Open-File Report 06-02

Rifts, Diabase, and the Topographic "Fishhook": Terrain and Military Geology of the Battle of Gettysburg --- July 1-3, 1863

(Guidebook
Post-Meeting Field Trip
National Annual Meeting
Geological Society of America
Philadelphia, PA
26 October 2006)

Revised and expanded from guidebook of same title and authorship from 2004

by Jon D. Inners, Pennsylvania Geological Survey;
Roger J. Cuffey, Pennsylvania State University;
Robert C. Smith II, Pennsylvania Geological Survey;
John C. Neubaum, Pennsylvania Geological Survey;
Richard C. Keen, Pennsylvania Geological Survey;
Gary M. Fleeger, Pennsylvania Geological Survey;
Lewis Butts, Pennsylvania Geological Survey;
Helen L. Delano, Pennsylvania Geological Survey;
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PENNSYLVANIA GEOLOGICAL SURVEY

FOURTH SERIES

HARRISBURG

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This is a detailed guide to the Gettysburg Battlefield National Military Park, emphasizing the landscape topography, underlying geology, military actions, historical consequences, and commemorative monuments. ***The correlations and stratigraphic names used herein do not necessarily conform to currently approved usage of the Pennsylvania Geological Survey.***

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York Haven Diabase (Lower Jurassic) at Devil's Den,
Gettysburg National Military Park, Pennsylvania

View north from the summit of Little Round Top (STOP 4), showing the Union position on the topographic "fishhook" developed on the Early Jurassic-age Gettysburg sheet. In the foreground is the bronze statue of Maj. (then Brig.) Gen. G. K. Warren on "Warren Rock." "Signal Rock" is just ahead to the right. The boulders are York Haven Diabase. Off in the distance to the right of the statue is Cemetery Ridge with the Pennsylvania Monument and behind that the Cyclorama Building. The water tower on East Cemetery Hill is visible to the right of the latter. South Mountain forms the skyline on the left.

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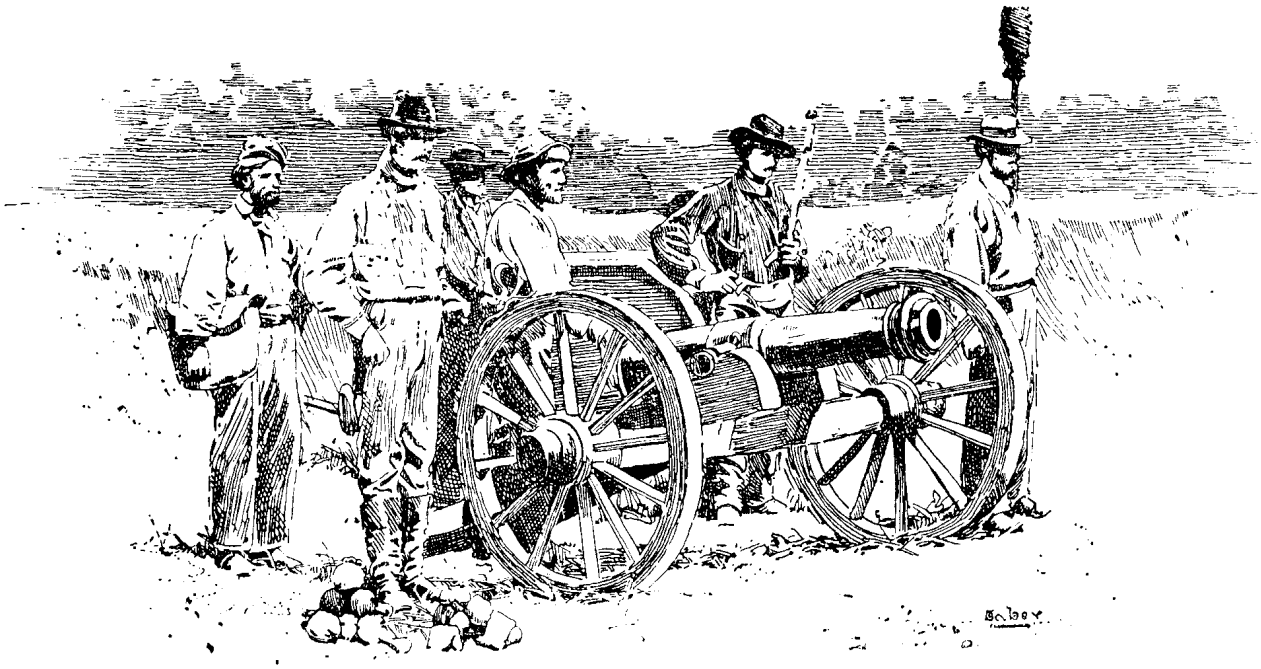

