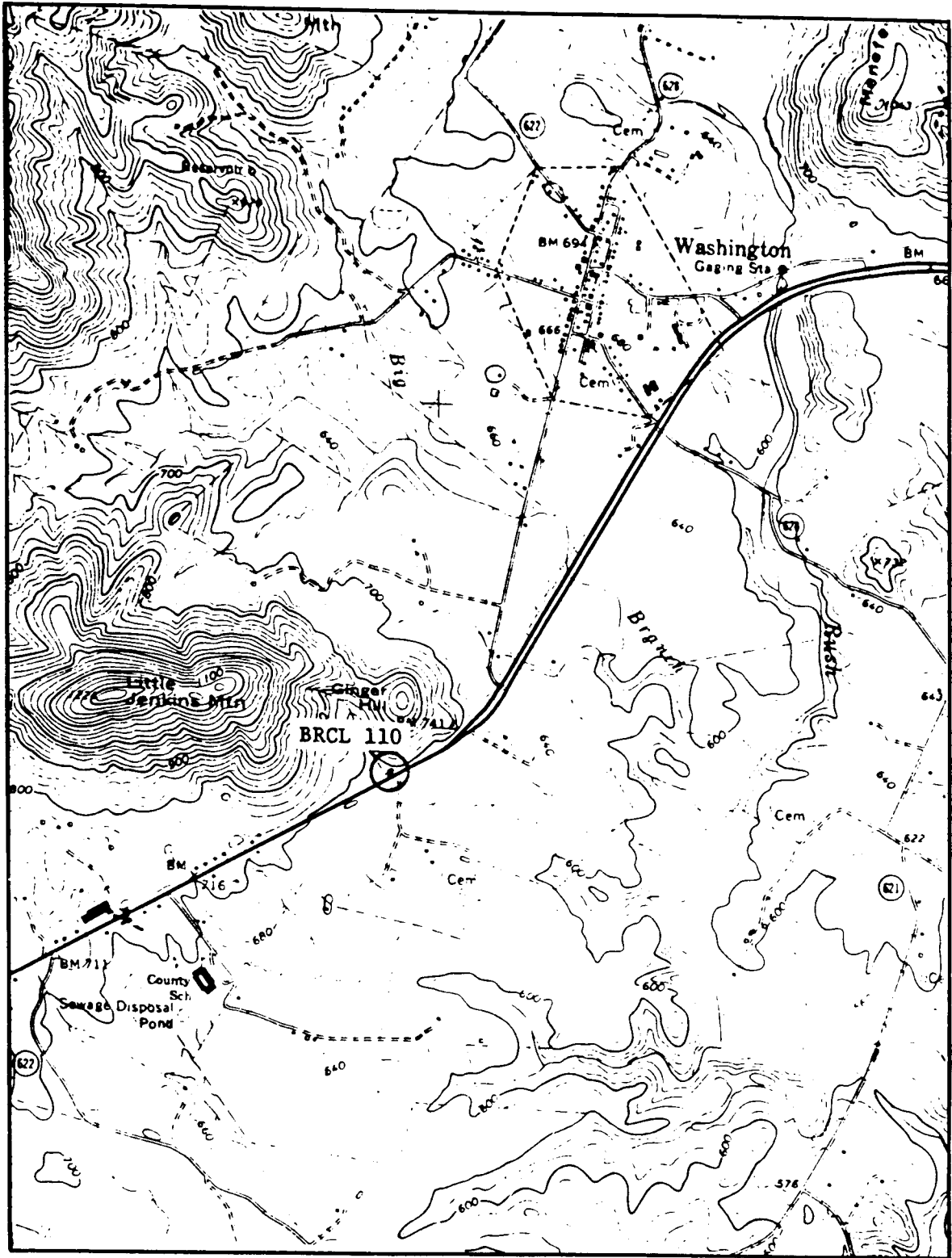


Figure 11C.--Location of gravity bench mark BRCL 110,  
Blue Ridge Gravimeter Calibration Base Line.



