GROUND-WATER RESOURCES ALONG THE BLUE RIDGE PARKWAY, NORTH CAROLINA

U. S. GEOLOGICAL SURVEY
WATER RESOURCES INVESTIGATIONS 77-65

PREPARED IN COOPERATION WITH THE
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"Good" areas for wells, "fair" areas for wells, and inferred fracture zones are shown on a series of topographic maps of the Parkway, and are based upon an assessment of the topography and saprolite thickness in each map area. The text that accompanies each map describes the geology of the area, recreational and associated facilities along the Parkway, well and spring data, and potential yields of wells.

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By

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COVER PHOTOGRAPH: Blue Ridge Parkway in the Doughton Recreation Area near Milepost 240. Well A1-67 is in the draw near the center of the photograph. The draw is a fair area for wells. (See page 38.)

USE OF INTERNATIONAL SYSTEM UNITS

The following table gives the factors used to convert English units to metric or International System (SI).

Multiply English units	by	to obtain SI units
inches (in)	25.40	millimeters (mm)
feet (ft)	.3048	meters (m)
miles (mi)	1.609	kilometers (km)
gallons per minute (gal/min)	.0631	liters per second (L/s)

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ABSTRACT

The best areas to develop ground water along the Blue Ridge Parkway in North Carolina are in broad draws and in stream valleys where draws open to the valleys. Saprolite thickness in these places can exceed 50 feet and provide adequate ground-water storage; draws are topographic expressions of fracture zones in the underlying bedrock, which transmit water from the overlying saprolite to the wells. Well yields along the Parkway can exceed 25 gallons per minute.

"Good" areas for wells, "fair" areas for wells, and inferred fracture zones are shown on a series of topographic maps of the Parkway, and are based upon an assessment of the topography and saprolite thickness in each map area. The text that accompanies each map describes the geology of the area, recreational and associated facilities along the Parkway, well and spring data, and potential yields of wells.

INTRODUCTION

The Blue Ridge Parkway is a scenic highway occupying a narrow strip of land running along the eastern continental divide. The Parkway, operated by the National Park Service, is nearly 470 mi long--about 250 mi in North Carolina and 220 mi in Virginia (fig. 1). The route, which millions of people tour each year, has numerous overlooks and recreation facilities.

In accommodating these many visitors, the Park Service is faced with providing water supplies at overlooks, parks, campgrounds, rangers' residences, maintenance areas, visitor centers, and administrative buildings. In the past the Geological Survey has assisted the Park Service in locating and testing suitable supplies of both surface water and ground water on a site by site basis along the Parkway. Now, however, because of increasing emphasis on long-range planning, the Park Service needs information on the availability of ground water along the entire Parkway.

The purpose of this report is to show generally where favorable conditions exist for the development of ground-water supplies along the Parkway in North Carolina, and to provide an assessment of well-location sites within these areas. Emphasis of this study was placed on evaluating well-location sites in terms of topographic and geologic conditions as generally described by LeGrand (1967). The relationship between topography, geology, and the occurrence of ground water in bedrock is discussed in detail in a following section. This report is intended to be used for general planning purposes, and the choice of specific well sites should be made by qualified persons in the field where the topography and geology can be seen in finer detail than is possible on the largest-scale topographic maps currently available.

Hydrologic information includes various letter reports prepared by the U.S. Geological Survey for the Park Service for sites along the Parkway at which test holes and wells have been constructed. These reports are dated 1961 (Balsam Gap, Tanasee Bald, Mt. Pisgah, Linville Falls, Tomkins Knob, Cherry Hill, Doughton Park, and Cumberland Knob), 1963 (Benge Gap and Tomkins Knob), 1970 (Price Park), and 1971 (Cone Park, Doughton Park, and Linville Falls). An administrative report in 1975 deals with the description, location, water quality, and flow characteristics of spring supplies along the Parkway (Brinegar Cabin at Doughton Park, Jeffress Park, Cone Park, Price Park, Flat Rock area, Linville Falls, Black Mountain Gap, Craggy Gardens, Graveyard Fields, Fork Ridge, Waterrock Knob, and the Soco Gap area).

Regional ground-water reports containing general descriptions of ground-water occurrence and well and spring records, chemical analyses, and geological and geophysical logs also have been published for each county through which the Blue Ridge Parkway runs. These reports are by: Marsh and Laney, 1966 (Haywood and Jackson Counties); Sumsion and Laney, 1967, (Yancey, McDowell, Avery, and Watauga Counties); Dodson and Laney, 1968 (Swain County); Trapp, 1970 (Transylvania, Henderson, and Buncombe Counties); and Peace and Link, 1971 (Wilkes, Ashe, and Alleghany Counties).

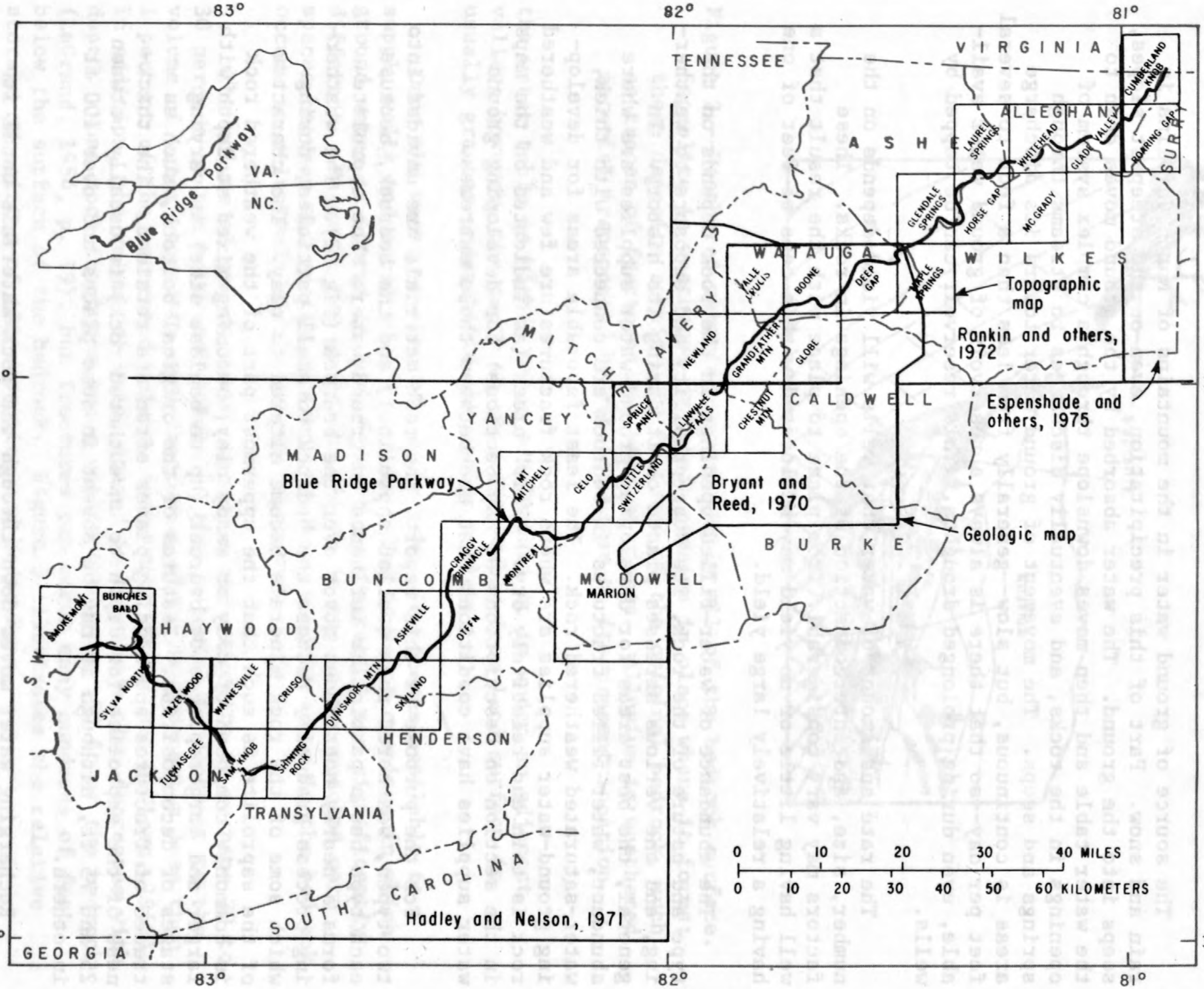

Figure 1.--Location map and index to topographic and geologic maps of the Blue Ridge Parkway in North Carolina.

The source of ground water in the mountains of North Carolina is rain and snow. Part of this precipitation, even on the steepest slopes, seeps into the ground. The water absorbed by the ground moves down to the water table and then moves downslope through a complex system of openings in the rocks, and eventually discharges to streams through springs and seeps. The movement of ground water toward its discharge areas is continuous, but slow--generally from less than a foot to several feet per day--so that there is always a reservoir of ground water available, even during prolonged droughts. This reservoir can be tapped by wells.

The rate and amount of water that wells will yield depends on the number, size, and interconnection of the openings in rocks. These factors may vary considerably from place to place with the result that a well having little or no yield may be located within tens of feet of one having a relatively large yield.

The abundance of water-filled openings in the rock depends on the type and nature of the rock, its susceptability and exposure to weathering, and the various stresses placed on it during its history. In general, the best areas for developing ground-water supplies are where abundant, water-filled fractures in bedrock are connected with thick, water-saturated weathered rock. The least favorable areas for developing ground-water supplies are where rock fractures are few and weathered rock is thin and relatively dry. "Fair" areas (as indicated on the maps in the section on Descriptions of Map Sections) for developing ground-water supplies have conditions that are between these extremes.

For the purpose of this report, the rock materials are divided into two types, weathered rock (called saprolite), and the bedrock, because each type has a particular influence on ground water. The saprolite forms a nearly continuous cover over the bedrock (fig. 2). The weathering process gradually reduces the bedrock to small particles, during which some of the rock minerals become altered to clay. The character of the saprolite is such that the uppermost part of the weathered rock is commonly composed of clay or sandy clay, becoming mixed at depth with larger and larger pieces of bedrock (up to boulder size) in varying stages of decomposition. Features of the original bedrock, such as traces of fractures and bedding planes often are retained. The thickness of the saprolite (or depth to unweathered rock) is usually between 25 and 75 ft, although it may be absent in some places and over 100 ft in others.

Recharging water moves down through the rock materials until it reaches the zone of saturation, or water table. The water table may occur in the saprolite or in the bedrock, and generally conforms to the shape of the land surface under which it lies, so that the altitude of

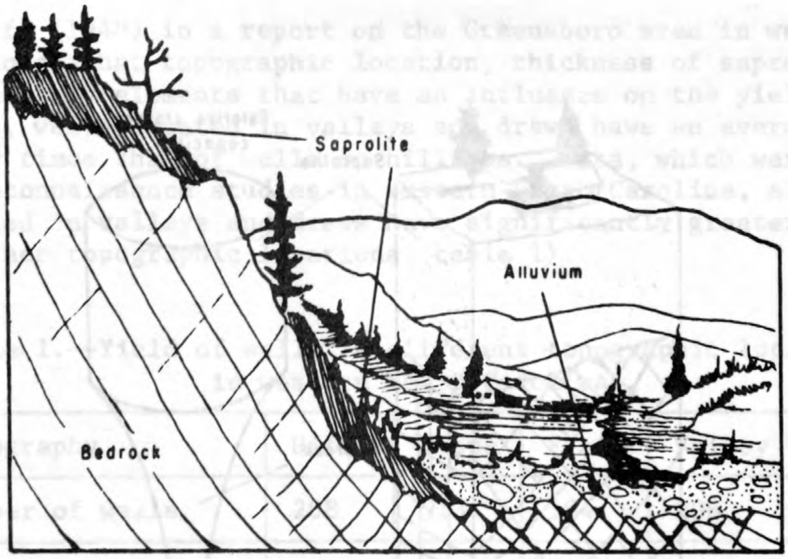

Figure 2.--Weathered materials cover nearly all of the bedrock surface. Saprolite is weathered rock that remains in place where it forms; these deposits retain some features of the original bedrock, such as traces of fractures and bedding planes. Alluvium is weathered material transported by running water to its present location.

the water table is higher under a hill than it is under an adjacent valley; however, the depth to the water table from land surface is usually greater under hills than under valleys.

Once the water reaches the water table it becomes available to supply wells and moves toward springs. The types of openings in which ground water is stored in each type of rock material are significantly different. Water in the saprolite occurs in the interconnected pore spaces between the grains of sand and clay, whereas water in the bedrock occurs in relatively widely spaced fractures.

The volume of ground water stored in the saprolite is perhaps 20 to 30 percent of the saturated volume of this material in contrast to the volume of water stored in rock fractures, which is frequently less than 1 percent of the saturated volume of the rock (Davis and DeWiest, 1966). In addition, the volume of water stored in fractures also decreases with depth. Most rock fractures occur within the upper 150 ft of the bedrock (LeGrand, 1954, p. 19), but fractures can occur many hundreds of feet below the surface of the bedrock. Figure 3 illustrates the relative storage capacities of the saprolite and bedrock.

Water discharges from the ground-water reservoir wherever the water table intersects the land surface, most commonly along well-developed stream channels. Discharge may also occur through springs and seeps

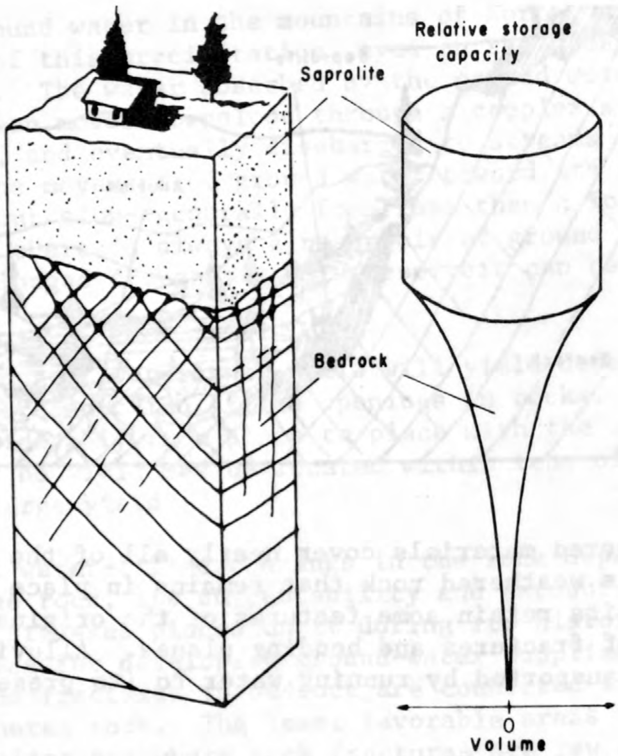

Figure 3.--Most ground water is stored in the pore spaces in the saprolite; a smaller volume is stored in fractures in the bedrock, which decrease in number with depth.

along the contact between saturated saprolite and underlying impermeable bedrock, where the contact is at or near land surface. Seepage may issue directly from bedrock fractures that are exposed at land surface.

Well Yields

The yields of individual wells in bedrock often show a great range even though the wells are in the same rock type, are at about the same depth, and are in a similar topographic setting. One well may have a large yield, whereas another well nearby may produce very little water. There is no way to predict the yield of a given well in bedrock, although the chances of completing a successful well may be improved by recognizing that well yields seem to be related to certain geological and topographic factors.

Mundorff (1948) in a report on the Greensboro area in western North Carolina showed that topographic location, thickness of saprolite, and rock type are key elements that have an influence on the yield of wells. For example, wells located in valleys and draws have an average yield nearly four times that of wells on hilltops. Data, which were summarized from the reconnaissance studies in western North Carolina, also show that wells located in valleys and draws have significantly greater yields than wells in other topographic locations (table 1).

Table 1.--Yield of wells in different topographic locations in western North Carolina

Topography	Hill	Slope	Flat	Valley	Draw
Number of wells	208	513	194	206	162
Average reported yield, in gal/min	12.2	15.2	15.8	22.2	32.9

The thickness of saprolite is also an important factor in the yield of wells in western North Carolina. Because most drilled wells are cased to hard rock to prevent the collapse of the saprolite into the well, the depth of casing is directly related to the thickness of the saprolite at the well site, and may be used as an approximate measure of saprolite thickness. Casing depths and well yields in the western counties are summarized in table 2 to show that wells penetrating greater thicknesses of saprolite also, have larger yields.

Table 2.--Well yield and casing depth (saprolite thickness) in western North Carolina

Casing depth, in ft	Less than 21	21-40	41-60	61-80	81-100	More than 100
Number of wells	91	297	324	236	122	91
Average yield, in gal/min	12.3	17.6	19.6	20.4	21.0	21.8

Yields of wells can be expected to differ somewhat according to rock type because differences in rock composition and texture could result in differences in the type and number of fractures produced in the rock. A summary of well yields according to the predominant types of rock, disregarding the thickness of saprolite, found along the Blue Ridge Parkway is given in table 3. When compared with tables 1 and 2, the relatively small differences in average yield from the various rocks leads to the conclusion that although rock types differ in the ease with which they yield water to wells, the thickness of saprolite and the topographic position are the more important factors in determining the yield of a well.

Table 3.--Well yield and rock type in western North Carolina

Rock type	Granite	Mica gneiss	Mica schist	Quartzite and metasandstone	Granite gneiss
Number of wells	40	397	213	30	455
Average yield, in gal/min	16.6	18.6	20.6	22.3	22.9

Evaluation of well sites

The evaluation of well sites in this report is based on the method described by LeGrand (1967). The main factors in the evaluation are the topographic setting and the thickness of saprolite, which, when considered together, serve as a good index for evaluating the potential yield of a well site.

Valleys and draws are the best locations for wells because ground-water movement is toward these areas. Valleys and draws also are indicative of the presence of rock fractures under the saprolite cover, especially where the topographic expression of a draw is linear (Mundorff, 1948, p. 31) (fig. 4). This suggests that ground-water discharge from fractures may contribute to the development of draws.

Topographic settings can be judged from available topographic maps, but saprolite thickness must be estimated, except where well data are available. Saprolite thickness also bears a relation to the topographic setting; for example, saprolite is usually thicker in valleys and draws than on steep hilltops and slopes. Figure 5 is adapted from LeGrand (1967, fig. 3) to provide a means of estimating saprolite thickness in various topographic settings. In topographically favorable areas such as broad draws and valleys, saprolite thickness usually is 50 ft or more (fig. 5) and there is about a 50 percent chance that a well in these areas will yield 50 gal/min (LeGrand, 1967, table 1).

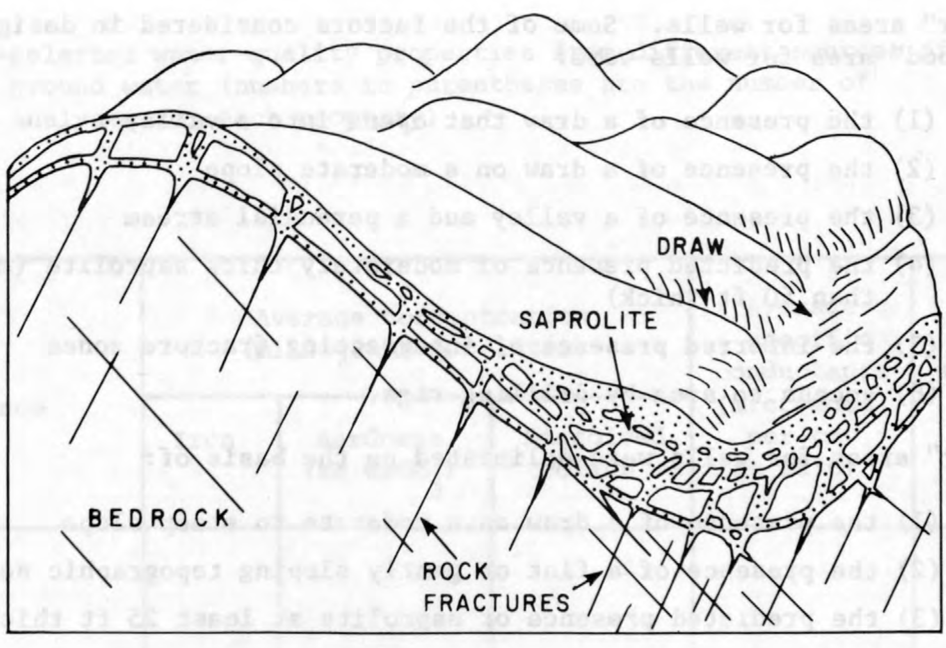

Figure 4.--Schematic sketch showing inferred relation between the presence of draws and fractures in bedrock.

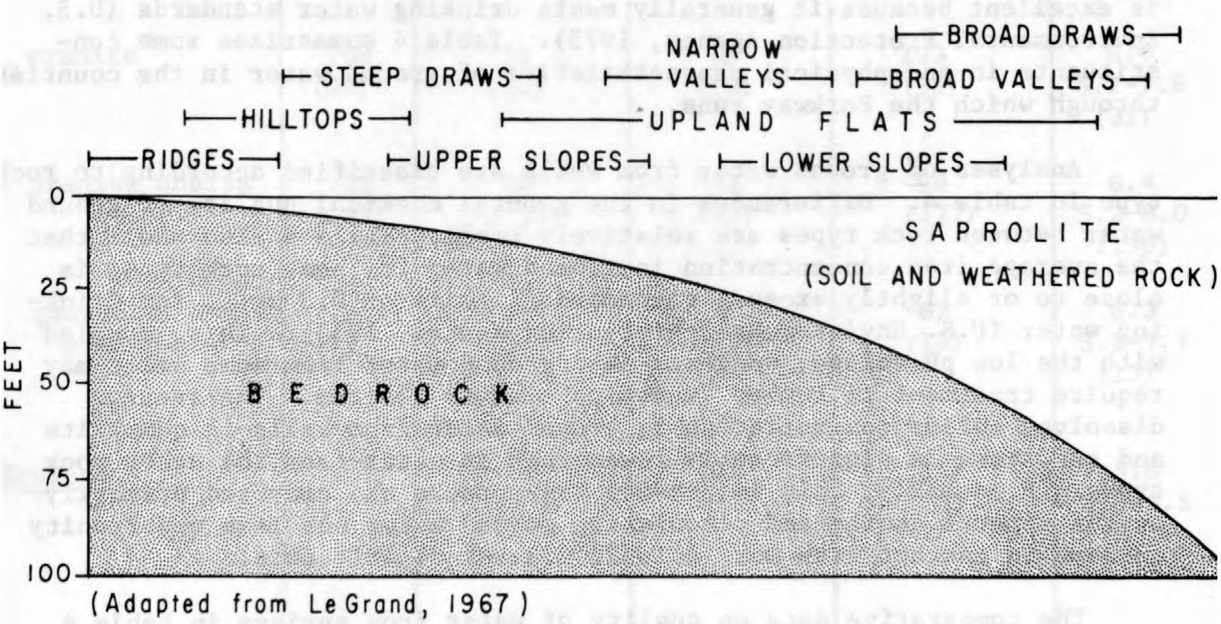

Figure 5.--The thickness of saprolite in various topographic settings.

Potential well sites along the Blue Ridge Parkway are evaluated on the following maps in terms of: (1) "good" areas for wells and (2) "fair" areas for wells. Some of the factors considered in designating a "good" area for wells were:

(1) the presence of a draw that opens into a valley

(2) the presence of a draw on a moderate slope

(3) the presence of a valley and a perennial stream

(4) the predicted presence of moderately thick saprolite (more than 50 ft thick)

(5) the inferred presence of intersecting fracture zones

(6) access to area by drilling rigs.

"Fair" areas for wells were delineated on the basis of:

(1) the presence of a draw on a moderate to steep slope

(2) the presence of a flat or gently sloping topographic setting

(3) the predicted presence of saprolite at least 25 ft thick

(4) limited access to area by drilling rigs.

Ground-Water Quality

The chemical quality of ground water along the Blue Ridge Parkway is excellent because it generally meets drinking water standards (U.S. Environmental Protection Agency, 1973). Table 4 summarizes some constituents in and physical characteristics of ground water in the counties through which the Parkway runs.

Analyses of ground water from wells are classified according to rock type in table 4. Differences in the general chemical quality of ground water between rock types are relatively small. Table 4 also shows that the average iron concentration in ground water for some rock types is close to or slightly exceeds recommended limits of 0.3 mg/L, for drinking water (U.S. Environmental Protection Agency, 1973). This, coupled with the low pH values, suggests that ground water from some wells may require treatment to remove excessive amounts of iron. The average dissolved-solids concentration in ground water from wells in quartzite and sandstone is significantly lower than in water from the other rock types. Presumably, this is because these rocks are composed primarily of the mineral quartz and circulating ground water has less opportunity to come in contact with more soluble mineral constituents.

The comparative data on quality of water from springs in table 4 show significantly less dissolved solids, iron, and hardness than does ground water from wells. Ground water seeping from springs usually has not travelled very far from its point of recharge, nor has it circulated

Table 4.--Selected water-quality properties from different sources of ground water (numbers in parentheses are the number of analyses for each property)

Source	Average concentration (milligrams per liter)			Average specific conductance (micromhos per cm at 25°C)	pH (median value and range)
	Iron	Hardness (as $CaCO_3$)	Dissolved solids		
Wells					
mica gneiss	0.30 (206)	27 (199)	66 (126)	88 (182)	6.4 5.1-7.6 (193)
mica schist	.41 (115)	31 (108)	66 (61)	97 (117)	6.4 5.3-8.1 (116)
granite	.08 (29)	32 (22)	86 (15)	103 (31)	6.0 5.2-7.6 (31)
granite gneiss	.22 (227)	26 (194)	71 (87)	98 (177)	6.4 5.2-8.0 (196)
quartzite and sandstone	.15 (17)	20 (17)	46 (17)	62 (17)	6.3 5.2-7.7 (17)
Springs	.01 (23)	6 (23)	15 (23)	15 (23)	5.6 4.9-6.5 (23)

much deeper than the saprolite zone; consequently, it has had less opportunity to dissolve mineral matter than has the water from wells which has circulated more deeply and been in contact with the bedrock for a longer period.

Table 5 shows that the dissolved-solids concentration in ground water generally increases with depth, where well depth is taken as an indicator of the depth to which the ground water has circulated. However, water from individual wells may not follow this pattern because (1) fracture zones penetrated near the surface by some deep wells may contribute a high proportion of ground water with a low dissolved-solids concentration, or (2) water from shallow wells may have a high dissolved-solids concentration because of the proximity of a source of pollution.

Table 5.--Dissolved-solids concentration and well depth

Depth of wells, in feet	Less than 50	51-100	101-150	151-200	201-300	More than 300
Number of wells	23	53	50	39	29	31
Range and average dissolved-solids concentration, in milligrams per liter	13-82 35	17-117 58	15-122 68	31-222 70	27-247 95	40-213 98

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DESCRIPTION OF MAP SECTIONS

The most favorable areas for the development of ground-water supplies along the Parkway and locations of wells, springs, test holes, and geologic units are shown on the following series of maps (figs. 7-79). Most of the maps cover approximately a 5-mi length of the Parkway, but maps of the larger recreation areas cover one or more pages. All the maps are at the scale of 1:24,000 (U.S. Geological Survey 7.5 minute quadrangle series) and are accompanied by a description of the availability of ground water. An index map (fig. 6) locates and identifies each map.

The interpretation of ground-water conditions is based on topographic maps published by the U.S. Geological Survey or the Tennessee Valley Authority at a scale of 1:24,000 (fig. 1). Base maps for figures 42 to 44 are available only at a scale of 1:62,500 and were enlarged to match the adjoining maps.

Geologic data that appears on the maps include rock types and some structural data that may have a bearing on ground-water availability. For example, the presence of a certain rock type in a given area could suggest a potential water-quality problem with iron. (See table 4.) The strike and dip of bedding or foliation planes may aid in the interpretation of the general direction of ground-water movement for the analysis of drawdown interference between wells, or for pollution studies.

For those who are interested in the age and structural relationships of the rocks along the Blue Ridge Parkway, table 6 is a generalized correlation table of the rock units shown on the following maps. The rocks along the Parkway range in age from Devonian(?) to Precambrian, and most have undergone varying degrees of metamorphism.

A detailed description of each geologic unit is presented in table 7. For the convenience of the reader, table 7 is arranged in alphabetical order of the geologic map symbols for quick reference to each map section of the Parkway. Credits for the geological mapping are shown in figure 1.

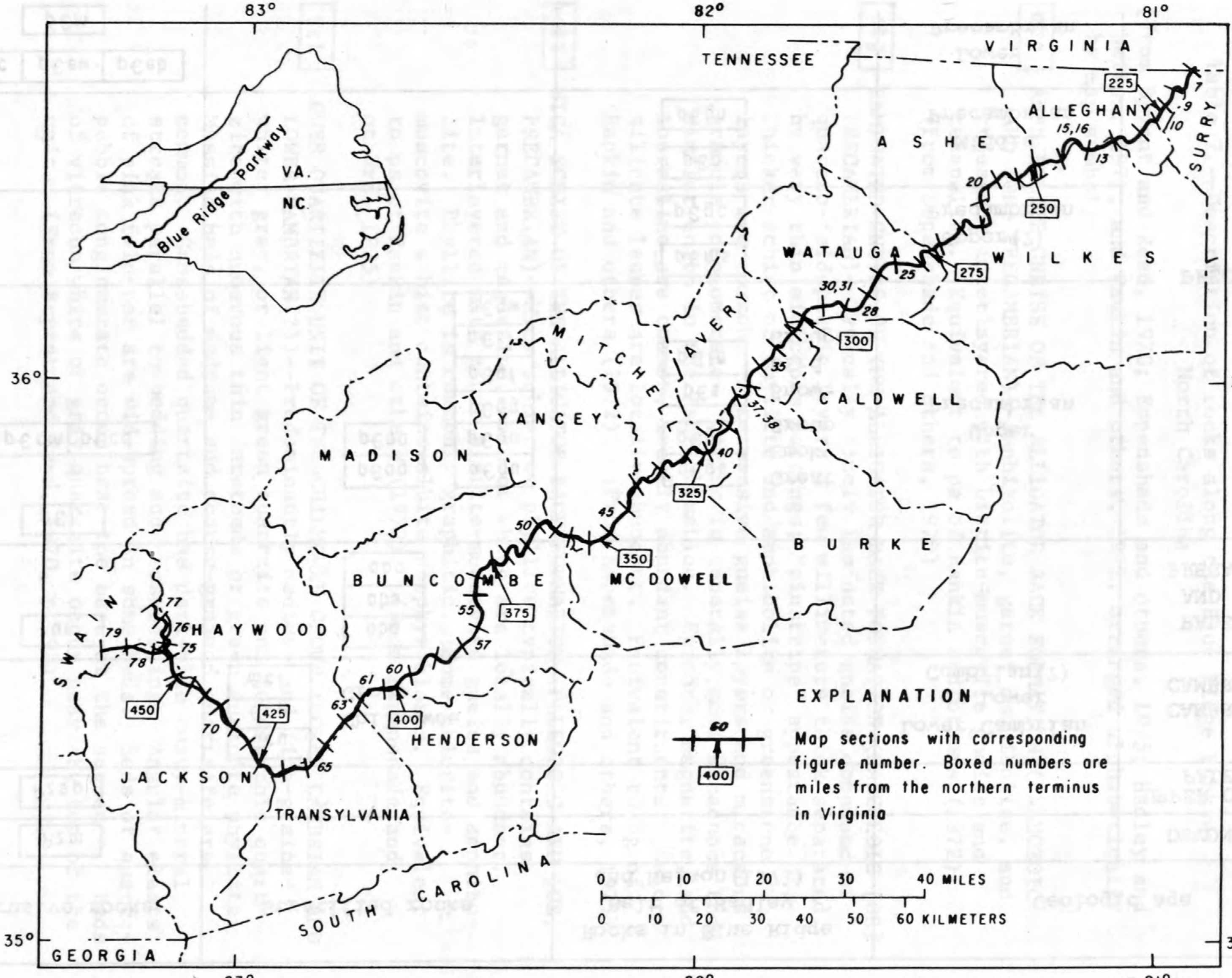


Figure 6.--Location of map sections along the Blue Ridge Parkway.

Table 6.--Generalized correlation of rocks along the Blue Ridge Parkway, North Carolina (compiled from four geologic maps shown in figure 1; stratigraphic order of some units is uncertain

Intrusive rocks	Stratified rocks	Rocks in Blue Ridge Belt of Hadley and Nelson (1971)	Geologic age	
Pzm				DEVONIAN(?)
Pzsp				UPPER OR MIDDLE PALEOZOIC
	€cu, €cp, €cl Chilhowee Group		Lower Cambrian or Lower Cambrian(?)	CAMBRIAN OR CAMBRIAN(?)
ur	abg, abs, aba			PALEOZOIC AND (OR) PRECAMBRIAN
p€l; p€cm, p€cd	p€ag, p€aa; p€gu, p€ga, p€gg, p€gf, p€sl, p€gw	p€gs, p€gt Great Smoky Group; p€s, p€la Snowbird Group	Upper Precambrian	PRECAMBRIAN
		p€ms, p€gc	Upper(?) Precambrian	
		p€g, p€gn	Middle Precambrian	
p€ec, p€ew, p€eb; p€m			Lower Precambrian	

Table 7.--Description of rocks along the Blue Ridge Parkway, North Carolina

[From Bryant and Reed, 1970; Espenshade and others, 1975; Hadley and Nelson, 1971; and Rankin and others, 1972; arranged alphabetically by map symbol]

aba AMPHIBOLITE GNEISS OF THE ALLIGATOR BACK FORMATION (PALEOZOIC AND [OR] PRECAMBRIAN)--Amphibolite, garnet amphibolite, and greestone interlayered with biotite-muscovite gneiss and metapelite. Equivalent to pa of Rankin and others (1972). (From Espenshade and others, 1975)

abg LAMINATED GNEISS OF THE ALLIGATOR BACK FORMATION (PALEOZOIC [OR] PRECAMBRIAN)--Typically finely laminated gneiss composed of quartzo-feldspathic layers a few millimeters thick separated by very thin micaceous partings; "pinstripe" appearance. Thicker schist or phyllite and amphibolite or greenstone layers are common. Some massive gneiss layers and micaceous granule conglomerate. Gneiss is generally more micaceous than similar units in the Ashe Formation. Epidote, magnetite, and tourmaline are common, locally abundant constituents. Calc-silicate lenses are locally abundant. Equivalent to pg of Rankin and others (1972). (From Espenshade and others, 1975)

abs MICA SCHIST OF THE ALLIGATOR BACK FORMATION (PALEOZOIC AND [OR] PRECAMBRIAN)--Mica schist or phyllite typically contains garnet and magnetite, both of which are locally abundant. Interlayered with minor biotite-muscovite gneiss and amphibolite. Phyllite is commonly graphitic. Some chlorite-muscovite schist contains albite porphyroblasts. Equivalent to ps of Rankin and others (1972). (From Espenshade and others, 1975)

€cl LOWER QUARTIZITE UNIT OF THE CHILHOWEE GROUP (LOWER CAMBRIAN AND LOWER CAMBRIAN(?))--Predominantly medium- and fine-grained white, gray, or light green quartzite and feldspathic quartzite with numerous thin interbeds of green sericite phyllite. Massive beds of medium- and coarse-grained quartzite are common. Crossbedded quartzite has dark-blue heavy-mineral streaks parallel to bedding and crossbedding. Angular clasts of pink feldspar are widespread in some beds. Beds of quartz-pebble conglomerate occur near the base of the sequence. Beds of vitreous white or gray quartzite occur near the top of the unit. (From Bryant and Reed, 1970, p. 99)

Table 7.--Description of rocks along the Blue Ridge Parkway, North Carolina--Continued

€cp	PHYLLITE UNIT OF THE CHILHOWEE GROUP (LOWER CAMBRIAN AND LOWER CAMBRIAN(?))--The phyllite is a lustrous, finely laminated, dark-blue, blue-gray, or blue rock consisting of folia of fine-grained sericite and thin lenses and laminae of granoblastic quartz, parallel to a strong bedding foliation. The foliation is commonly cut by slip cleavage which produces minor crenulations on the foliation surfaces. The rock contains minor amounts of FeMg chlorite, biotite, magnetite, and ilmenite and scattered grains of zircon and green tourmaline. Interbeds of fine-grained light-gray or blue-gray sugary quartzite are common in the phyllite; local layers of blue or white vitreous quartzite are 2 to 20 feet thick, especially where the phyllite is unusually thick. (From Bryant and Reed, 1970, p. 99)
€cu	UPPER QUARTZITE UNIT OF THE CHILHOWEE GROUP (LOWER CAMBRIAN AND LOWER CAMBRIAN(?))--Thin- to thick-bedded medium- to fine-grained white, greenish-gray, or bluish-gray quartzite and felspathic quartzite. Massive beds of fine-grained vitreous quartzite are more common than in the lower quartzite unit, and phyllite is less common. Phyllites of the upper unit resemble the blue phyllite of the phyllite unit rather than the green phyllites of the lower quartzite unit. (From Bryant and Reed, 1970, p. 99)
p€aa	AMPHIBOLITE GNEISS OF THE ASHE FORMATION (UPPER PRECAMBRIAN)--Amphibolite, garnet amphibolite, and hornblende gneiss and interlayered biotite-muscovite gneiss and mica schist. Mostly metamorphosed mafic volcanic rock, but includes thinly layered amphibolite of uncertain origin and coarser grained rock that may be of shallow intrusive origin. (From Rankin and others, 1972)
p€ag	MICA GNEISS OF THE ASHE FORMATION (UPPER PRECAMBRIAN)--Typically fine-grained thinly layered sulfidic biotite-muscovite gneiss interlayered with varying amounts of mica schist and minor amphibolite and hornblende gneiss. Gneiss layers as thick as five feet predominate locally. Inequigranular gneiss containing recognizable granule-to pebble-size quartz and feldspar detritus is common. Some schists are graphitic. (From Rankin and others, 1972)

Table 7.--Description of rocks along the Blue Ridge Parkway, North Carolina--Continued

p€cd GREENSTONE AND AMPHIBOLITE DIKES AND SILLS OF THE CROSSNORE PLUTONIC-VOLCANIC GROUP (UPPER PRECAMBRIAN)--Greenstone and amphibolite dikes and sills. Mapped where approximately equal to or exceed country rock in volume. Where strongly sheared and recrystallized, intrusive relationships are obscure and an interlayering with granitic gneiss results. (From Rankin and others, 1972)

p€cm GREENSTONE AMPHIBOLITE AND METAGABBRO OF THE CROSSNORE PLUTONIC-VOLCANIC GROUP (UPPER PRECAMBRIAN)--Massive to schistose greenstone, amphibolite, and metagabbro. (From Rankin and others, 1972)

p€eb BLOWING ROCK GNEISS OF THE ELK PARK PLUTONIC GROUP (LOWER PRECAMBRIAN)--Very coarse grained augen gneiss containing microcline porphyroblasts averaging 0.75 to 1.5 in long. Locally grades to p€ew and includes equigranular quartz monzonite gneiss resembling p€ew. (From Rankin and others, 1972)

p€ec CRANBERRY GNEISS OF THE ELK PARK PLUTONIC GROUP (LOWER PRECAMBRIAN)--Dominantly equigranular quartz monzonite, quartz monzonite flaser gneiss, and quartz monzonite gneiss. (From Rankin and others, 1972)

p€ew WILSON CREEK GNEISS OF THE ELK PARK PLUTONIC GROUP (LOWER PRECAMBRIAN)--Dominantly equigranular quartz monzonite gneiss and cataclastic gneiss. Ranges in composition from diorite to granite and in texture from equigranular to porphyritic. Includes layered biotite-muscovite gneiss and schist and metavolcanic rock that may belong to Grandfather Mountain Formation. (From Rankin and others, 1972)

p€g MAX PATCH GRANITE AND RELATED GRANITIC ROCKS (MIDDLE PRECAMBRIAN)--Biotite augen gneiss and gneissic granite and quartz monzonite; includes small areas of mafic or calc-alkaline migmatite gneiss and inclusions of metagabbro or diorite; all rocks variably foliated or blastomylonitic. (From Hadley and Nelson, 1971)

p€ga ARKOSE OF THE GRANDFATHER MOUNTAIN FORMATION (UPPER PRECAMBRIAN)--Arkose and grit and interbedded siltstone, slate, sandy slate, and some laminated pebbly mudstone; maroon color common. (From Rankin and others, 1972)

Table 7.--Description of rocks along the Blue Ridge Parkway, North Carolina--Continued

p€gc BIOTITE SCHIST AND GNEISS (UPPER(?) PRECAMBRIAN)--Biotite-quartz-plagioclase gneiss and schist, commonly characterized by porphyroblasts of muscovite, microcline, garnet, or kyanite; locally contains sillimanite, graphite, or hornblend; commonly thinly interlayered with micaceous quartz-feldspar gneiss (metasandstone); less commonly interlayered with amphibolite and hornblende schist. (From Hadley and Nelson, 1971)

p€gf FELSITE PORPHYRY OF THE GRANDFATHER MOUNTAIN FORMATION (UPPER PRECAMBRIAN)--Porphyritic felsic volcanic rock. Felsic volcanic rocks are light to medium gray and superficially resemble vitreous quartzite, arkose, or mylonitic gneiss, but usually contain euhedral or partly resorbed phenocrysts of gray to blue-gray quartz or tan or light pink phenocrysts of potassic feldspar. (From Bryant and Reed, 1970, p. 89)

p€gg GREENSTONE OF THE GRANDFATHER MOUNTAIN FORMATION (UPPER PRECAMBRIAN)--Greenstone and minor interbedded sedimentary rock. Greenstones are green, blue-green, or blue-gray fine-grained rocks containing epidote and quartz-epidote knots, lenses, and veinlets. Amygdules containing epidote, albite, and quartz occur in zones of massive dark-blue-gray rock. Locally, chlorite and calcite occur in amygdules. (From Bryant and Reed, 1970, p. 93)

p€gn LAYERED GNEISS AND MIGMATITE (MIDDLE PRECAMBRIAN)--Mafic and calc-alkaline migmatite gneiss and various biotite-, hornblende-, or garnet-bearing gneisses; rare muscovite schist or gneiss and very rare marble; contains abundant layers and lenses of granitic rocks; variably foliated and blastomylonitic. Includes small bodies of biotite augen gneiss locally. (From Hadley and Nelson, 1971)

p€gs GREAT SMOKY GROUP, UNDIVIDED (UPPER PRECAMBRIAN)--Largely feldspathic metasandstone, medium to thick bedded, with interbeds of feldspathic quartz-mica schist or gray phyllite; includes local beds of quartz-feldspar pebble conglomerate, graphitic and sulfidic mica schist, garnet-mica schist, kyanite- or sillimanite-bearing garnet-mica schist, and rare thin interbeds of garnet-hornblende-quartz-feldspar granofels. Metasandstone is generally more abundant and thicker bedded toward northwest. (From Hadley and Nelson, 1971)

Table 7.--Description of rocks along the Blue Ridge Parkway, North Carolina--Continued

p€gt THUNDERHEAD SANDSTONE OF GREAT SMOKY GROUP (UPPER PRECAMBRIAN)--Highly feldspathic metasandstone and arkosic conglomerate, commonly in thick graded beds with interbeds of dark gray slate, siltstone, phyllite, or schist; contains beds of boulder conglomerate 5 to 50 ft thick interbedded with carbonatic metasandstone and argillite in northwestern Great Smoky Mountains; metasandstone thinner bedded and metapelite more abundant southward. (From Hadley and Nelson, 1971)

p€gu GRANDFATHER MOUNTAIN FORMATION, UNDIVIDED (UPPER PRECAMBRIAN)--A thick sequence of interlensing arkose, siltstone, shale and volcanic rocks. (Adapted from Rankin and others, 1972)

p€gw GRAYWACKE OF THE GRANDFATHER MOUNTAIN FORMATION (UPPER PRECAMBRIAN)--Graywacke and sericitic arkose; graywacke conglomerate locally abundant. Contains minor interbeds of phyllite and siltstone. (From Rankin and others, 1972)

p€l LINVILLE METADIABASE (UPPER PRECAMBRIAN)--Dark green, green gray, or blue gray metadiabase containing abundant amphibole megacrysts, and less abundant laths of plagioclase and segregation knots and lenses of epidote and quartz. Rarely, the rock contains veinlets and fractures filled with quartz or albite. Metadiabase ranges from completely altered but unsheared rock with ophitic or diabasic texture to blastomylonitic greenschist. Much of the metadiabase is a blastomylonitic gneiss in which the large crystals are porphyroclasts. (From Bryant and Reed, 1970, p. 97)

p€la LONGARM QUARTZITE OF SNOWBIRD GROUP (UPPER PRECAMBRIAN)--Medium to coarse feldspathic quartzite grading to arkose, light colored, thin- to thick-bedded and generally cross-bedded; variably interbedded with darker, thin-bedded feldspathic quartz-mica schist; locally contains quartz and microcline pebbles to 0.5-in. Equivalent to p€sl of Hadley and Nelson (1971). (From Hadley and Nelson, 1971)

p€m BIOTITE-MUSCOVITE SCHIST AND GNEISS (LOWER PRECAMBRIAN)--Gray to light gray and fine- to coarse-grained rocks containing muscovite flakes up to 0.3-in. in diameter giving the rocks a glittery aspect. Rocks commonly contain light pink to red garnet. Schist and gneiss are gradational and intimately intercalated in layers up to tens of feet thick. Layers and lenses of amphibolite, granofels and micaceous quartzite are intercalated with the schist and gneiss. (Equivalent to p€ms from Bryant and Reed, 1970)

Table 7.--Description of rocks along the Blue Ridge Parkway, North Carolina--Continued

p€ms MUSCOVITE SCHIST AND GNEISS (UPPER(?) PRECAMBRIAN)--Mica-quartz-plagioclase schist generally interlayered with gneissic micaceous metasandstone; schist locally graphitic and sulfidic, commonly garnetiferous and/or sillimanite bearing; locally contains hornblende-garnet granofels. (From Hadley and Nelson, 1971)

p€s SNOWBIRD GROUP, UNDIVIDED (UPPER PRECAMBRIAN)--Composed of the Roaring Fork Sandstone, Longarm Quartzite, and Wading Branch Formation. Mostly light-colored feldspathic quartzite or metasandstone and interbedded dark quartz-feldspar-mica schist; basal unit of micaceous phyllite or schist with rare quartz-pebble conglomerate. (From Hadley and Nelson, 1971)

p€sl SILTSTONE OF THE GRANDFATHER MOUNTAIN FORMATION (UPPER PRECAMBRIAN)--Dark blue-gray, gray, green-gray, and light gray, fine-grained, thin-bedded chlorite- and biotite-bearing siltstone, phyllite, and graywacke. Beds locally contain calcareous dolomitic sandstone layers and a few lenses of sandy marble. Light-gray to white fine-grained sandstone and phyllite or siltstone alternate in beds up to 2-in. thick in some places. (Equivalent to p€gs from Bryant and Reed, 1970, p. 82)

Pzm MIGMATITE (DEVONIAN(?))--Gneiss and schist containing abundant granitic and pegmatitic material, probably palingenetic, in thin layers, lenses, and irregular bodies. (From Hadley and Nelson, 1971)

Pzsp GRANITE DIKES AND SILLS OF THE SPRUCE PINE PLUTONIC GROUP (UPPER OR MIDDLE PALEOZOIC)--Dikes and sills of biotite-muscovite granitic rocks and pegmatite. Mapped where about equal to or exceeds country rock in outcrop. (From Rankin and others, 1972)

ur ULTRAMAFIC ROCKS (PALEOZOIC AND [OR] PRECAMBRIAN)--Mainly chlorite-tremolite-magnetite schist that commonly contains either serpentine or talc; has relict olivine locally. Most bodies were probably emplaced tectonically. (From Espenshade and others, 1975)

Cumberland Knob Area (Miles 216.9 to 219.8).--This section of the Parkway (fig. 7) begins at the Virginia-North Carolina line, rises to the Blue Ridge from the West Fork of Chestnut Creek, reaching a maximum altitude of about 2,900 ft and descends to the headwaters of Crab Creek. Chestnut Creek and Crab Creek are tributaries to New River.