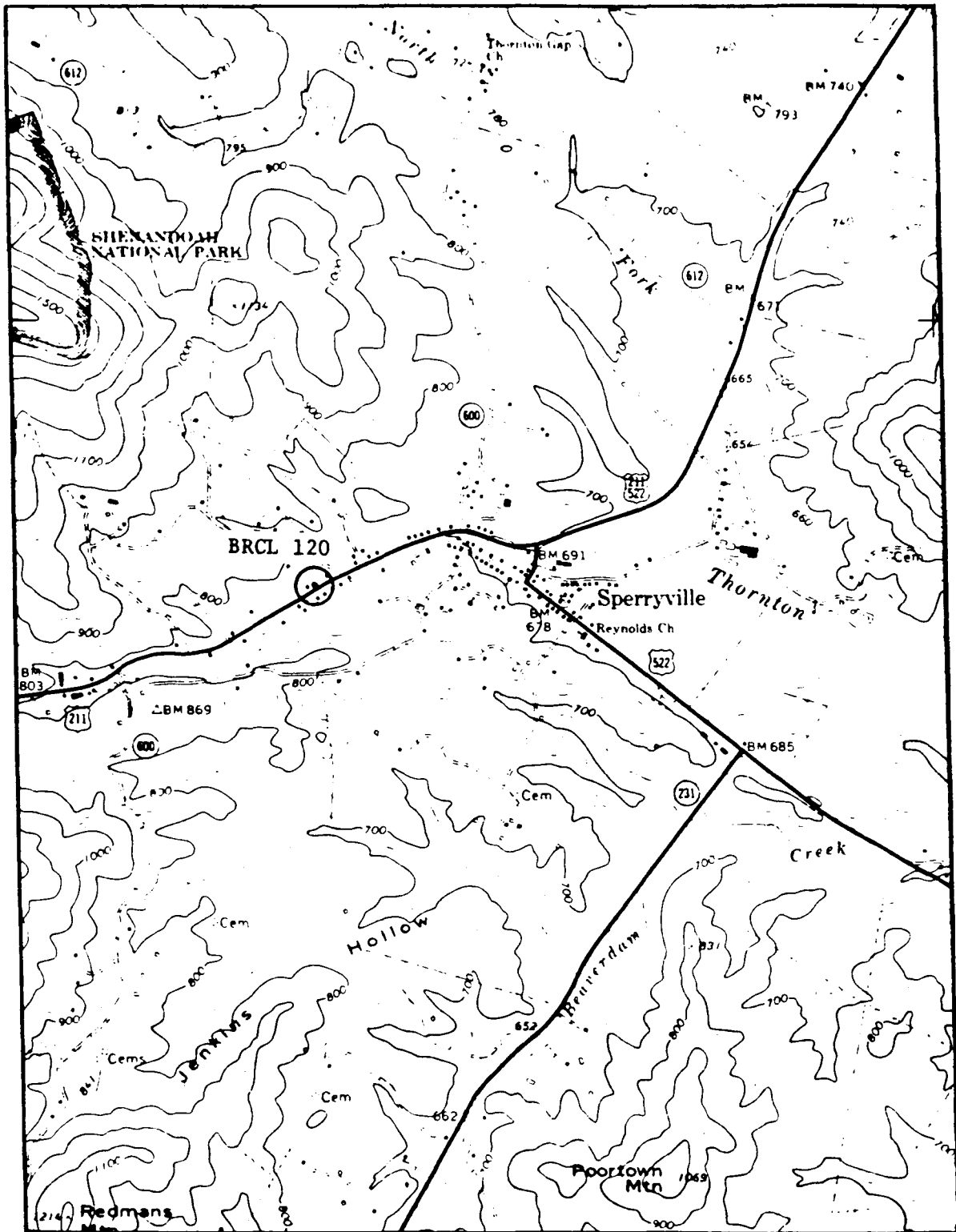


Figure 12C.--Location of gravity bench mark BRCL 120,  
Blue Ridge Gravimeter Calibration Base Line.