Exposed along this section of the Parkway are metamorphosed sedimentary rocks composed of laminated gneiss and mica schist of the Alligator Back Formation (Precambrian and [or] Paleozoic age). Rocks composed of amphibolite gneiss of the Alligator Back Formation occur in the Cumberland Knob Recreation Area, and ultramafic rocks composed mainly of chlorite-tremolite-magnetite schist are shown northwest of the Parkway area. The strike of the foliation or schistosity of the rocks ranges between N 40° E and N 70° E; the dip is generally 60° to 70° to the southeast.

Recreation facilities in the Cumberland Knob Area include a snack shop, restrooms, picnic areas, and hiking trails. Before 1963 water for these facilities was obtained from a spring (Su-90), shown on figure 7. Water is now pumped from a well (Al-6) located near the access road to the Parkway from State Route 18. The developed ground-water sources shown on figure 7 are:

Well Al-6 (363324080544001)[1/] - drilled October 1961; owner, National Park Service; depth, 115 ft; diameter, 5 in; depth cased, 33 ft; yield, 8 gal/min; water used for Cumberland Knob Recreation Area.

Spring Su-90 (363323080542601) - developed about 1952; owner, National Park Service; maximum measured discharge, 25 gal/min, May 1960; minimum measured discharge, 25 gal/min, July 1963; median discharge, 16 gal/min, 1959-63; water not used; formerly supplied the Cumberland Knob Recreation Area.

Several areas along this section of the Parkway and in the Cumberland Knob Recreation Area are favorable for the development of ground-water supplies. The area where the Parkway parallels the West Fork of Chestnut Creek between the State line and State Route 18 is a good area for wells, and the best potential is where inferred fracture zones extend into the valley. Sustained well yields are estimated to be 25 gal/min or more in this area. A driller's log for well Al-6 shows a saprolite thickness of nearly 30 ft, which is a favorable indication of adequate ground-water storage. Fair areas for well-site location include the section of Parkway near the head of West Fork of Chestnut Creek. Other fair areas for wells exist in the southeastern part of the Cumberland Knob Recreation Area along Gully Creek and a tributary to Roaring Fork; however, access roads to these areas are limited.

1/ Well or spring identification number composed of a latitude-longitude coordinate for the site and a sequential number.

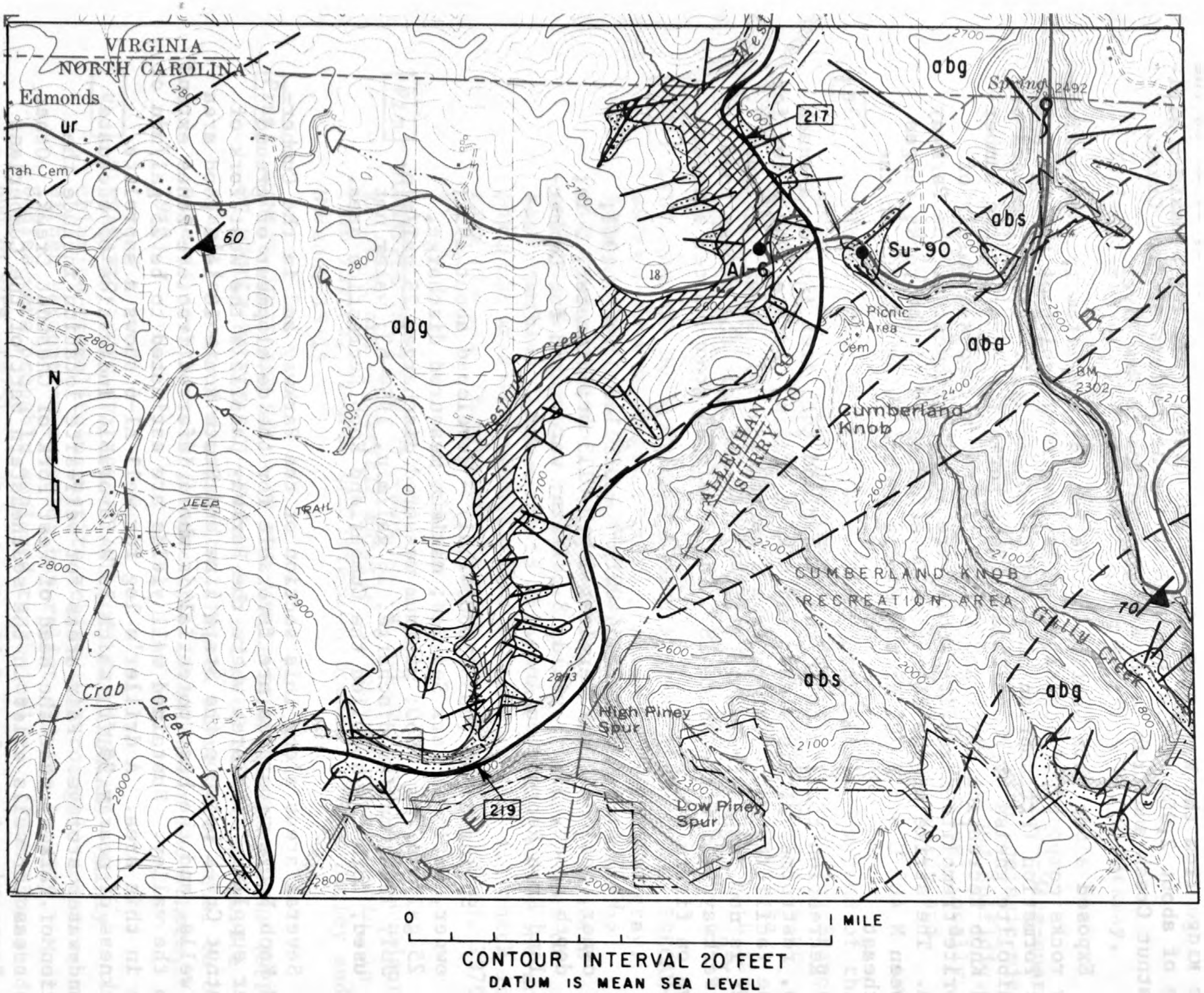


Figure 7.--Cumberland Knob area (*Miles 216.9 to 219.8*).

EXPLANATION FOR FIGURE 7

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Al-6 Well and number

Su-90 Developed spring and number

Undeveloped spring

ROCK UNITS

aba Amphibolite gneiss of the Alligator Back Formation

abg Laminated gneiss of the Alligator Back Formation

abs Mica schist of the Alligator Back Formation

ur Ultramafic rocks

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

60 Strike and dip of foliation or schistosity parallel to compositional layering

Boundary of the Blue Ridge Parkway

217 NPS Milepost

Big Pine Creek Area, East Section (Miles 219.8 to 223.3).--The Parkway along this section (fig. 9) descends to Mill Creek, crosses the Eastern continental divide between Mill Creek and Big Pine Creek at an altitude of about 2,830 ft, and follows the gently sloping valley of Big Pine Creek. Mill Creek is tributary to the Yadkin River and Big Pine Creek is tributary to New River.

The rocks exposed along the Parkway are mica schist and laminated gneiss of the Alligator Back Formation.

Although no recreation facilities are along this section of the Parkway, there are numerous sites for the development of a ground-water supply. Virtually all of the Parkway property along the valley of Big Pine Creek is a good area for wells (fig. 8), especially where draws join the main valley. Mill Creek valley is also a good area for wells. Estimated sustained yields of 25 gal/min or more are obtainable from wells in this section.

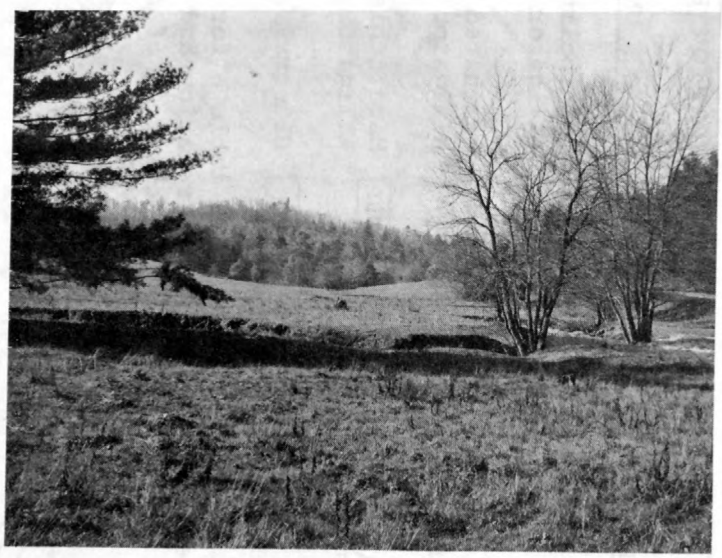
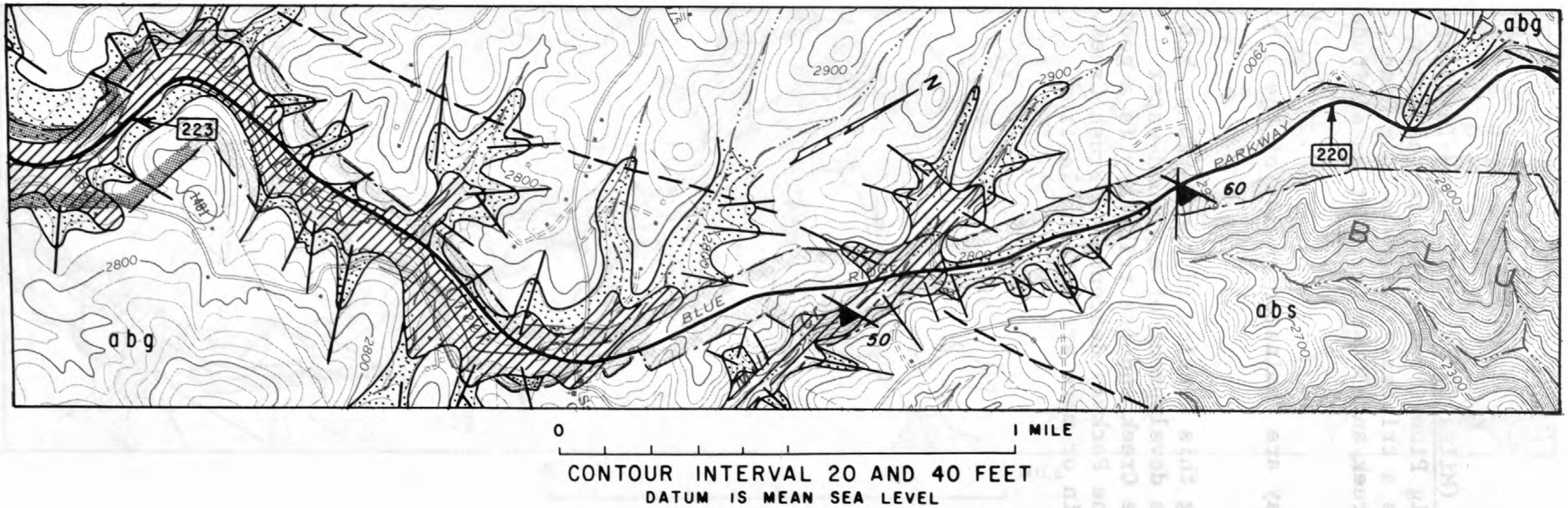


Figure 8.--The valley of Big Pine Creek.



EXPLANATION

BEST AREAS FOR WELLS

- Good
- Fair
- Inferred fractures
- Boundary of the Blue Ridge Parkway
- 220 NPS Milepost

ROCK UNITS

- abg Laminated gneiss of the Alligator Back Formation
- abs Mica schist of the Alligator Back Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

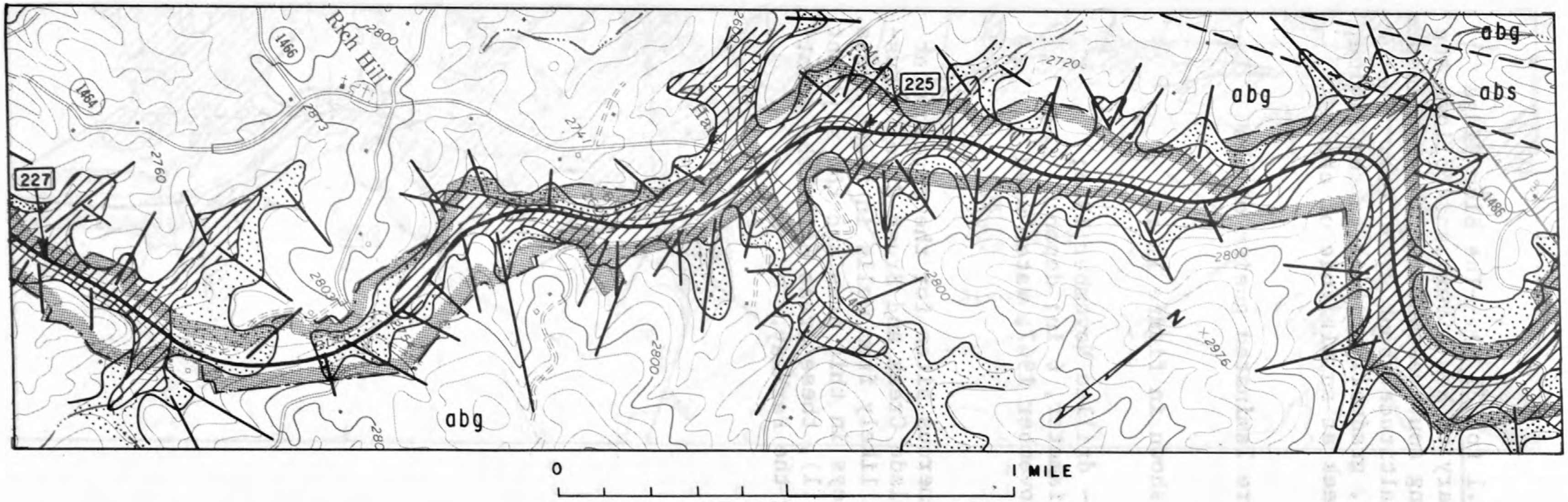
- Approximate boundary between rock units
- 50 Strike and dip of foliation or schistosity parallel to compositional layering

Figure 9.--Big Pine Creek area, east section (Miles 219.8 to 223.3).

Big Pine Creek Area, West Section (Miles 223.3 to 227.1).--In figure 10 the Parkway follows the valley of Big Pine Creek. At Hare the creek turns northwest and the Parkway ascends a tributary valley of Big Pine Creek to the divide between Big Pine Creek and Brush Creek at an altitude of about 2,760 ft.

The rocks exposed along the Parkway are laminated gneiss of the Alligator Back Formation.

No recreation facilities are along this section of the Parkway, but this section has numerous sites for the development of a ground-water supply. All of the area along Big Pine Creek and its tributary is a good area for wells, as is the area where the Parkway descends to Brush Creek. Estimated sustained yields of 25 gal/min or more are obtainable from wells in these areas.



CONTOUR INTERVAL 20 AND 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

ROCK UNITS

abg Laminated gneiss of the Alligator Back Formation

abs Mica schist of the Alligator Back Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

Boundary of the Blue Ridge Parkway

225 NPS Milepost

Figure 10.--Big Pine Creek area, west section (Miles 223.3 to 227.1).

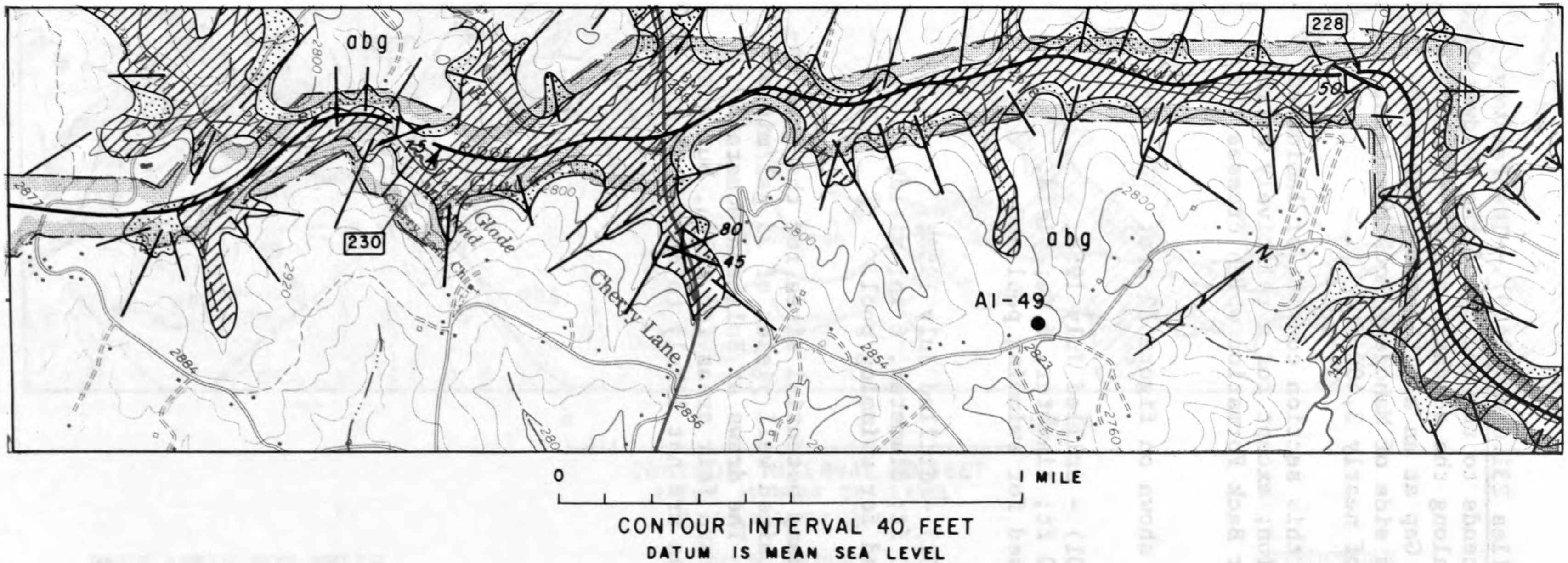
Little Glade Creek Area (Miles 227.1 to 231.0).--The Blue Ridge Parkway descends to Brush Creek (tributary to New River) and follows the creek for a short distance before turning southwestward at the confluence of Little Glade Creek and Brush Creek (altitude about 2,600 ft). The Parkway then follows Little Glade Creek, gradually rising to the divide between Little Glade Creek and Brush Creek at an altitude of about 2,900 ft (fig. 11).

All of the rocks in this section are laminated gneiss of the Alligator Back Formation.

The developed ground-water source shown in figure 11 is:

Well A1-49 (362706081003801) - drilled November 1945; owner, L. B. Todd; depth, 95 ft; diameter, 6 in; depth cased, 10 ft; yield, 12 gal/min, November 1947; water used for domestic supply.

This section of the Parkway has numerous sites for the development of ground-water supplies along Little Glade Creek and Brush Creek. Sustained yields of 25 gal/min or more are likely from wells in these areas. Because the Parkway follows stream valleys in this area and the adjacent Big Pine Creek area (Miles 219.8 to 227.1), these areas offer the greatest choice of well-site locations along the Parkway.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

AI-49
● Well and number

ROCK UNITS

abg Laminated gneiss of the Alligator Back Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

50 Strike and dip of foliation

Boundary of the Blue Ridge Parkway

230 NPS Milepost

Figure 11.--Little Glade Creek area (Miles 227.1 to 231.0).

Mahogany Rock Mountain Area (Miles 231.0 to 234.9).--The Parkway turns southwest then west as it descends to the valley of the headwaters of Brush Creek and gradually rises along the southern flank of Bullhead Mountain. The Parkway crosses Deep Gap at an altitude of about 3,180 ft and turns southwest around the north side of Mahogany Rock Mountain, where the road reaches an altitude of nearly 3,400 ft.

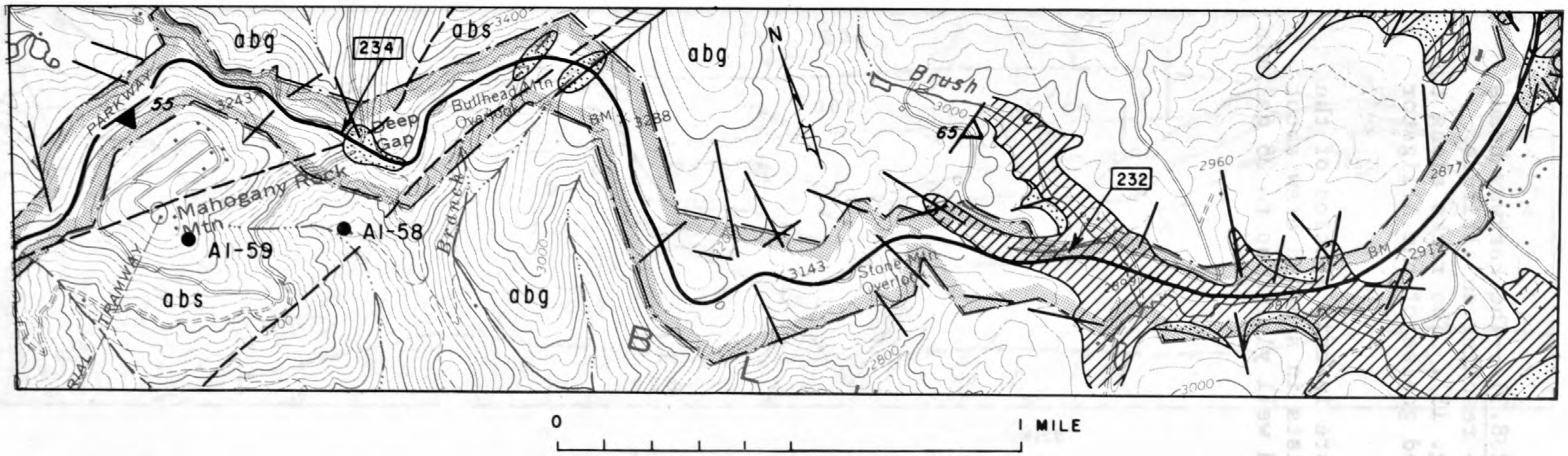
The rocks along the Parkway in this section consist of laminated gneiss of the Alligator Back Formation; except for a relatively narrow band of mica schist of the Alligator Back Formation which crosses the Parkway at Deep Gap.

Developed ground-water sources shown on figure 12 are:

Well A1-58 (362620081050001) - drilled July 1958; owner, Worth Folger; depth, 100 ft; diameter, 6 in; yield, 15 gal/min, July 1958; water used for swimming pool and domestic supply.

Well A1-59 (362624081052101) - drilled July 1958; owner, Worth Folger; depth, 340 ft; diameter, 6 in; yield, 3 gal/min, July 1958; water used for swimming pool.

The valley of Brush Creek has many potential sites for the development of ground-water supplies. Sustained well yields of 25 gal/min or more should be possible along here. The draws at Bullhead Mountain Overlook and the saddle at Deep Gap are fair areas for wells, but sustained yields of wells in these areas are not likely to exceed 25 gal/min.



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

AI-58
Well and number

ROCK UNITS

abg Laminated gneiss of the Alligator Back Formation

abs Mica schist of the Alligator Back Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

55 Strike and dip of foliation or schistosity parallel to compositional layering

65 Strike and dip of foliation

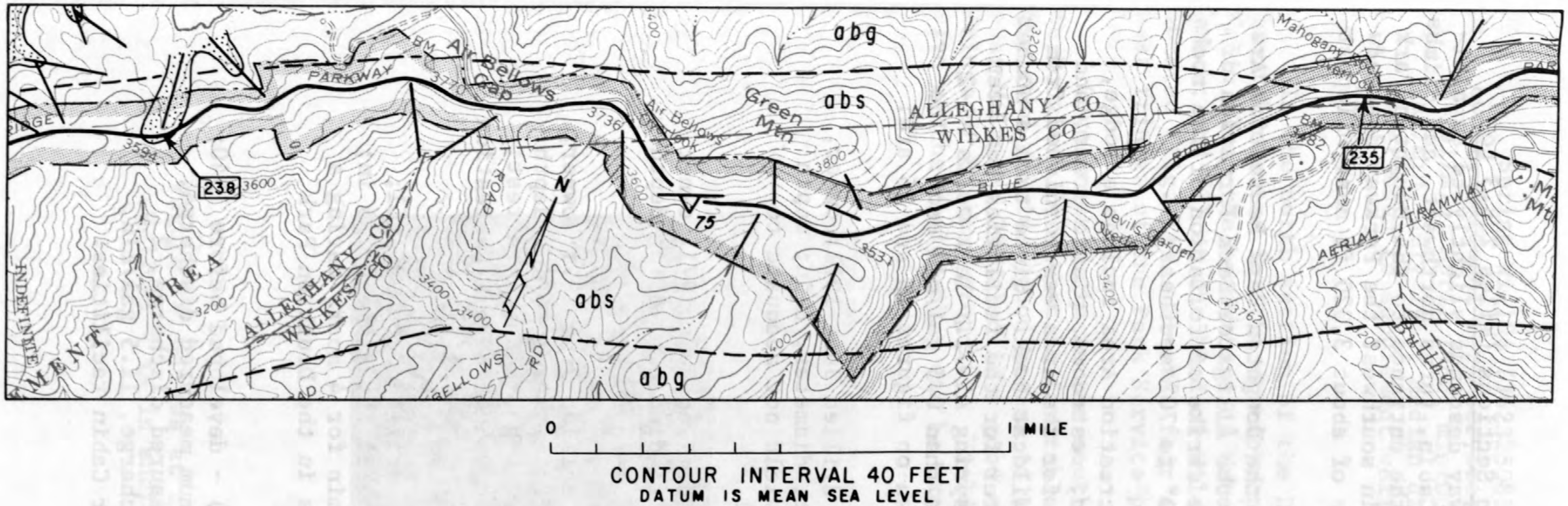
Boundary of the Blue Ridge Parkway

232 NPS Milepost

Figure 12.--Mahogany Rock Mountain area (Miles 231.0 to 234.9).

Air Bellows Gap Area (Miles 234.9 to 238.3).--The Parkway heads southwest along the crest of the Blue Ridge reaching an altitude of about 3,740 ft near Air Bellows Gap (fig. 13). The rocks along the Parkway consist of mica schist and laminated gneiss of the Alligator Back Formation.

No developed sources of ground water are in this section of the Parkway; however, a fair area for wells exists in a broad draw about 0.75 mi west of Air Bellows Gap. Sustained well yields up to 25 gal/min are possible in this area.



EXPLANATION

BEST AREAS FOR WELLS

Fair

Inferred fractures

Boundary of the Blue Ridge Parkway

235 NPS Milepost

ROCK UNITS

abg Laminated gneiss of the Alligator Back Formation

abs Mica schist of the Alligator Back Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

75 Strike and dip of foliation

Figure 13.--Air Bellows Gap area (Miles 234.9 to 238.3).

Doughton Park Area, North and South Sections (Miles 238.3 to 245.0).--From Air Bellows Gap, the Parkway descends slightly to an altitude of about 3,500 ft at the Brinegar Cabin, turns northwest, and climbs to a maximum altitude of 3,700 ft near the entrance to the Doughton Park Recreation Area (fig. 15). Turning again southwest the Parkway descends toward Meadow Fork valley to an altitude of about 3,320 ft near Milepost 245 (fig. 16).

The rocks along the Parkway and in the Doughton Park Recreation Area are laminated gneiss and mica schist of the Alligator Back Formation of Precambrian and (or) Paleozoic age. The strike of foliation of the rocks ranges N 30° to 40° E, and the dip is 50° to 70° southeast.

Facilities in the Doughton Park Recreation Area include a lodge, campgrounds, snack shop, service station, restrooms, picnic areas, and hiking trails. Until about 1961, water for the area was furnished from a surface-water reservoir northeast of Wildcat Rock. Since then a number of test wells have been drilled, and water for the facilities has been obtained from wells Al-4 and Al-67 and spring Al-72. Test wells Al-2 and Al-3 were "dry holes," yielding less than 0.5 gal/min each. The ground-water sources and test wells shown on figures 15 and 16 are:

Well Al-2 (362542081104001) - drilled June 1971; owner, National Park Service; depth, 84 ft; diameter, 6 in; depth cased, 16 ft; yield, 0.5 gal/min; yield not adequate to warrant completion as a supply well.

Well Al-3 (362541081103901) - drilled June 1971; owner, National Park Service; depth, 150 ft; diameter, 6 in; depth cased, 14 ft; yield, none.

Well Al-4 (362546081104201) - drilled June 1971; owner, National Park Service; depth, 150 ft; diameter, 6 in; depth cased, 31 ft; yield, 37 gal/min for 10 hours during a test; water used for the facilities in the Doughton Park Recreation Area.

Well Al-67 (362610081095801) - drilled October 1961; owner, National Park Service; depth, 85 ft; diameter, 5 in; depth cased, 45 ft; yield, 55 gal/min for 4 hours during a test; water used for the facilities in the Doughton Park Recreation Area.

Spring Al-72 (362513081084401) - developed before 1940; owner, National Park Service; maximum measured discharge, 25 gal/min, April 1962; minimum measured discharge, 2 gal/min, December 1960; median discharge, 11.5 gal/min, 1959-63; water used at the Brinegar Cabin facilities.

Spring Wi-104 (362325081120501) - developed about 1959; owner, National Park Service; maximum measured discharge, 8 gal/min, April 1962; minimum measured discharge, 1.75 gal/min, July 1963; median discharge, 4.5 gal/min, 1959-63; water used to supplement well supply at the Bluff Maintenance Area.

In the north section of the Doughton Park Recreation Area (fig. 15), favorable areas for the development of wells are: (1) north of Brinegar Cabin along the headwaters of Waterfalls Creek; (2) northwest of Fodder Stack; and (3) at the head of Wildcat Branch where supply well A1-4 is located (fig. 14). Several fair areas for wells are on the north and west fringes of the Park Service property.

Cove Creek Basin in the south section (fig. 16) is the largest area in Doughton Park that is favorable for the development of wells. Grassy Gap road provides good access to this area. A small valley that heads near Milepost 244 also is a good area for wells, although it is on the fringe of Parkway property. Yields of wells A1-4 and A1-67 are indicative of the yields that can be expected in these areas.

Figure 14.--Draws at the head of Wildcat Branch. Well A1-4 is in enclosure in center of picture.

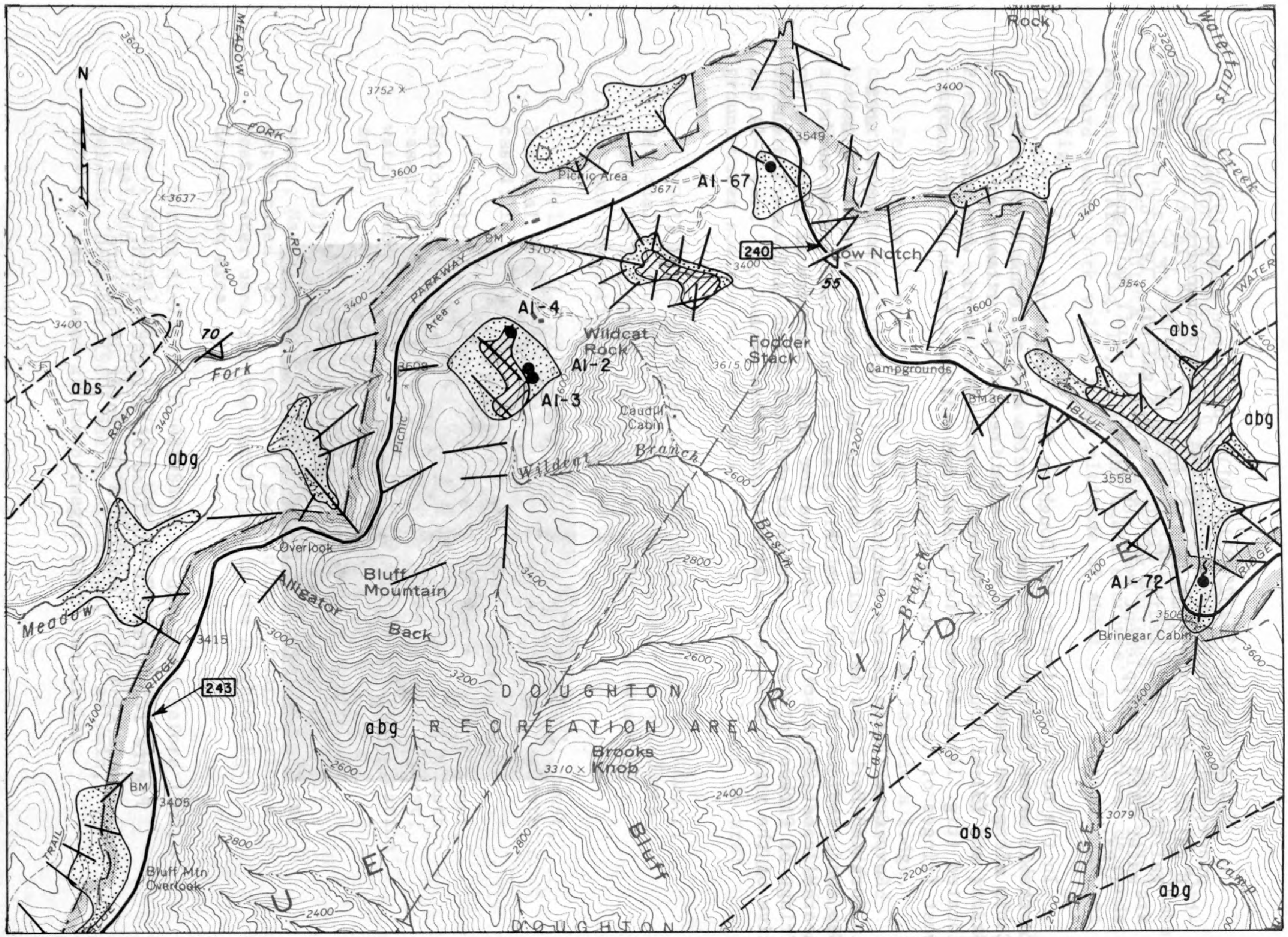


Figure 15.--Doughton Park area, north section (Miles 238.3 to 243.5).

0 1 MILE

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION FOR FIGURE 15

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

AI-3
Well and number

AI-72
Developed spring and number

ROCK UNITS

abg Laminated gneiss of the Alligator Back Formation

abs Mica schist of the Alligator Back Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

55 Strike and dip of foliation

Boundary of the Blue Ridge Parkway

243 NPS Milepost

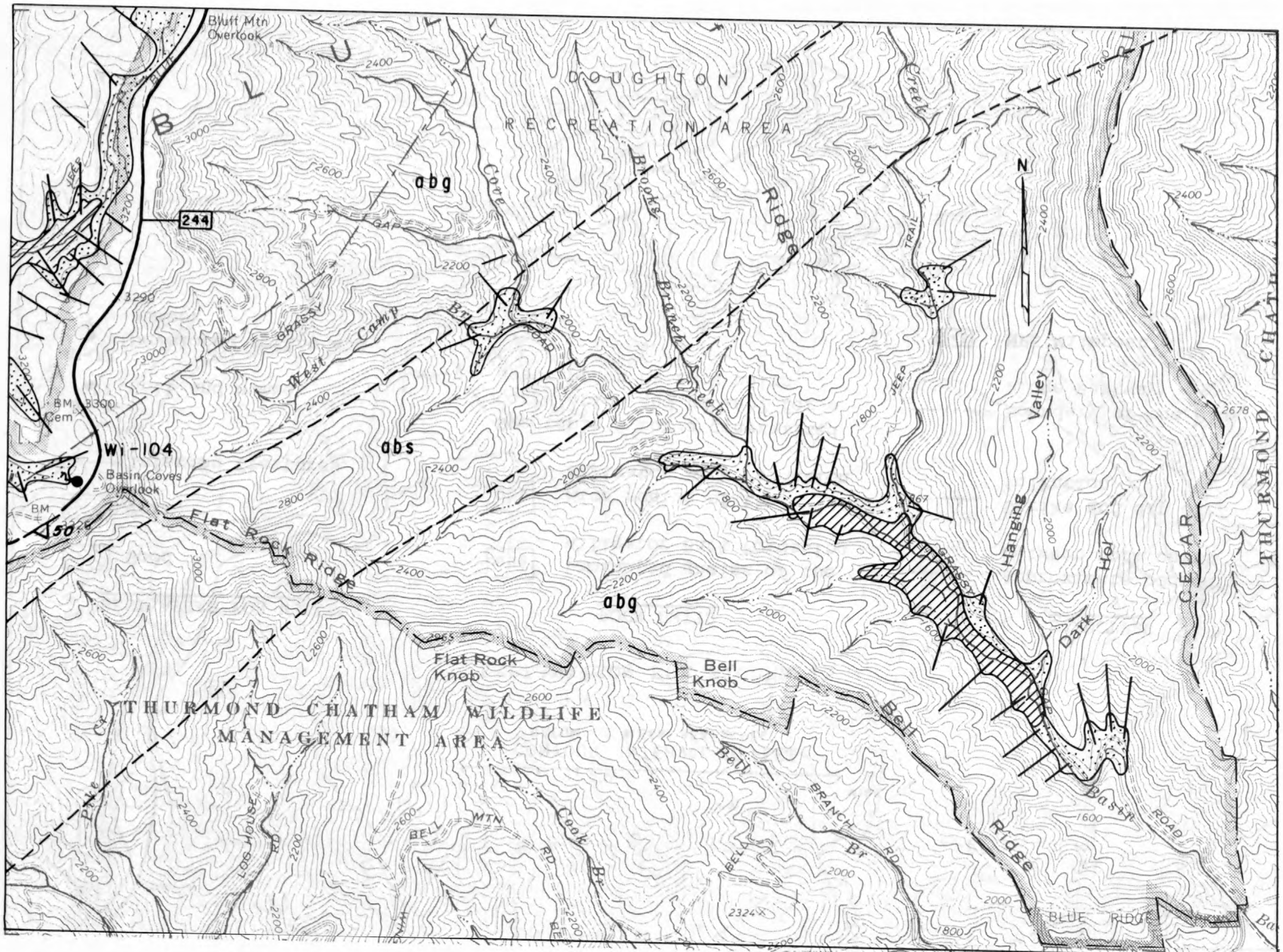


Figure 16.--Doughton Park area, south section (Miles 243.5 to 245.0).

0 1 MILE

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION FOR FIGURE 16

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Wi-104
Developed spring and number

ROCK UNITS

abg Laminated gneiss of the Alligator Back Formation

abs Mica schist of the Alligator Back Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

50 Strike and dip of foliation

Boundary of the Blue Ridge Parkway

244 NPS Milepost

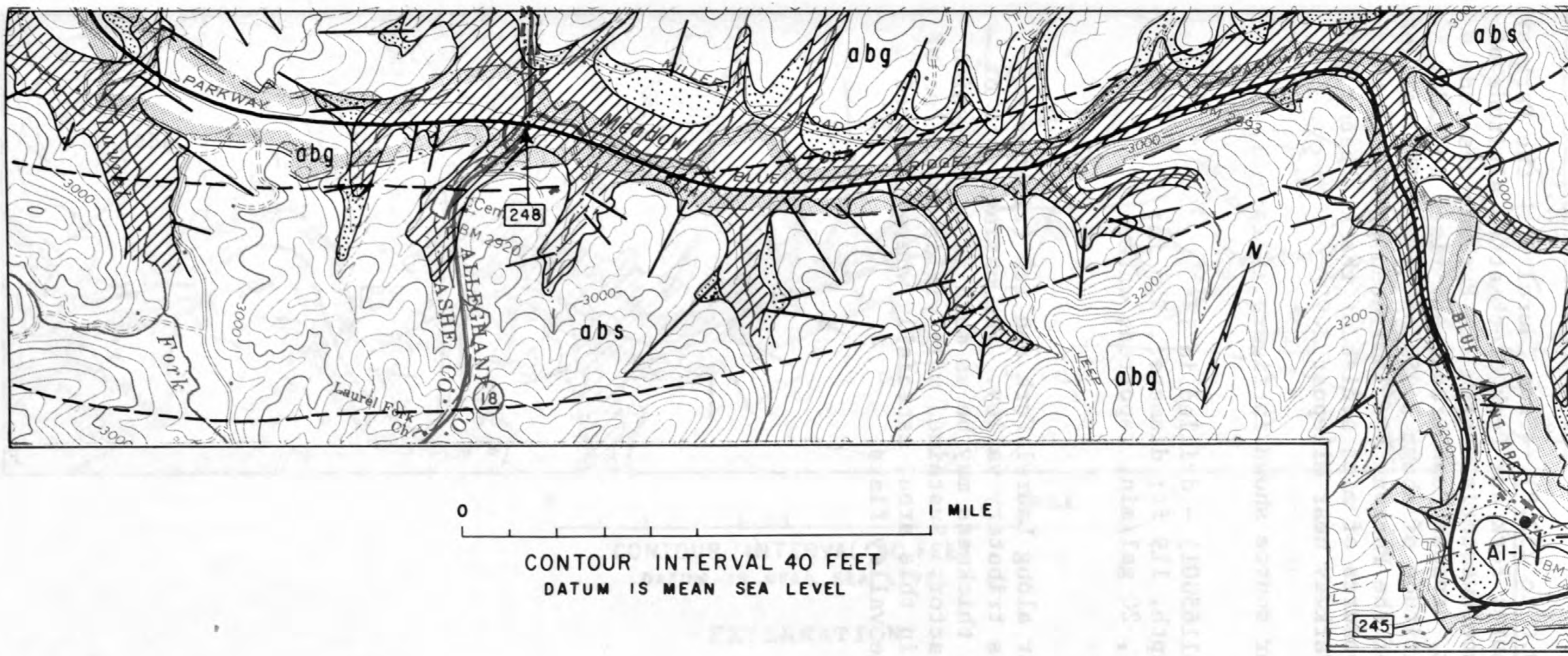
Bluff Maintenance Area (Miles 245.0 to 249.0).--At Milepost 245 the Parkway turns northwest along a tributary to Meadow Fork and descends to Meadow Fork, where the Parkway turns southwest along Meadow Fork valley (fig. 17). Meadow Fork valley is unusually flat for a stream valley near the crest of the Blue Ridge. The lowest point along the Parkway in this section is near the junction of State Route 18 at an altitude of about 2,840 ft. As the Parkway continues west, it crosses Laurel Fork near the end of this section. Both Laurel Fork and Meadow Fork are tributary to New River (Gulf of Mexico drainage).

The rocks in this section of the Parkway are composed of laminated gneiss and mica schist of the Alligator Back Formation.

The Bluff Maintenance Area of the Park Service is located near Milepost 245 and contains shop facilities for the maintenance of the Parkway. The water supply for these facilities is well Al-1 with spring Wi-104 (located in fig. 16 and described on p. 37) serving as an auxiliary source of water. The ground-water supply shown on figure 17 is:

Well Al-1 (362326081121701) - drilled about 1946; owner, National Park Service; depth, 190 ft; diameter, 6 in; depth cased, unknown; yield, 7 gal/min for 52 hours during a test; water used for maintenance facilities.

An almost continuous area favorable for the development of ground-water supplies is available to the Parkway in Meadow Fork valley, its tributary valley and in a small area of Laurel Fork valley. Sustained yields of 25 gal/min or more are possible from wells in these areas, expecially where inferred fracture zones extend under the broad valley.



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

AI-1
Well and number

ROCK UNITS

abg Laminated gneiss of the Alligator Back Formation

abs Mica schist of the Alligator Back Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

Boundary of the Blue Ridge Parkway

245 NPS Milepost

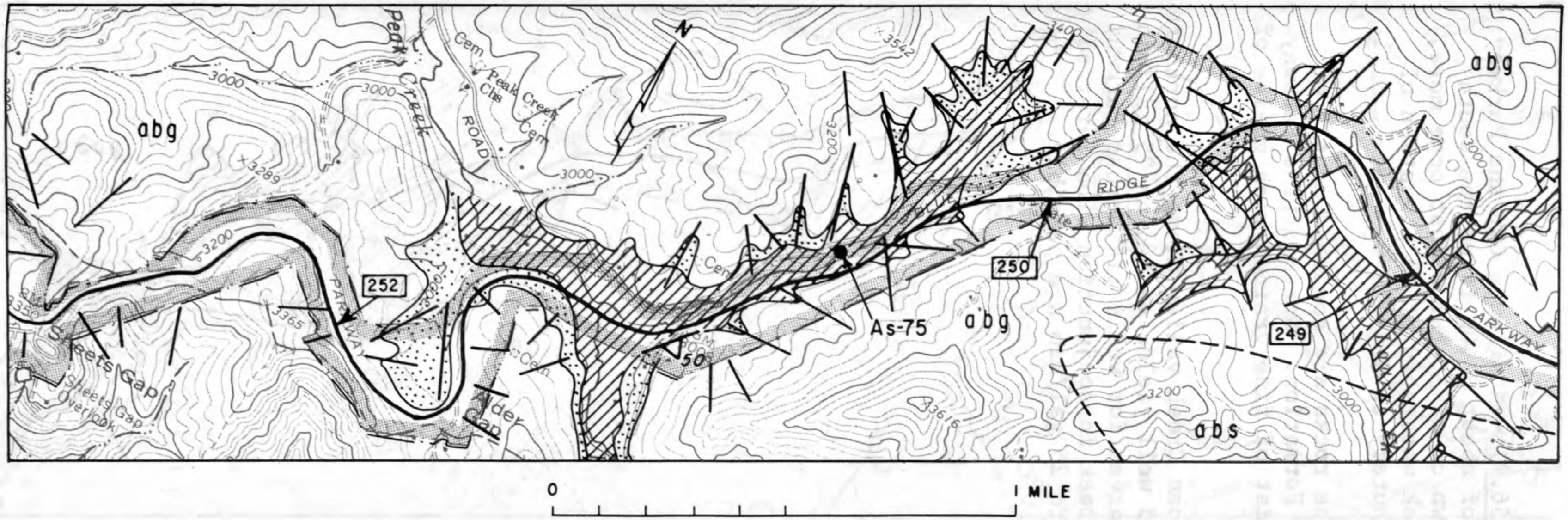
Figure 17.--Bluff Maintenance area (Miles 245.0 to 249.0).

Alder Gap Area (Miles 249.0 to 252.8).--From Laurel Fork the Parkway rises to the divide between Laurel Fork and Peak Creek at an altitude of about 3,200 ft. Following a southwesterly course the Parkway descends a tributary valley of Peak Creek, crosses Peak Creek, and rises to Alder Gap and to Sheets Gap at an altitude of about 3,350 ft (fig. 18). All of the rocks along this section of the Parkway are laminated gneiss of the Alligator Back Formation. Exposures of mica schist of the Alligator Back Formation occur south of the Parkway near Milepost 249.

The developed ground-water source shown in figure 18 is:

Well As-75 (362246081165001) - drilled in 1960; owner, Kennley Lyalls; depth, 119 ft; diameter, 5.6 in; depth cased, 57 ft; yield, 20 gal/min, reported; water used for domestic supply.

Good areas for wells occur along Laurel Fork and its tributary valleys, and Peak Creek and its tributary valley. The casing depth of well As-75 indicates saprolite thickness may be as much as 60 ft, which would be a favorable storage factor. Sustained well yields in excess of 25 gal/min should be possible in this area, especially where inferred fracture zones extend under the valley flats.



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

As-75
● Well and number

ROCK UNITS

abg Laminated gneiss of the Alligator Back Formation

abs Mica schist of the Alligator Back Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

50 Strike and dip of foliation

Boundary of the Blue Ridge Parkway

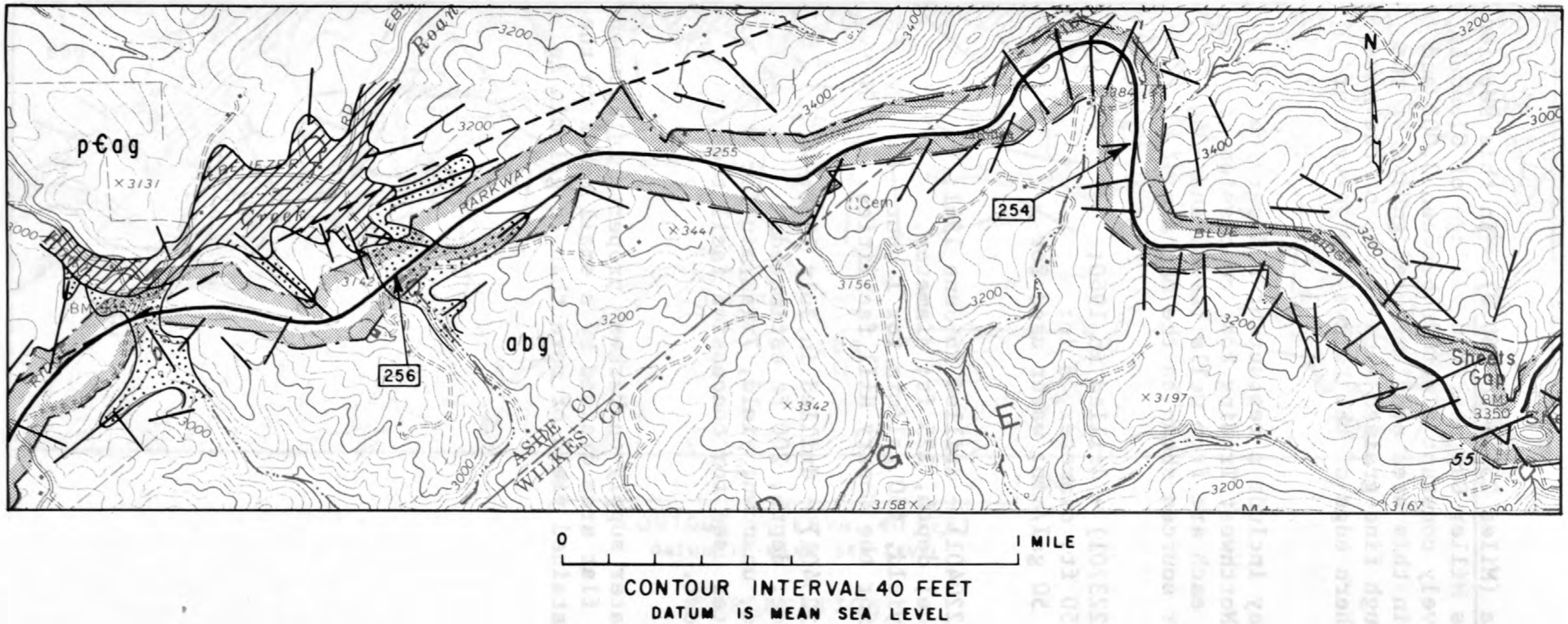
250 NPS Milepost

Figure 18.--Alder Gap area (Miles 249.0 to 252.8).

Roan Creek Area (Miles 252.8 to 256.9).--At Sheets Gap the Parkway turns northwest, rises to an altitude of about 3,400 ft on the south flank of Rattlesnake Mountain (not shown on map), turns west once more, and gradually descends to the Roan Creek watershed at an elevation of 3,050 ft (fig. 19). Roan Creek is tributary to New River.

In this section of the Parkway, the rocks are composed mostly of laminated gneiss of the Alligator Back Formation. North of the Parkway in the Roan Creek area, the rocks consist of fine-grained mica gneiss of the Ashe Formation of Precambrian age.

Good areas for wells are in the Roan Creek valley along the northern edge of the Parkway property; sustained well yields exceeding 25 gal/min may be expected in these areas. Fair areas for wells lie across Parkway property in several places near Roan Creek in conjunction with inferred fracture zones. Here, well yields up to 25 gal/min are possible.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Boundary of Blue Ridge Parkway

254 NPS Milepost

ROCK UNITS

abg Laminated gneiss of the Alligator Back Formation

pЄag Mica gneiss of the Ashe Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

55 Strike and dip of foliation

Figure 19.--Roan Creek area (Miles 252.8 to 256.9).

Northwest Trading Post Area (Miles 256.9 to 260.8).--In this section the Parkway turns south, crosses Miller Gap near the village of Glendale Springs, and maintains a relatively constant altitude between 3,000 and 3,100 ft (fig. 20). The rocks in this area are laminated gneiss of the Alligator Back Formation, although fine-grained mica gneiss of the Ashe Formation occurs along the northern edge of the Parkway property near Cherry Hill.

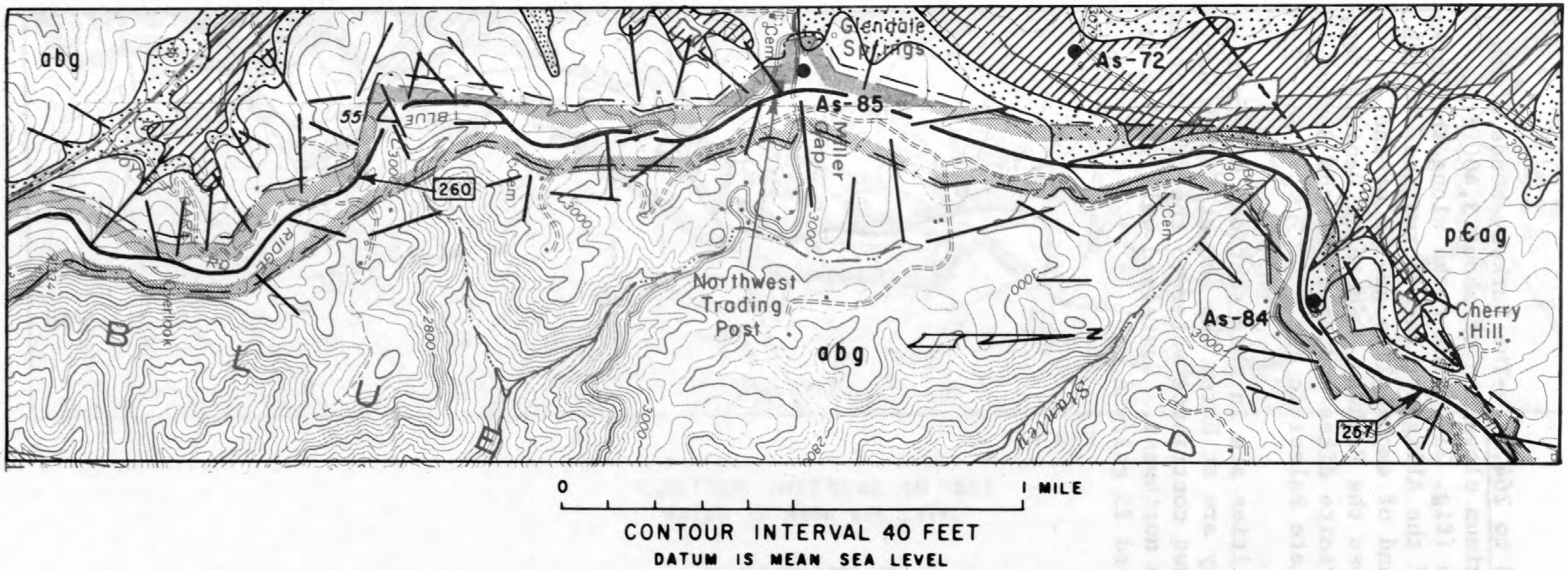
Facilities along the Parkway include a restaurant and service station at Cherry Hill and the Northwest Trading Post concession at Miller Gap. Water supplies for each are from wells (As-84 and -85, respectively). The ground-water sources shown on the map are:

Well As-72 (362109081223701) - drilled in 1960; owner, Joe Craven; depth, 50 ft; diameter, 5 in; depth cased, 28 ft; yield, 50 gal/min; water used for domestic supply.

Well As-84 (362137081220401) - drilled in June 1961; owner, National Park Service; depth, 125 ft; diameter, 6 in; depth cased, 47 ft; yield, 150 gal/min for 1 hour during a test; water used for the Cherry Hill facilities.

Well As-85 (362038081223401) - drilled in July 1958; owner, National Park Service; depth, 200 ft estimated; diameter, 6 in; depth cased, unknown; yield, 7 gal/min for 0.5 hour during a test; water used for concession facilities at the Northwest Trading Post.

A good area for a ground-water supply on Parkway property is between Cherry Hill and Miller Gap in a flat area drained by a small creek on the west side of the Parkway. A sustained yield of more than 25 gal/min is likely in this area.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

As-72
Well and number

ROCK UNITS

abg Laminated gneiss of the Alligator Back Formation

p€ag Mica gneiss of the Ashe Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

55 Strike and dip of foliation

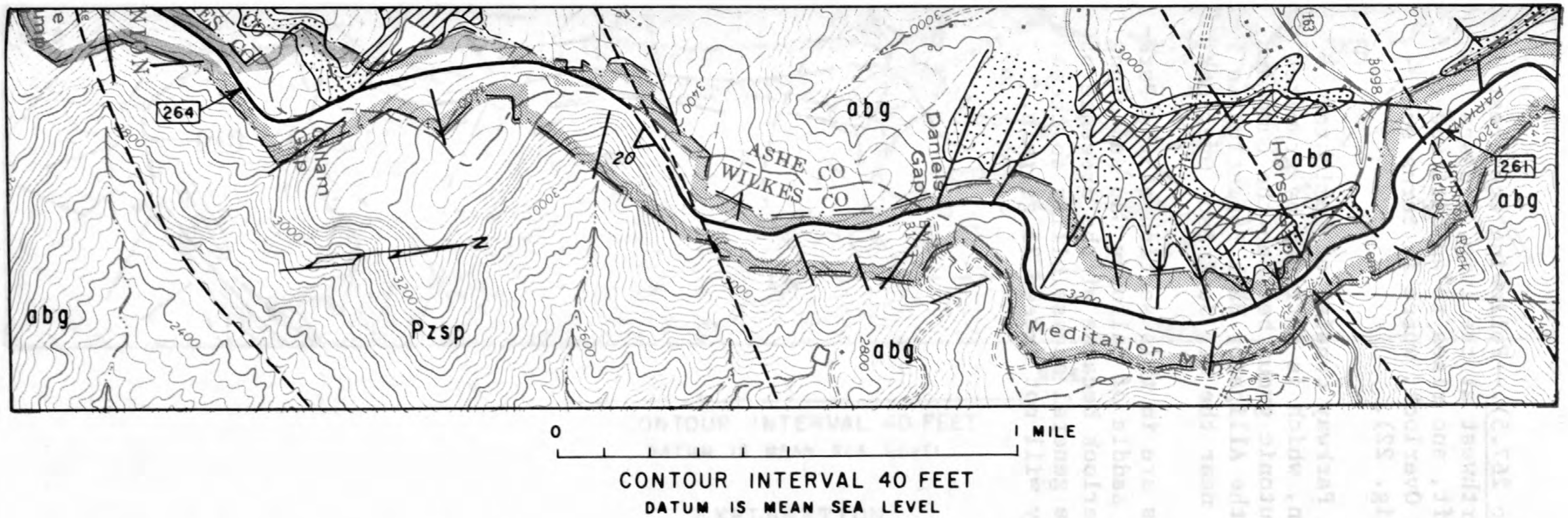
Boundary of the Blue Ridge Parkway

260 NPS Milepost

Figure 20.--Northwest Trading Post area (Miles 256.9 to 260.8).

Daniels Gap Area (Miles 260.8 to 264.2).--The Parkway heads south in this section and rises to a maximum elevation of about 3,400 ft between Daniels Gap and Gillam Gap (fig. 21). The rocks along the Parkway are mostly laminated gneiss of the Alligator Back Formation. North of Horse Gap, however, a narrow band of amphibolite gneiss of the Alligator Back Formation cuts across the Parkway. South of Daniels Gap, laminated gneiss is intruded by granite dikes and sills of the Spruce Pine plutonic group of middle or late Paleozoic age.

No developed recreation facilities are in this section, but fair areas for wells on Parkway property are at Horse Gap and at Gillam Gap, where fracture zones in upland draws contribute water to the tributaries of Obids Creek which drains to the northwest. Sustained well yields in these areas are not likely to exceed 25 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

- Good
- Fair
- Inferred fractures

ROCK UNITS

- aba — Amphibolite gneiss of the Alligator Back Formation
- abg — Laminated gneiss of the Alligator Back Formation
- Pzsp — Granite dikes and sills of the Spruce Pine plutonic group

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

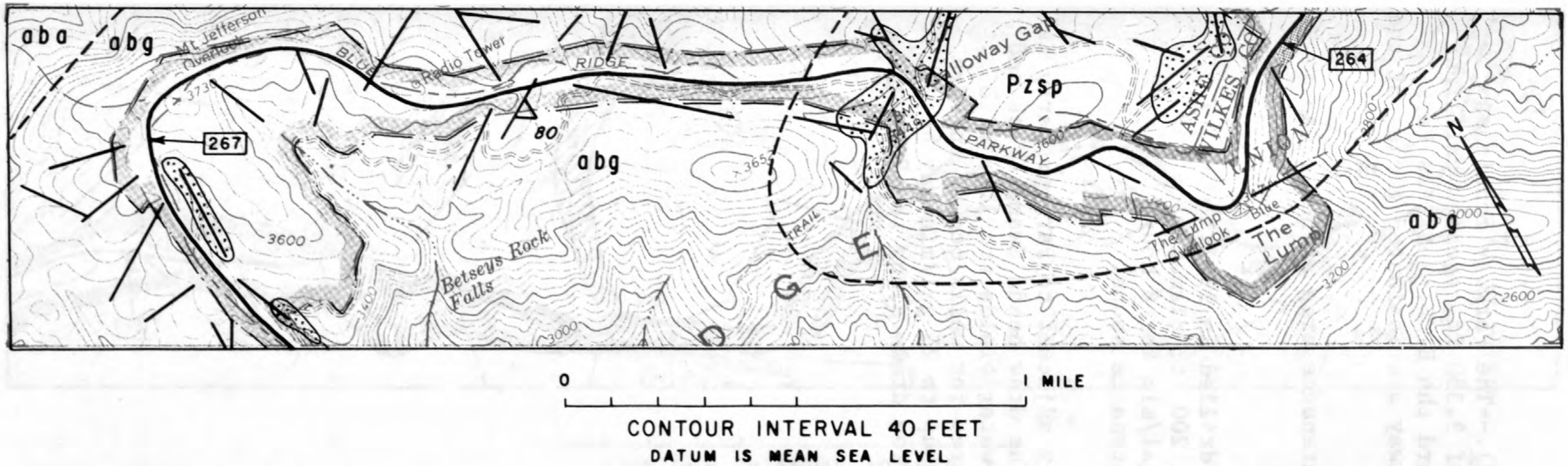
- Approximate boundary between rock units
- 20 Strike and dip of foliation
- Boundary of the Blue Ridge Parkway
- 261 NPS Milepost

Figure 21.--Daniels Gap area (Miles 260.8 to 264.2).

Calloway Gap Area (Miles 264.2 to 267.5).--Following the crest of the Blue Ridge, the Parkway swings northwest at the Lump, crosses Calloway Gap at an altitude of 3,450 ft, and rises to an altitude of about 3,700 ft near the Mt. Jefferson Overlook, where it turns southwest and descends toward Benge Gap (fig. 22).

The rocks in this section of the Parkway consist of laminated gneiss of the Alligator Back Formation, which is intruded by granite dikes and sills of the Spruce Pine plutonic group between the Lump and Calloway Gap. Amphibolite gneiss of the Alligator Back Formation is shown on the map north of the Parkway near the Mt. Jefferson Overlook.

No developed ground-water sources are in this section of the Parkway. Fair areas for wells are in the saddle of Calloway Gap and along the Parkway south of Mt. Jefferson Overlook because of the presence of draws, intersecting fractures, and the general accessibility to these areas. Sustained well yields probably will not exceed 25 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

Fair

Inferred fractures

ROCK UNITS

aba — Amphibolite gneiss of the Alligator Back Formation

abg — Laminated gneiss of the Alligator Back Formation

Pzsp — Granite dikes and sills of the Spruce Pine plutonic group

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

80 Strike and dip of foliation

Boundary of the Blue Ridge Parkway

264 NPS Milepost

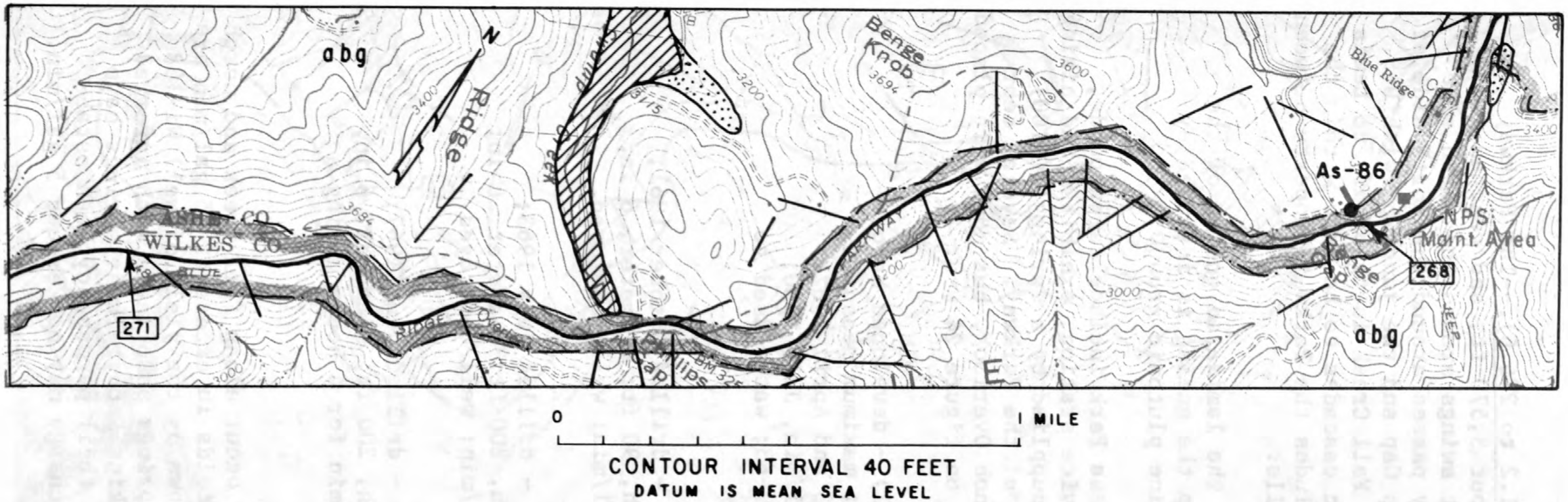
Figure 22.--Calloway Gap area (Miles 264.2 to 267.5).

Benge Gap Area (Miles 267.5 to 271.2).--The Parkway continues southwest from Benge Gap at an altitude of 3,350 ft, crosses Phillips Gap (3,200 ft), and gradually climbs toward the E. B. Jeffress Park area (fig. 23). The rocks along the Parkway are laminated gneiss of th Alligator Back Formation.

The National Park Service Benge Maintenance area at Benge Gap is served by a well:

Well As-86 (361649081245501) - drilled in 1963; owner, National Park Service; depth, 200 ft; diameter, 6 in; depth cased, 38 ft; yield, 4 gal/min for 8 hours during a test; water supply for maintenance shops.

A good area for a ground-water supply adjacent to Park property is in a broad draw north of Phillips Gap. The draw heads Swamp Creek and is accessible by road. Sustained ground-water yields are likely to exceed 25 gal/min in this area. A fair area for wells occurs on Park property north of Benge Gap. Well yields up to 25 gal/min may be expected here and also in a number of narrow draws along the Parkway.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

As-86
● Well and number

ROCK UNITS

abg Laminated gneiss of the Alligator Back Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

Boundary of the Blue Ridge Parkway

271 NPS Milepost

Figure 23.--Benge Gap area (Miles 267.5 to 271.2).

E. B. Jeffress Park Area (Miles 271.2 to 276.6).--The Parkway crosses Fall Creek at an altitude of about 3,570 ft, and reaches a maximum altitude of about 3,900 ft as it swings around the north side of Tompkins Knob (fig. 24). The Parkway passes around the north side of Fire Scale Mountain and descends to Deep Gap and the junction with U.S. 421 at an elevation of about 3,140 ft. Fall Creek is tributary to Lewis Fork and the Yadkin River and has scenic cascades to be seen within the Park area. Jeffress Park generally includes the Parkway property betwee Deep Gap and the vicinity of Cascade Falls.

The rocks within Jeffress Park are the laminated gneiss of the Alligator Back Formation. Near Deep Gap the gneiss is intruded by granite dikes and sills of the Spruce Pine plutonic group.

The recreation facilities at Jeffress Park include campgrounds, picnic areas, snack shop and store, service station, exhibits, and hikin trails. Water for these facilities is supplied by a spring (Wi-100) located near mile 273 on the south side of the Parkway. Several test wells have been drilled near Tompkins Knob Overlook, but none were place in use. The ground-water sources shown on figure 24 are:

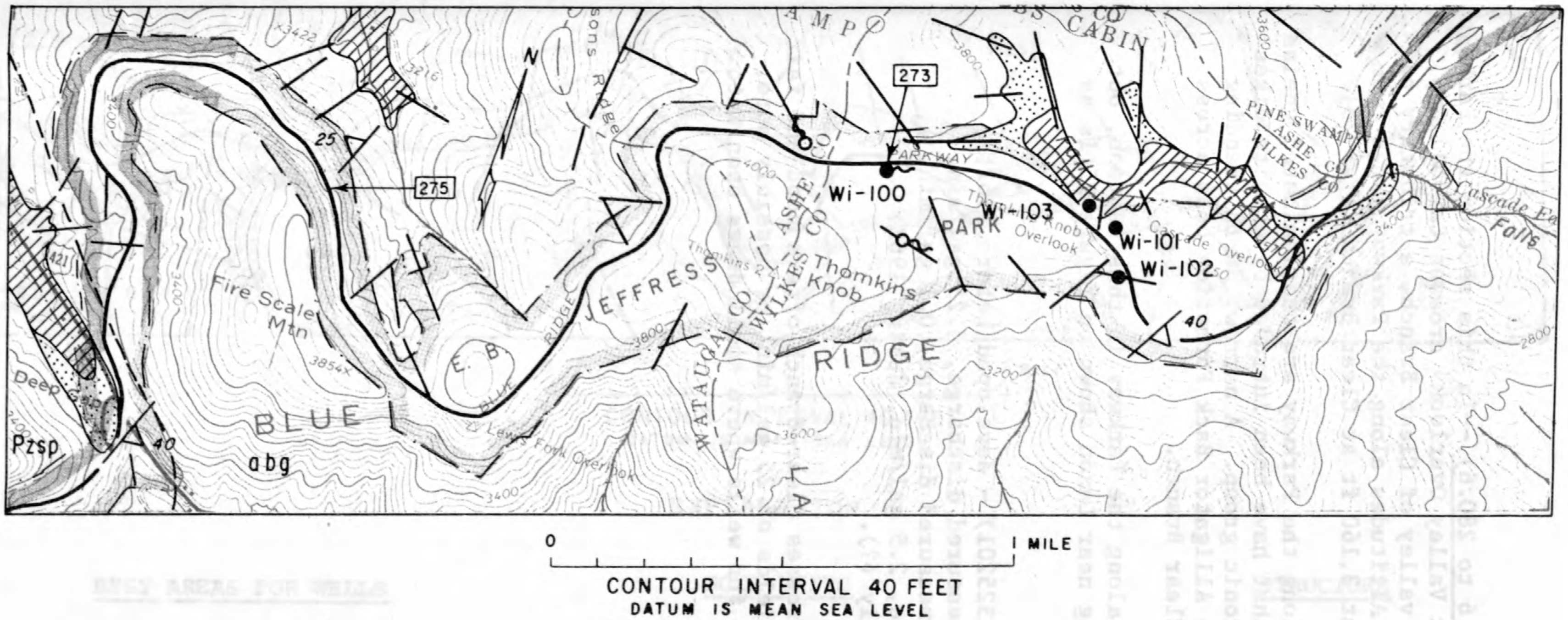
Spring Wi-100 (361439081282901) - developed before 1959; owner, National Park Service; maximum measured discharge, 9.75 gal/min, March 1963 and April 1962; minimum measured discharge, 3.0 gal/min, July 1960; median discharge, 6.5 gal/min, 1959-63; water used to supply facilities at Jeffress Park.

Well Wi-101 (361451081275601) - drilled October 1961; owner, National Park Service; depth, 90 ft; diameter, 6 in; depth cased, unknown; yield, 18 gal/min; well destroyed.

Well Wi-102 (361436081275401) - drilled July 1963; owner, National Park Service; depth, 200 ft; diameter, 6 in; depth cased, unknown; yield, 2 gal/min; well destroyed.

Well Wi-103 (361442081275501) - drilled June 1967; owner, National Park Service; depth, 200 ft; diameter, 6 in; depth cased, 29 ft; yield, 45 gal/min for 4 hours during a test; well capped and not in use.

Both good and fair areas for wells occur along Fall Creek and north and west of Deep Gap. Sustained well yields in excess of 25 gal/min are possible in good areas for wells, as shown by the yield of well Wi-103 located near Fall Creek. Undeveloped springs associated with inferred fractures occur in the vicinity of Tompkins Knob. These springs have been neither measured for flow, nor has their permanency been established, but their estimated average discharge may not exceed 5 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Wi-101
Well and number

Wi-100
Developed spring and number

Undeveloped spring

ROCK UNITS

abg — Laminated gneiss of the Alligator Back Formation

Pzsp — Granite dikes and sills of the Spruce Pine plutonic group

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

40 Strike and dip of foliation

Boundary of the Blue Ridge Parkway

275 NPS Milepost

Figure 24.--E. B. Jeffress Park area (Miles 271.2 to 276.6).

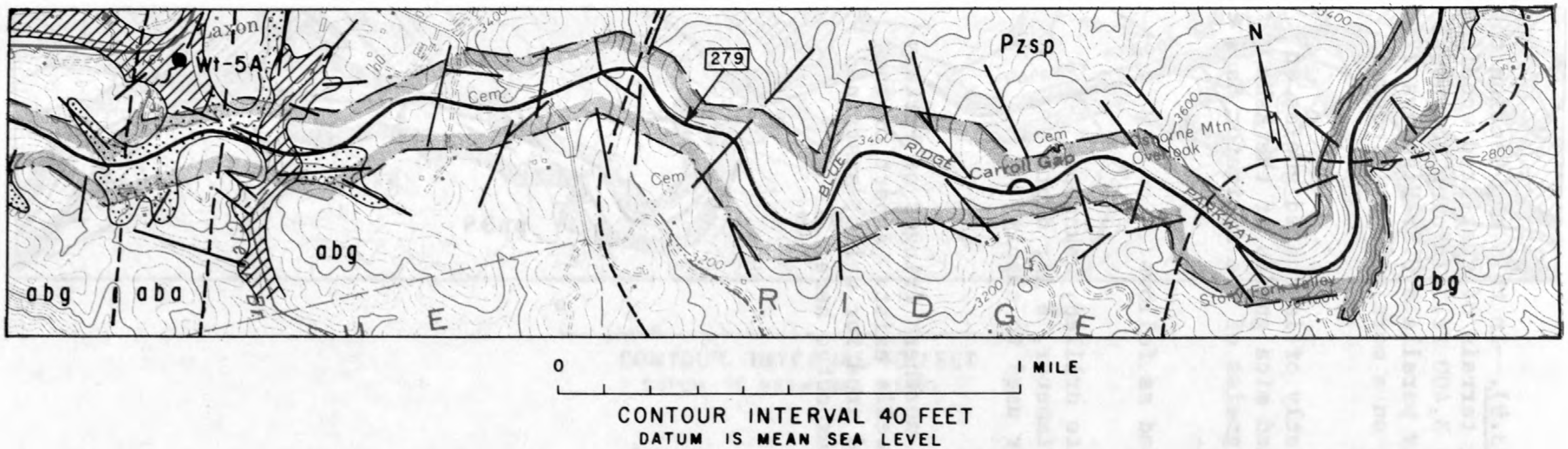
Carroll Gap Area (Miles 276.6 to 280.6).--In this section the Parkway heads nearly west from Stony Fork Valley Overlook crosses Carroll Gap, and descends to the small stream valley of Clear Branch, a tributary to Elk Creek and the Yadkin River. Altitudes along the Parkway range from 3,480 ft near Carroll Gap to about 3,160 ft at Clear Branch (fig. 25).

Most of the rocks exposed along the Parkway are the laminated gneiss of the Alligator Back Formation that have been intruded by granite dikes and sills of the Spruce Pine plutonic group. A narrow, north trending band of amphibolite gneiss of the Alligator Back Formation cuts across the Parkway just to the west of Clear Branch.

No developed facilities are along the Parkway in this section, but the record of one developed spring near Laxon shown on figure 25 is as follows:

> Spring Wt-5A (361357081325201) - developed before 1962; owner, Z. Ticknor; maximum measured discharge, 3.25 gal/min, April and May 1962; minimum measured discharge, 0.1 gal/min, August 1962; median discharge, 2.5 gal/min, during 1962; water used for domestic supply (?).

The area where the Parkway crosses Clear Branch offers good and fair locations for wells. Sustained yields of 25 gal/min, or possibly more, can be expected in the good areas for wells where small draws open into the valley.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Wt-5A
Developed spring and number

ROCK UNITS

aba — Amphibolite gneiss of the Alligator Back Formation

abg — Laminated gneiss of the Alligator Back Formation

Pzsp — Granite dikes and sills of the Spruce Pine plutonic group

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

Boundary of the Blue Ridge Parkway

279 — NPS Milepost

Figure 25.--Carroll Gap area (Miles 276.6 to 280.6).

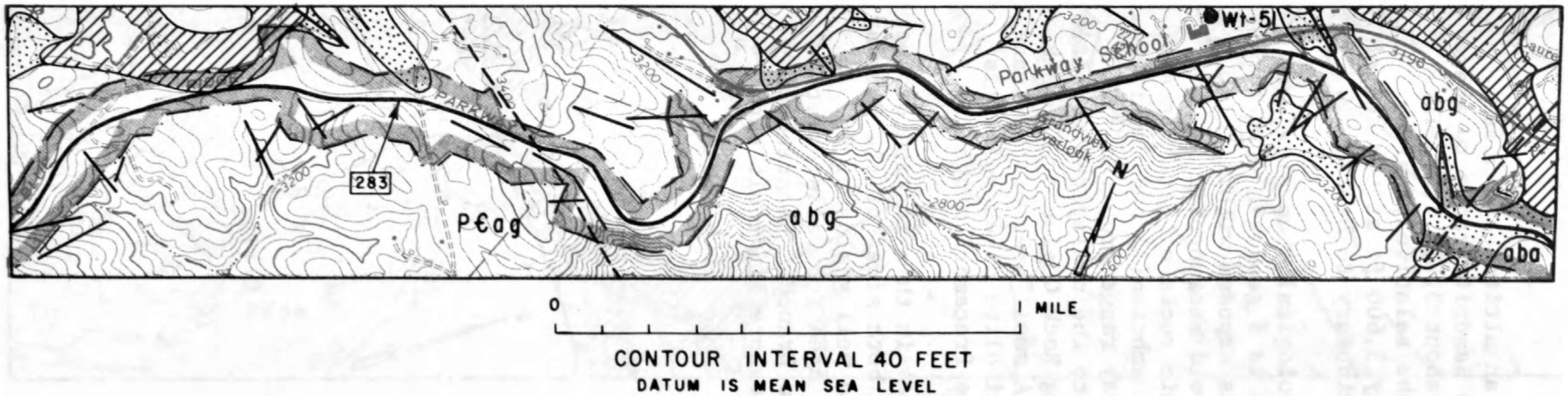
Parkway School Area (Miles 280.6 to 283.9).--In this map section th Parkway begins a traverse of gently rolling terrain of scattered woodlan and farmland at altitudes of about 3,200 to 3,400 ft. Turning southwest near the Parkway School, the Parkway closely parallels U.S. Highways 221 and 421 for more than a mile before turning on a more southerly course (fig. 26).

The rocks along the Parkway consist mostly of laminated gneiss of the Alligator Back Formation and fine-grained mica gneiss of the Ashe Formation. A small section of amphibolite gneiss of the Alligator Back Formation occurs east of the Parkway School.

The well shown on figure 26 is described as follows:

Well Wt-51 (361356081331501) - date drilled, unknown; owner, Parkway School; depth 400 ft; diameter, 6 in; depth cased, unknown; yield, 4 gal/min; water used to supply school.

Several small stream valleys skirt the northern fringes of Parkway property where fair and good locations for wells exist. A part of the Parkway property near Milepost 283 is a good area for wells; sustained well yields of 25 gal/min, or more, can be expected here.



EXPLANATION

BEST AREAS FOR WELLS

- Good
- Fair
- Inferred fractures
- Wt-51 ● Well and number

ROCK UNITS

- aba — Amphibolite gneiss of the Alligator Back Formation
- abg — Laminated gneiss of the Alligator Back Formation
- p€ag — Mica gneiss of the Ashe Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

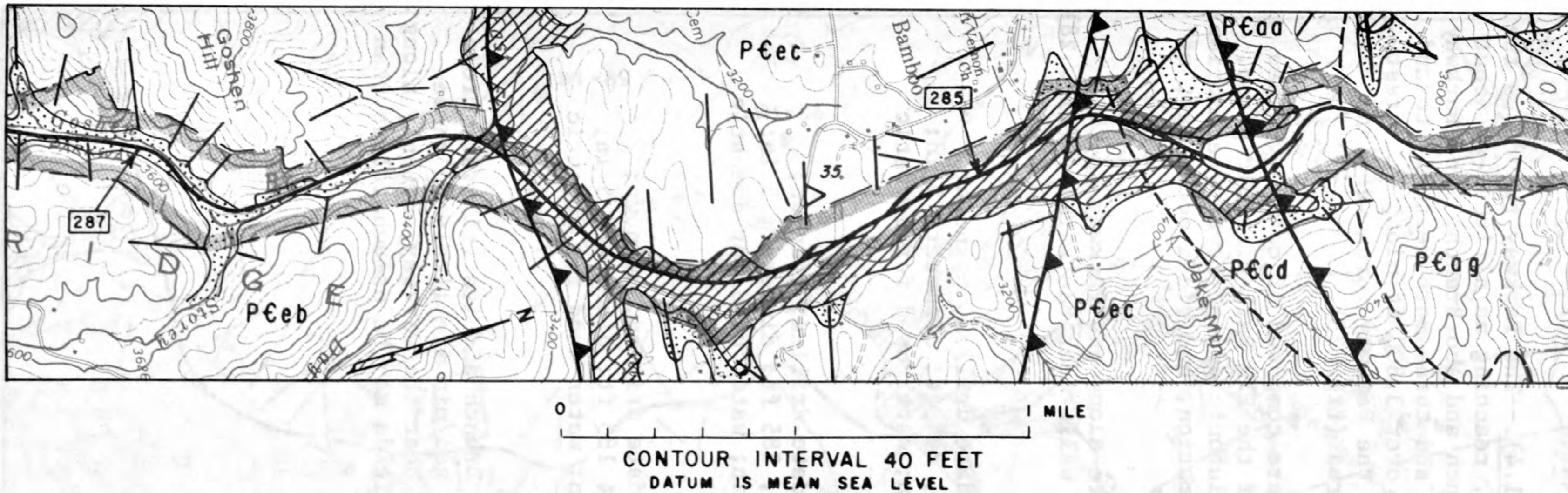
- Approximate boundary between rock units
- Boundary of the Blue Ridge Parkway
- 283 NPS Milepost

Figure 26.--Parkway School area (Miles 280.6 to 283.9).

Bamboo Area (Miles 283.9 to 287.3).--From an altitude of about 3,400 ft, the Parkway descends to and parallels Sandpit Branch to where it joins East Fork and Goshen Branch (altitude about 3,200 ft). The Parkway continues in a southerly direction up the relatively narrow valley of Goshen Branch to an altitude of nearly 3,600 ft at the end of this section (fig. 27). All the streams are tributary to New River.

Near Jake Mountain the Parkway enters a geologically complex area known as the Grandfather Mountain window, which is a geologic structure bounded by a series of thrust faults. The rocks exposed within this window consist chiefly of 1,000 - million-year-old metamorphic and plutonic basement rocks, sedimentary and volcanic rocks of late Precambrian age, and some sedimentary rocks of Early Cambrian(?) and Cambrian age. The rocks along this section of the Parkway range from the mica and amphibolite gneisses of the Ashe Formation to the nonlayered granitic gneisses of the Cranberry Gneiss and the Blowing Rock Gneiss of the Elk Park plutonic group of early Precambrian age. A small area of the Cranberry Gneiss is intruded by greenstone and amphibolite dikes and sills of the Crossnore plutonic-volcanic group of late Precambrian age.

There are no developed recreation facilities in this section of the Parkway, although good areas for wells occur on both sides of the Parkway in a 2-mi reach along Sandpit Branch. Sustained well yields of 25 gal/min, or more, can be expected here. A fair area for wells exists along the Parkway in the narrow valley of Goshen Branch. Locating an accessible well site along Goshen Branch will be more difficult than along Sandpit Branch.



EXPLANATION

BEST AREAS FOR WELLS

- Good
- Fair
- Inferred fractures
- Boundary of the Blue Ridge Parkway
- 287 NPS Milepost

ROCK UNITS

- pЄaa Amphibolite gneiss of the Ashe Formation
- pЄag Mica gneiss of the Ashe Formation
- pЄcd Greenstone and amphibolite dikes and sills of the Crossnore plutonic-volcanic group
- pЄeb Blowing Rock Gneiss of Elk Park plutonic group
- pЄec Cranberry Gneiss of Elk Park plutonic group

STRUCTURE

- Approximate boundary between rock units
- 35 Strike and dip of foliation
- Thrust fault
  Dashed where approximately located or inferred. Sawteeth on upper plate

See table 6 for a generalized correlation and table 7 for a description of rock units

Figure 27.--Bamboo area (Miles 283.9 to 287.3).

Thunder Hill Area (Miles 287.3 to 291.4).--The Parkway traverses the valley of Goshen Branch to its headwaters, reaching an altitude of about 3,700 ft at the divide between Goshen Branch and Aho Branch. The Parkway crosses Aho Branch and a small tributary, and turns more westerly toward Thunder Hill reaching an altitude of just over 3,800 ft along the crest of the Blue Ridge. South of Thunder Hill the Parkway turns west and gradually descends toward the Cone Park area (fig. 28).

The rocks exposed along the Parkway are composed of coarse-grained augen gneiss of the Blowing Rock Gneiss of the Elk Park plutonic group. The Wilson Creek Gneiss of the Elk Park plutonic group (Lower Precambrian and rocks of the Grandfather Mountain Formation, undivided occur east of the Parkway.