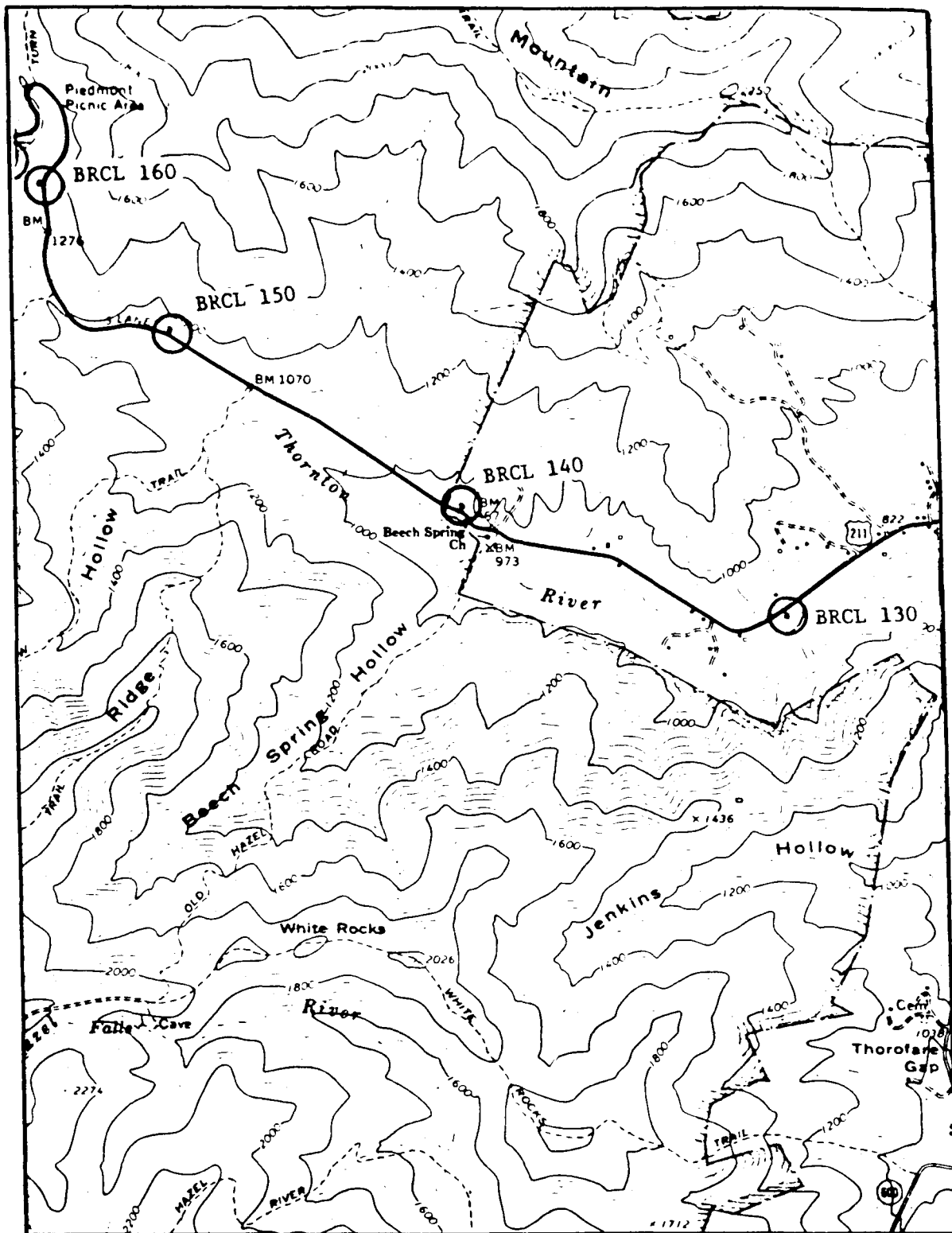


Figure 13C.--Locations of gravity bench marks BRCL 130, BRCL 140, BRCL 150, and BRCL 160, Blue Ridge Gravimeter Calibration Base Line.