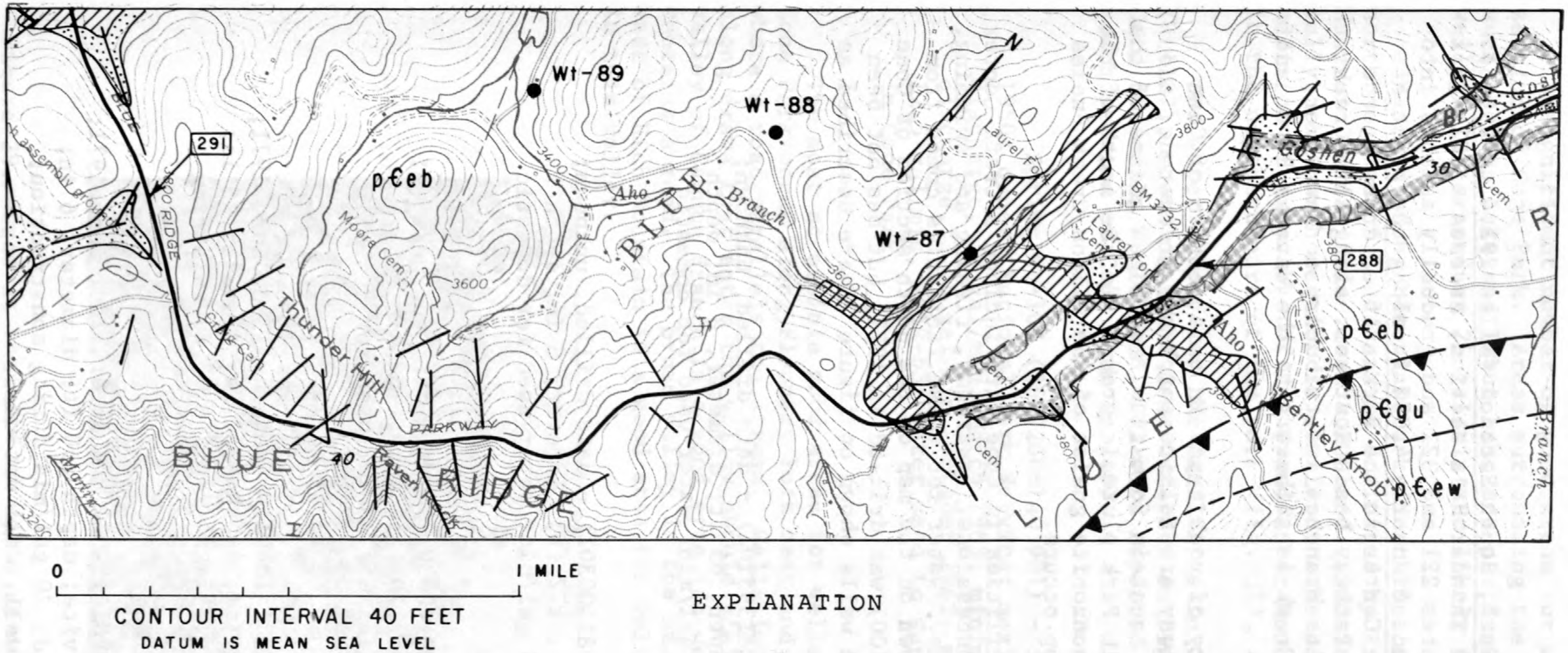
No developed recreation facilities are along the Parkway in this section; however, several privately owned wells near the Parkway (fig. 28 are described as follows:

Well Wt-87 (360918081373901) - date drilled, unknown; owner, Demette Realty Company; depth, 245 ft; diameter, 5 in; depth cased, 16 ft; yield, 11 gal/min; water used for domestic supply.

Well Wt-88 (360913081381001) - date drilled, unknown; owner, Demette Realty Company; depth, 285 ft; diameter, 5 in; depth cased, 23 ft; yield, 2.5 gal/min; water used for domestic supply.

Well Wt-89 (360858081383801) - date drilled, unknown; owner, Demette Realty Company; depth, 185 ft; diameter, 5 in; depth cased, 14 ft; yield, 10 gal/min; water used for domestic supply.

Good areas for wells occur where Aho Branch and its tributary cross the Parkway. Sustained well yields of 25 gal/min are likely in these areas. Several fair areas exist along or near the Parkway, notably along Goshen Branch and its headwaters, where yields may be somewhat less than 25 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Wt-88 Well and number

Boundary of the Blue Ridge Parkway

291 NPS Milepost

ROCK UNITS

p€eb Blowing Rock Gneiss of the Elk Park plutonic group

p€ew Wilson Creek Gneiss of the Elk Park plutonic group

p€gu Grandfather Mountain Formation, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

40 Strike and dip of foliation

Thrust fault
Dashed where approximately located or inferred. Sawteeth on upper plate

Figure 28.--Thunder Hill area (Miles 287.3 to 291.4).

Moses H. Cone Memorial Park, South Section (Miles 291.4 to 295.5).--The Parkway descends from the Thunder Hill section, crosses Middle Fork at the junction with U.S. Routes 221 and 321 and gradually ascends into Cone Park, reaching an altitude of nearly 4,000 ft along the crest of the Blue Ridge near the Craft Center in the Park. After crossing the Tennessee Valley Divide, the Parkway heads southwest along Sims Creek (fig. 30). Middle Fork and its branches are tributary to New River (Ohio River drainage); Sims Creek is tributary to the Watauga River and the Tennessee River drainage.

There is a wide diversity of rock types in this section of Cone Park. Exposed along the Parkway are felsite porphyry, greenstone, and siltstone of the Grandfather Mountain Formation, and augen gneiss of the Blowing Rock Gneiss of the Elk Park plutonic group. To the south of the Parkway in Cone Park quartz monzonite gneiss of the Wilson Creek Gneiss of the Elk Park plutonic group occurs.

Developed recreation facilities in Cone Park include a Craft Center (formerly the Cone Manor), concessions, restrooms, fishing and swimming, nature trail, and bridle paths. Water for these facilities comes from the Cone Spring (Wt-107), shown on the map of the north section of Cone Park (fig. 31). A well (Wt-100) was drilled in 1971, but has not been placed in use (fig. 29). The wells shown on figure 30 are described as follows.

Well Wt-91 (360910081395101) - date drilled, unknown; owner, C. Hollifield; depth, 65 ft; diameter, 8 in; depth cased, 65 ft; yield, 10 gal/min; water used for domestic supply.

Well Wt-92 (360850081400301) - date drilled, unknown; owner, R. Colvard; depth, 172 ft; diameter, 6 in; depth cased, 100 ft; yield, 35 gal/min; water used for domestic supply.

Well Wt-93 (363826081400801) - date drilled, unknown; owner, E. C. Coker; depth, 70 ft; diameter, 6 in; depth cased, 47 ft; yield, 20 gal/min; water used for domestic supply.

Well Wt-100 (360907081413401) - date drilled, June 1971; owner, National Park Service; depth, 250 ft; diameter, 6 in; depth cased, 24 ft; yield, 41 gal/min for 13 hours during test; well not in use.

Well Wt-101 (360907081413402) - date drilled, June 1971; owner, National Park Service; depth 250 ft; diameter, 6 in; depth cased, 16 ft; yield, 20 gal/min during construction; water level observation well, well not used.

A significant number of good areas for wells exist in the south section of Cone Park. Areas surrounding the numerous lakes and ponds such as Bass Lake and Trout Lake are particularly good, and sustained well yields exceeding 25 gal/min are likely in these areas.

Moses H. Cone Memorial Park, North Section.--The topography in the north section of Cone Park is dominated by Rich Mountain and Flat Top Mountain at altitudes over 4,200 and 4,500 ft, respectively. Geologically, the north section is similar to the south section, with the addition of graywacke of the Grandfather Mountain Formation that occurs in the northern part of the park (fig. 31).

The water supply for the facilities in Cone Park is Cone Spring (Wt-107), shown near the Cone Cemetery on figure 31 and summarized below. Data for wells Wt-100 and -101 were reported in the description of the south section of Cone Park (p. 66).

> Spring Wt-107 (360926081405901) - developed before 1950; owner, National Park Service; maximum measured discharge, 30 gal/min, March 1963; minimum measured discharge, 3.25 gal/min, October 1962; median discharge, 12.5 gal/min, 1959-63; water used to supply facilities in Cone Park.

The most accessible good areas for wells in the north section of Cone Park occur along Flannery Fork near and upstream from Trout Lake where a road parallels the stream. Wells located in fracture zones along draws that enter the valley should yield 25 gal/min or more. The valley of Cannon Branch is a good area for wells, and that valley also contains a road. The broad valley in the headwaters of Winkler Creek east of Rich Mountain is a good area for wells, but no access road is in this valley.

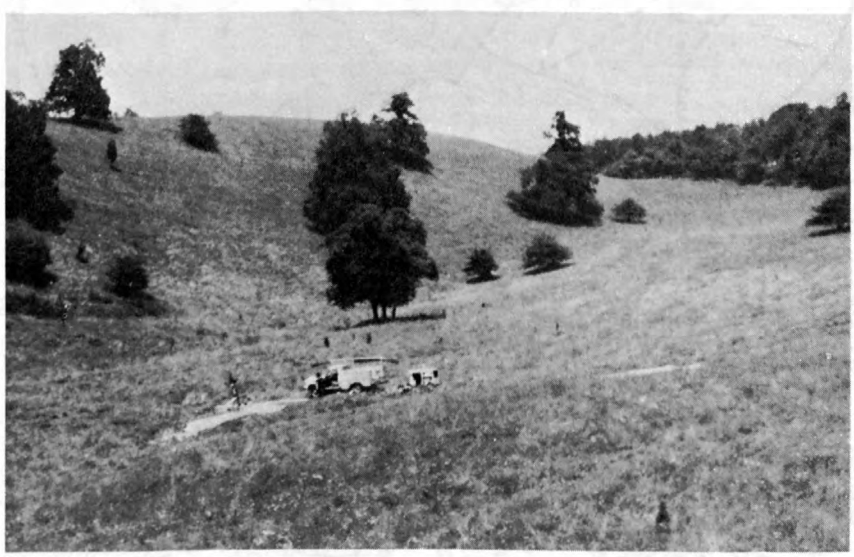
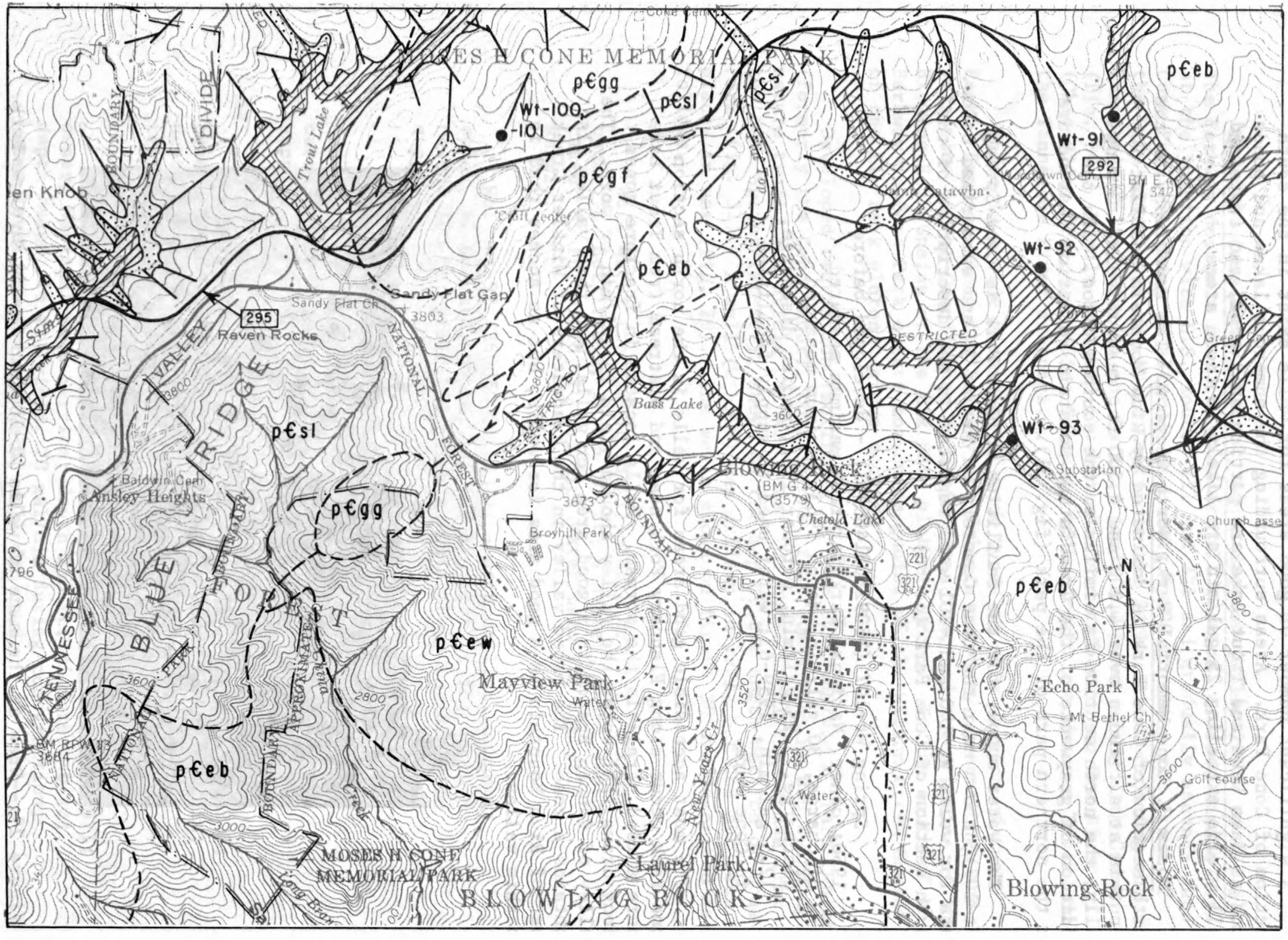


Figure 29.--Draw at the site of wells Wt-100 and Wt-101 in Cone Park.


MOSES H CONE MEMORIAL PARK
p€gg
p€sl
Wt-100,
-101
p€eb
Wt-91
292
p€gf
Wt-92
p€eb
Sandy Flat Gap
Sandy Flat Ch
3803
295
Raven Rocks
BLUE RIDGE
VALLEY
DIVIDE
BOUNDARY
Trout Lake
Bass Lake
RESTRICTED
Wt-93
Blowing Rock
Substation
Chetola Lake
Broyhill Park
Baldwin Cem
Ansley Heights
p€sl
p€gg
p€eb
p€ew
Mayview Park
Water
Echo Park
Mt Bethel Ch
Golf course
N
TENNESSEE
NATIONAL PARK
BLUE RIDGE FOREST
APPROXIMATE
BOUNDARY
p€eb
MOSES H CONE
MEMORIAL PARK
BLOWING ROCK
Laurel Park
New Years Cr
Blowing Rock
Water
Green Knob
Church

0 1 MILE

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION FOR FIGURE 30

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Wt-91
Well and number

ROCK UNITS

p€eb	Blowing Rock Gneiss of the Elk Park Plutonic Group
p€ew	Wilson Creek Gneiss of the Elk Park Plutonic Group
p€gf	Felsite porphyry of the Grandfather Mountain Formation
p€gg	Greenstone of the Grandfather Mountain Formation
p€sl	Siltstone of the Grandfather Mountain Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

Boundary of the Blue Ridge Parkway

295 NPS Milepost

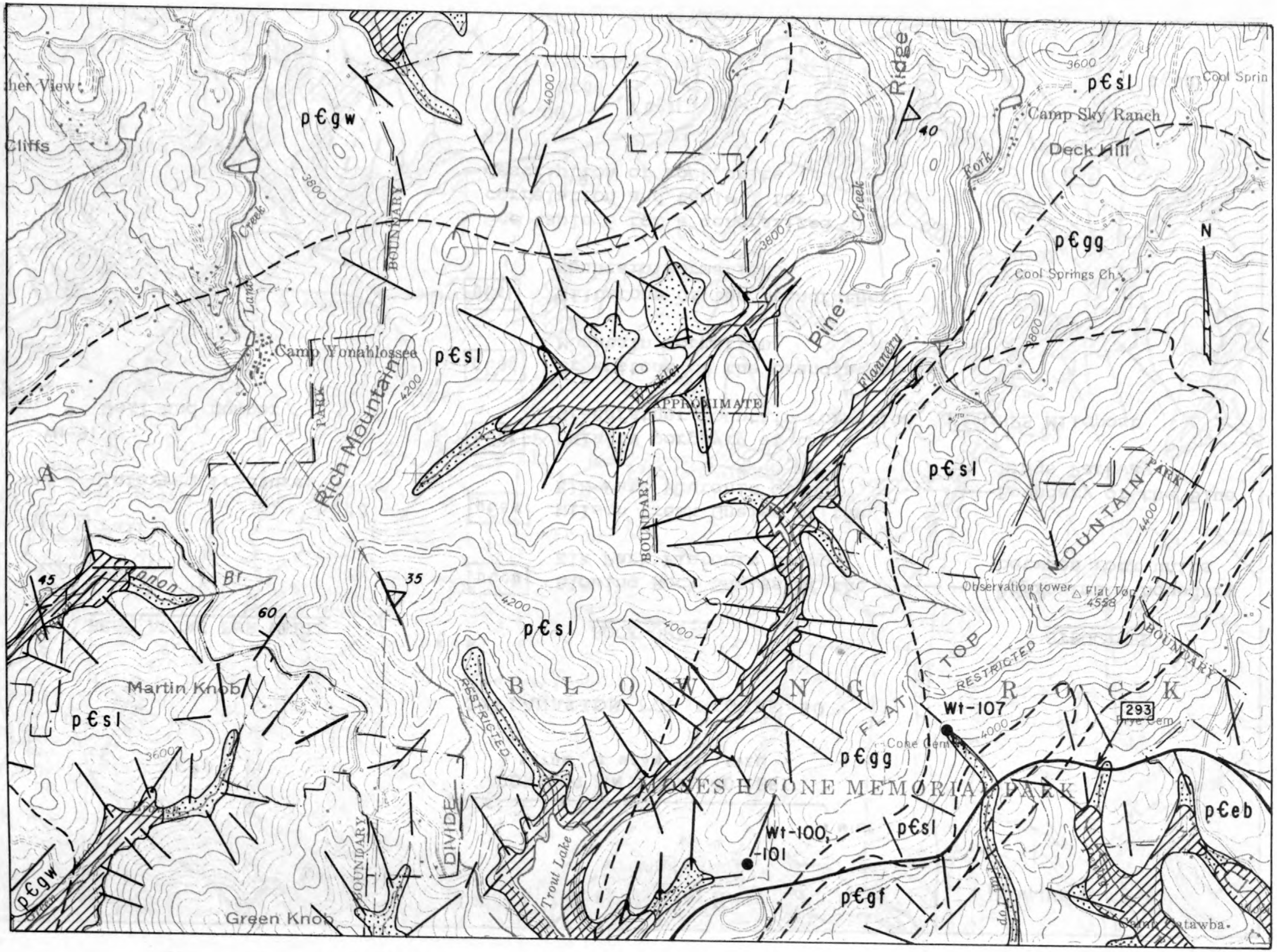


Figure 31.--Moses H. Cone Memorial Park, *north section.*

0 — 1 MILE

CONTOUR INTERVAL 40 FEET

DATUM IS MEAN SEA LEVEL

EXPLANATION FOR FIGURE 31

BEST AREAS FOR WELLS	ROCK UNITS		STRUCTURE
Good	p€eb	Blowing Rock Gneiss of the Elk Park Plutonic Group	Approximate boundary between rock units
Fair	p€gf	Felsite porphyry of the Grandfather Mountain Formation	35 Strike and dip of foliation
Inferred fractures	p€gg	Greenstone of the Grandfather Mountain Formation	45 Strike and dip of bedding
Wt-100 Well and number	p€gw	Graywacke of the Grandfather Mountain Formation	Boundary of the Blue Ridge Parkway
Wt-107 Developed spring and number	p€sl	Siltstone of the Grandfather Mountain Formation	293 NPS Milepost

See table 6 for a generalized correlation and table 7 for a description of rock units

<u>Julian Price Memorial Park (Miles 295.5 to 299.0)</u>.--Price Park lies immediately west of Cone Park. The Parkway descends from Sandy Flat Gap at an altitude of about 3,800 ft to the Price Lake area at an altitude of about 3,380 ft (fig. 32). Here, Price Lake has been formed by the damming of Boone Fork where the Parkway crosses this stream. In this area of Price Park a number of small streams join Boone Fork (and Price Lake) forming relatively flat broad flood plains adjacent to the Parkway. The Parkway continues westward, gradually ascending the valley of Cold Prong to an altitude of about 3,600 ft. All of these streams are tributary to the Watauga River, which is north of the Park.

Most of the rocks underlying Price Park are graywacke and siltstone of the Grandfather Mountain Formation. In several areas, these rocks are intruded by greenstone, amphibolite and metagabbro of the Crossnore plutonic-volcanic group, notably in the western half of the Price Lake Campground west of Pigpen Knob and in a narrow body extending from west of Bull Mountain northward across the Parkway.

Recreation facilities in Price Park include a campground, comfort stations, trails, boating, and fishing. Water for the facilities is supplied by two springs (Wt-109 and -110) and a well (Wt-111). The Sims House residence along Sims Creek is supplied by a spring (Wt-108). Two test wells and an observation well (Wt-99, -97 and -98) were constructed in 1970 to furnish water for proposed expanded facilities, but have not been placed in use. The wells and springs are shown on figure 32 and are summarized below:

Well Wt-97 (360753081452801) - date drilled, June 1970; owner, National Park Service; depth, 150 ft; diameter, 6 in; depth cased, 60 ft; maximum yield, 150 gal/min for 1 hour during development test; yields during pumping test ranged from 2 to 50 gal/min; well not in use.

Well Wt-98 (360753081452802) - date drilled, June 1970; owner, National Park Service; depth, 55 ft; diameter, 6 in; depth cased, 51 ft; yield, unknown; well used only for observation during test of Wt-97.

Well Wt-99 (360801081432201) - date drilled, June 1970; owner, National Park Service; depth, 155 ft; diameter, 6 in; depth cased, 61 ft; yield, 12 gal/min for 1 hour during test; well not used.

Spring Wt-108 (360816081431901) - developed before 1960; owner, National Park Service; discharge, 2.5 gal/min measured November 1974 and January 1975; water used for domestic supply (Sims House).

Spring Wt-109 (360829081441101) - developed in 1958; owner, National Park Service; maximum measured discharge, 8.5 gal/min, April 1962 and October 1959; minimum measured discharge, 2 gal/min, October 1961 and 1962, January and July 1963; median discharge, 4.5 gal/min, 1959-63; water used to supply facilities in Price Park.

Spring Wt-110 (360823081442801) - developed in 1958; owner, National Park Service; maximum measured discharge, 14 gal/min, April and May 1961; minimum measured discharge, 3.5 gal/min, June 1963; median discharge, 7.5 gal/min, 1959-63; water used to supply facilities in Price Park.

Well Wt-111 (360830081441501) - date drilled, December 1963; owner, National Park Service; depth, 200 ft; diameter, 5 in; depth cased, 66 ft; yield, 8 gal/min; water used to supply facilities in Price Park.

The broad, interconnected valley flats around the Price Lake area are good areas for wells in Price Park. The average saprolite thickness is likely to be near the 50-ft thickness reported at well Wt-99 and the 60-ft reported at well Wt-111. In addition, alluvial deposits in the wide valleys considerably increase the storage capacity of the ground-water reservoir. By the use of LeGrand's 1967 criteria, the chance that sustained well yields in this area would equal or exceed 50 gal/min was determined to be better than even. Wells intercepting fractures that are hydraulically connected with Price Lake or other lakes and ponds would have a large source of recharge. The flat terrain of these valleys also provides relatively easy access to a wide choice of well locations.

The valleys of Green Branch and Cannon Branch also provide good areas for wells, especially where draws open into the valley. Sustained well yields could exceed 25 gal/min, although the valleys are narrow and access is somewhat limited.

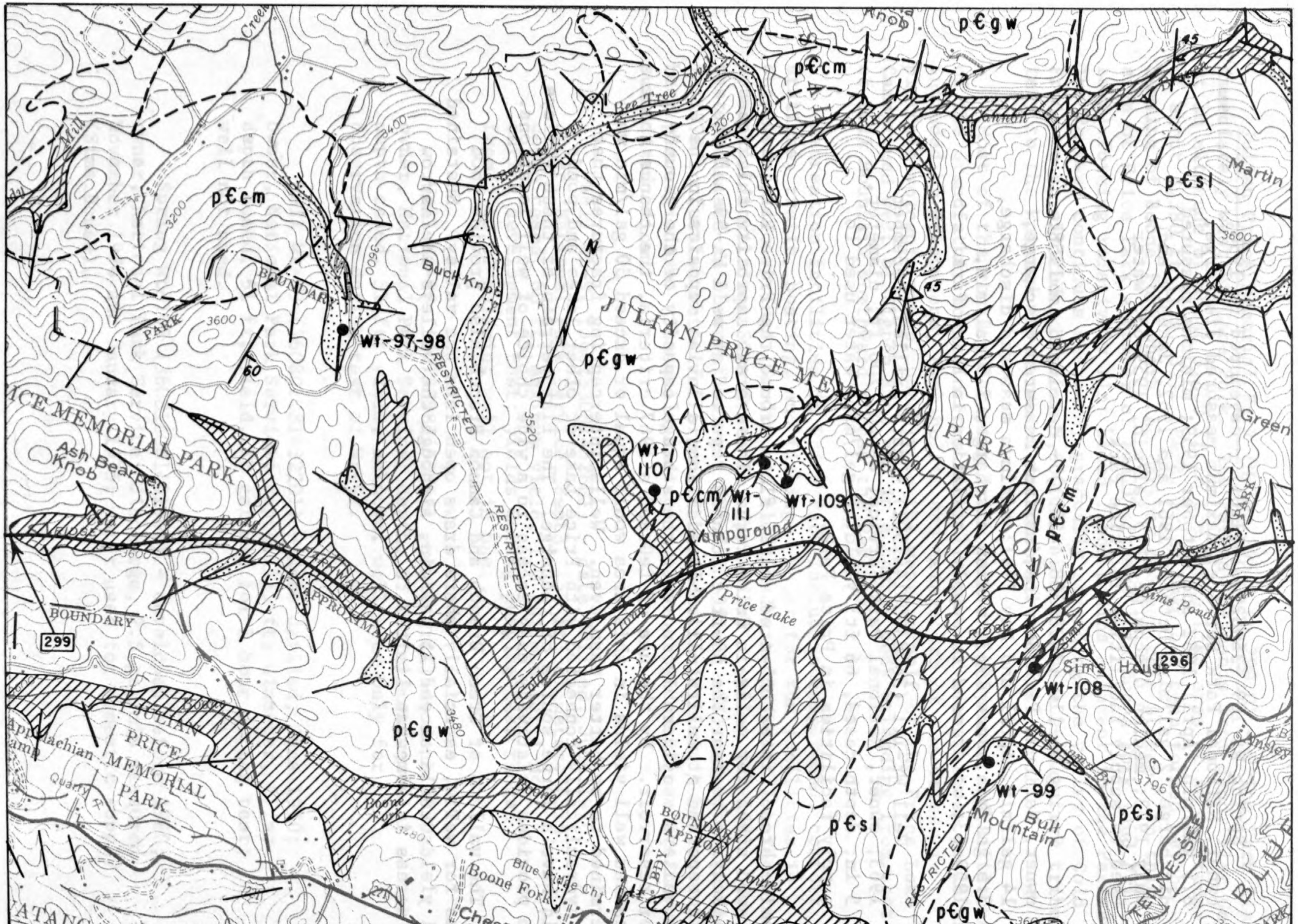


Figure 32.--Julian Price Memorial Park (Miles 295.5 to 299.0).

0 1 MILE

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION FOR FIGURE 32

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Wt-99
Well and number

Wt-109
Developed spring and number

ROCK UNITS

p€cm Greenstone, amphibolite, and metagobbro of the Crossnore plutonic-volcanic group

p€gw Graywacke of the Grandfather Mountain Formation

p€sl Siltstone of the Grandfather Mountain Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

60 Strike and dip of bedding

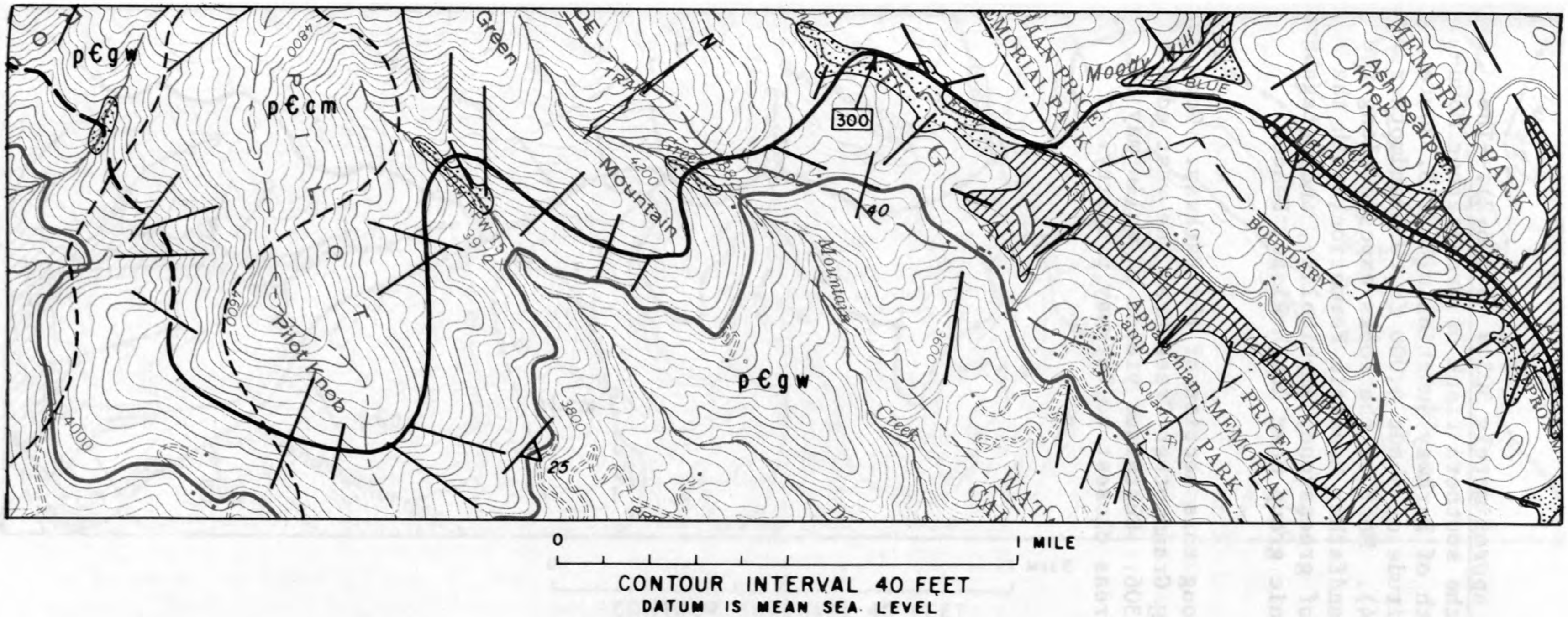
45 Strike and dip of foliation

Boundary of the Blue Ridge Parkway

296 NPS Milepost

Green Mountain area (Miles 298.2 to 303.4).--From Price Park a newly completed (1976) section of the Parkway continues south across Green Mountain, and crosses Pilot Ridge near Pilot Knob at an altitude of about 4,400 ft. West of Pilot Knob a section of the Parkway is under construction (fig. 33). The rocks in this area are composed primarily of graywacke of the Grandfather Mountain Formation. An exposure of greenstone, amphibolite and metagabbro of the Crossnore plutonic-volcanic group crosses the Parkway at Pilot Knob.

Facilities along the newly constructed road are not known at this time. Good areas for wells occur along Moody Mill Creek, Cold Prong, and Boone Fork, which are in or near Price Park. The relatively flat valleys of Boone Fork and Cold Prong are directly accessible from the Parkway. Wells here and along Moody Mill Creek can be expected to yield at least 25 gal/min. Several small streams cross the road and a number of fracture zones are shown in narrow, deep draws, although accessibility to these areas by well rigs will be difficult.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Boundary of the Blue Ridge Parkway

300 NPS Milepost

Blue Ridge Parkway under construction

ROCK UNITS

p€cm Greenstone, amphibolite, and metagabbro of the Crossnore plutonic-volcanic group

p€gw Graywacke of the Grandfather Mountain Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

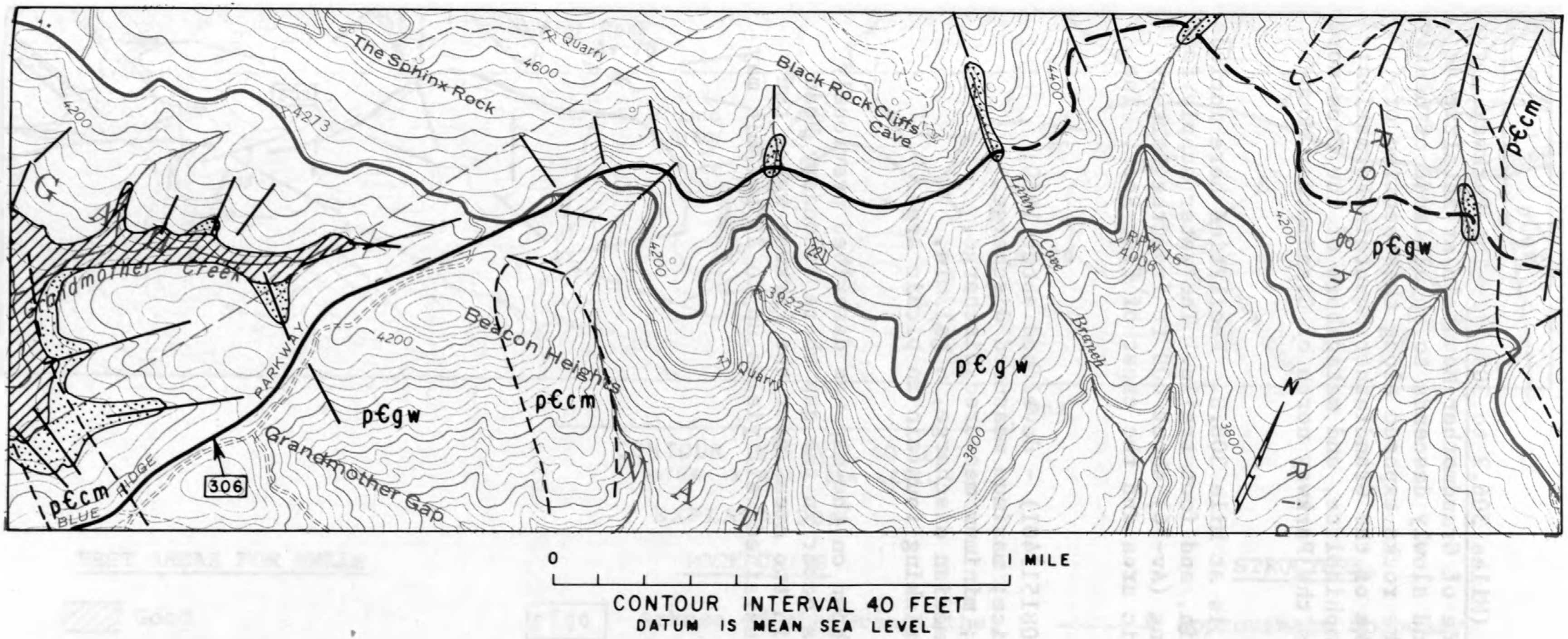
40 Strike and dip of bedding

25 Strike and dip of foliation

Figure 33.--Green Mountain area (Miles 298.2 to 303.4).

Beacon Heights Area (Miles approximately 303.4 to 306.2).--The Parkway passes southwest along the southern flank of Grandfather Mountain, which is about 3/4-mi north of Parkway junction with U.S. Route 221, from Rough Ridge at an altitude of about 4,000 ft to Grandmother Gap (altitude 4,040 ft) (fig. 34). Most of the rocks exposed along the Parkway are graywacke of the Grandfather Mountain Formation, with the exception of several exposures of greenstone, amphibolite, and metagabbro of the Crossnore plutonic-volcanic group near Rough Ridge, Beacon Heights, and Grandmother Gap.

There are no facilities along this section of the Parkway. Good and fair areas for wells occur along Grandmother Creek near the west edge of Parkway property near Milepost 306. Sustained yields of wells may not exceed 25 gal/min in the fair areas closest to Parkway property.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

ROCK UNITS

p€cm — Greenstone, amphibolite, and metagabbro of the Crossnore plutonic-volcanic group

p€gw — Graywacke of the Grandfather Mountain Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

306 — NPS Milepost

Blue Ridge Parkway under construction

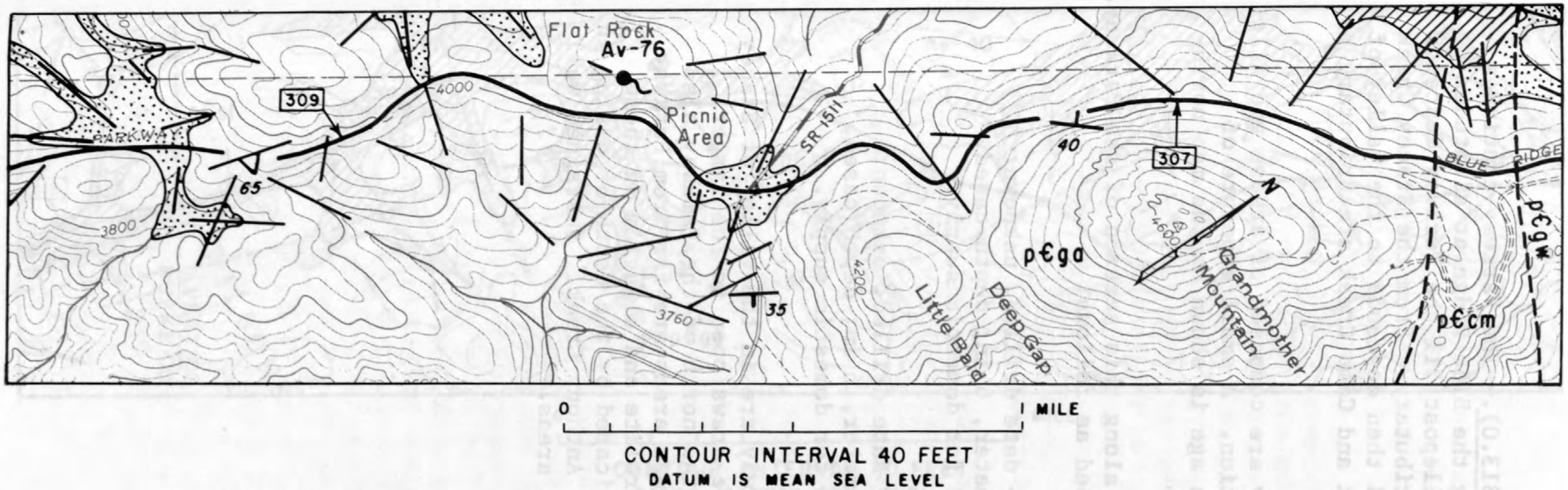
Figure 34.--Beacon Heights area (Miles approximately 303.4 to 306.2).

Grandmother Mountain Area (Miles 306.2 to 309.7).--The Parkway passes around the northwest side of Grandmother Mountain at an altitude slightly more than 4,200 ft, and slowly descends to an altitude of nearly 3,800 ft (fig. 35). Most of the rocks exposed along this section of Parkway are arkose and graywacke of the Grandfather Mountain Formation; a narrow belt of greenstone, amphibolite, and metagabbro of the Crossnore plutonic-volcanic group crosses the Parkway north of Grandmother Mountain.

The Flat Rock picnic area is at Mile 308.3. Facilities here include a picnic area, drinking fountain, and foot trails. The water supply for the picnic area is from a spring (Av-76) about 400 ft from the Parkway along a trail between the picnic area and the crest of Flat Rock. The spring is described below:

Spring Av-76 (360302081513401) - developed about 1960; owner, National Park Service; maximum measured discharge, 15 gal/min, February 1961; minimum measured discharge, 1 gal/min, October 1961; median discharge, 6 gal/min, 1959-63; water used for drinking fountain in picnic area.

The good area for wells shown on the map was described previously on p. 78. Fair areas for wells occur in the gap where Secondary Road 1511 crosses the Parkway, and in two areas near the Parkway where the terrain is relatively flat. Sustained well yields up to 25 gal/min may be possible in these areas.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Av-76
Developed spring and number

ROCK UNITS

pЄga Arkose of the Grandfather Mountain Formation

pЄcm Greenstone, amphibolite, and metagabbro of the Crossnore plutonic-volcanic group

pЄgw Graywacke of the Grandfather Mountain Formation

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

65 Strike and dip of foliation

40 Strike and dip of bedding

309 NPS Milepost

Figure 35.--Grandmother Mountain area (Miles 306.2 to 309.7).

Stacey Creek Area (Miles 309.7 to 313.0).--The Parkway continues southwest along small ridges paralleling the Blue Ridge at altitudes ranging from 3,600 to 3,800 ft. Near Milepost 311 the Parkway descends to and parallels Stacey Creek and its tributary. From the Stacey Creek drainage, the Parkway rises slightly and then descends to the valley of Camp Creek (fig. 36). Both Stacey Creek and Camp Creek are tributary to the Linville River.

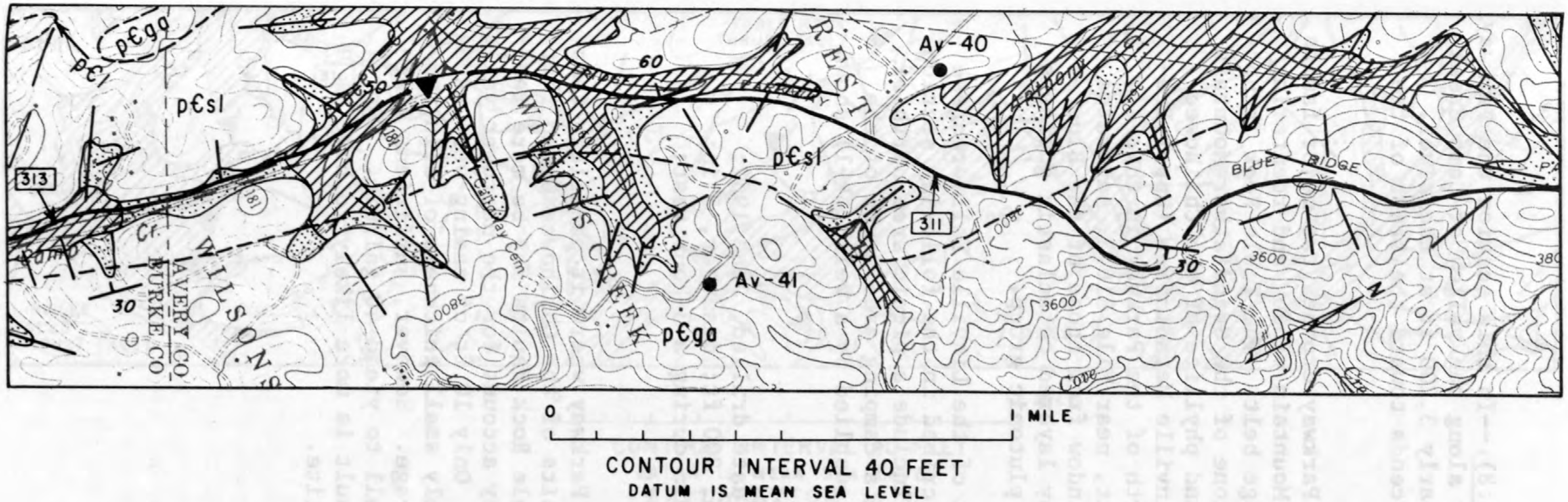
The rocks exposed along the Parkway are composed of arkose and siltstone of the Grandfather Mountain Formation. A small exposure of Linville Metadiabase of late Precambrian age is shown on the map northwest of Milepost 313.

There are no recreation facilities along this section of the Parkway. Two wells shown on figure 36 are described as follows:

Well Av-40 (360112081525701) - date drilled, unknown; owner, J. Baker; depth, 66 ft; diameter, 6 in; depth cased, 61 ft; yield, 7 gal/min; water used for domestic supply.

Well Av-41 (360039081524401) - date drilled, unknown; owner, M. Shink; depth, 125 ft; diameter, 6 in; depth cased, 36 ft; yield, 7 gal/min; water used for domestic supply.

Good areas for wells along the Parkway are in the valley of Stacey Creek and its tributary, especially where draws open to the larger valley. The valley of Anthony Creek to the north of the Parkway also offers good areas for wells, although these areas are far from Parkway property. The combined thickness of saprolite and alluvium in these valleys may be in excess of 60 ft as indicated by the depth of casing in well Av-40 located near the headwater of Anthony Creek. Sustained well yields should exceed 25 gal/min in these areas.



EXPLANATION

BEST AREAS FOR WELLS

- Good
- Fair
- Inferred fractures
- Av-40 ● Well and number

ROCK UNITS

- pЄga — Arkose of the Grandfather Mountain Formation
- pЄsl — Siltstone of the Grandfather Mountain Formation
- pЄl — Linville Metadiabase

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

- Approximate boundary between rock units
- 30 Strike and dip of bedding
- 50 Strike and dip of foliation or schistosity parallel to compositional layering
- 311 NPS Milepost

Figure 36.--Stacey Creek area (Miles 309.7 to 313.0).

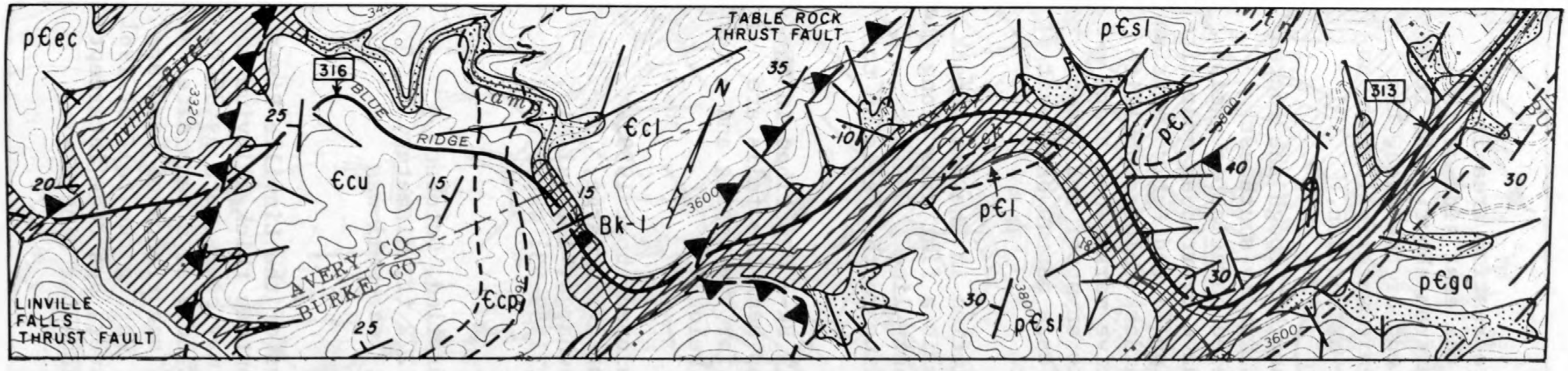
Camp Creek Area (Miles 313.0 to 316.8).--In this section the Parkway gradually descends to the Linville River along the valley of Camp Creek from an altitude of about 3,600 ft to nearly 3,200 ft at the river. After crossing the river, the Parkway ascends toward the crest of the Blue Ridge (fig. 37).

Within the Camp Creek section, the Parkway crosses two major faults in leaving the rocks of the Grandfather Mountain window and reentering the terrane of the rocks of the Blue Ridge belt. The Table Rock Thrust Fault, which separates arkose and siltstone of the Grandfather Mountain Formation from younger quartzite units and phyllite of the Chilhowee Group, is crossed near Mile 315. The Linville Metadiabase (Upper Precambrian age) is also exposed to the north of the Parkway in this section. The Linville Falls Thrust Fault, near Mile 316.3, separates the rocks of the Grandfather Mountain window from those of the Blue Ridge belt, which are represented here by layered cataclastic gneisses of the Cranberry Gneiss of the Elk Park plutonic group.

The Camp Creek valley contains part of the Linville Falls recreation area, the main area of which is described in the following section. Facilities along the Camp Creek section include a picnic area north of the Parkway along the Linville River and a camping area south of the Parkway. Water for these facilities is supplied by a well (Bk-1) shown on figure 37 and described below:

Well Bk-1 (355843081551201) - date drilled, June 1962; owner, National Park Service; depth, 200 ft; diameter, 5 in; depth cased, 10 ft; yield, 40 gal/min during a 3-hour test; water used for recreation facilities.

Good areas for wells are along the Parkway where it parallels Camp Creek. The lower and upper quartzite units of the Chilhowee Group that occur between the Linville Falls and Table Rock Faults may be more resistant to weathering and, therefore, may account for the narrower valley width of Camp Creek between the faults. Only 10 ft of casing were used in well Bk-1, which indicates a relatively small thickness of alluvium and weathered rock for ground-water storage. However, sufficient fractures were found in the rocks for the well to yield 40 gal/min. The broader valley east of the Table Rock Fault is more likely to have greater thickness of alluvium and saprolite.



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

- Good
- Fair
- Inferred fractures
- Bk-1 — Well and number
- 316 — NPS Milepost

See table 6 for a generalized correlation and table 7 for a description of rock units

ROCK UNITS

- Єcl — Lower quartzite unit of the Chilhowee Group
- Єcp — Phyllite unit of the Chilhowee Group
- Єcu — Upper quartzite unit of the Chilhowee Group
- pЄga — Arkose of the Grandfather Mountain Formation
- pЄec — Cranberry Gneiss of the Elk Park Plutonic Group
- pЄl — Linville Metadiabase
- pЄsl — Siltstone of the Grandfather Mountain Formation

STRUCTURE

- Approximate boundary between rock units
- 30 — Strike and dip of bedding
- 40 — Strike and dip of foliation or schistosity parallel to compositional layering
- Thrust fault. Dashed where approximately located or inferred. Sawteeth on upper plate

Figure 37.--Camp Creek area (Miles 313.0 to 316.8).

Linville Falls Recreation Area.--The main recreation area lies south of the Camp Creek section (fig. 37) along the east side of the Linville River. Altitudes within the area range from about 3,160 ft at the river to about 3,620 ft. Near the southern end of the area, the Linville River plunges about 30 ft forming a scenic waterfall known as Linville Falls, which has become a major tourist attraction.

The Linville Falls Fault trends generally south through the recreation area, passes through the falls, and turns slightly southwest (fig. 38). The rocks west of the fault are layered cataclastic gneiss of the lower Precambrian Cranberry Gneiss that have overridden quartzite belonging to the Chilhowee Group of Early Cambrian(?) and Early Cambrian age which crops out to the east of the fault. A dark-colored phyllite unit interbedded with quartzite forms a distinctive marker bed that divides the quartzite of the Chilhowee Group into an upper and lower unit. This phyllite unit is shown on figure 38 as a narrow band east of and roughly paralleling the Linville Falls Fault.

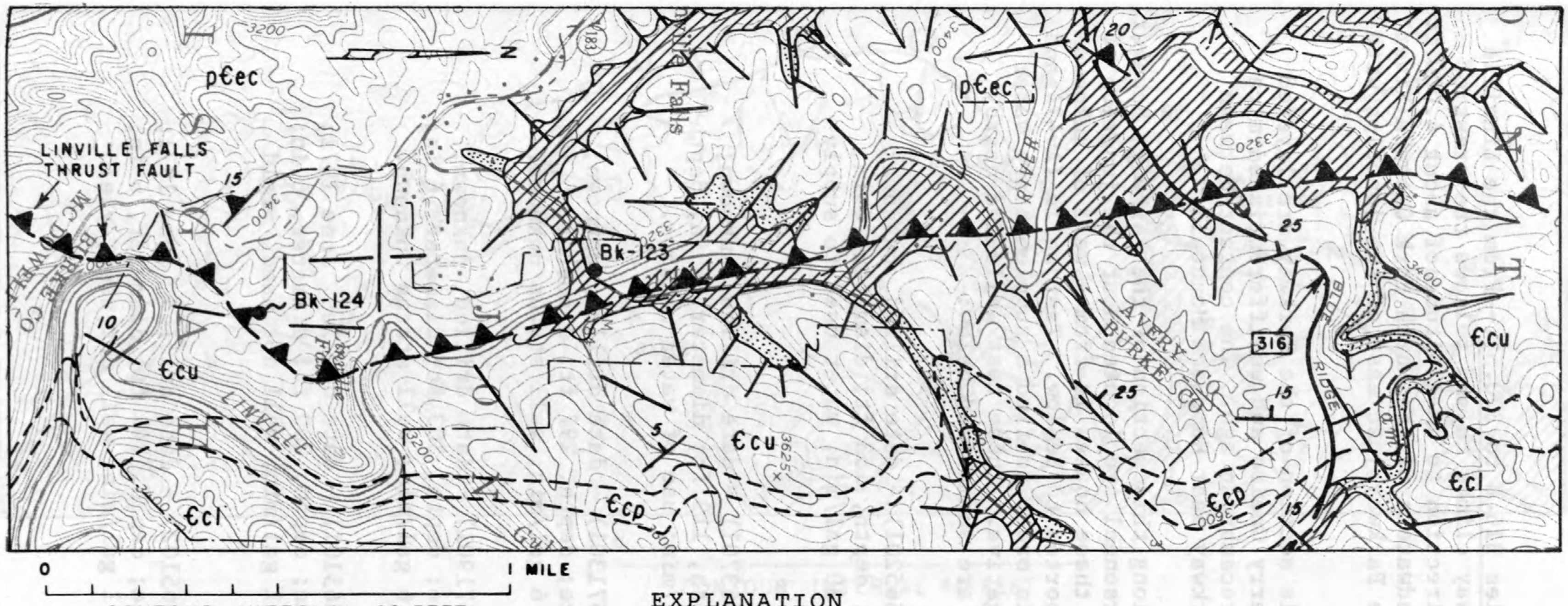
In addition to the camping and picnic facilities in the Camp Creek area previously described, another campground is in a flat area along the Linville River just south of the Avery-Burke County line. Comfort stations are provided along numerous trails leading to the falls or to views of the falls.

Water for the campground is supplied by well Bk-1 described in the Camp Creek section (p. 84). The comfort stations near the falls are supplied by water from a spring (Bk-124). Data for the spring and a test well (Bk-123) shown on figure 38 are summarized below:

Spring Bk-124 (355648081554401) - developed about 1959; owner, National Park Service; maximum measured discharge, 5 gal/min, April 1960; minimum measured discharge, 1.2 gal/min, November 1961; median discharge, 2 gal/min, 1959-63; water used to supply comfort stations.

Well Bk-123 (355724081555001) - date drilled, October 1961; owner, National Park Service; depth, 222 ft; diameter, 5 in; depth cased, 21 ft; yield, 1 gal/min; test well was abandoned.

Good areas for wells occur along the valleys of the Linville River and small tributaries where flat flood plains contain thick alluvium and relatively good access to well sites. Alluvium may be as much as 30 ft thick as reported from a driller's log of a test hole at a camp site along the river (location unknown); however, the occurrence of fracture zones beneath alluvium is difficult to predict. During the fall of 1961 a number of test wells were drilled along the river, but none intercepted enough fractures to produce more than a few gallons per minute.



EXPLANATION

BEST AREAS FOR WELLS

- Good
- Fair
- Inferred fractures
- Bk-123 Well and number
- Bk-124 Developed spring and number
- 316 NPS Milepost
- Boundary of the Blue Ridge Parkway

ROCK UNITS

- €cl — Lower quartzite unit of the Chilhowee Group
- €cp — Phyllite unit of the Chilhowee Group
- €cu — Upper quartzite unit of the Chilhowee Group
- p€ec — Cranberry Gneiss of the Elk Park Plutonic Group

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

- Approximate boundary between rock units
- 10 Strike and dip of bedding
- 15 Strike and dip of foliation or schistosity parallel to compositional layering
- Thrust fault. Dashed where approximately located or inferred. Sawteeth on upper plate

Figure 38.--Linville Falls recreation area.

Humpback Mountain Area (Miles 316.8 to 320.5).--From the Linville River, this section of the Parkway climbs to and follows the crest of the Blue Ridge in a southerly direction to an altitude of about 4,000 ft near Humpback Mountain. The headwaters of the North Fork Catawba River are on the southeast side of the Parkway just east of the junction with U.S. 221 (fig. 39).

The rocks exposed along this section of the Parkway are layered cataclastic gneiss of the Cranberry Gneiss and undifferentiated mica schists and gneisses of early Precambrian age. The contact between these rock units crosses the Parkway near Humpback Mountain.

No public facilities are along this section of the Parkway; however seasonal residences for Park personnel are located near the junction of U.S. 221. The water supply for these houses is from a well of unknown depth, although the yield is reported to be low. Test wells (Av-74 and -75) were drilled in June 1971 in order to find a supplementary water supply, but the results were negative. These test wells and nearby supply wells shown on figure 39 are summarized below:

Well Av-65 (355753081565201) - date drilled, unknown; owner, Parkway Motor Lodge; depth, 153 ft; diameter, 6 in; depth cased, 52 ft; yield, 30 gal/min; water used to supply motel.

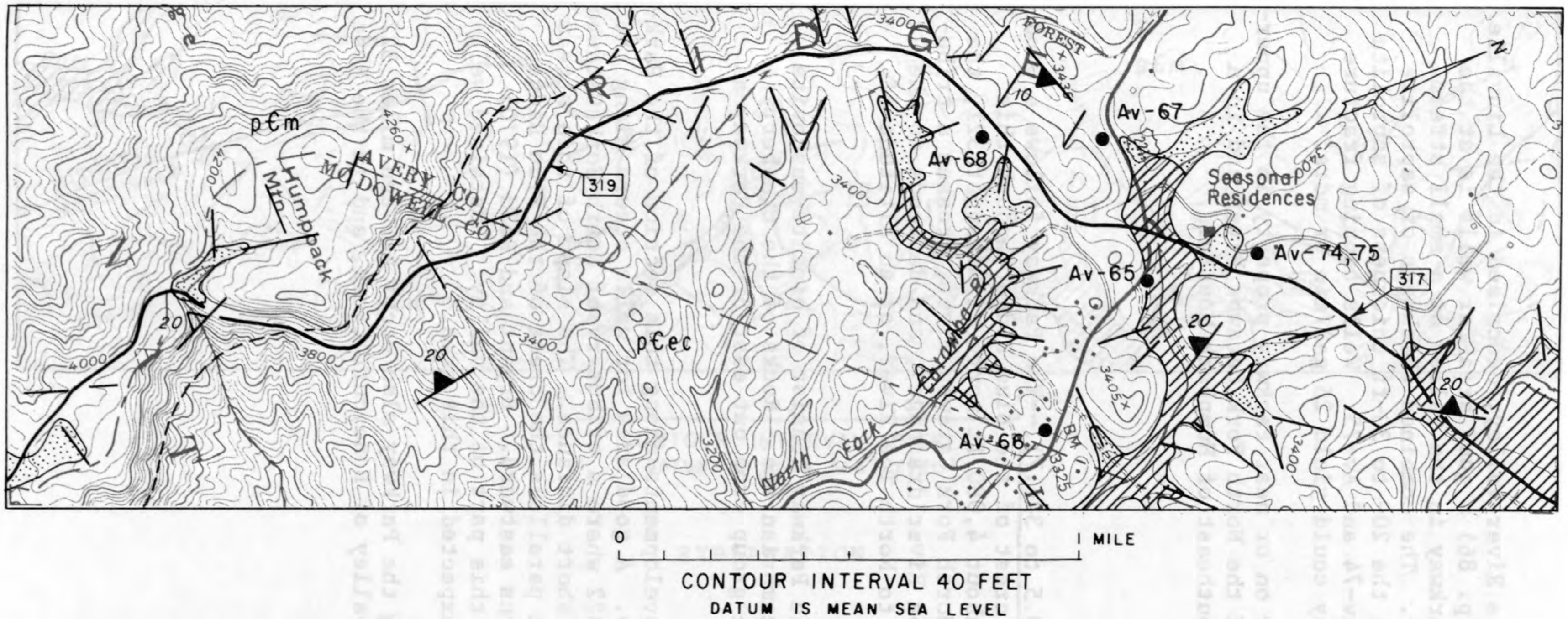
Well Av-66 (355737081563701) - date drilled, unknown; owner, Sellers Oil Co.; depth, 119 ft; diameter, 6 in; depth cased, 50 ft; yield, 20 gal/min; use of water unknown.

Well Av-67 (355754081571301) - date drilled, unknown; owner, National Park Service; depth, 297 ft; diameter, 5 in; depth cased, 54 ft; yield, 6 gal/min; well status unknown.

Well Av-68 (355741081571901) - date drilled, unknown; owner, National Park Service; depth, 303 ft; diameter, 6 in; depth cased, 54 ft; yield, 6 gal/min; well status unknown.

Well Av-74 (355806081565101) - date drilled, June 1971; owner, National Park Service; depth, 200 ft; diameter, 6 in; depth cased, 31 ft; yield, 1 gal/min; well not used, yield insufficient.

Well Av-75 (355806081565102) - date drilled, June 1971; owner, National Park Service; depth, 244 ft; diameter, 6 in; depth cased, 21 ft; yield, 1 gal/min; well not used, yield insufficient.



EXPLANATION

BEST AREAS FOR WELLS

- Good
- Fair
- Inferred fractures
- Av-74 ● Well and number
- 319 NPS Milepost

ROCK UNITS

- pꞒec — Cranberry Gneiss of the Elk Park plutonic group
- pꞒm — Biotite-muscovite schist and gneiss

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

- Approximate boundary between rock units
- 20 — Strike and dip of foliation
- 10 — Strike and dip of foliation or schistosity parallel to compositional layering

Figure 39.--Humpback Mountain area (Miles 316.8 to 320.5).

In addition to the Linville River valley, described in the Linville Falls recreation area section (p. 86) a good area for wells is at the junction of U.S. 221 and the Parkway in the valley of a small stream tributary to the Linville River. The combined thickness of saprolite and alluvium here should exceed the 20- to 30-ft thickness of saprolite reported in nearby test wells Av-74 and Av-75. Wells tapping fracture zones extending under the valley could yield 25 gal/min or more.

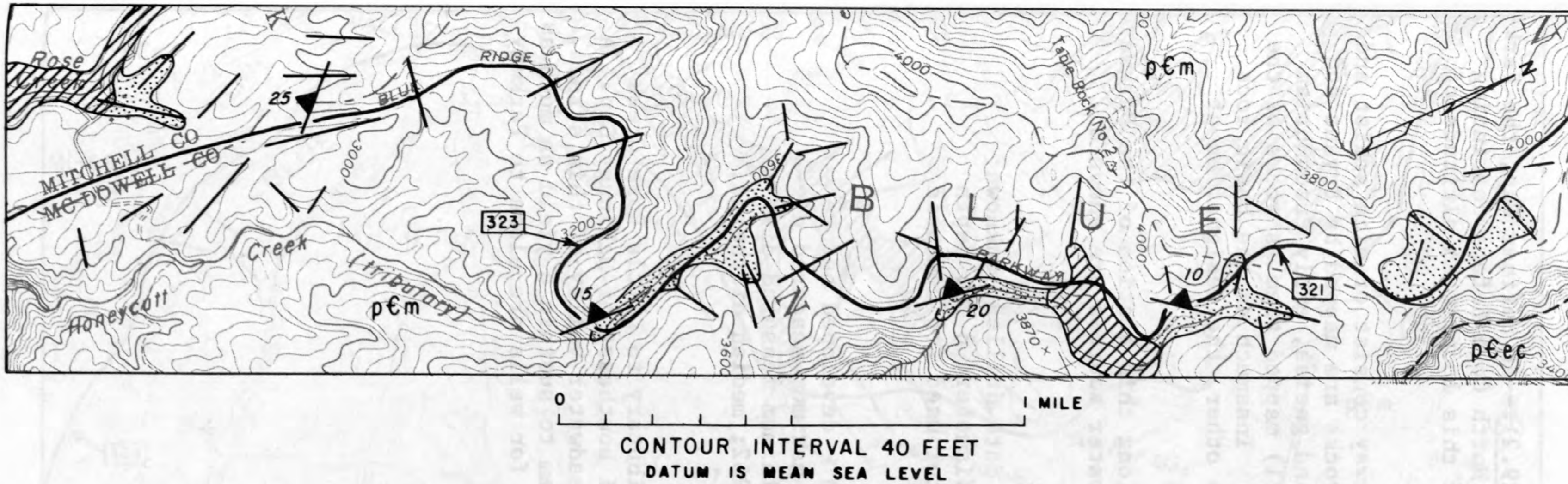
Fair areas for wells occur on or near Parkway property in the uppermost draws of the headwaters of the North Fork Catawba River and in a draw and small stream valley southeast of Humpback Mountain.

Rose Creek Area (Miles 320.5 to 324.7).--The Parkway follows a winding southerly course along the crest of the Blue Ridge through this section. From an altitude of about 4,080 ft north of Milepost 321, the road parallels a tributary of North Fork Catawba River, crosses a tributary of Honeycutt Creek (Catawba River drainage), and descends to the Rose Creek drainage, tributary to North Toe River, at an altitude of about 2,880 ft (fig. 40).

The rocks exposed along the Parkway consist of biotite-muscovite schist and gneiss of early Precambrian age. Rocks of the Cranberry Gneiss of the Elk Park plutonic group crop out east of the Parkway as shown in figure 40.

There are no recreation developments along this section of the Parkway that require a water supply. A good area for wells occurs along the Parkway between miles 321 and 322 where a tributary of North Fork Catawba River parallels the road for a short distance. The slope of this stream valley is relatively flat as it parallels the crest of the Blue Ridge before it becomes steep and turns eastward. Bryant and Reed (1970) mapped alluvial deposits along this part of the valley. Sustained well yields of 25 gal/min could be expected in this area.

Fair areas for wells along the Parkway also occur between miles 322 and 323 in a narrow tributary valley of Honeycutt Creek, and in the Rose Creek drainage area.



EXPLANATION

BEST AREAS FOR WELLS

- Good
- Fair
- Inferred fractures
- 321 NPS Milepost

ROCK UNITS

- pЄm Biotite-muscovite schist and gneiss
- pЄec Cranberry Gneiss of the Elk Park plutonic group

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

- Approximate boundary between rock units
- 20 Strike and dip of foliation or schistosity parallel to compositional layering.

Figure 40.--Rose Creek area (Miles 320.5 to 324.7).

McKinney Gap Area (Miles 324.7 to 329.2).--At Heffner Gap, the Parkway begins a broad northward loop around North Cove before continuing southwest. McKinney Gap is at the top of this loop at an altitude of about 2,800 ft (fig. 41).

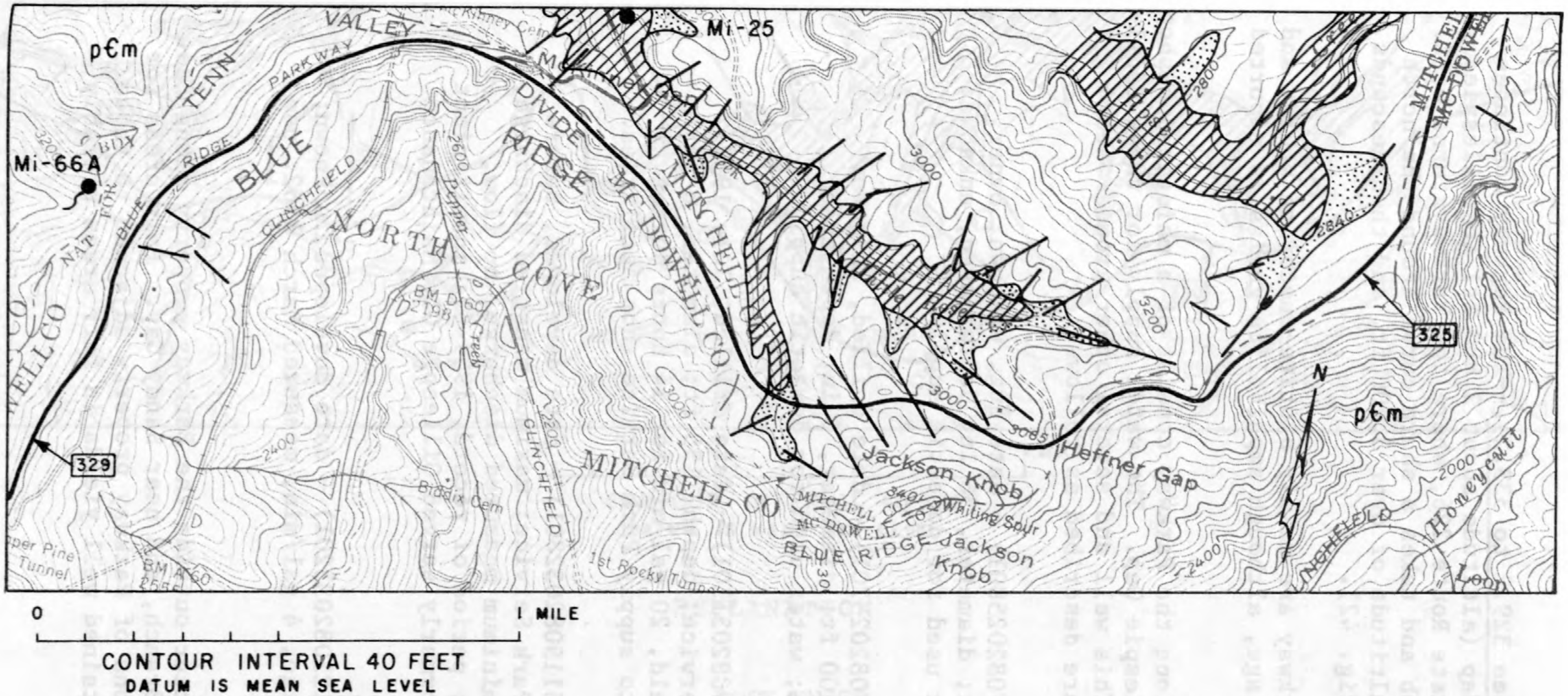
The rocks along this section of Parkway consist of mica schist and mica gneiss. East of Jackson Knob, the rocks are mapped by Bryant and Reed (1970) as biotite-muscovite schist and gneiss, early Precambrian age. To the west, Hadley and Nelson (1971) mapped them as rocks of the Spruce Pine area of late Precambrian age. Inasmuch as the basic rock types are the same from one report to the other, the designation of Bryant and Reed (1970) will be continued.

There are no developed facilities along this section of the Parkway. The approximate locations of two ground-water sources are shown on figure 41 and are described as follows:

Well Mi-25 (355315082003901) - date drilled, unknown; owner, R. Harrison; depth, 146 ft; diameter, 6 in; depth cased, 46 ft; yield, 18 gal/min; water used for domestic supply.

Spring Mi-66A (355240082014101) - developed before 1962; owner, National Park Service; maximum measured discharge, 14.5 gal/min, April 1962; minimum measured discharge, 2 gal/min, Jan. and Sept. 1962; median discharge, 5 gal/min, 1962; water not used.

A good area for wells is along a tributary to Little Rose Creek where it crosses the Parkway about 0.9 mi southeast of McKinney Gap. A few draws, open to the relatively flat headwater valley of this stream, could contain a sufficient fracture system to sustain a yield as much as 25 gal/min to wells. Several fair areas for wells are close to Parkway property north of Heffner Gap.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

ROCK UNITS

p€m Biotite-muscovite schist and gneiss

See table 6 for a generalized correlation and table 7 for a description of rock units

Mi-25 Well and number

Mi-66A Developed spring and number

325 NPS Milepost

Figure 41.--McKinney Gap area (Miles 324.7 to 329.2).

Gillespie Gap Area (Miles 329.2 to 333.2).--The Parkway continues southwest through Swafford Gap (altitude about 2,880 ft) to Gillespie Gap and the junction with State Route 226, where the Parkway turns west. The road climbs to Stony Knob and takes a sharp curve around the north side of the mountain to an altitude of over 3,200 ft, and then descends to Lynn Gap and Sandy Gap (fig. 42).

The rocks along the Parkway are mainly biotite-muscovite schist and gneiss of early Precambrian age, although amphibolite gneiss is reported at some well sites.

Developed facilities along the Parkway consist of a maintenance shop and a mineral museum at Gillespie Gap. The water supply for these facilities is from well Mi-36. This well and several other ground-water sources shown on figure 42 are described as follows:

Well Mi-32 (355117082025801) - date dug, unknown; owner, L. Snipes; depth, 60 ft; diameter, 36 in; depth cased, unknown; yield, 6 gal/min; water used for domestic supply.

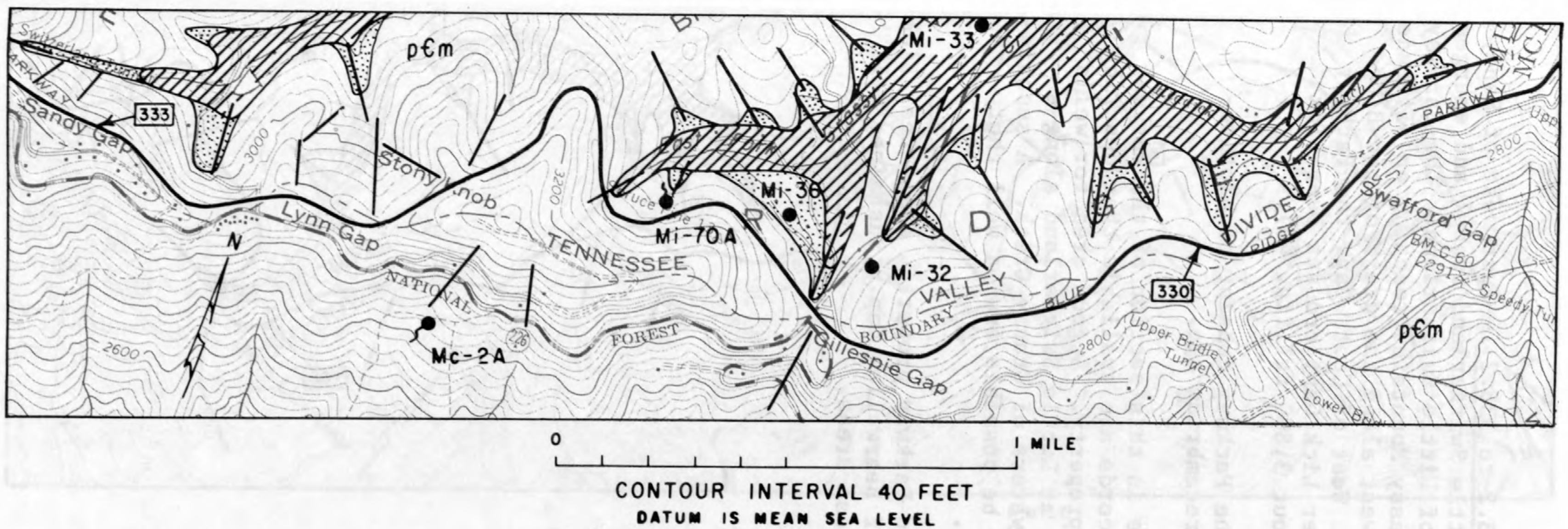
Well Mi-33 (355147082025701) - date drilled, unknown; owner, W. Cox; depth, 100 ft; diameter, 6 in; depth cased, 48 ft; yield, 4 gal/min; water used for domestic supply.

Well Mi-36 (355119082031101) - date drilled, July 1959; owner, National Park Service; depth, 135 ft; diameter, 6 in; depth cased, 58 ft; yield, 20 gal/min for 14 hours during well test; water used to supply Park Service shop facilities.

Spring Mi-70A (355115082032801) - date developed, before 1960; owner, National Park Service; maximum measured discharge, 4 gal/min, Nov. 1959; minimum measured discharge, no flow, July 1960 to June 1962; period of record, 1959-62; insufficient water supply, spring formerly served Gillespie Gap Maintenance area.

Spring Mc-2A (355122082035201) - date developed, unknown; owner, unknown; discharge, 4 gal/min, measured March 1962; use of water unknown.

Good areas for wells occur outside the Parkway property along East Fork Grassy Creek, Reddick Branch, and near Sandy Gap. Fair areas for wells include certain portions of Parkway property adjacent to those areas mentioned above. Sustained well yields in fair areas probably will not exceed 25 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

ROCK UNITS

p€m Biotite-muscovite schist and gneiss

See table 6 for a generalized correlation and table 7 for a description of rock units

Mi-32 Well and number

Mc-2A Developed spring and number

330 NPS Milepost

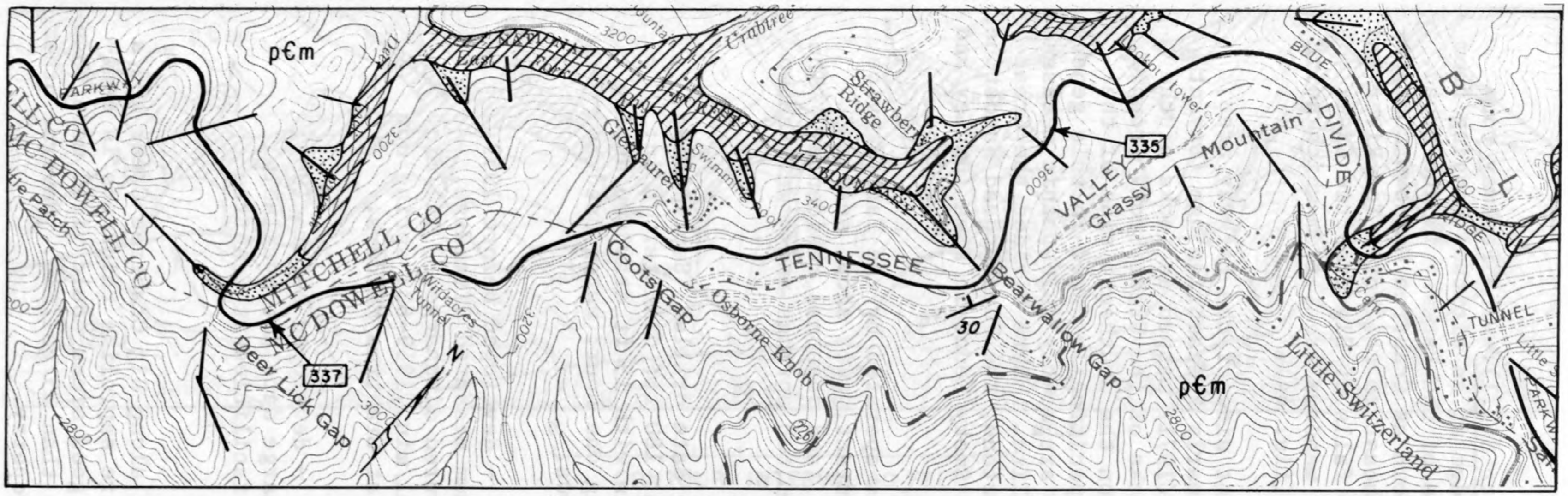
Figure 42.--Gillespie Gap area (Miles 329.2 to 333.2).

Little Switzerland Area (Miles 333.2 to 338.2).--Just west of Sandy Gap, the Parkway passes through the Little Switzerland Tunnel and emerges in the gap containing the resort town of Little Switzerland. The Parkway takes a broad northward loop around Grassy Mountain, reaching an altitude of about 3,700 ft, and continues southwest along the crest of the Blue Ridge and the Tennessee Valley Divide. West of Coots Gap, the Parkway passes through Wildacres Tunnel and Deer Lick Gap, crosses Deer Lick Branch, and rises to an altitude of about 3,800 ft (fig. 43).

The rocks along this section of the Parkway consist of biotite-muscovite schist and gneiss of early Precambrian age.

There are no recreation facilities in this section of the Parkway that require a water supply, and no records are available that describe ground-water sources near the Parkway property. A good area for wells occurs close to the Parkway in the gap at Little Switzerland along a large, well-developed draw in the headwaters of Grassy Creek. A sustained yield of at least 25 gal/min should be possible from a well that intersects fracture zones in this draw.

Fair areas for wells also occur on Parkway property, along Deer Lick Branch, and possibly in the vicinity of Bearwallow Gap. Sustained well yields may not exceed 25 gal/min in these areas.



0 — 1 MILE

CONTOUR INTERVAL 40 FEET

DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

335 NPS Milepost

ROCK UNITS

p€m Biotite-muscovite schist and gneiss

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

30 Strike and dip of bedding

Figure 43.--Little Switzerland area (Miles 333.2 to 338.2).

Crabtree Meadows Area (Miles 338.2 to 342.1).--The Parkway runs southwest along the crest of the Blue Ridge at an altitude ranging from 3,600 to 3,800 ft. On the northwest side of the Parkway is the broad, gently rolling upland flats generally known as Crabtree Meadows containing Big Crabtree Creek, which flows northeast to the North Toe River and the Tennessee River drainage. The upper falls of Big Crabtree Creek generally marks the northeast end of the meadows area, from which point the topography becomes more mountainous (fig. 44).

The rocks exposed along the northwest side of the Parkway are biotite-muscovite schist and gneiss, of early Precambrian age (Bryant and Reed, 1970) which Hadley and Nelson (1971) mapped as rocks of the Spruce area of late Precambrian age. Rocks of the Great Smoky Group, undivided of late Precambrian age occur on the southeast side of the Parkway. The rock types have not been specifically named in this general area (Hadley and Nelson, 1971), but they are mostly feldspathic metasandstone, quartz-mica schist, and gray phyllite. Where divided the Great Smoky Group consists of the Elkmont Sandstone, the Thunderhead Sandstone, and the Anakeesta Formation in the Great Smoky Mountain area (Hadley and Nelson, 1971).

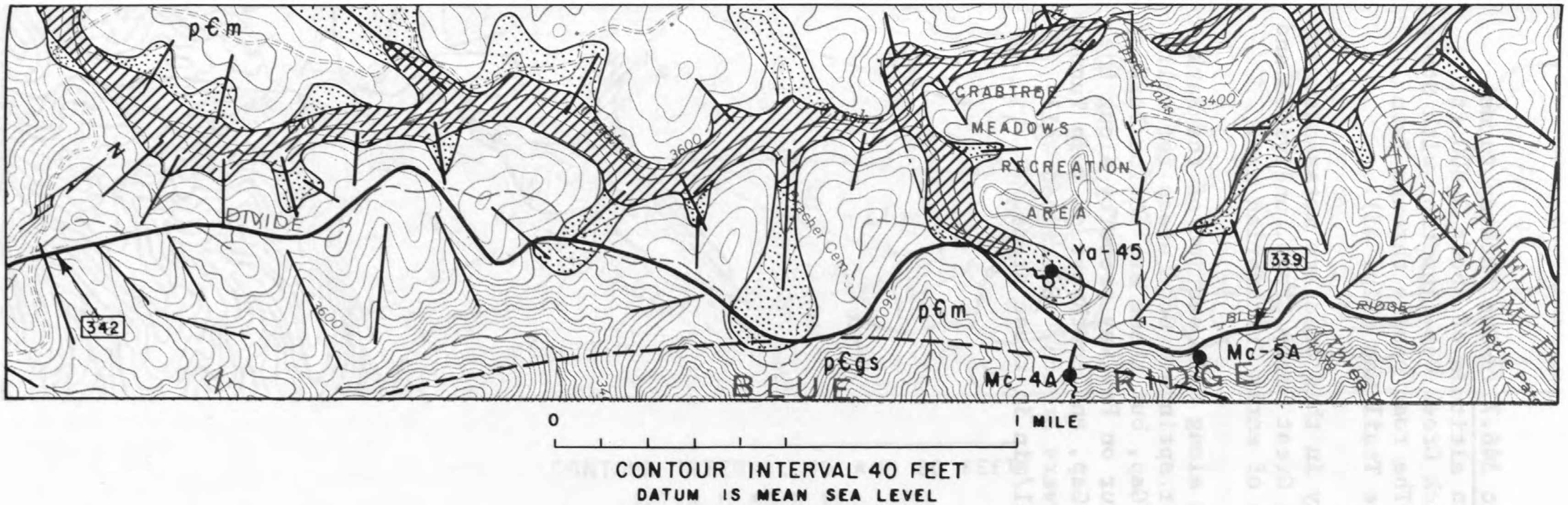
The Crabtree Meadows recreation area operated by the Park Service includes campgrounds, picnic area, restaurant, gift shop, service station, comfort stations, hiking trails, and seasonal residences. The water supply for these facilities is from two springs and a well shown on figure 44 and described below.

Well Ya-45 (354847082084101) - date drilled, Sept. 1959; owner, National Park Service; depth, 180 ft; diameter, 6 in; depth cased, 6 ft; yield, 35 gal/min with 15 ft drawdown during a short test, probably not exceeding one hour; water used to supply facilities at Crabtree Meadows.

Spring Mc-4A (354841082082801) - developed before 1959; owner, National Park Service; maximum measured discharge, 15 gal/min, Apr. 1960; minimum measured discharge, 3 gal/min, Oct. 1962; median discharge, 9.3 gal/min, 1959-63; spring not used; formerly supplied facilities at Crabtree Meadows.

Spring Mc-5A (354854082081901) - developed before 1959; owner, National Park Service; discharge data not available; spring not used; formerly supplied facilities at Crabtree Meadows.

Good and fair areas for wells occur along Big Crabtree Creek and a tributary within the recreation area where saprolite thickness is estimated to be as much as 50 ft. Wells in good areas could yield more than 25 gal/min, and those in fair areas less than 25 gal/min. Several other fair areas for wells occur on Parkway property.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Ya-45
Well and number

Mc-4A
Developed spring and number

Undeveloped spring

ROCK UNITS

pЄgs — Rocks of the Great Smoky Group, undivided

pЄm — Biotite-muscovite schist and gneiss

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

342 — NPS Milepost

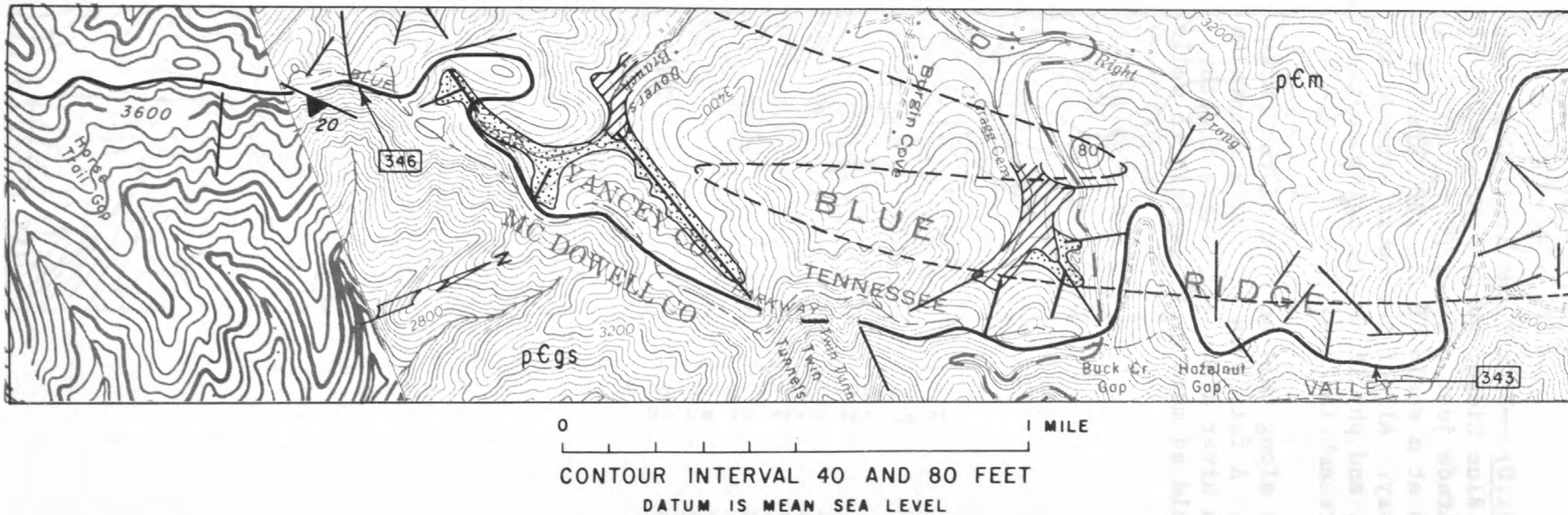
Approximate boundary of recreation area

Figure 44.--Crabtree Meadows area (Miles 338.2 to 342.1).

Buck Creek Gap Area (Miles 342.1 to 346.7).--The Parkway turns southeast and gradually descends from an altitude of about 3,800 ft, turns southwest past Hazelnut Gap to Buck Creek Gap (junction with State Route 80) at an altitude of 3,320 ft. The road passes through Twin Tunnels and continues southwest to Horse Trail Gap (fig. 45).

The rocks exposed along the Parkway in this area are metasandstone, quartz-mica schist, and phyllite of the Great Smoky Group, undivided and the biotite-muscovite schist and gneiss of early Precambrian age.

There are no recreation facilities along this section of the Parkway, nor are data available for wells or springs. Good areas for wells are along Dovers Branch and Buck Creek Gap, but these are not on Parkway property. Fair areas for wells may occur on Parkway property along the west side of the Parkway at Buck Creek Gap, and southwest of Twin Tunnels in broad draws that form the head of Dovers Branch. Sustained well yields are not expected to exceed 25 gal/min in these areas.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

346 NPS Milepost

ROCK UNITS

p€gs Rocks of the Great Smoky Group, undivided

p€m Biotite-muscovite schist and gneiss

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

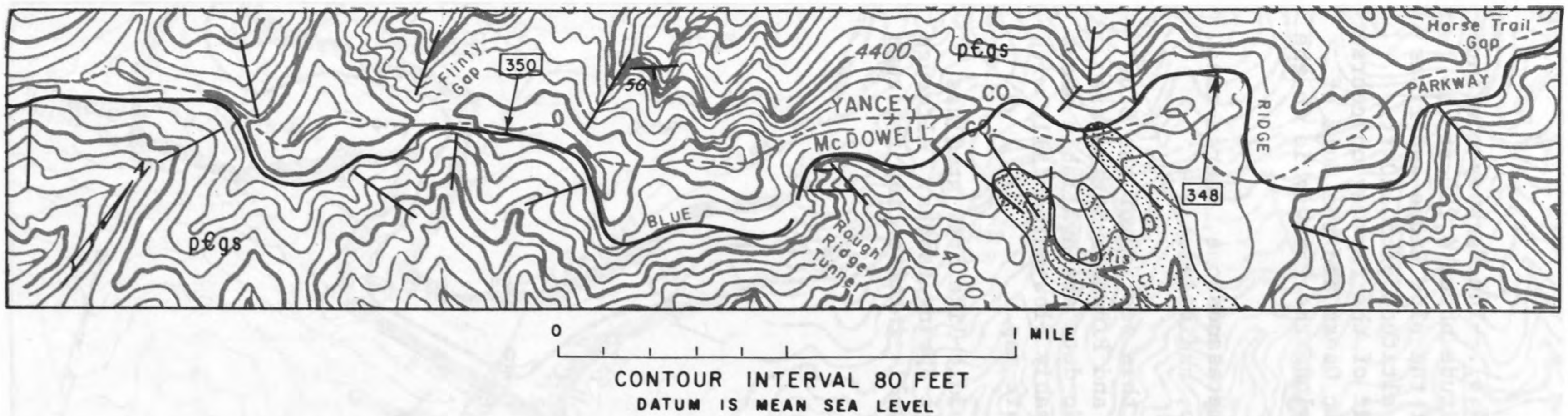
Approximate boundary between rock units

20 Strike and dip of foliation or schistosity parallel to compositional layering

Figure 45.--Buck Creek Gap area (Miles 342.1 to 346.7).