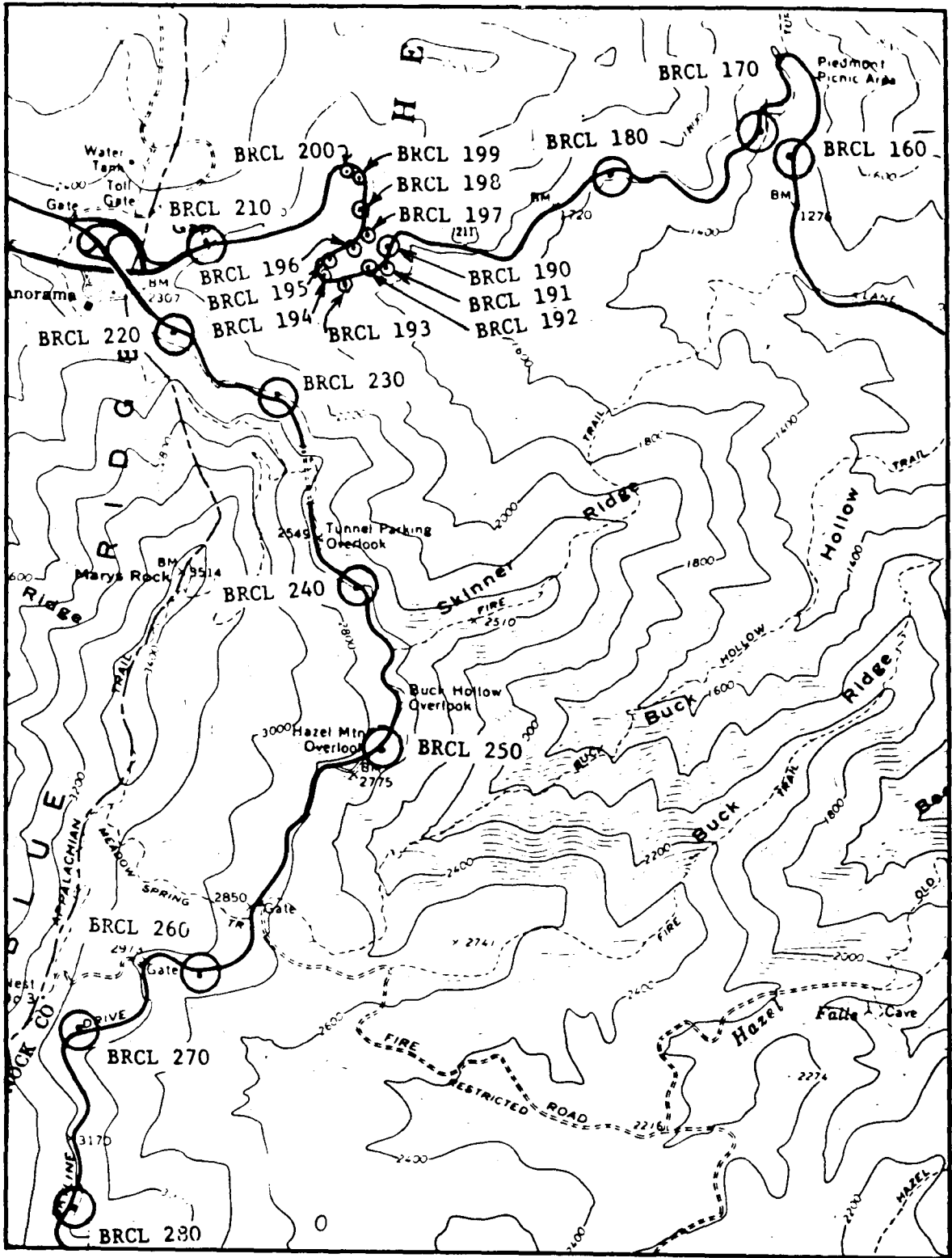


Figure 14C.--Locations of gravity bench marks BRCL 160 through BRCL 280, Blue Ridge Gravimeter Calibration Base Line.