Flinty Gap Area (Miles 346.7 to 351.0).--From Horse Trail Gap, the Parkway ascends along the crest of the Blue Ridge, passes through 245-ft Rough Ridge Tunnel, and reaches an altitude just over 4,800 ft near Flinty Gap (fig. 46). Topographic maps at a scale of 1:24,000 are not available for this section of the Parkway. All of the rocks exposed in this area are metasandstones, gneisses, and phyllites belonging to the Great Smoky Group, undivided of late Precambrian age.

There are no recreation facilities along this section of the Parkway, nor are there well or spring data. A fair area for wells occurs in the headwaters of Curtis Creek (Catawba River drainage), where fracture zones in relatively broad draws may yield as much as 25 gal/min to wells.



EXPLANATION

BEST AREAS FOR WELLS

Fair

Inferred fractures

ROCK UNITS

p€gs Rocks of the Great Smoky Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

50 Strike and dip of bedding

350 NPS Milepost

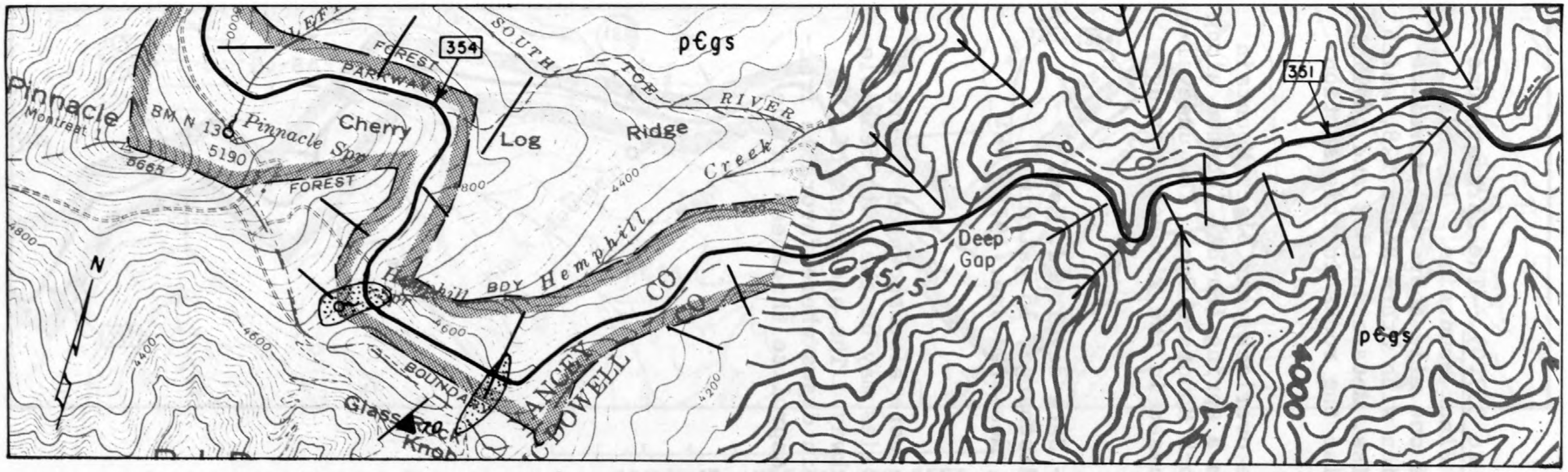
Figure 46.--Flinty Gap area (Miles 346.7 to 351.0).

Pinnacle Spring Area (Miles 351.0 to 354.6).--The Parkway continues in a southwest direction, past Deep Gap (altitude about 4,280 ft) to Glass Rock Knob, where the road turns west of the Blue Ridge and rises along the crest of the Black Mountains to an altitude of 5,120 ft (fig. 47). The Pinnacle is the southern limit of the Parkway on course along the drainage divide between the Atlantic Ocean and the Gulf of Mexico. South of here, all of the drainage along the Parkway is to the Gulf of Mexico.

The rocks along the Parkway consist of metasandstone, quartz-mica gneiss, and phyllite of the Great Smoky Group, undivided.

There are no developed facilities along this section of the Blue Ridge Parkway. Two springs, Hemphill Spring and Pinnacle Spring are shown on figure 47 as undeveloped springs. No data are available about their yield or past use, although they presumably flow perennially with sufficient yield to be noted on the topographic map.

Fair areas for wells exist in a small saddle-like draw at Glass Rock Knob, and in the draw from which Hemphill Spring issues. Although saprolite thickness may be less than 30 ft, wells intersecting fracture zones here may yield as much as 25 gal/min.



0 1 MILE

CONTOUR INTERVAL 40 AND 80 FEET

DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Fair

Inferred fractures

Undeveloped spring

ROCK UNITS

p€gs Rocks of the Great Smoky Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

70 Strike and dip of foliation or schistosity parallel to compositional layering

Boundary of the Blue Ridge Parkway

351 NPS Milepost

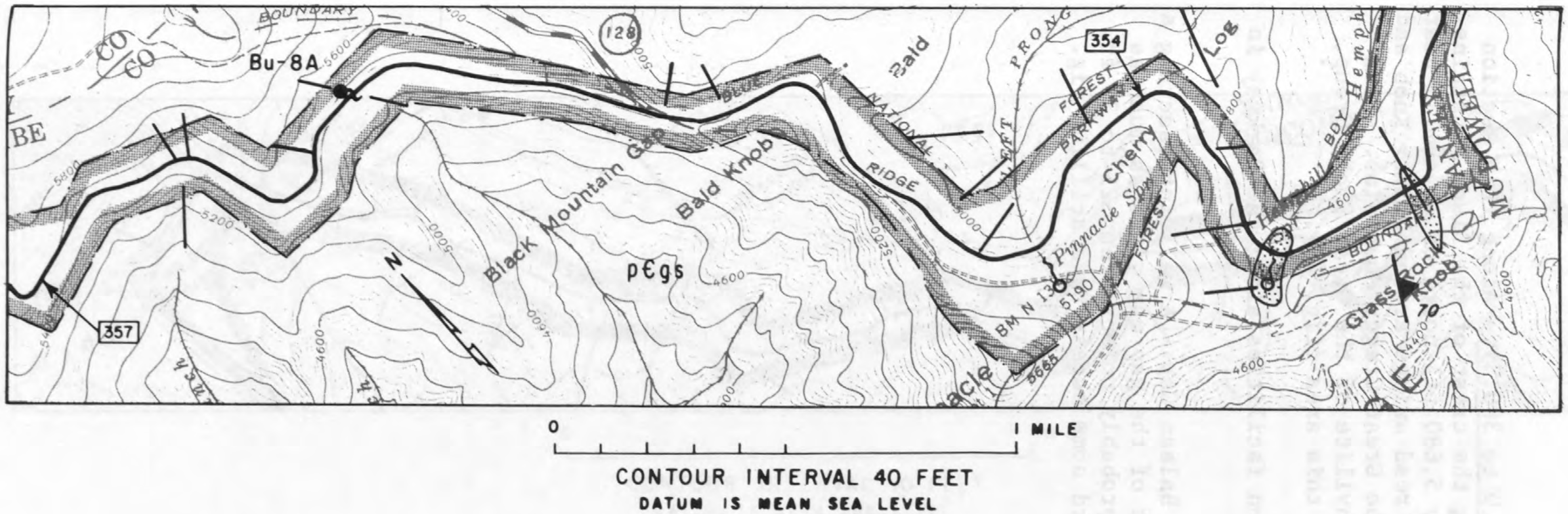
Figure 47.--Pinnacle Spring area (Miles 351.0 to 354.6).

Black Mountain Gap Area (Miles 353.0 to 357.0).--The Parkway runs northwest along the southern crest of the Black Mountains. In this section the Parkway reaches an altitude of one mile above sea level at Black Mountain Gap just west of the junction with State Route 128, which leads to Mount Mitchell. Quartz-mica gneiss, metasandstone, and phyllite of the Great Smoky Group, undivided comprise the rocks in this section (fig. 48).

A drinking fountain serves a roadside overlook near Black Mountain Gap. Water for the fountain is piped from a spring (Bu-8A) located along the Parkway, about 0.7 mi northwest of Black Mountain Gap. The undeveloped springs shown on figure 48 were discussed in the Pinnacle Spring area section of this report (p. 104).

Spring Bu-8A (354328082172001) - date developed, Nov. 1962; owner, National Park Service; discharge, 15 gal/min, measured Nov. 1962, and 24.8 gal/min, measured Jan. 1975; water used for drinking fountain.

Fair areas for wells shown on the map were also shown on figure 47 and were discussed on p. 104. Spring supplies may be the only feasible water source along this section of the Parkway. The steepness of the terrain may limit access by drilling rigs in draws where favorable fracture zones are likely to occur. Also the saprolite thickness in the narrow draws may be less than 25 ft.



EXPLANATION

BEST AREAS FOR WELLS

Fair

Inferred fractures

Bu-8A

Developed spring and number

Undeveloped spring

ROCK UNITS

p€gs Rocks of the Great Smoky Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

70 Strike and dip of foliation or schistosity parallel to compositional layering

Boundary of the Blue Ridge Parkway

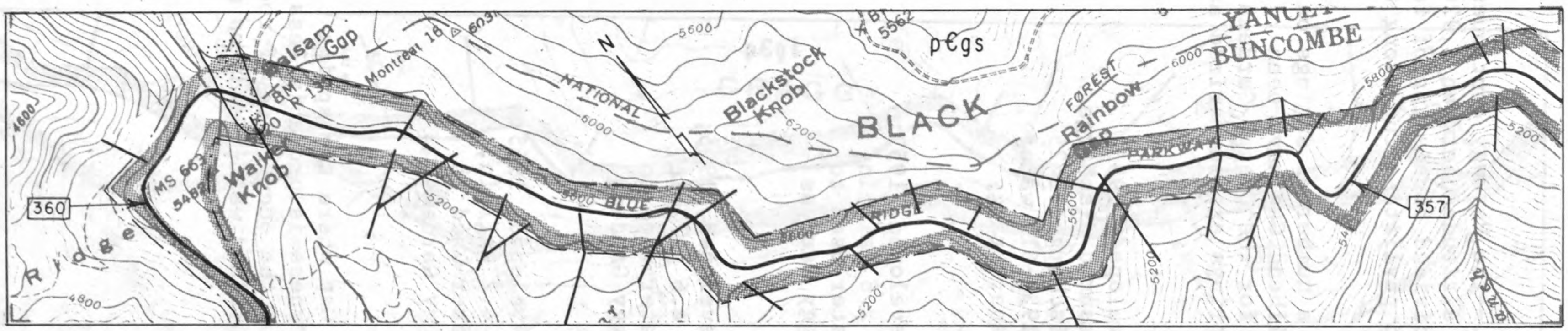
354 NPS Milepost

Figure 48.--Black Mountain Gap area (Miles 353.0 to 357.0).

Blackstock Knob Area (Miles 357.0 to 360.3).--Along this section the Parkway continues northwest along the crest of the Black Mountains, reaching the highest altitude (nearly 5,680 ft) north of Asheville near Blackstock Knob. At Balsam Gap, the road swings around Walker Knob and heads southwest along the ridge of the Great Craggy Mountains. Metasandstone, quartz-mica gneiss, and phyllite of the Great Smoky Group, undivided occur along the Parkway in this area (fig. 49).

There are no developed recreation facilities along the Parkway in this area.

A fair area for wells occurs at Balsam Gap. A well intersecting a fracture zone in the saddle-like area of the gap may yield as much as 25 gal/min. Saprolite thickness is probably no more than 25 to 30 ft, and slopes are gentle enough to afford some access by a drilling rig.



0 — 1 MILE

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Fair

Inferred fractures

ROCK UNITS

p€gs Rocks of the Great Smoky Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

Boundary of the Blue Ridge Parkway

360 NPS Milepost

Figure 49.--Blackstock Knob area (Miles 357.0 to 360.3).

Bullhead Gap Area (Miles 360.3 to 363.9).--The Parkway continues southwest along the Great Craggy Mountains at altitudes between 4,920 and 5,640 ft. Rocks of the Great Smoky Group, undivided consisting of feldspathic metasandstone, quartz-mica gniess, and phyllite occur along this section of the Parkway (fig. 50).

Although no facilities are in this area, a number of springs on the northwest slope of the Craggy Mountains at Bullhead Gap have been developed to furnish part of the water supply for the Craggy Gardens facilities farther to the southwest. These springs are summarized as follows:

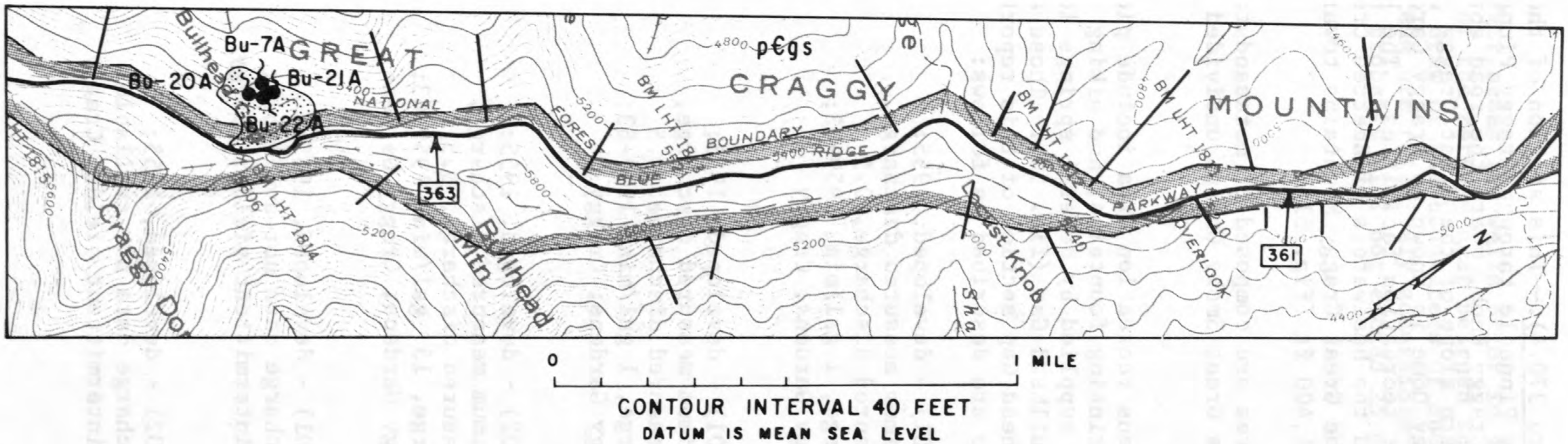
Spring Bu-7A (354242082220001) - developed, 1955; owner, National Park Service; maximum measured discharge, 9 gal/min, Oct. 1959; minimum measured discharge, 2.25 gal/min; median discharge, 6.4 gal/min, 1959-61; water used to supply facilities at Craggy Gardens; Craggy Gardens spring 7.

Spring Bu-20A (354240082220101) - developed, 1955; owner, National Park Service; discharge, 2.8 gal/min, Nov. 1974, and 3.0 gal/min, Jan. 1975; water used to supply facilities at Craggy Gardens; Craggy Gardens spring 6.

Spring Bu-21A (354242082215801) - developed, 1955; owner, National Park Service; discharge, 4.6 gal/min, Nov. 1974, and 5.2 gal/min, Jan. 1975; water used to supply facilities at Craggy Gardens; Craggy Gardens spring 8.

Spring Bu-22A (354241082215801) - developed, 1955; owner, National Park Service; discharge, 4.2 gal/min, Nov. 1974, and 5.3 gal/min, Jan. 1975; water used to supply facilities at Craggy Gardens; Craggy Gardens spring 9.

A fair area for wells occurs at Bullhead Gap where the spring supplies are located. Although saprolite thickness is probably less than 25 ft, vein quartz, which is indicative of the occurrence of rock fractures, has been reported at the site. Sustained well yields as much as 25 gal/min may be possible at the site.



EXPLANATION

BEST AREAS FOR WELLS

Fair

——Inferred fractures

Bu-21A
Developed spring and number

ROCK UNITS

p€gs Rocks of the Great Smoky Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

——·——Boundary of the Blue Ridge Parkway

361 NPS Milepost

Figure 50.--Bullhead Gap area (Miles 360.3 to 363.9).

Craggy Gardens Area (Miles 363.9 to 370.4).--This section of the Parkway continues southwest past Craggy Pinnacle through Craggy Pinnacle Tunnel and along the eastern slope of Craggy Knob, where the road abruptly turns north. The gentler northwestern slope of the Great Craggy Mountains between Craggy Knob and Craggy Dome is known as Craggy Gardens around which the Park Service has built recreation facilities. The Parkway takes a broad northward turn around the headwaters of Beetree Creek and heads southwest, descending from the Great Craggy Mountains toward Lane Pinnacle at an altitude of about 4,400 ft (fig. 51).

The rocks of the Craggy Gardens area are composed of metasandstone, quartz-mica gneiss, and phyllite of the Great Smoky Group, undivided of late Precambrian age.

The facilities at the Craggy Gardens recreation area include picnic grounds, visitor center, rest rooms, drinking fountains, and hiking trails. Water for these facilities is supplied by several springs located near Bearpen Gap (fig. 51) and at Bullhead Gap (fig. 50). Those at Bullhead Gap are discussed in the Bullhead Gap section of this report (p. 110). The springs near Bearpen Gap are described as follows:

Spring Bu-23A (354154082230301) - developed, 1955; owner, National Park Service; maximum measured discharge, 2 gal/min, June 1959; minimum measured discharge, 0.5 gal/min, July 1959; median discharge, 1 gal/min, 1959-63; water used for facilities at Craggy Gardens; Craggy Gardens spring 1.

Spring Bu-24A (354156082230501) - developed, 1955; owner, National Park Service; maximum measured discharge, 2.5 gal/min, June 1959; minimum measured discharge, 0.5 gal/min, July 1959; median discharge, 1 gal/min, 1959-63; water used for facilities at Craggy Gardens; Craggy Gardens spring 2.

Spring Bu-25A (354156082230502) - developed, 1955; owner, National Park Service; maximum measured discharge, 2.5 gal/min, May 1961; minimum measured discharge, 0.5 gal/min, Oct. 1959; median discharge, 15. gal/min, 1959-63; water used for facilities at Craggy Gardens; Craggy Gardens spring 3.

Spring Bu-26A (354217082223901) - developed, 1955; owner, National Park Service; discharge data not available; water not used because of low or intermittent yields; Craggy Gardens spring 4.

Spring Bu-27A (354217082223902) - developed, 1955; owner, National Park Service; discharge data not available; water not used because of low or intermittent yields; Craggy Gardens spring 5.

Fair areas for wells occur in Bearpen Gap, on a broad, smooth slope south of the Parkway near Bearpen Knob, in Potato Field Gap, and in a narrow draw of the headwaters of Shope Creek that crosses the Parkway. All areas are relatively accessible by drilling rigs, but sustained well yields probably will not exceed 25 gal/min.

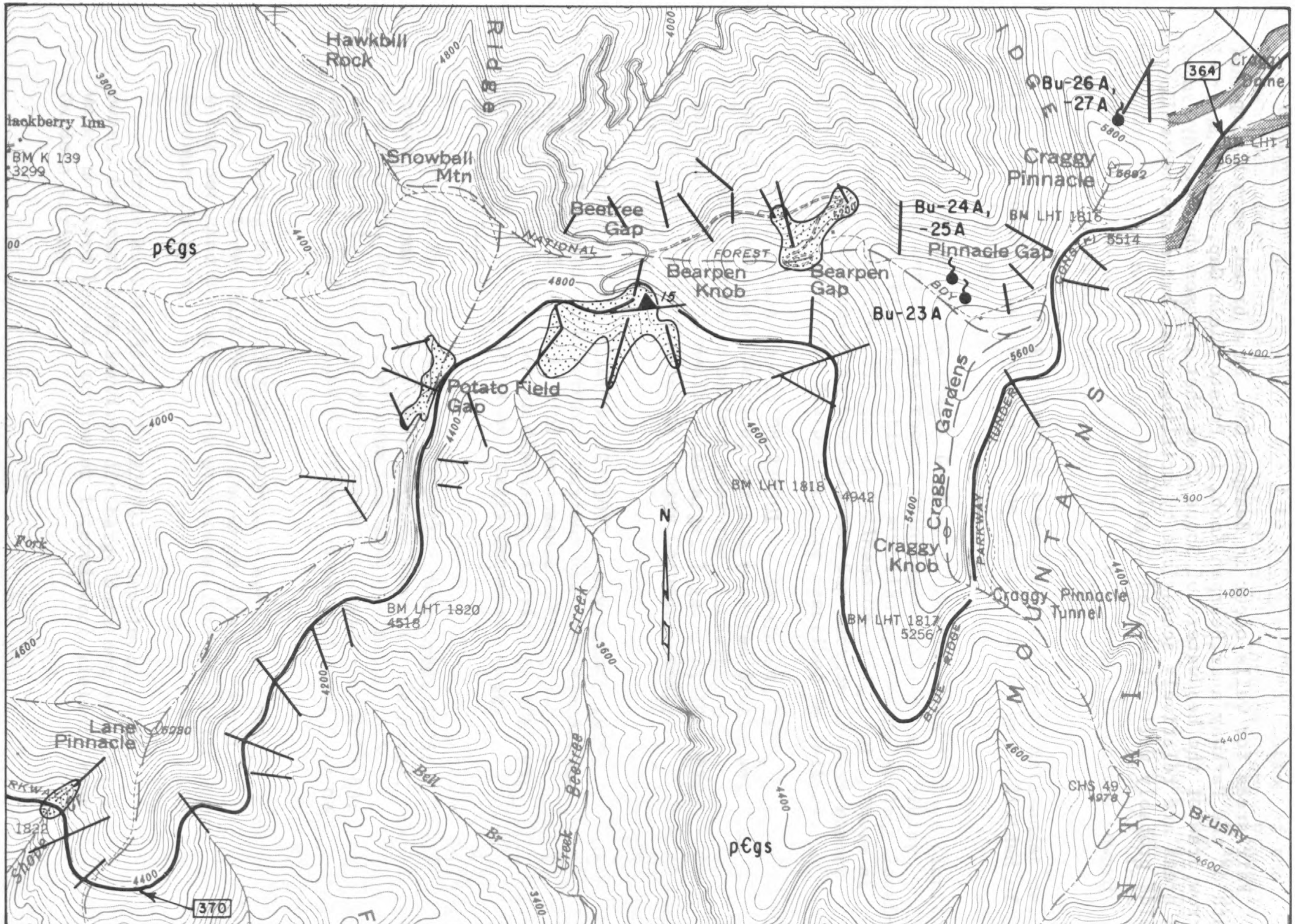


Figure 51.--Craggy Gardens area (Miles 363.9 to 370.4).

0 1 MILE

CONTOUR INTERVAL 40 FEET

DATUM IS MEAN SEA LEVEL

EXPLANATION FOR FIGURE 51

BEST AREAS FOR WELLS

Fair

Inferred fractures

Bu-23A

Developed spring and number

ROCK UNITS

p€gs Rocks of the Great Smoky Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

15 Strike and dip of foliation or schistosity parallel to compositional layering

370 NPS Milepost

Boundary of the Blue Ridge Parkway

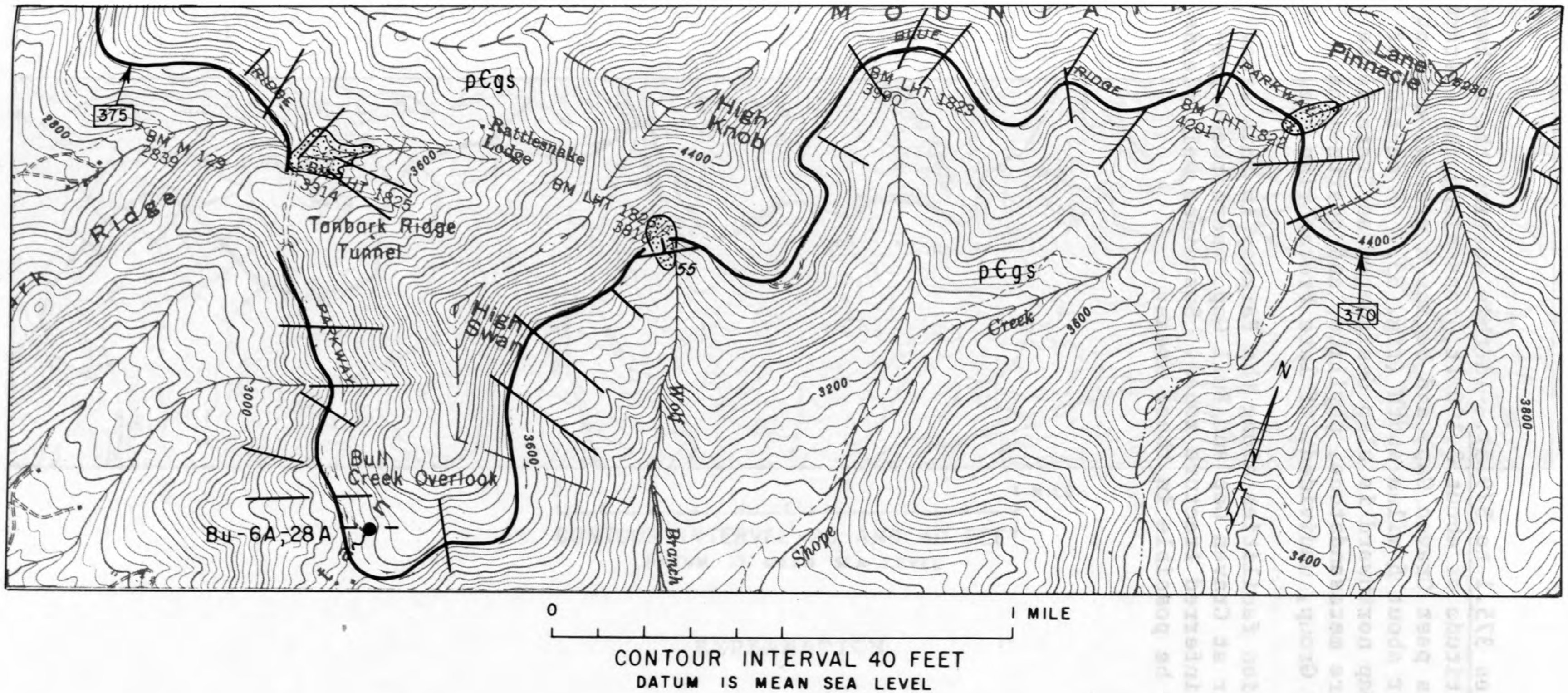
High Swan Area (Miles 370.4 to 375.1).--Gradually descending from the Great Craggy Mountains, the Parkway continues southwest, winding along the sides of several mountain ridges. The altitude of the Parkway drops from about 4,400 to 3,200 ft in this section. Near the end of this section the Parkway passes through Tanbark Ridge Tunnel (fig. 52). The rocks along the Parkway are metasandstone and quartz-mica gneiss of the Great Smoky Group, undivided.

The only facility along this section of Parkway is a drinking fountain at Bull Creek Overlook on the south side of High Swan served by two springs, Bu-6A and -28A, shown on figure 52. A Park Service maintenance storage area is nearby. A description of these springs is as follows:

Spring Bu-6A (353919082271401) - developed, before 1959; owner, National Park Service; maximum measured discharge, over 3.0 gal/min, 1961 and 1962; minimum measured discharge, 0.25 gal/min, several times between 1959 and 1962; median discharge, 1.1 gal/min, 1959-63; water used for drinking fountain.

Spring Bu-28A (353919082271402) - developed, before 1959; owner, National Park Service; discharge data not available, although believed to be of same magnitude as Bu-6A; water used for drinking fountain.

Fair areas for wells occur in several draws where perennial streams cross the Parkway and where access by drilling rigs may not be too difficult. Access to other draws along the Parkway also may be reasonably good. Fracture zones in these areas probably will yield less than 25 gal/min to wells.



EXPLANATION

BEST AREAS FOR WELLS

Fair

Inferred fractures

Bu-6A

Developed spring and number

ROCK UNITS

p€gs Rocks of the Great Smoky Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

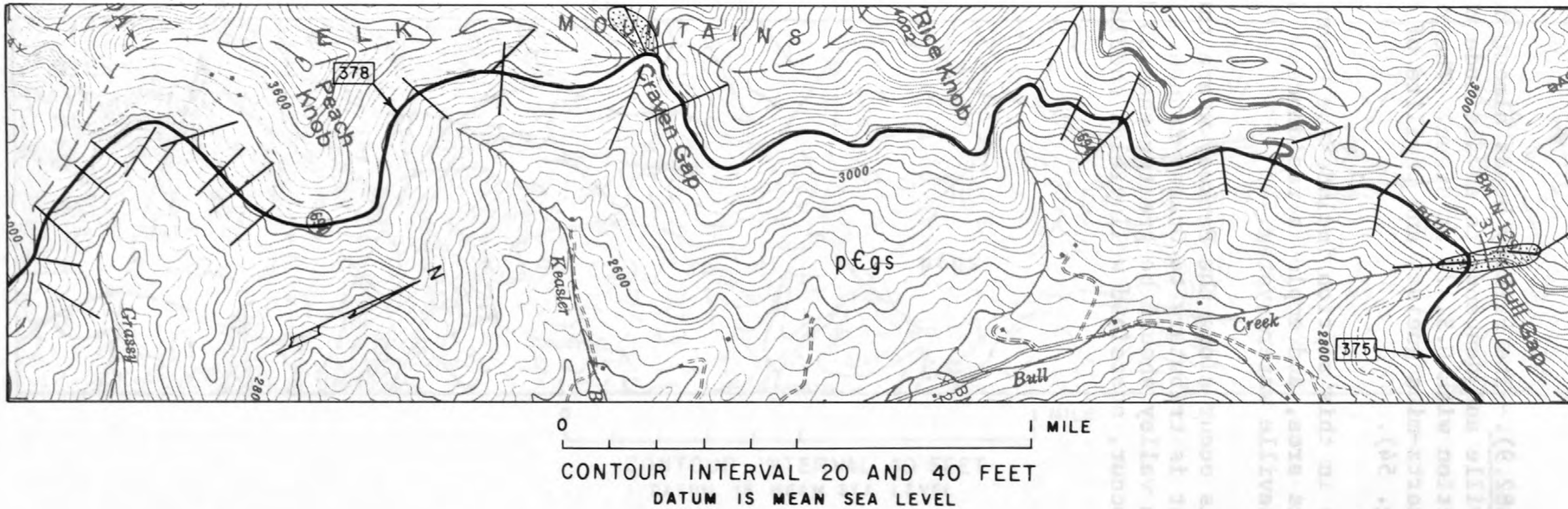
55 Strike and dip of bedding

375 NPS Milepost

Figure 52.--High Swan area (Miles 370.4 to 375.1).

Craven Gap Area (Miles 375.1 to 379.3).--In this section the Parkway crosses Bull Gap at an altitude of about 3,100 ft, runs along the eastern flank of the Elk Mountains past Craven Gap, and begins a gradual descent toward the Swannanoa River about 5 miles south (fig. 53). A section of the Parkway from Craven Gap northward is also designated as State Route 694. Rocks in the area are metasandstone, phyllite, and quartz-mica gneiss of the Great Smoky Group, undivided, of late Precambrian age.

There are no recreation facilities along the Parkway in this area. Fair areas for wells occur at Craven Gap and Bull Gap, where roads provide favorable access to inferred fracture zones. Sustained well yields as much as 25 gal/min may be possible in these areas.



EXPLANATION

BEST AREAS FOR WELLS

Fair

Inferred fractures

ROCK UNITS

pЄgs Rocks of the Great Smoky Group, undivided

375 NPS Milepost

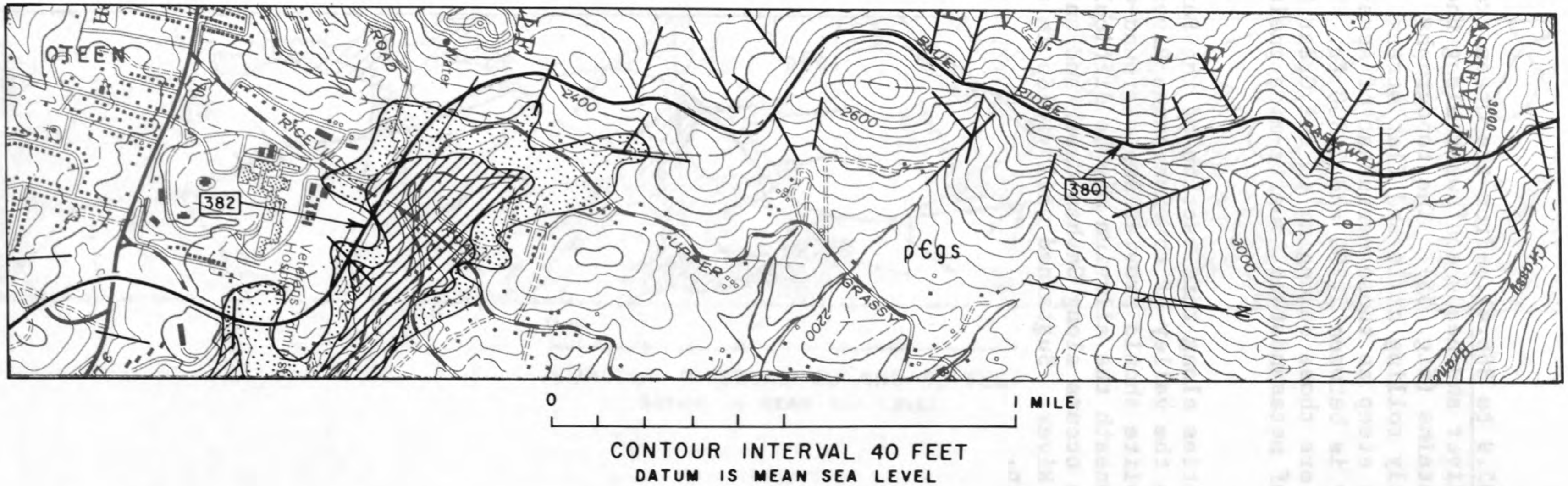
See table 6 for a generalized correlation and table 7 for a description of rock units

Figure 53.--Craven Gap area (Miles 375.1 to 379.3).

Oteen Area (Miles 379.3 to 382.9).--The Parkway heads almost due south past the east side of Asheville and descends to an altitude of about 2,200 ft just past the junction with U.S. 70 at Oteen. The rocks in the area are metasandstone, quartz-mica gneiss, and phyllite of the Great Smoky Group, undivided (fig. 54).

Facilities along the Parkway in this section include the Oteen District headquarters, maintenance area, and employee residences. Water for these is furnished by the Asheville water system.

Good and fair areas for wells occur along the Parkway where the road parallels a small stream that is tributary to Grassy Branch. Saprolite thickness in the stream valley should be greater than 30 ft, and, where sufficient fractures occur, sustained well yields should exceed 25 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

——— Inferred fractures

ROCK UNITS

p€gs Rocks of the Great Smoky Group, undivided

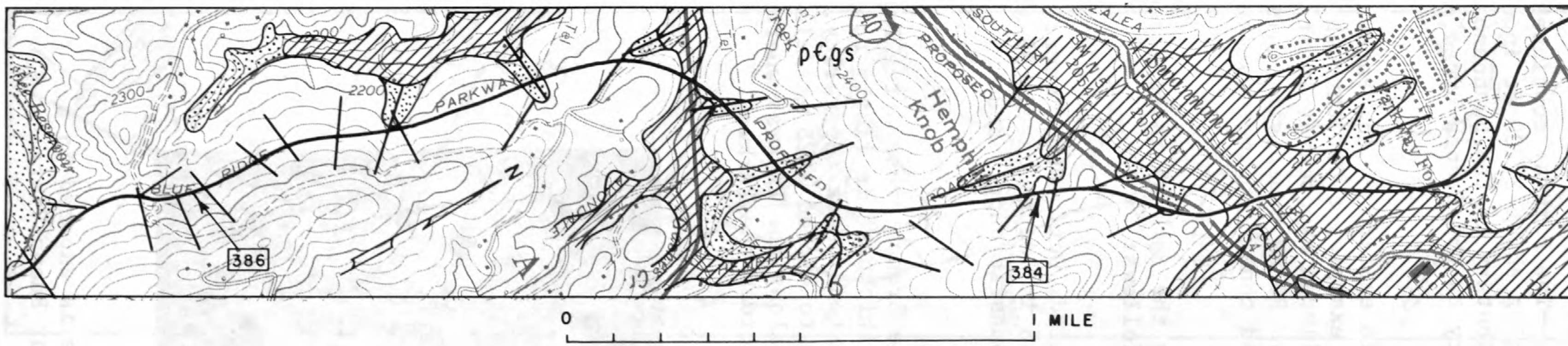
See table 6 for a generalized correlation and table 7 for a description of rock units

380 NPS Milepost

Figure 54.--Oteen area (Miles 379.3 to 382.9).

Swannanoa River Area (Miles 382.9 to 386.4).--From the Oteen area, the Parkway crosses the Swannanoa River and heads southwest along the western flank of the Swannanoa Mountains (fig. 55). The topography along this section consists of gently rolling hills and flat stream valleys; mountain slopes are not as steep as those northeast of Asheville. The altitude of the Parkway is between 2,200 and 2,300 ft. Rocks that are exposed along the Parkway are those belonging to the Great Smoky Group, undivided and are composed of metasandstone, quartz-mica gneiss, and phyllite.

There are no recreation facilities along this section of the Parkway. Good areas for wells occur in the valley of the Swannanoa River where alluvium in addition to saprolite should provide ample ground-water storage; however, rock fractures beneath the alluvium may be difficult to locate. A good area for wells also occurs along Gashes Creek and an unnamed tributary to the Swannanoa River. Sustained well yields in these areas should be more than 25 gal/min.



CONTOUR INTERVAL 20 AND 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

ROCK UNITS

p€gs Rocks of the Great Smoky Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

386 NPS Milepost

Figure 55.--Swannanoa River area (Miles 382.9 to 386.4).

Buena Vista Area (Miles 386.4 to 389.7).--The Parkway continues southwest across gently rolling hills, averaging about 2,200 ft in altitude. It crosses Sweeten Creek, which is tributary to the Swannanoa River, and Fourmile Branch, which is tributary to the French Broad River (fig. 57).

Few rock outcrops can be found along this section of the Parkway, which is indicative of thick saprolite. For example, a cut through a small ridge where the Parkway crosses the railroad exposed at least 30 ft of saprolite and weathered rock (fig. 56). Rocks underlying this area belong to the Great Smoky Group, undivided and consist of metasandstone, quartz-mica gneiss, and phyllite.

There are no recreation facilities along the Parkway in this section. One well shown on figure 57 is described as follows:

Well Bu-40 (353136082305501) - drilled, Oct. 1960; owner, Melvin Carland; depth, 80 ft; diameter, 6 in; depth cased, 53 ft; yield, 15 gal/min; water used for domestic supply and nursery.

Good areas for wells occur where Fourmile Branch crosses the Parkway and runs parallel to the Parkway. Saprolite thickness is likely to exceed 50 ft in this area. Where fractures extend under the valley, wells intercepting these fractures are likely to exceed a 25 gal/min sustained yield. Fair areas for wells occur along the Parkway where Sweeten Creek and several of its tributaries cross the Parkway.

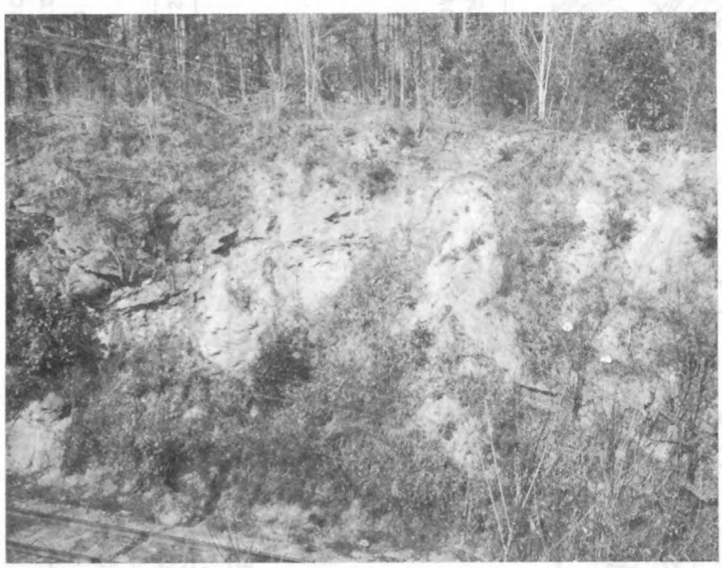
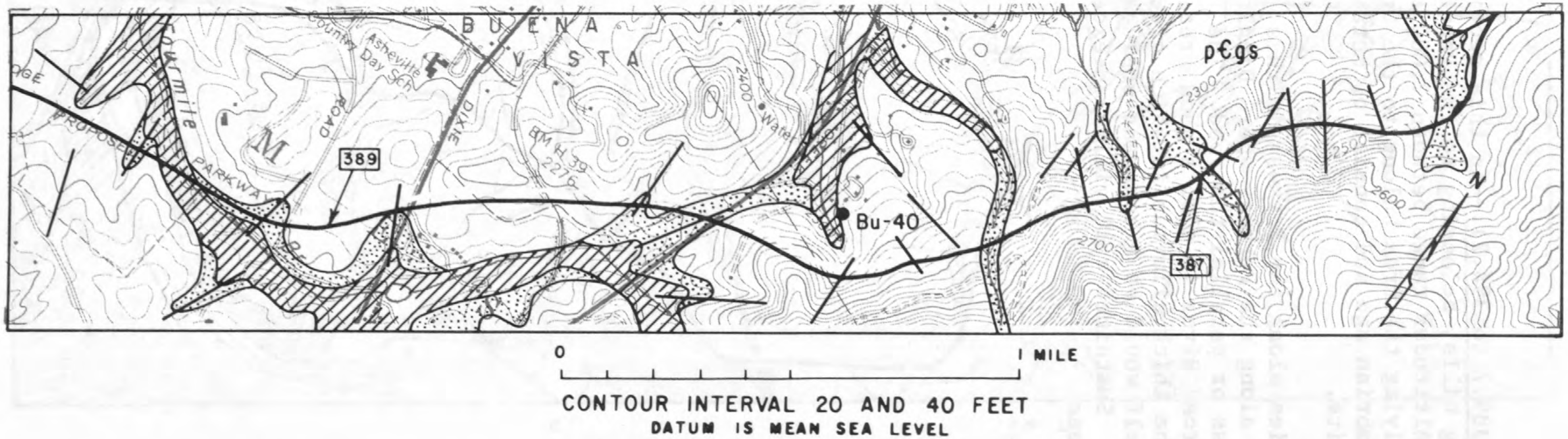


Figure 56.--About 30 ft of saprolite is exposed in a railroad cut along the Parkway near Buena Vista.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Bu-40
• Well and number

ROCK UNITS

p€gs Rocks of the Great Smoky Group, undivided

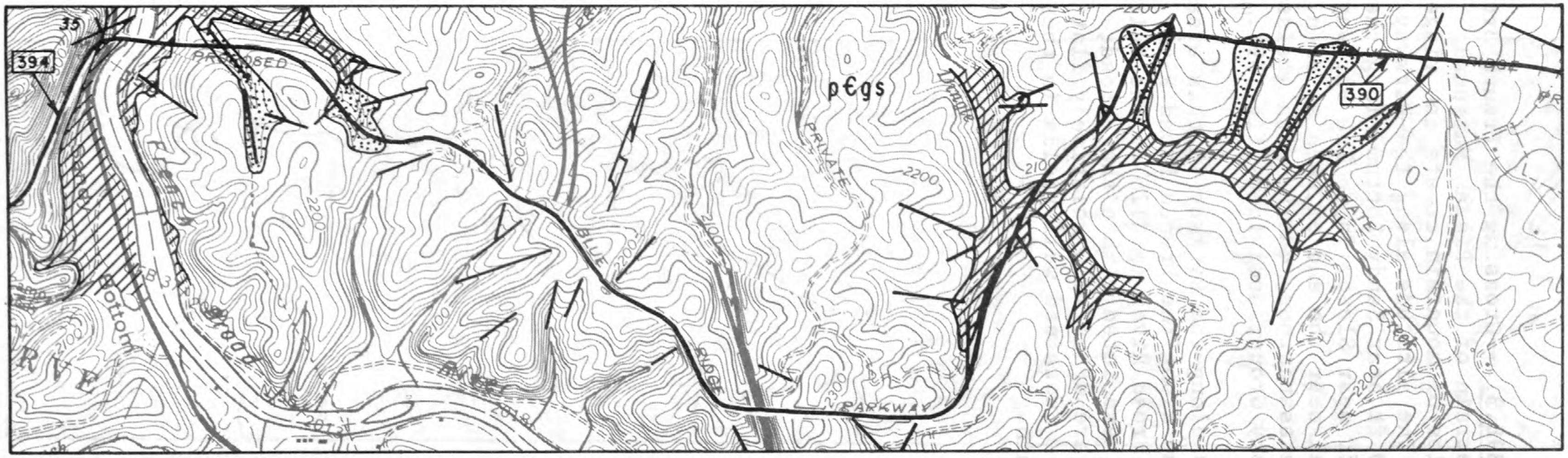
See table 6 for a generalized correlation and table 7 for a description of rock units

387 NPS Milepost

Figure 57.--Buena Vista area (Miles 386.4 to 389.7).