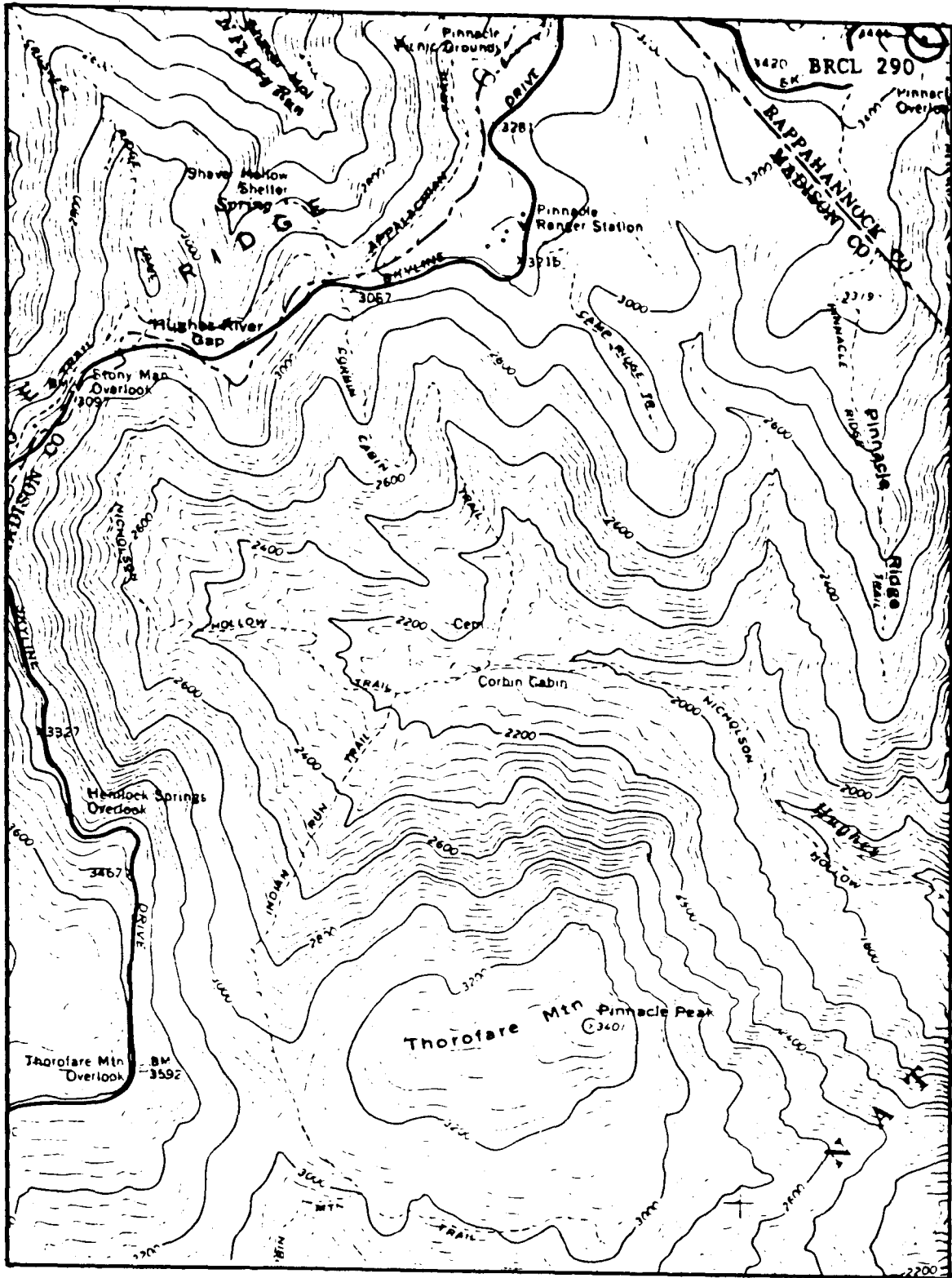


Figure 15C.--Location of gravity bench mark BRCL 290,  
Blue Ridge Gravimeter Calibration Base Line.

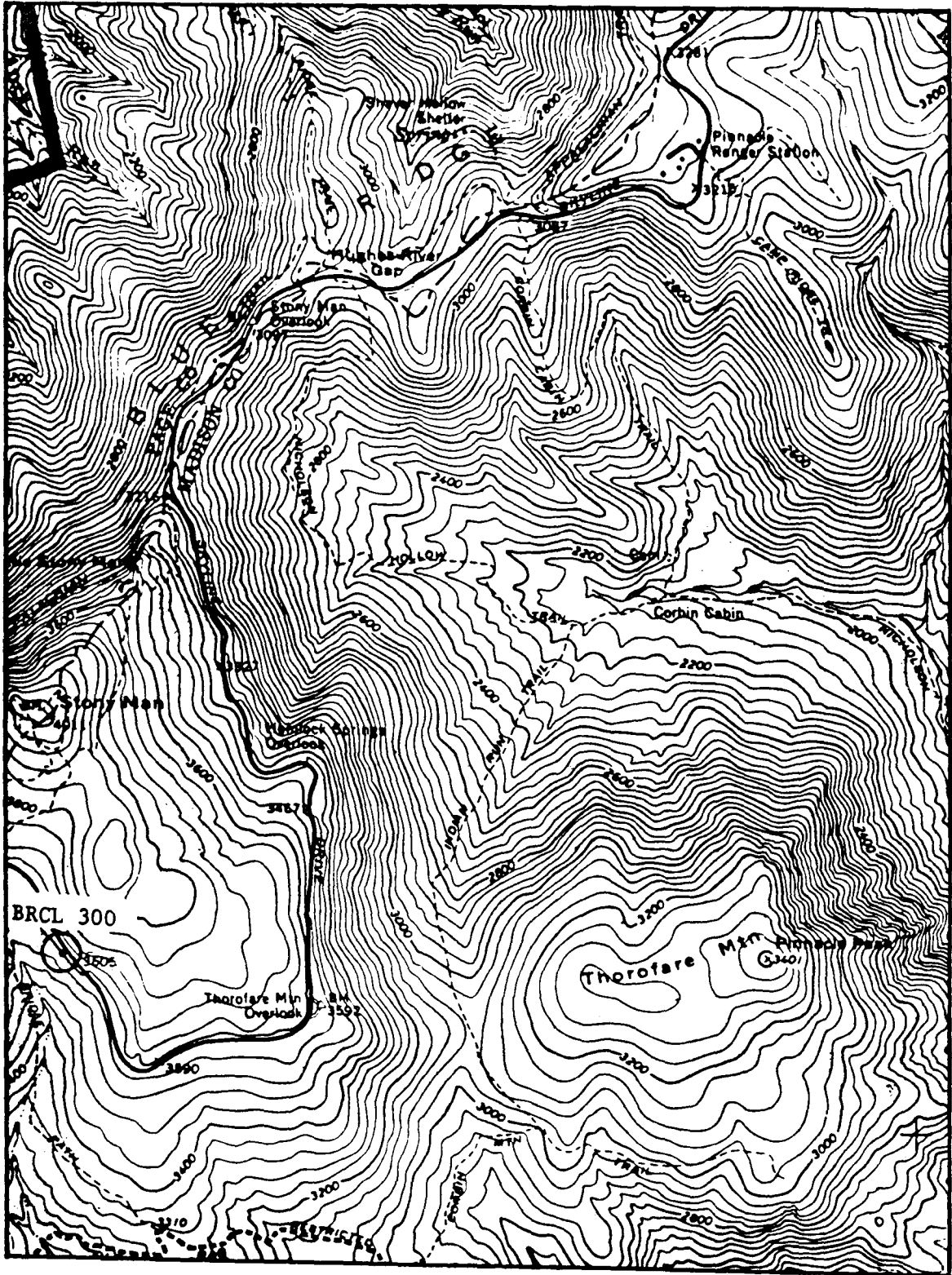


Figure 16C.--Location of gravity bench mark BRCL 300, Blue Ridge Gravimeter Calibration Base Line.