French Broad River Area (Miles 389.7 to 394.2).--In this section the Parkway heads west across rolling hills, belonging to the Vanderbilt Estate, to the French Broad River. Altitudes range between 2,000 and 2,200 ft (fig. 58). The rocks underlying the area belong to the Great Smoky Group, undivided of late Precambrian age and consist of metasandstone, quartz-mica gneiss, and phyllite.

There are no recreation facilities along the Parkway in this section. Good areas for wells occur along the Parkway where Dingle Creek and several feeder streams cross or parallel the road. The alluvial flood plain of the French Broad River is also a good area for wells because of the occurrence of the thick alluvium in which ground water is stored; also, the river itself would be a constant source of recharge to the ground-water system. Sustained well yields in excess of 25 gal/min are likely in these areas.



0 1 MILE

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

ROCK UNITS

p€gs Rocks of the Great Smoky Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

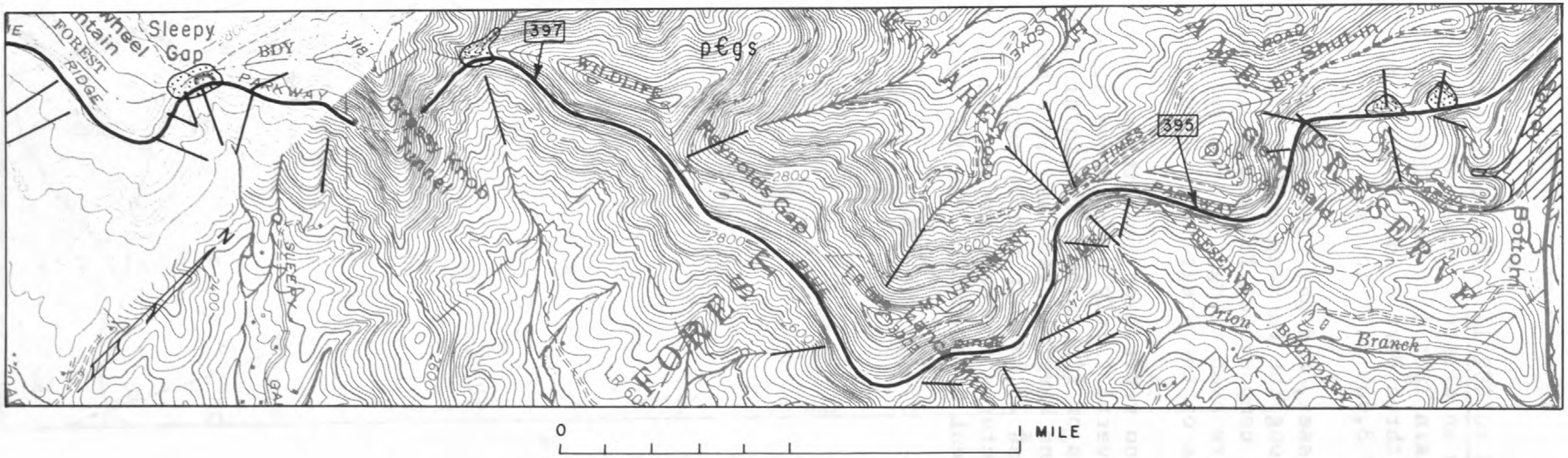
35 Strike and dip of bedding

390 NPS Milepost

Figure 58.--French Broad River area (Miles 389.7 to 394.2).

Grassy Knob Area (Miles 394.2 to 398.3).--Crossing the French Broad River, the Parkway enters the rugged terrain of the Pisgah National Forest, and begins a climb along a series of mountain crests and ridges leading to the Great Smoky Mountains. The altitude along the Parkway in this section ranges from about 2,000 ft near Sandy Bottom along the French Broad River to just over 3,000 ft near Sleepy Gap. The Parkway passes through 600-ft Grassy Knob Tunnel near the end of this section. The rocks exposed along the road are metasandstone, quartz-mica gneiss, and phyllite belonging to the Great Smoky Group, undivided (fig. 59).

There are no recreation facilities along the Parkway in this area. The good area for wells shown on the map along the French Broad River is discussed in the section on the French Broad River (p. 126). The fair areas for wells shown on figure 59 are associated with either broad, saddle-like areas at mountain gaps, or are draws with relatively flat areas allowing access by drilling rigs. Sustained well yields in these areas are not likely to exceed 25 gal/min.



CONTOUR INTERVAL 20 AND 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

ROCK UNITS

p€gs Rocks of the Great Smoky Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

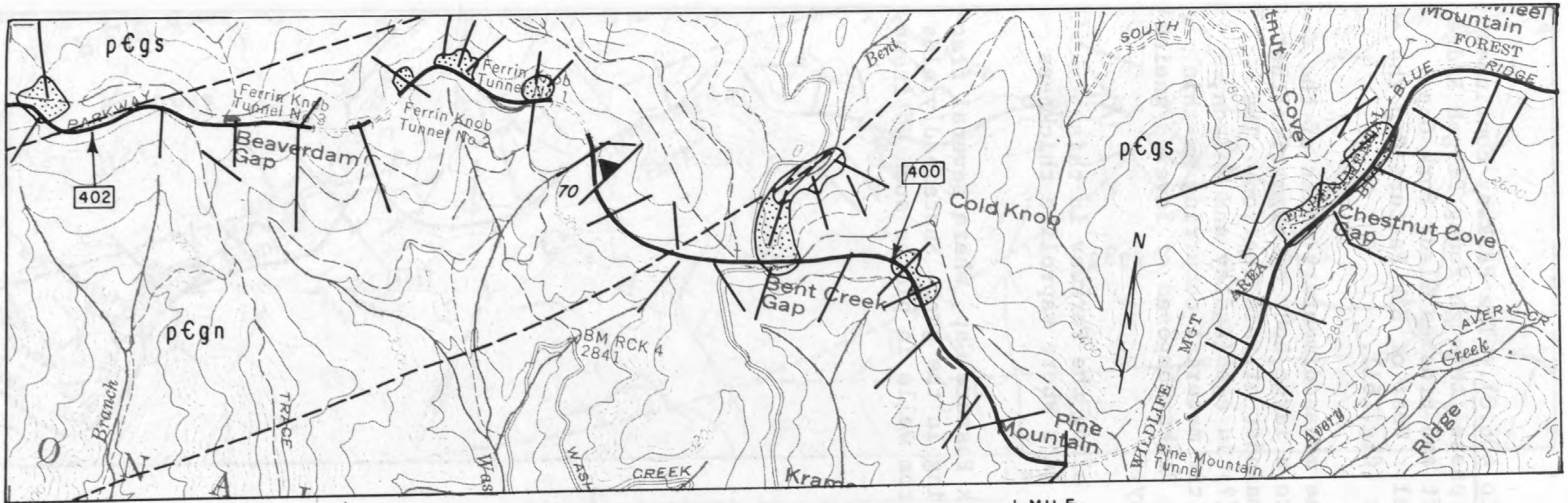
397 NPS Milepost

Figure 59.--Grassy Knob area (Miles 394.2 to 398.3).

Bent Creek Gap Area (Miles 398.3 to 402.1).--The Parkway continues a gradual climb to the southwest from an altitude of about 3,000 ft at Chestnut Cove Gap, through Pine Mountain Tunnel to Bent Creek Gap (altitude 3,300 ft), and through the three Ferrin Knob Tunnels to Beaverdam Gap at an altitude of about 3,600 ft (fig. 60).

Metasandstones, quartz-mica gneisses, and phyllites of the Great Smoky Group, undivided are exposed along the Parkway east of Bent Creek Gap. From here a broad band of rocks composed of layered gneiss and migmatite of middle Precambrian age are seen along the Parkway to the area of Beaverdam Gap, where the rocks of the Great Smoky Group reappear.

This section of the Parkway has no recreation facilities. Ground-water supplies may be developed in several fairly broad draws along the Parkway, shown as fair areas for wells on figure 60. The saddle-like area at Chestnut Cove Gap also contains several draws and is a fair area for wells. Sustained yields as much as 25 gal/min can be expected from wells penetrating sufficient rock fractures in these areas. The good area for wells shown at the head of Bent Creek, which may not be on Parkway property, has good road access.



0 — 1 MILE

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

ROCK UNITS

p€gn — Layered gneiss and migmatite

p€gs — Rocks of the Great Smoky Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

70 Strike and dip of foliation or schistosity parallel to compositional layering

400 NPS Milepost

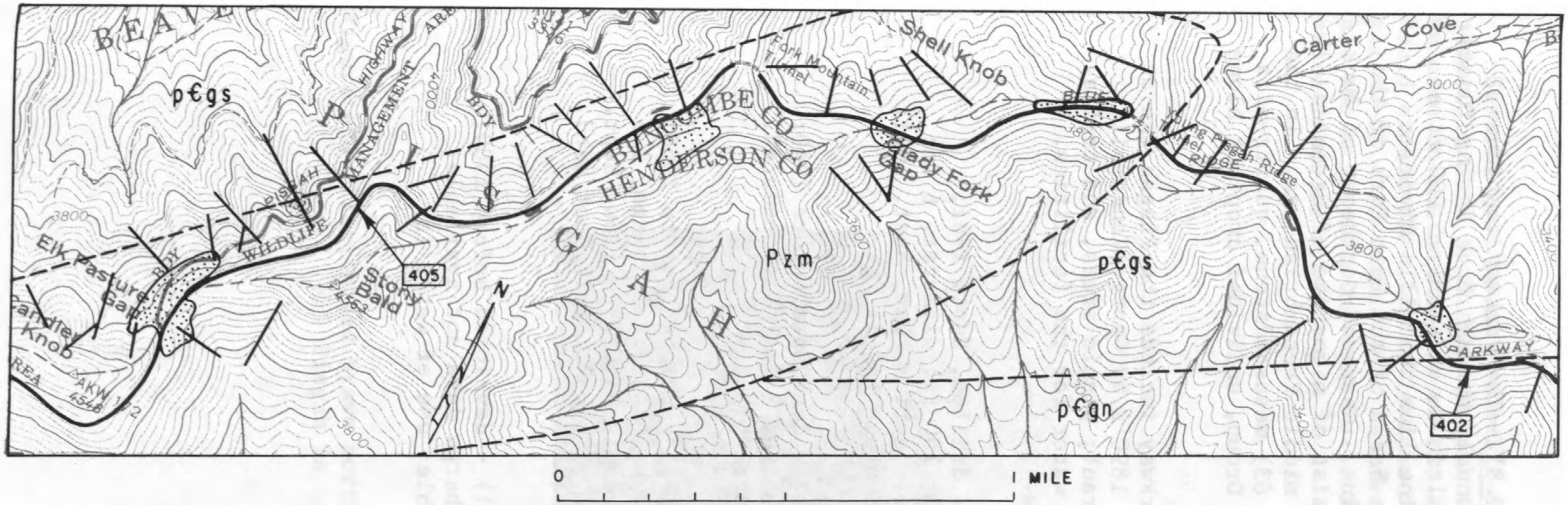
Figure 60.--Bent Creek Gap area (Miles 398.3 to 402.1)

Glady Fork Gap Area (Miles 402.1 to 406.0).--The Parkway continues a gradual ascent toward the southwest, passes through Young Pisgah Ridge Tunnel at an altitude of nearly 3,900 ft and crosses Glady Fork Gap before entering the Fork Mountain Tunnel. West of Elk Pasture Gap the Parkway reaches an altitude of 4,600 ft (fig. 61).

Near Young Pisgah Ridge Tunnel, the metasedimentary rocks of the Great Smoky Group, undivided give way to a large body of migmatite that is exposed along the Parkway in the remainder of this section. The migmatite, which is mapped as Devonian(?) in age (Hadley and Nelson, 1971), consists of granitic and pegmatitic material occurring as thin layers or lenses in gneiss and schist. Rocks composed of layered gneiss and migmatite occur south of the Parkway.

There are no recreation facilities along the Parkway in this section. Fair areas for wells occur in gaps where saprolite thickness may be as much as 25 ft.

The largest such area occurs at Elk Pasture Gap, where several fracture zones are inferred from draws heading in the gap. Sustained yields as much as 25 gal/min may be possible from wells in places such as these.



EXPLANATION

BEST AREAS FOR WELLS

Fair

——— Inferred fractures

ROCK UNITS

p€gn — Layered gneiss and migmatite

p€gs — Rocks of the Great Smoky Group, undivided

Pzm — Migmatite

See table 6 for a generalized correlation and table 7 for a description of rock units.

STRUCTURE

– – – – Approximate boundary between rock units

405 — NPS Milepost

Figure 61.--Glady Fork Gap area (Miles 402.1 to 406.0).

Mt. Pisgah Area (Miles 406.0 to 409.8).--The Parkway continues southwest through Little Pisgah Ridge Tunnel, through Buck Spring Tunnel, across Flat Laurel Gap, and reaches an altitude of nearly 5,000 ft at Fryingpan Gap. Southeast of the ridgeline lies the Mills River, a tributary of the French Broad River; the basin of the East Fork of the Pigeon River is northwest of the ridgeline. Near and northeast of Buck Spring, the rocks along the Parkway consist of migmatite of Devonian (?) age and layered gneiss and migmatite of middle Precambrian age. In the southwest half of the mapped area (fig. 63) metasandstone, quartz-mica gneiss, and phyllite of the Great Smoky Group, undivided crop out along the road.

Recreation facilities along the Parkway include the Pisgah Inn at Flat Laurel Gap, which was built in the 1890's by George Vanderbilt; campgrounds; service station and restaurant; picnic areas, and trails. A well (Hw-63) was completed to furnish water for the facilities. Ground-water sources in the area include:

Well Hw-63 (352440082445601) - drilled, Sept. 1961; owner, National Park Service; depth, 100 ft; diameter, 6 in; depth cased, 28 ft; yield, 52 gal/min during test, Sept. 1961; water used to supply Pisgah Inn and other facilities.

Spring Hw-28A (352449082450201) - developed before 1940; owner, National Park Service; discharge, 2 gal/min, measured, Sept. 1961; spring not used (Buck Spring).

Spring Hw-29A (352412082452201) - developed before 1958; owner, National Park Service; maximum measured discharge, 1.8 gal/min, Dec. 1961; minimum measured discharge, no flow, Sept. 1962; median discharge, 1.0 gal/min, 1961-62; spring not used, but formerly supplied Pisgah Inn.

Spring Hw-30A (352347082461101) - developed before 1900; owner, National Park Service; discharge data not available, but spring is reported to be reliable; use of water is unknown.

Several good areas for wells occur on Parkway property. The most accessible area is in Flat Laurel Gap where several flat, broad draws coalesce on the north side of the Parkway (fig. 62). Saprolite here should exceed the 25-ft thickness of saprolite in the narrower draw at well Hw-63. Sustained well yields also should exceed 25 gal/min. Note that the high-yielding well Hw-63 is near the intersection of two inferred fracture zones.

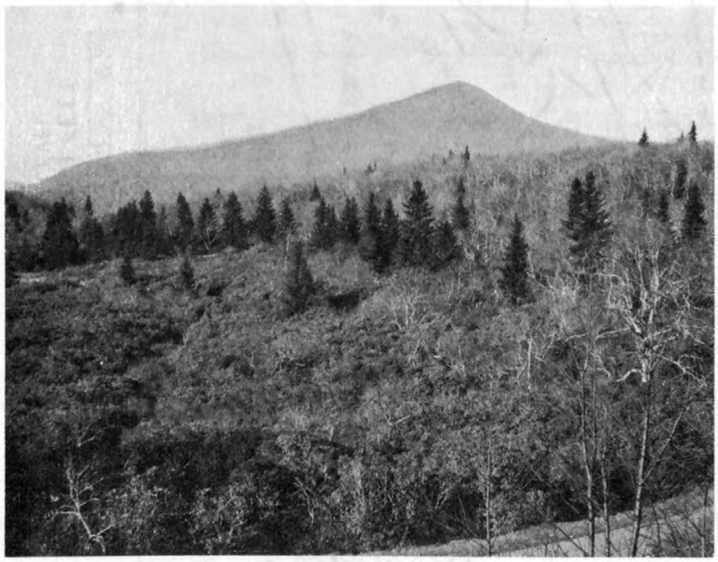


Figure 62.--Flat, broad draws north of the Parkway at Flat Laurel Gap. Mt. Pisgah is in the background.

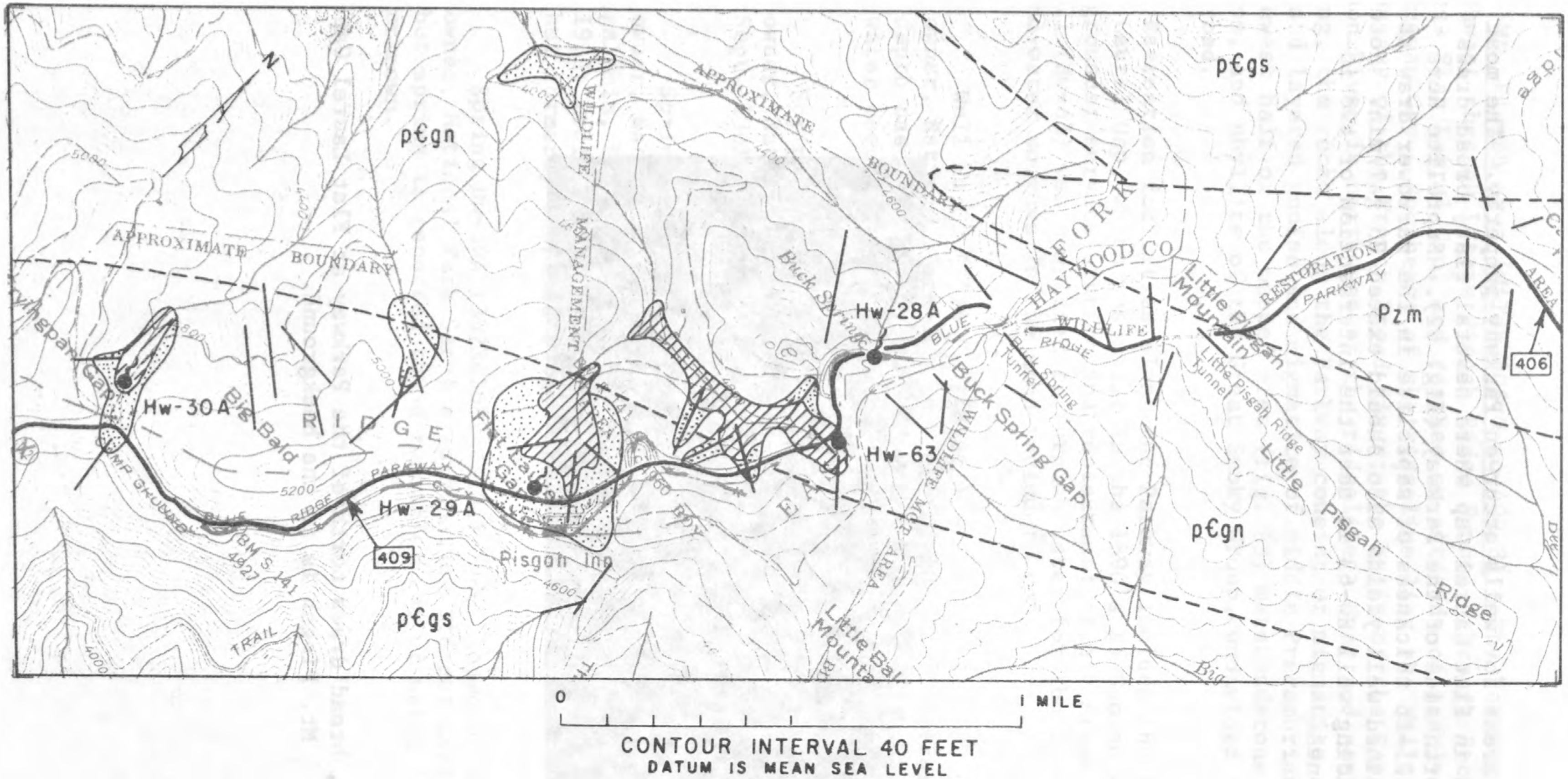


Figure 63.--Mt. Pisgah area (Miles 406.0 to 409.8).

EXPLANATION FOR FIGURE 63

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Hw-63
Well and number

Hw-28A
Developed spring and number

ROCK UNITS

p€gn Layered gneiss and migmatite

p€gs Rocks of the Great Smoky Group, undivided

Pzm Migmatite

See table 6 for a generalized correlation and table 7 for a description of rock units

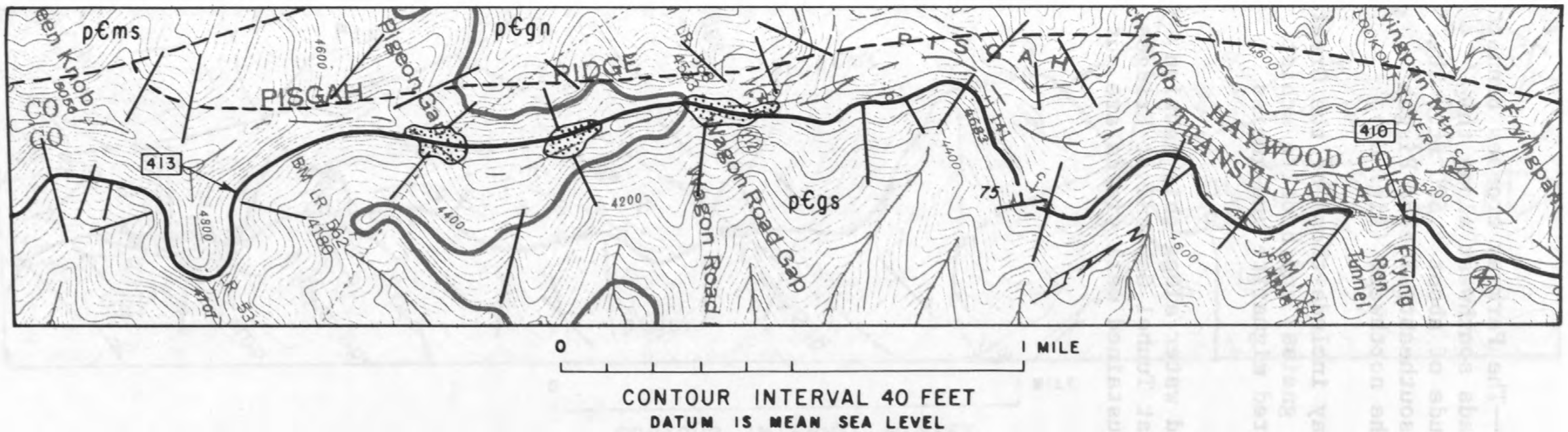
STRUCTURE

Approximate boundary between rock units

409 NPS Milepost

Wagon Road Gap Area (Miles 409.8 to 413.7).--The Parkway in this section passes through Fryingpan Tunnel at an altitude of about 5,400 ft and heads southwest along Pisgah Ridge. The road descends to an altitude of just over 4,500 ft at Pigeon Gap (fig. 64). The rocks that crop out along the Parkway are those belonging to the Great Smoky Group, undivided and consist of metasandstone, quartz-mica gneiss, and phyllite. Rocks composed of layered gneiss and migmatite, and muscovite schist and gneiss occur west of the Parkway.

At Wagon Road Gap, the Park Service has maintenance facilities and storage area, but there is no water supply at this site. Fair areas for wells occur between Wagon Road Gap and Pigeon Gap in small gaps broaching the ridge line. Where draws head in these gaps, saprolite thickness may be as much as 25 ft, but well yields are not likely to exceed 25 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

Fair

Inferred fractures

ROCK UNITS

p€gn — Layered gneiss and migmatite

p€gs — Rocks of the Great Smoky Group, undivided

p€ms — Muscovite schist and gneiss

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

75 Strike and dip of bedding

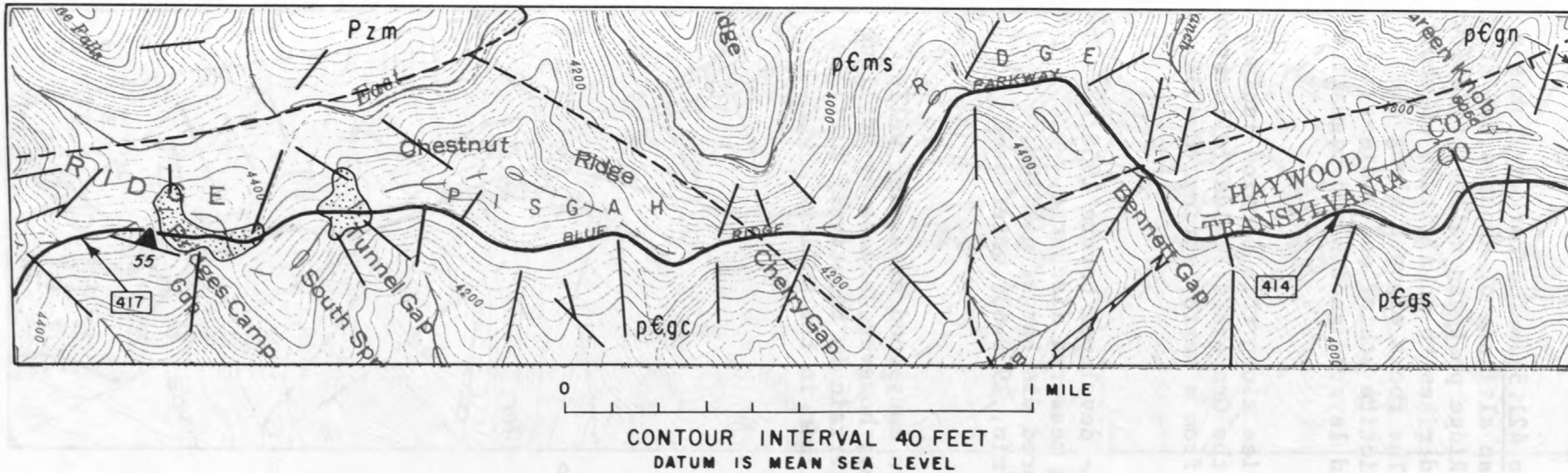
410 NPS Milepost

Figure 64.--Wagon Road Gap area (Miles 409.8 to 413.7).

Cherry Gap Area (Miles 413.7 to 417.1).--The Parkway crosses Bennett Gap at an altitude of about 4,400 ft, and heads southwest along the Pisgah Ridge to Bridges Camp Gap at an altitude of about 4,600 ft. The headwaters of the Davidson River lie on the southeast side of Pisgah Ridge, and the Pigeon River drainage is on the northwest (fig. 65).

The rocks that crop-out along the Parkway include those of the Great Smoky Group, undivided; muscovite schist and gneiss; and biotite schist and gneiss. To the west, migmatite and layered migmatite and gneiss occur.

There are no developed sources of ground water along this section of the Parkway. Fair areas for wells occur at Tunnel Gap and at Bridges Camp Gap, where draws head in these gaps. Sustained well yields are not expected to exceed 25 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

Fair

Inferred fractures

ROCK UNITS

p€gc Biotite schist and gneiss

p€gn Layered gneiss and migmatite

p€gs Rocks of the Great Smoky Group, undivided

p€ms Muscovite schist and gneiss

Pzm Migmatite

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

55 Strike and dip of foliation or schistosity parallel to compositional layering

414 NPS Milepost

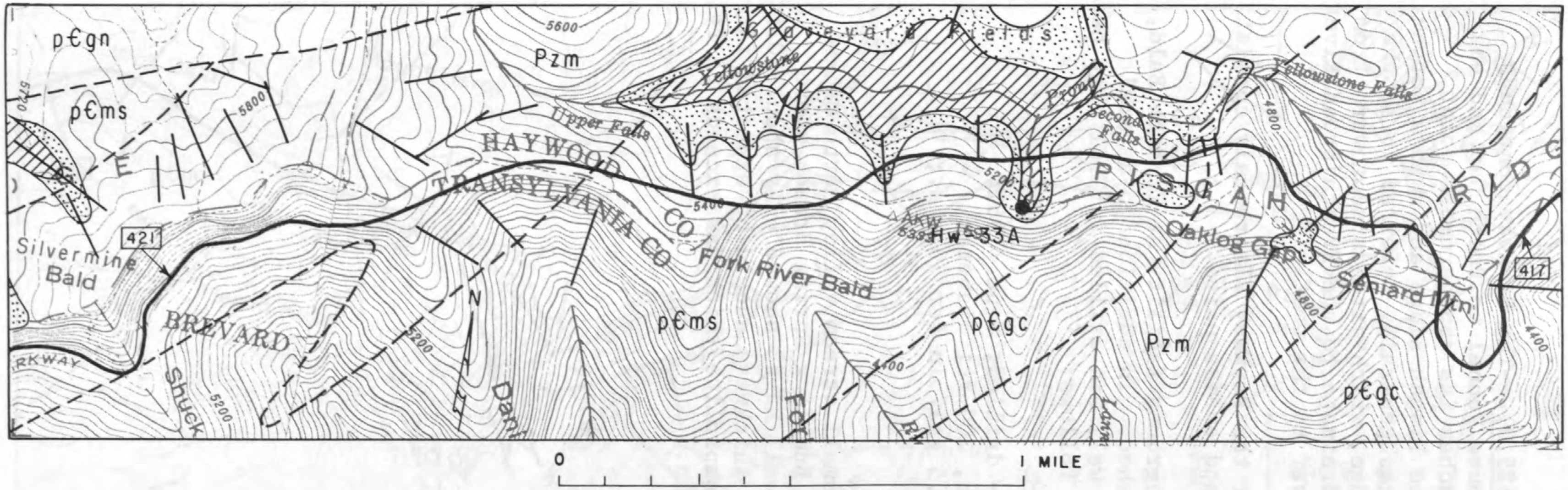
Figure 65.--Cherry Gap area (Miles 413.7 to 417.1).

Yellowstone Falls Area (Miles 417.1 to 421.5).--The Parkway takes a southward loop around Seniard Mountain at an altitude of about 4,800 ft. The road continues southwest along Pisgah Ridge past the valley of Yellowstone Prong, known as Graveyard Fields, and rises to an altitude of about 5,500 ft near Silvermine Bald (fig. 66). The rocks exposed along the Parkway are alternating sequences of the biotite schist and gneiss, migmatite, muscovite schist and gneiss, and layered gneiss and migmatite units.

Facilities developed by the Park Service along this section include hiking trails and a drinking fountain for the Graveyard Fields-Yellowstone Falls area. Water for the fountain comes from a nearby spring (Hw-33A), which is summarized as follows:

> Spring Hw-33A (351904082505701) - developed before 1958; owner, National Park Service; maximum measured discharge, 15 gal/min, March 1961; minimum measured discharge, no flow, Nov. 1974; median discharge, 2.0 gal/min, 1959-63; water used for drinking fountain.

The valley of Yellowstone Prong offers many good areas for wells, especially where draws open into the valley; however, access by drilling rigs is somewhat limited even though the terrain is relatively flat. Sustained well yields should exceed 25 gal/min in the valley.



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Hw-33A
Developed spring and number

ROCK UNITS

p€gc Biotite schist and gneiss

p€gn Layered gneiss and migmatite

p€ms Muscovite schist and gneiss

Pzm Migmatite

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

417 NPS Milepost

Figure 66.--Yellowstone Falls area (Miles 417.1 to 421.5).

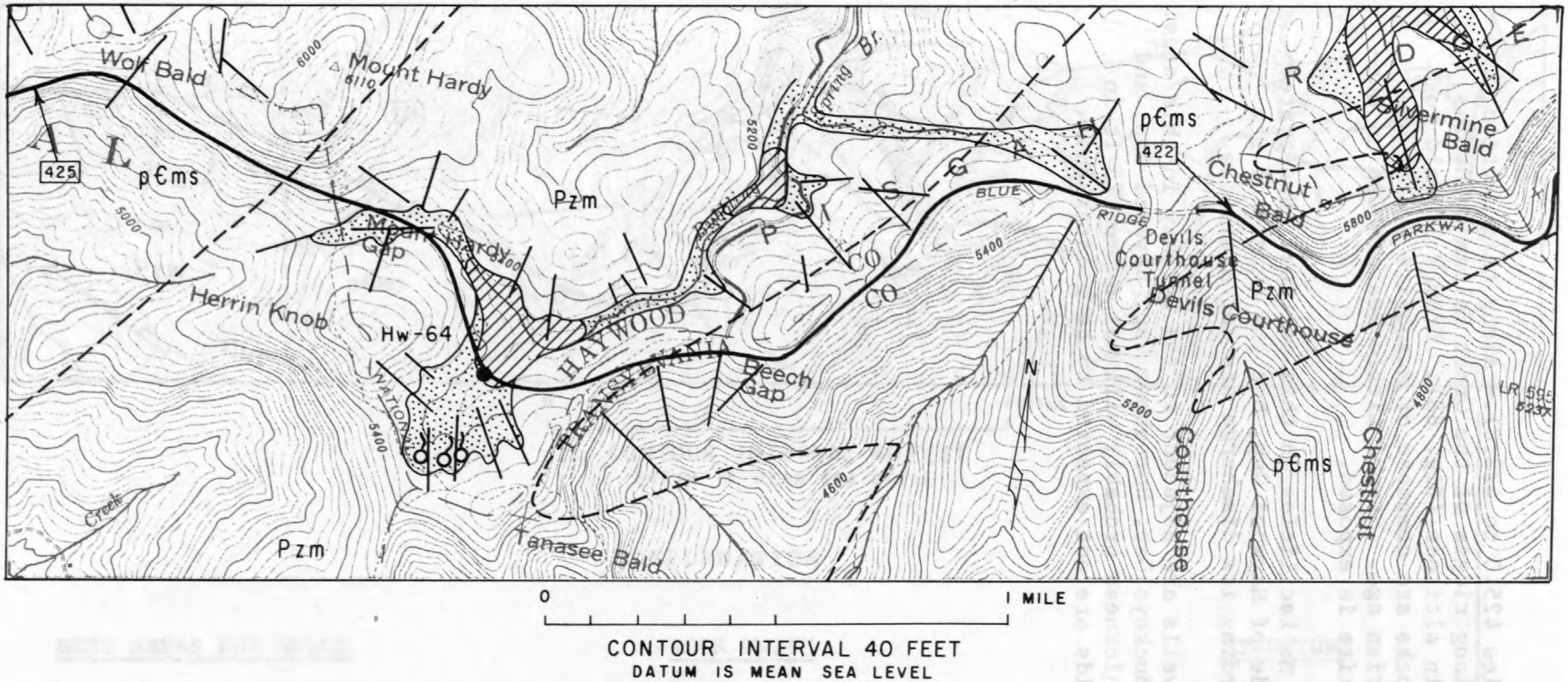
Tanasee Bald Area (Miles 421.5 to 425.0).--The Parkway continues southwest, passes through Devils Courthouse Tunnel to Beech Gap and the Tanasee Bald area, where the Parkway reaches its southernmost point (fig. 67). From here the road leaves the Pisgah Ridge and swings northwest along the first in a series of ridges generally referred to as the Great Balsam Mountains. The Tanasee Ridge, which extends southward from Tanasee Bald, marks the divide between drainage to the French Broad River to the east and the Little Tennessee River to the west.

Rocks exposed along this section of the Parkway alternately consist of the migmatite, and muscovite schist and gneiss units.

The Park Service has planned a campground facility at Tanasee Bald, but a water supply has not been established. In addition to several undeveloped springs in the area, a test well was drilled in 1961 that had a low yield. This well is described as follows:

> Well Hw-64 (351745082550901) - drilled, Sept. 1961; owner, National Park Service; depth, 200 ft; diameter, 5 in; depth cased, 10 ft; yield, 2.5 gal/min for 20 min.; test well.

Good areas for wells occur in the small stream valley north of Silvermine Bald and along the valley of Bubbling Spring Branch where draws open into the valleys. Although well Hw-63 showed only about 10 ft of saprolite at its location, a greater thickness should be expected farther down the valley slope. Where the saprolite thickness exceeds 25 ft, well yields should be at least 25 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Hw-64
Well and number

Undeveloped spring

ROCK UNITS

p€ms Muscovite schist and gneiss

Pzm Migmatite

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

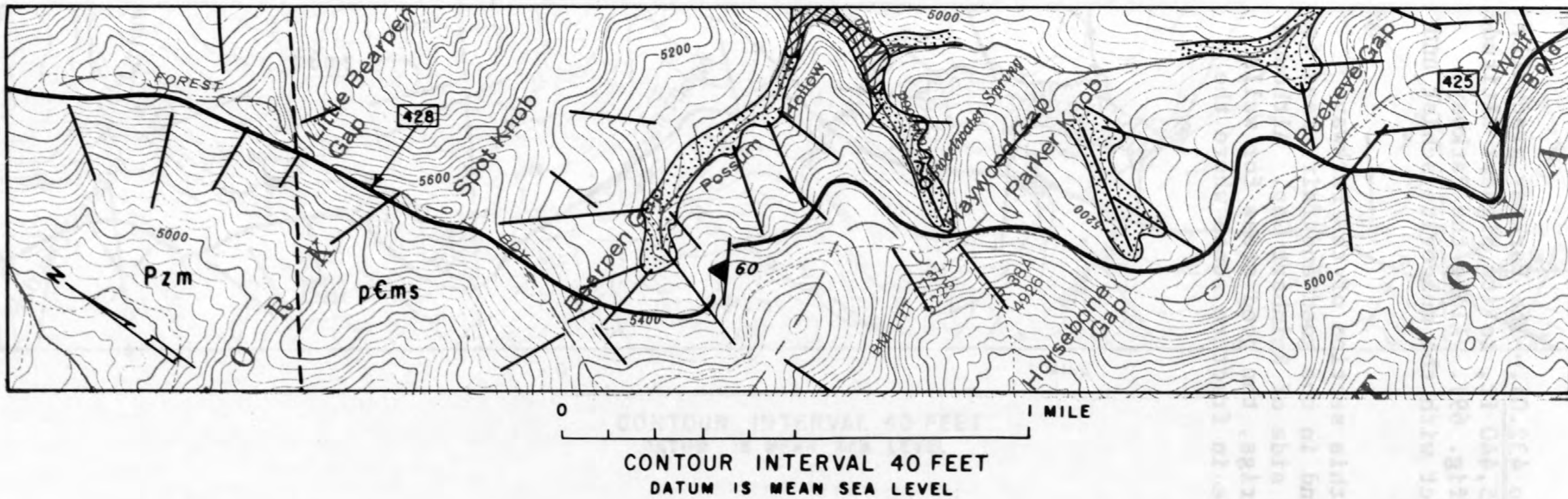
422 NPS Milepost

Figure 67.--Tanasee Bald area (Miles 421.5 to 425.0).

Haywood Gap Area (Miles 425.0 to 428.8).--Along this section, the Parkway heads northwest along ridges of the Great Balsam Mountains, averaging about 5,500 ft in altitude (fig. 68). From Wolf Bald to Little Bearpen Gap, the rocks are composed of muscovite schist and gneiss of late(?) Precambrian age. Beyond Little Bearpen Gap an outcrop of Devonian(?) migmatite is exposed.

The Park Service has no facilities in this section. Sweetwater Spring is on the north side of Haywood Gap, but the extent of its development, or data regarding its discharge are not available.

Only fair areas for wells are adjacent to the Parkway in this area. These include areas near Buckeye Gap, Horsebone Gap, Haywood Gap, and Bearpen Gap. Saprolite thickness probably will not exceed 25 ft in these areas, and well yields are not expected to be greater than 25 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Undeveloped spring

ROCK UNITS

p€ms Muscovite schist and gneiss

Pzm Migmatite

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

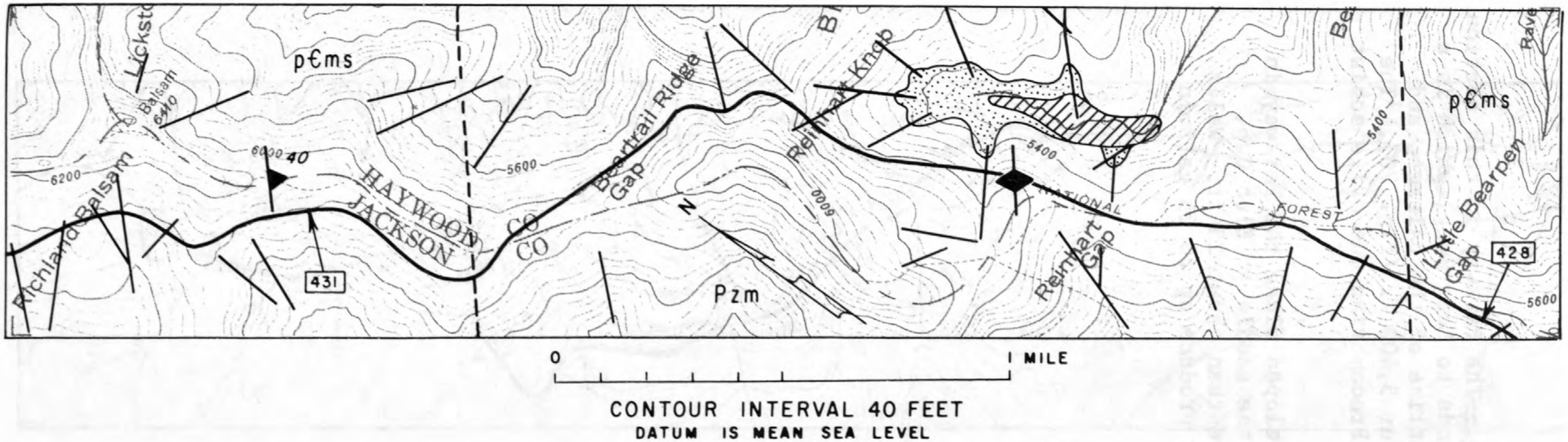
60 Strike and dip of foliation or schistosity parallel to compositional layering

425 NPS Milepost

Figure 68.--Haywood Gap area (Miles 425.0 to 428.8).

Richland Balsam Area (Miles 428.8 to 432.0).--The Parkway gradually rises from Reinhart Gap, altitude about 5,440 ft, to its highest altitude of about 6,050 ft near Richland Balsam (fig. 69). Along the Parkway, rocks composed of migmatite are in contact with the muscovite schist and gneiss northwest of Beartrail Ridge Gap.

No recreation facilities are along this section of the Parkway. Water supplies are most likely to be found in the good and fair areas for wells along the small branch on the east side of Reinhart Gap. Although access is somewhat limited for drilling rigs, the good areas for wells could yield as much as 25 gal/min or more in fracture zones where the saprolite cover is thickest.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

ROCK UNITS

p€ms — Muscovite schist and gneiss

Pzm — Migmatite

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

40 — Strike and dip of foliation or schistosity parallel to compositional layering

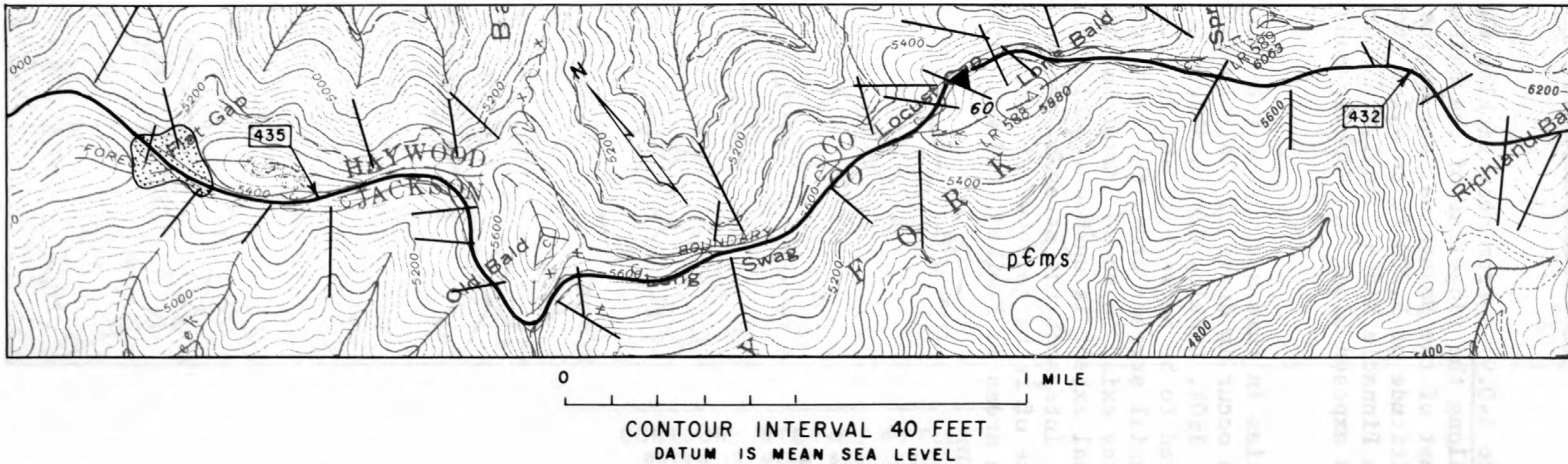
Inclined

Vertical

Figure 69.--Richland Balsam area (Miles 428.8 to 432.0).

Locust Gap Area (Miles 432.0 to 435.7).--The Parkway in this section heads northwest from Richland Balsam, descends to Long Swag, which is a mile-long shallow depression along the crestline of the Balsams, and crosses Flat Gap at an altitude of just under 5,400 ft (fig. 70). The rocks in the area are composed of upper(?) Precambrian muscovite schist and gneiss.