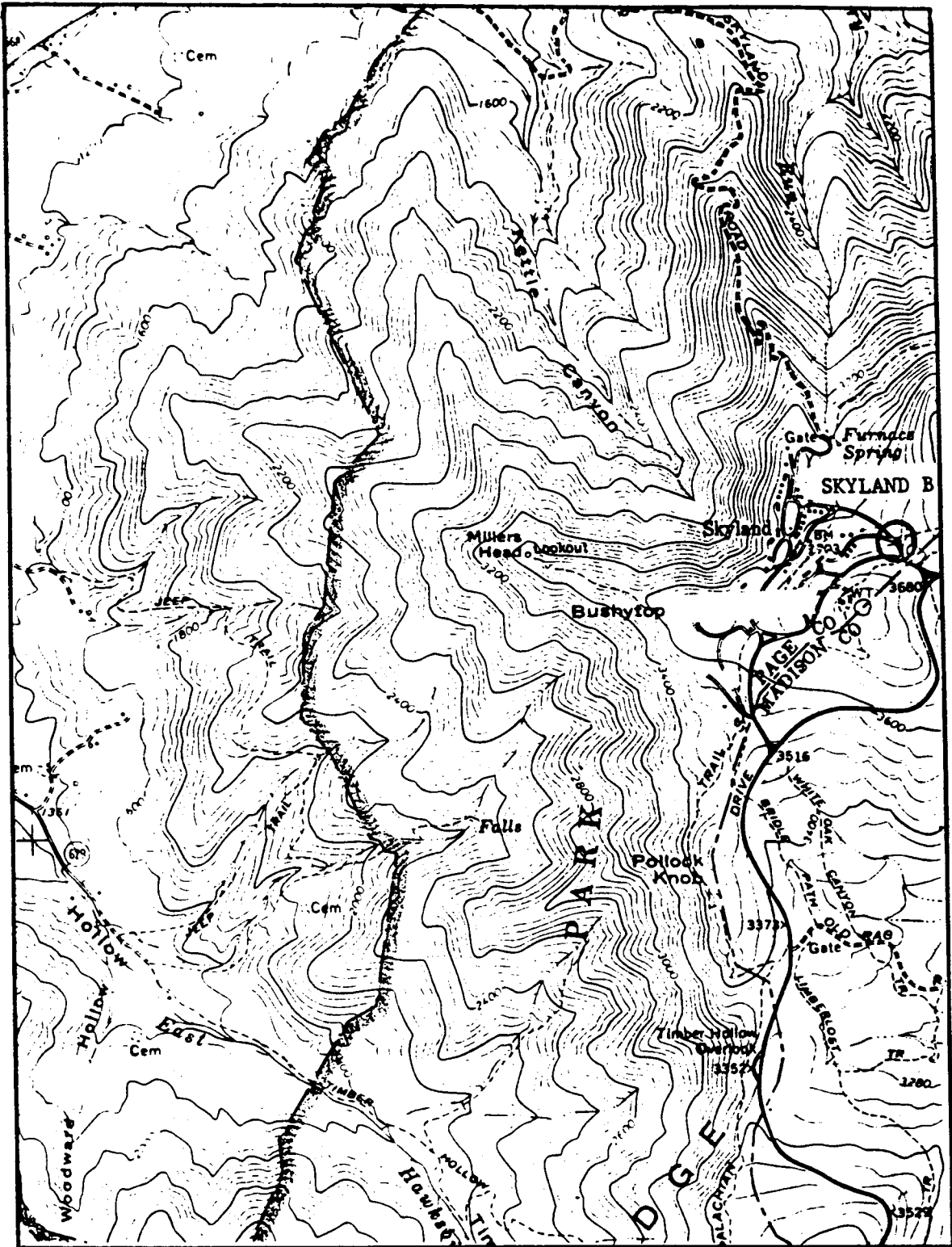


Figure 17C.--Location of gravity bench mark SKYLAND B, Blue Ridge Gravimeter Calibration Base Line.

**U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration**

National Ocean Service  
Charting and Geodetic Services  
National Geodetic Survey (N/CG17x2)  
Rockville, Maryland 20852

---

**Official Business**

POSTAGE AND FEES PAID  
U.S. DEPARTMENT OF COMMERCE  
COM-210  
THIRD CLASS MAIL