There are no recreation facilities developed along the Parkway in this section. A fair area for wells is in the saddle at Flat Gap, although saprolite thickness may not be more than about 25 ft. Wells located in the draws heading in the gap may produce up to 25 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

Fair

Inferred fractures

ROCK UNITS

p€ms Muscovite schist and gneiss

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

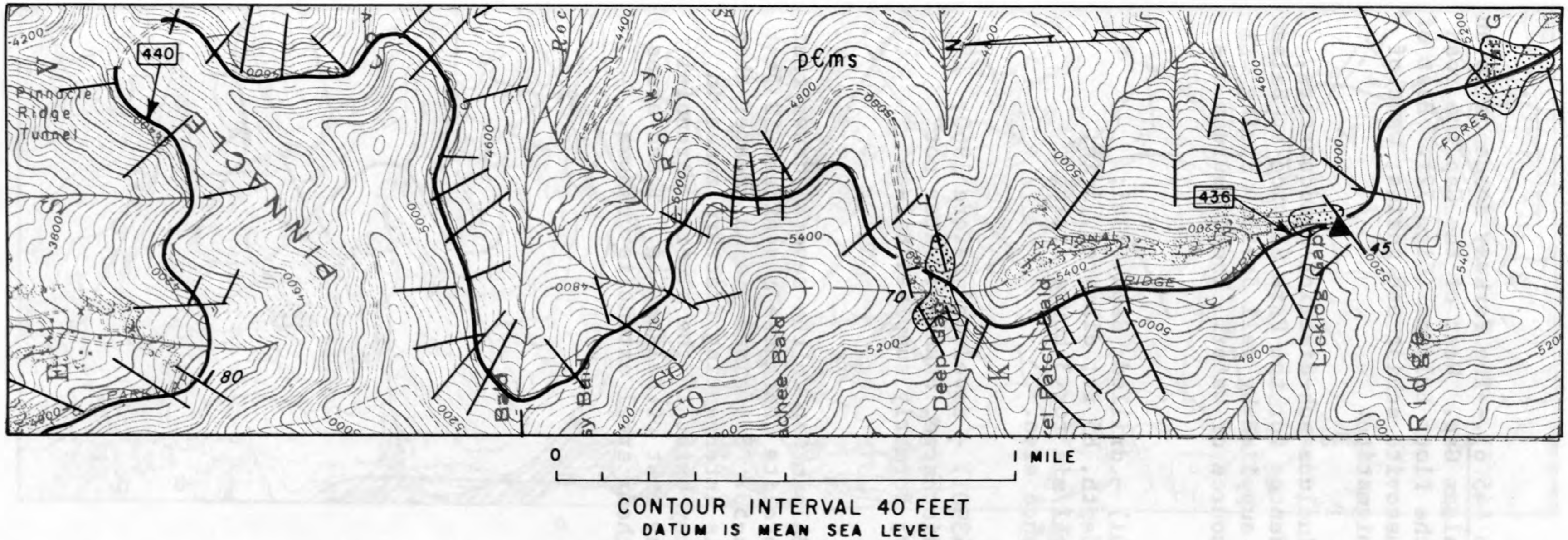
60 Strike and dip of foliation or schistosity parallel to compositional layering

435 NPS Milepost

Figure 70.--Locust Gap area (Miles 432.0 to 435.7).

Licklog Gap Area (Miles 435.7 to 440.9).--From near Licklog Gap, the Parkway heads nearly due north along the ridgeline of the Balsams. At Deep Gap, the road leaves the crest of the Mountains, and begins a descent toward Balsam Gap from an altitude of 5,200 ft to 4,200 ft in this section. After passing through Pinnacle Ridge Tunnel, the Parkway turns westward (fig. 71). The rocks exposed along the Parkway consist of muscovite schist and gneiss.

There are no recreation facilities in this section of the Parkway. Fair areas for ground-water supplies occur in draws at Flat Gap (discussed in Locust Gap map section, p. 150), Licklog Gap, and Deep Gap where saprolite thickness is estimated to be between 10 and 25 ft. Several steep draws containing perennial streams cross the Parkway north of Deep Gap. Fair areas for wells may exist in these draws, but are not shown on figure 71 because their areal extent is unknown. Wells that penetrate fracture zones, which also intersect the streams, should be assured of a fairly dependable source of recharge; however, access by drilling rigs to well sites in these areas is limited, and well yields are likely to be less than 25 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

Fair

Inferred fractures

ROCK UNITS

pЄms Muscovite schist and gneiss

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

45 Strike and dip of foliation or schistosity parallel to compositional layering

70 Strike and dip of bedding

440 NPS Milepost

Figure 71.--Licklog Gap area (Miles 435.7 to 440.9).

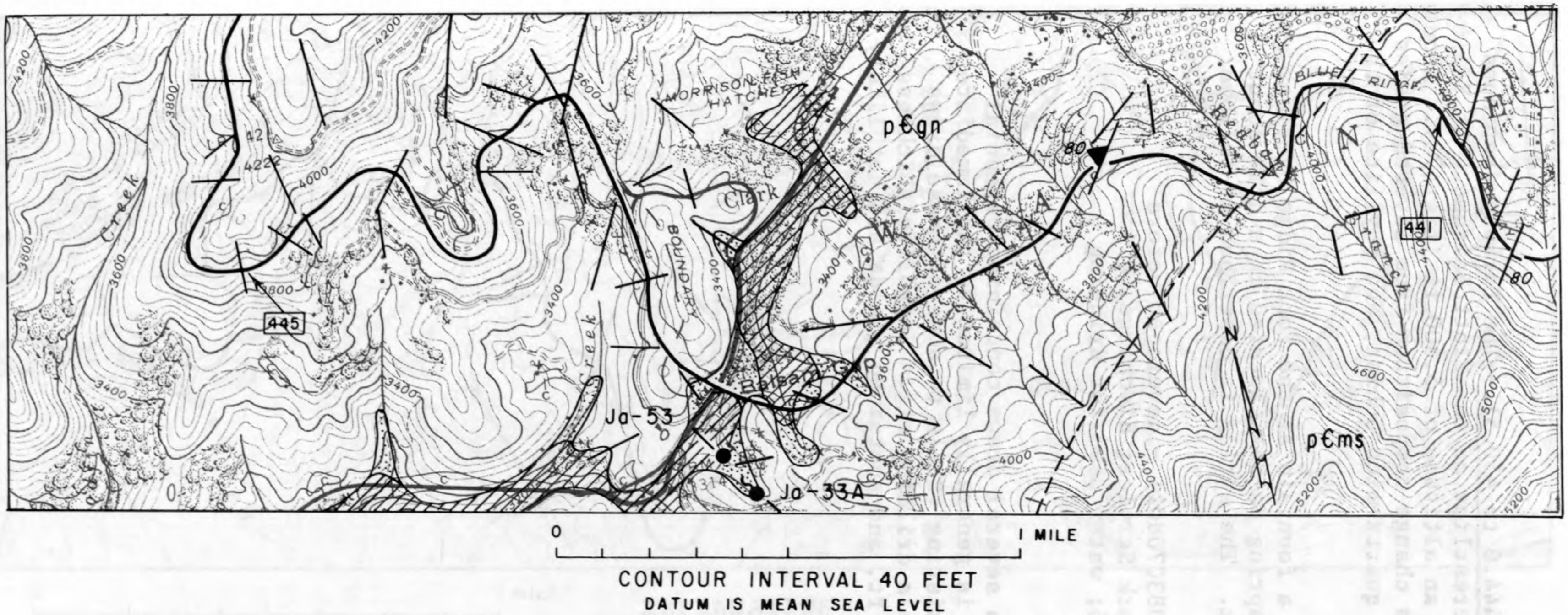
Balsam Gap Area (Miles 440.9 to 445.6).--The Parkway descends to an altitude of less than 3,400 ft at Balsam Gap. West of the Gap the road ascends again toward the ridges of the Plott Balsams (fig. 72). East of Redbank Branch, exposed rocks are muscovite schist and gneiss; west of there, they are layered gneiss and migmatite.

Facilities along this section include sub-district headquarters, maintenance area, and employee residences for the Park Service at Balsam Gap. Water for these facilities is supplied by well Ja-53. Spring Ja-33A can be used as an emergency source of water. These sources are described as follows:

> Well Ja-53 (352554083044301) - drilled, Sept. 1961; owner, National Park Service; depth, 85 ft; diameter, 5 in; depth cased, 45 ft; yield, 32 gal/min for 3 hours during test; water supply for maintenance area.

> Spring Ja-33A (352550083043901) - developed before 1960; owner, National Park Service; discharge, unknown; water not used except as emergency supply; formerly supplied Balsam Gap maintenance area.

Good areas for wells occur in Balsam Gap in the several draws that head on either side of the gap. Saprolite thickness may exceed 50 ft as suggested by the data for well Ja-53. Sustained yields greater than 25 gal/min may be expected from wells intercepting fracture zones in these areas. Fair areas for wells may exist in the several perennial stream valleys that cross the Parkway east of Balsam Gap. These areas are not shown on figure 72 because their areal extent is unknown.



EXPLANATION

BEST AREAS FOR WELLS

- Good
- Fair
- Inferred fractures
- Ja-53 Well and number
- Ja-33A Developed spring and number

ROCK UNITS

- p€gn Layered gneiss and migmatite
- p€ms Muscovite schist and gneiss

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

- Approximate boundary between rock units
- 80 Strike and dip of bedding
- 80 Strike and dip of foliation or schistosity parallel to compositional layering
- 441 NPS Milepost

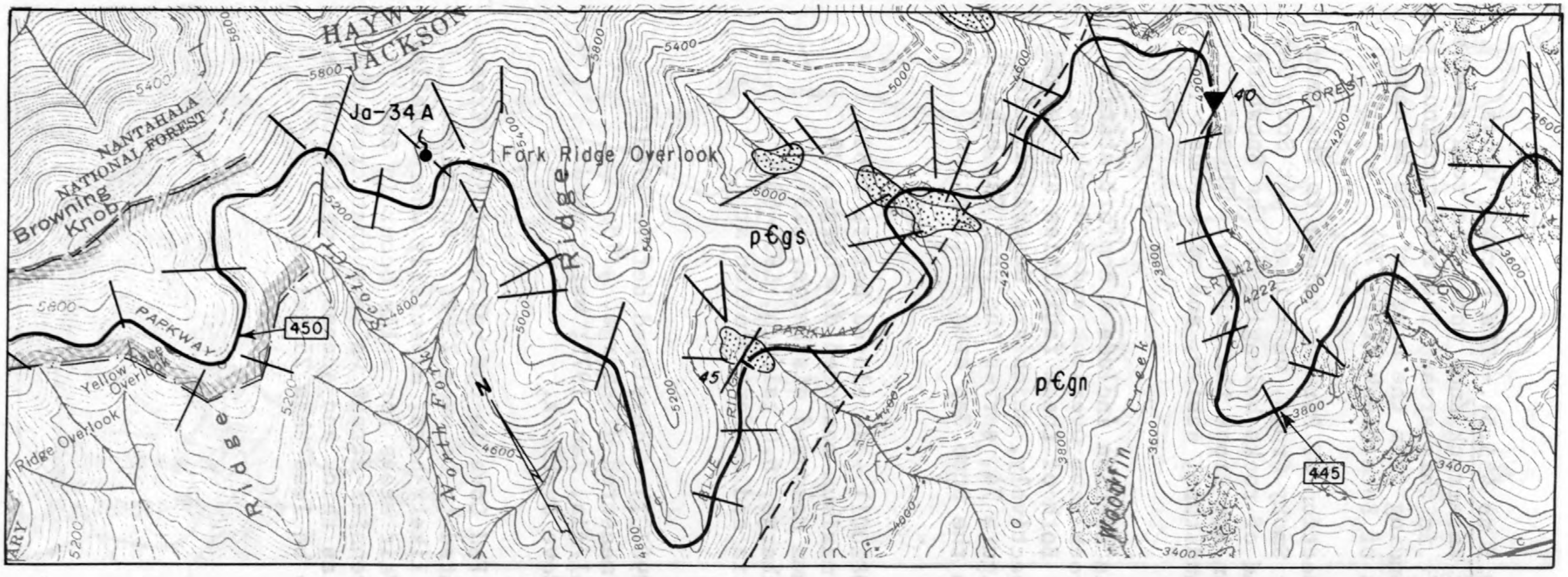
Figure 72.--Balsam Gap area (Miles 440.9 to 445.6).

Woodfin Creek Area (Miles 444.0 to 450.5).--The Parkway continues northwest ascending toward the crestline of the Plott Balsams. At Yellow Face Overlook, the road reaches an altitude of 5,600 ft (fig. 73). About midway in this section the rocks change composition from layered gneiss and migmatite to metasandstone, quartz-mica schist, and phyllite of the Great Smoky Group, undivided.

The Park Service maintains a fountain at the Fork Ridge Overlook at Mile 449, which is supplied by spring Ja-34A, located in a draw about 500 ft northwest of the overlook. The spring is described as follows:

> Spring Ja-34A (352738083070801) - developed before 1960(?); owner, National Park Service; discharge, 4.6 gal/min measured, Jan. 1975; water used for drinking fountain.

Fair areas for wells are in several draws containing perennial streams. Access to these areas is generally limited to the immediate area of the Parkway, although existing trails to some of these draws might be enlarged to accommodate a drilling rig. Saprolite thickness is estimated to be less than 25 ft, and sustained yields are not likely to exceed 25 gal/min.



0 — 1 MILE

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Fair

Inferred fractures

Ja-34 A
Developed spring and number

450 NPS Milepost

Boundary of the Blue Ridge Parkway

ROCK UNITS

p€gn Layered gneiss and migmatite

p€gs Rocks of the Great Smoky Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units.

STRUCTURE

Approximate boundary between rock units

45 Strike and dip of bedding

40 Strike and dip of foliation or schistosity parallel to compositional layering

Figure 73.--Woodfin Creek area (Miles 444.0 to 450.5).

Waterrock Knob Area (Miles 450.5 to 455.5).--The Parkway winds around the south and west flanks of Waterrock Knob where the road reaches a maximum altitude of about 5,700 ft in this area. The road continues north and northwest gradually descending from the crest of the Balsams and passes Fed Cove, the headwaters of Soco Creek (fig. 74).

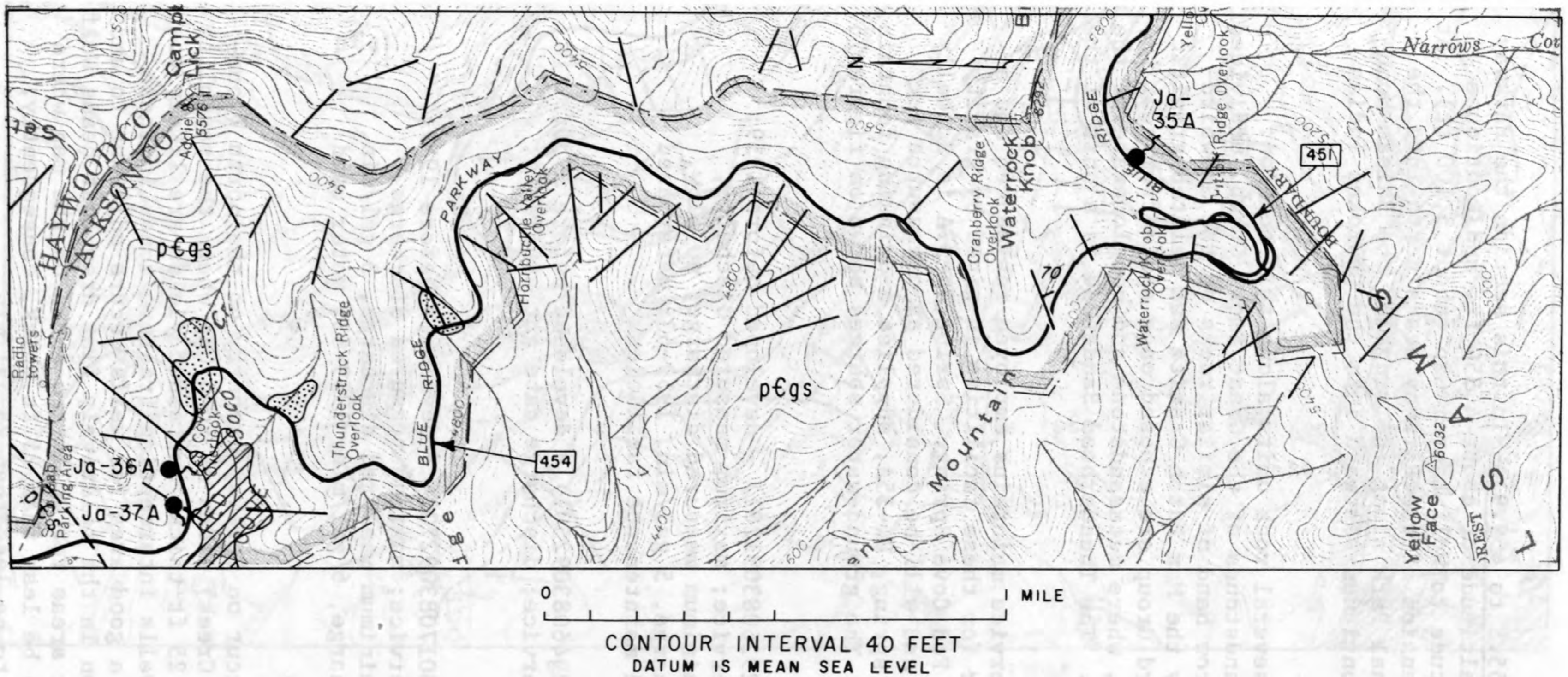
The rocks exposed along this section of Parkway belong to the meta-sedimentary formations of the Great Smoky Group, undivided. At Soco Gap parking area, however, a narrow band of rocks belonging to the Snowbird Group, undivided of late Precambrian age cross the Parkway. These consist mainly of quartzite, metasandstone, schist, and micaceous phyllite.

Park Service facilities in this section include a comfort station and drinking fountain at the Waterrock Knob Overlook and a drinking fountain at the Fed Cove Overlook. Both of these facilities are served by springs, Ja-35A and Ja-36A, respectively, which are described below. Spring Ja-37A, which is shown on figure 74, serves the Soco Gap sub-maintenance area and is included in the Soco Gap area description (p. 160).

Spring Ja-35A (352739083082001) - developed before 1963; owner, National Park Service; maximum measured discharge, 20 gal/min, Feb.-Mar. 1961; minimum measured discharge, 1.5 gal/min, May 1962; median discharge, 6.0 gal/min, 1959-63; water used for drinking fountain and comfort station at Waterrock Knob overlook.

Spring Ja-36A (352925083090701) - developed before 1963; owner, National Park Service; measured discharge, 4.75 gal/min, Nov. 1974 and 6.56 gal/min, Jan. 1975; water used for drinking fountain at Fed Cove overlook.

Good areas for wells occur in Fed Cove in the valley of Soco Creek, where saprolite thickness is estimated to be over 25 ft. Sustained yields in excess of 25 gal/min are likely here, especially where smaller draws open to the stream valley. Fair areas for wells occur in the narrower, steeper extensions of perennial-stream valleys that cross the Parkway, but saprolite here is not as thick and access to well sites is limited. Well yields are likely to be less than 25 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Ja-35A
Developed spring and number

ROCK UNITS

p€gs — Rocks of the Great Smoky Group, undivided

p€s — Snowbird Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

70 Strike and dip of bedding

Boundary of the Blue Ridge Parkway

451 NPS Milepost

Figure 74.--Waterrock Knob area (Miles 450.5 to 455.5).

Soco Gap Area (Miles 455.5 to 459.9).--In this section the Parkway descends to Soco Gap at an altitude of about 4,350 ft, and continues north and west gaining altitude to Wolf Laurel Gap (about 5,100 ft). At Wolf Laurel Gap, a 9-mi extension of the Parkway heads north into the Great Smoky Mountains National Park along the ridge of the Balsam Mountains, and the main route continues westward into the Cherokee Indian Reservation (fig. 75).

The Parkway traverses several rock units along this section. Approaching Soco Gap, metasandstones of the Great Smoky Group, undivided are followed first by a narrow band of similar rocks of the Snowbird Group, undivided and then by the Max Patch Granite and related granitic rocks. Rocks of the Snowbird Group are exposed once again from near mile 457 to Wolf Laurel Gap, where metasandstone and conglomerate of the Thunderhead Sandstone occur. The Thunderhead Sandstone is a unit of the Great Smoky Group.

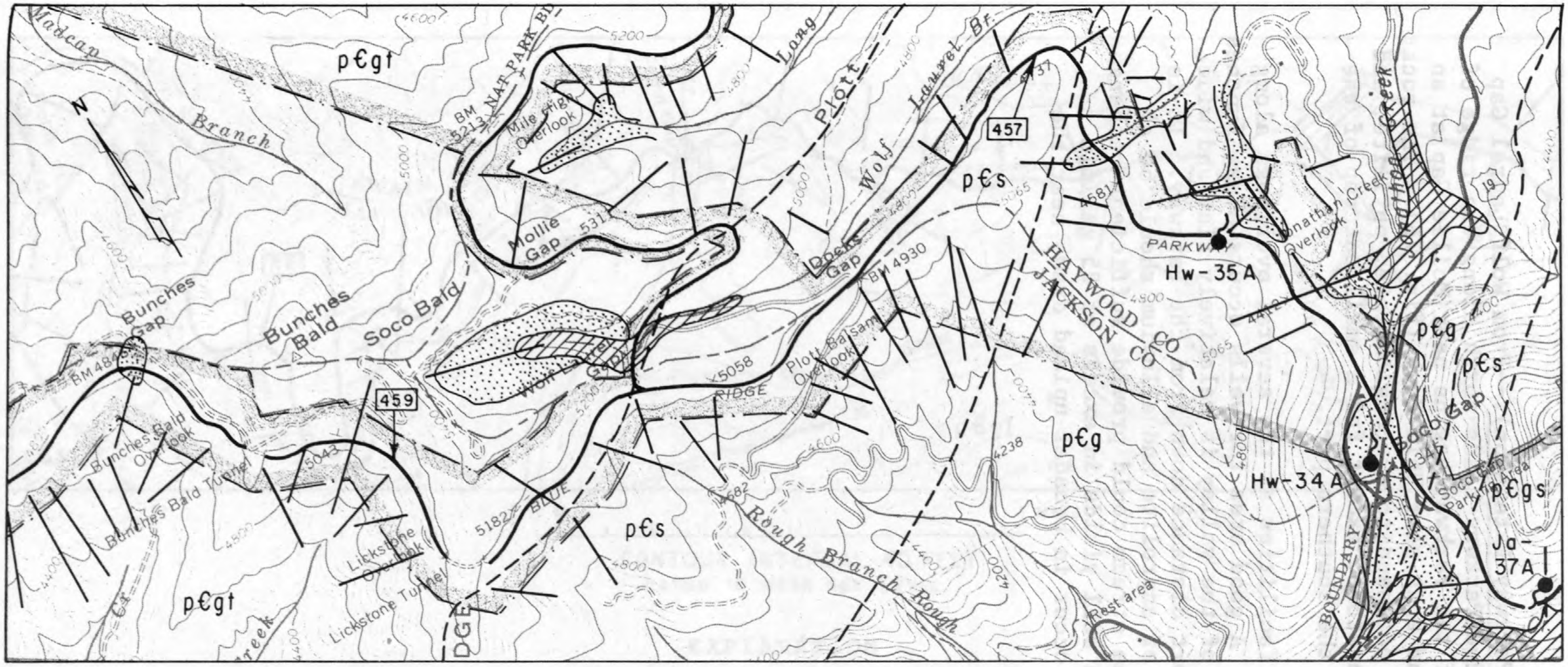
At Soco Gap the Park Service maintains employee residences and a sub-maintenance area. Water for these facilities is piped by gravity from spring Ja-37A near the Fed Cove Spring. Spring Ja-37A is actually two springs at one location and will be considered as one source for purposes of this report. A spring, Hw-35A, supplies a drinking fountain at Jonathan Creek Overlook. The ground-water sources shown on figure 75 are described as follows:

Spring Ja-37A (352926083091201) - developed before 1959; owner, National Park Service; maximum measured discharge, 20 gal/min, May 1961; minimum measured discharge, no flow, Dec. 1962; median discharge, 5 gal/min, 1959-63; water used for domestic supply and maintenance facilities.

Spring Hw-34A (352946083092501) - developed before 1950; owner, National Park Service; discharge data not available; spring not used.

Spring Hw-35A (353017083092701) - developed before 1959; owner, National Park Service; maximum measured discharge, 30 gal/min, May 1961; minimum measured discharge, 3 gal/min, Nov. 1962; median discharge, 6 gal/min, 1959-63; water used for drinking fountain.

Good areas for wells occur on Parkway property on the north (Jonathan Creek) and south (Soco Creek) sides of Soco Gap where the saprolite is estimated to be at least 25 ft thick; sustained yields are likely to be 25 gal/min or more from wells intercepting fracture zones in these areas. At Wolf Laurel Gap, a good area for wells occurs adjacent to and west of the Parkway Extension in the relatively flat draw that heads Wolf Laurel Branch. Several fair areas for wells are shown on the map where the saprolite is expected to be less than 25 ft thick, consequently, sustained yields are likely to be less than 25 gal/min.



0 — 1 MILE

CONTOUR INTERVAL 40 FEET

DATUM IS MEAN SEA LEVEL

BEST AREAS FOR WELLS

- Good
- Fair
- Inferred fractures
- Ja-37A — Developed spring and number
- 457 — NPS Milepost

ROCK UNITS

- p€g — Max Patch Granite and related granitic rocks
- p€gs — Rocks of the Great Smoky Group, undivided
- p€gt — Thunderhead Sandstone of the Great Smoky Group
- p€s — Snowbird Group, undivided

STRUCTURE

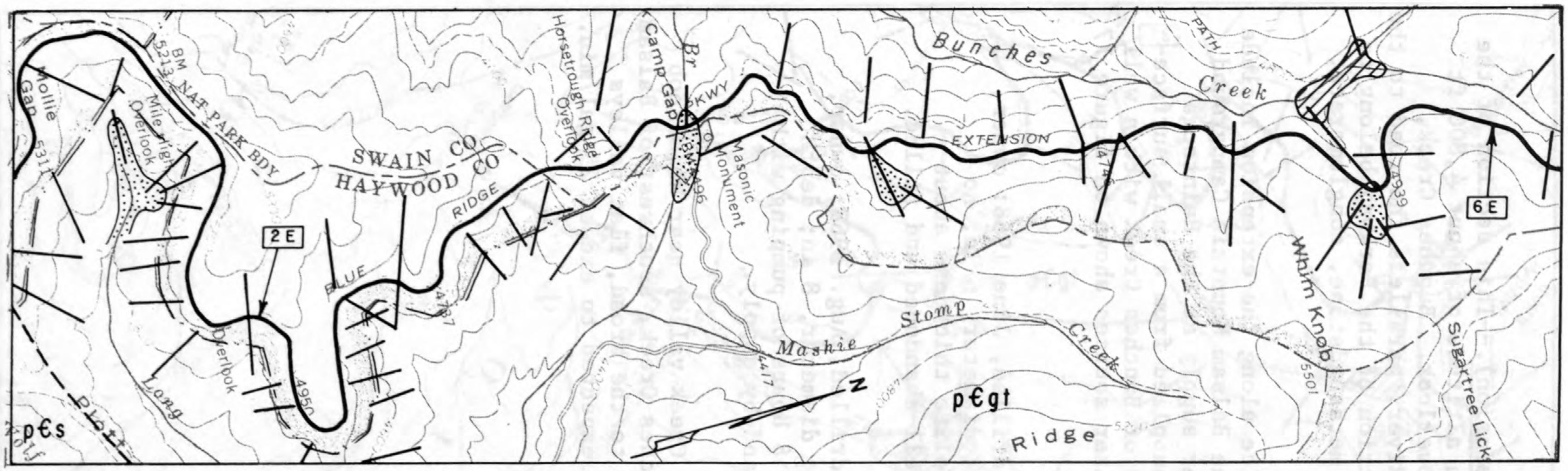
- Approximate boundary between rock units
- Boundary of the Blue Ridge Parkway

See table 6 for a generalized correlation and table 7 for a description of rock units

Figure 75.--Soco Gap area (Miles 455.5 to 459.9).

Masonic Monument Area (Parkway Extension).--From Wolf Laurel Gap the extension of the Blue Ridge Parkway heads north along the ridge of the Balsams. This section of the Parkway begins near Mollie Gap at an altitude of about 5,300 ft and ends near Whim Knob (fig. 76). The rocks in this area are composed of metasandstone, conglomerate, phyllite, and schist of the Thunderhead Sandstone, except for a small outcrop of the Snowbird Group, undivided in the southern part.

There are no recreation facilities at the several overlooks along this section of the Parkway. A good area for wells occurs along Bunches Creek, where a short section of the valley is relatively flat and wide, and where a trail leads a short distance down from the Parkway. It is estimated that the thickness of saprolite and alluvium should be at least 25 ft here, and that the stream could provide sufficient recharge to rock fractures to maintain well yields in excess of 25 gal/min. Several fair areas for wells occur in broader upland draws near the Parkway.



0 1 MILE

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

ROCK UNITS

p€gt Thunderhead Sandstone of the Great Smoky Group

p€s Snowbird Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

2E NPS Milepost

Boundary of the Blue Ridge Parkway

Figure 76.--Masonic Monument area (Parkway Extension).

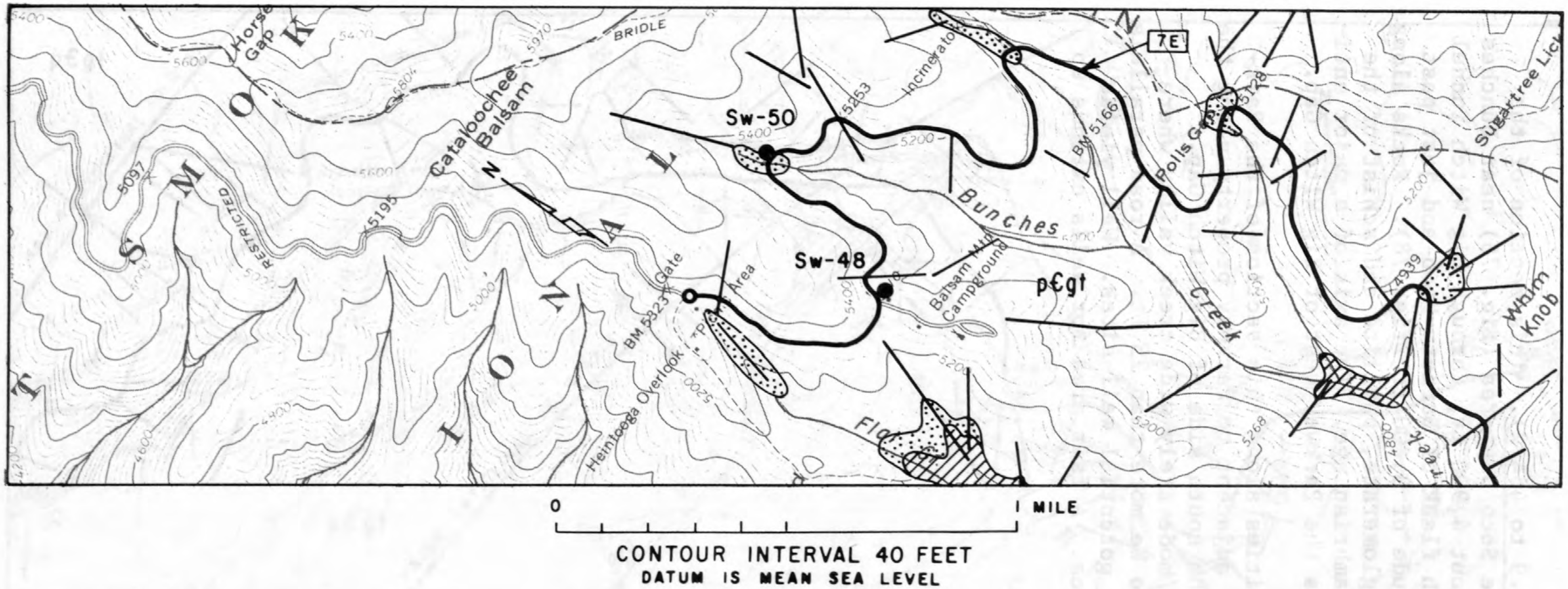
Heintooga Overlook Area (Parkway Extension).--This section of the Parkway Extension gradually rises from an altitude of about 4,800 ft near Whim Knob to 5,300 ft at Heintooga Overlook. Bunches Creek, tributary to Raven Fork and Oconaluftee River, parallels the road to the west (fig. 77). The rocks along this section of the Parkway belong to the Thunderhead Sandstone and consist of metasandstone, conglomerate, phyllite and schist.

Facilities managed by the Park Service along the extension include picnic areas at Heintooga Overlook and the Balsam Mountain Campground and employee residence. There is no water supply at the Heintooga Overlook; Balsam Mountain Campground is supplied from a small surface-water impoundment at the upper headwaters of Bunches Creek with a well (Sw-50) for emergency use. The ground-water sources shown on figure 77 are described as follows:

Well Sw-48 (353406083103201) - drilled, June 1968; owner, National Park Service; depth, 200 ft; diameter, 6 in; no casing installed, but log shows saprolite thickness about 25 ft; yield, less than 1 gal/min; well abandoned and filled.

Well Sw-50 (353426083102701) - drilled, Aug. 1968; owner, National Park Service; depth, 150 ft; diameter, 8 in; depth cased, 13 ft; yield, 8 gal/min after 8 hours of pumping with 120 ft of drawdown; well used for stand-by supply.

Good areas for wells include Bunches Creek valley near Whim Knob and Flat Creek valley, a tributary to Bunches Creek, southwest of Balsam Mountain Campground. Here, draws opening to the broad, flat valleys offer sites where sustained yields can be expected to exceed 25 gal/min.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Sw-50
● Well and number

ROCK UNITS

p€gt Thunderhead Sandstone of the Great Smoky Group

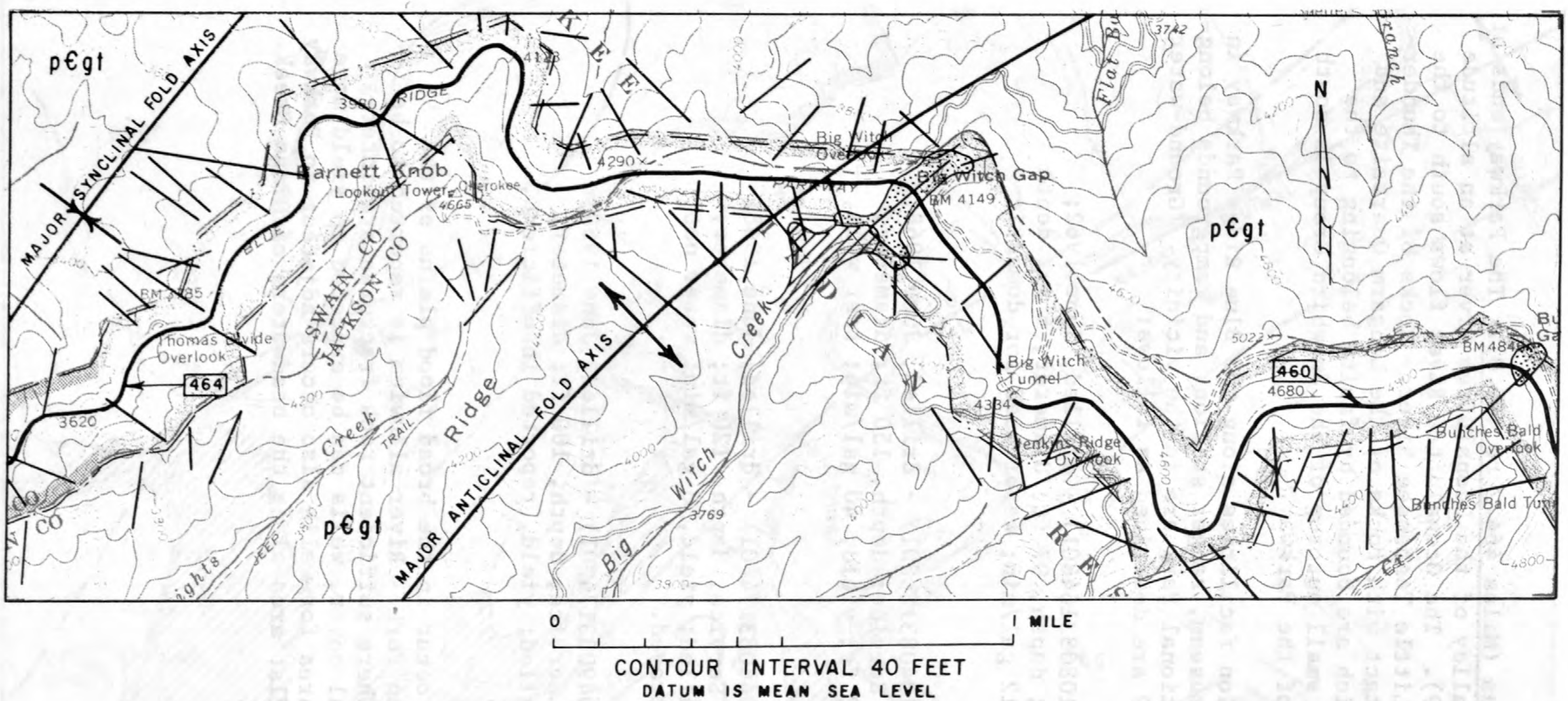
See table 6 for a generalized correlation and table 7 for a description of rock units

7E NPS Milepost

Figure 77.--Heintooga Overlook area (Parkway Extension).

Big Witch Gap Area (Miles 459.9 to 464.2).--This section of the Parkway continues westward from the Soco Gap area (fig. 75) near Bunches Bald Overlook at an altitude of about 4,900 ft, through Big Witch Tunnel and Big Witch Gap, around the north flank of Barnett Knob and just past Thomas Divide Overlook at an altitude of 3,600 ft (fig. 78). Rocks along the Parkway are metasandstone, conglomerate, phyllite and schist of the Thunderhead Sandstone of late Precambrian age. The axis of a major anticlinal fold trends northeast across the Parkway west of Big Witch Gap.

There are no recreation facilities along this section of the Parkway. A good area for wells occurs adjacent to Parkway property along the headwaters of Big Witch Creek on the south side of Big Witch Gap. Several draws open to the flat and moderately wide creek valley where saprolite thickness is estimated to be more than 25 ft. A road parallels the creek providing good access to potential well sites. Well yields could exceed 25 gal/min in this area. A fair area for wells extends up into Big Witch Gap.



EXPLANATION

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

ROCK UNITS

p€gt Thunderhead Sandstone of the Great Smoky Group

See table 6 for a generalized correlation and table 7 for a description of rock units

Boundary of the Blue Ridge Parkway

460 NPS Milepost

Figure 78.--Big Witch Gap area (Miles 459.9 to 464.2).

Southern Terminus Area (Miles 464.2 to 469.0). The Parkway ends at U.S. Highway 441 in the valley of the Oconaluftee River at an altitude of about 2,000 ft (fig. 79). The Oconaluftee River flows south to the Tuckasegee River and the Little Tennessee River. Rocks of the Thunderhead Sandstone are in contact with rocks of the Longarm Quartzite and the Max Patch Granite, which are bounded by faults belonging to the Greenbriar Fault Zone. A small outcrop of the Snowbird Group is south of the Southern Terminus of the Parkway.

There are no recreation facilities along the Blue Ridge Parkway in this section, although a museum, ranger station, and campgrounds belonging to the Great Smoky National Park are in the vicinity. Ground-water sources shown on figure 79 are described as follows:

Well Sw-18 (353108083164801) - drilled, June 1962; owner, Jerome Parker; depth, 97 ft; diameter, 6 in; depth cased, 9 ft; yield, 12 gal/min; water used for domestic supply.

Well Sw-47 (353134083180801) - drilled, June 1968; owner, National Park Service; depth, 150 ft; diameter, 6 in; depth cased, 43 ft; yield, 40 gal/min; test well, water not used.

Well Sw-49 (353046083174401) - drilled, June 1968; owner, National Park Service; depth, 120 ft; diameter, 6 in; no casing installed; yield, 8 gal/min; water not used, test well, destroyed.

Well Sw-51 (353049083174201) - drilled, June 1968; owner, National Park Service; depth, 100 ft; diameter, 6 in; no casing installed; yield, reported insufficient, test well, destroyed.

Good areas for wells occur in the broad flood plains of the Oconaluftee River and Raven Fork. River alluvium is reported to be as much as 40 ft thick. Where sufficient rock fractures are intercepted beneath the alluvial cover, wells can be expected to yield more than 25 gal/min. A good area for wells also occurs adjacent to Parkway property in a relatively flat area along the headwaters of Mingo Creek.

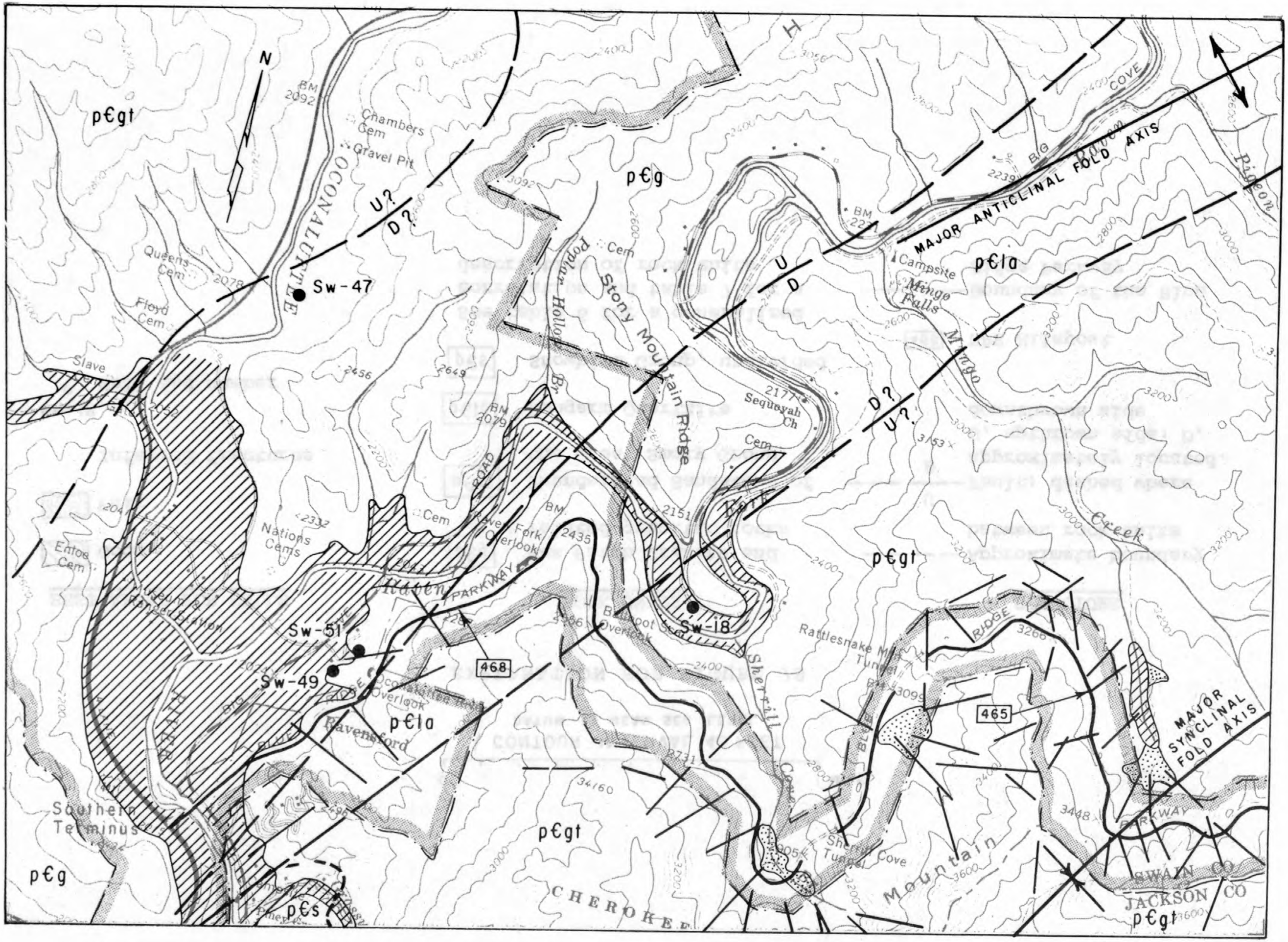


Figure 79.--Southern Terminus area (Miles 464.2 to 469.0).

0 1 MILE

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

EXPLANATION FOR FIGURE 79

BEST AREAS FOR WELLS

Good

Fair

Inferred fractures

Sw-18

Well and number

ROCK UNITS

p€g	Max Patch Granite and related granitic rocks
p€gt	Thunderhead Sandstone of the Great Smoky Group
p€la	Longarm Quartzite
p€s	Snowbird Group, undivided

See table 6 for a generalized correlation and table 7 for a description of rock units

STRUCTURE

Approximate boundary between rock units

U
D
Fault; dashed where approximately located. U, upthrown side; D, downthrown side

468 NPS Milepost

Boundary of the Blue Ridge Parkway

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