ABRAHAM LINCOLN

INTRODUCTION

People's experiences and memories are so subjective.
It makes you wonder about the whole idea of "historical fact."
Johnny Cash
The New Yorker, 11/24/2003

The battle of Gettysburg was the greatest military engagement ever fought on the North American continent. This is "historical fact"—born out not only by the numbers but also by the military, political, and economic ramifications of its outcome. 155,000 men fought here on those three July days of 1863 (85,000 on the Union side, 70,000 on the Confederate); 7,000 of them died (3,100 Union, 3,900 Confederate); and another 44,000 were casualties of one sort or another (19,900 Union, 24,100 Confederate). These are catastrophic numbers for any 19th-century battle—and certainly the highest for any fought in the American Civil War. Militarily, if the North had not won decisively at Gettysburg (even considering Grant's victory at Vicksburg), a disgusted Army, if not an aroused citizenry, may have forced the Federal government to sue for peace. Politically, even a compromise that did not split one nation into two would have destroyed American constitutional federalism and greatly weakened our role on the world stage. Economically—compromise or split—two unchecked oligarchies, an industrial one in the North and an agricultural one in the South, would have been greatly strengthened—and the "common man" in both relegated to impotence. But the North did win—and four and a half months later, Abraham Lincoln enshrined Gettysburg into the American canon with a speech that is, in its entirety, the most memorable of all time.

Our interest on this field trip is in the military aspects of the battle of Gettysburg—and particularly on the "historical fact" of the geography and geology of the region and locale over which the campaign and battle developed. A major reason for Gettysburg being "the most studied military action in the world" (Kross, 2000) is because of the importance of terrain considerations in the strategies and tactics adopted by the two opposing armies, the North's Army of the Potomac and the South's Army of Northern Virginia. Just as the name "Gettysburg" resonates down through American history (McPherson, 2003), so do "Little Round Top," "Devil's Den," "Cemetery Ridge," "Seminary Ridge," and the "Wheatfield." One of the reasons that both German and Japanese military experts visited the new "Electric Map" at Gettysburg in the late 1930's was to study in depth a battle and campaign that showed so clearly how West Pointers interpreted landscape in the past—certainly, in Huttonian terms, a key to how they might interpret it in the present.

Of a much more "subjective" nature are the many questions that arise about the Gettysburg Campaign and battle, particularly those related to individual personalities and their actions. Was it really fair for Lee to severely chastise "Jeb" Stuart for being "incommunicado" on his raid around the Union Army during those crucial last days of the Confederate advance into Pennsylvania? Did Henry Heth bring on the battle of Gettysburg on July 1 by disobeying Lee's order not to initiate a general engagement? Did Daniel Sickles have any defensible reasons for the unauthorized movement of his 3rd Corps out to the Peach Orchard and Emmitsburg Road on July 2? Was the successful Union defense of Little Round Top on the afternoon of July 2 really that critical to the outcome of the battle (Adelman, 2003)? Was Culp's Hill on the right just as important to the Union defensive position as Little Round Top on the left? Why did the Confederate cannonade of July 3 generally fail in its objective? Was ordering "Pickett's Charge" an act of hubris on the part of Robert E. Lee? Was "Farnsworth's Charge"—ordered by Judson ("Kill-Cavalry") late on July 3—really suicidal? Did George Gordon Meade miss a "once in a lifetime opportunity" to destroy Lee's army during its retreat by hesitating to order an attack on Confederate breastworks on the north bank of the Potomac River on July 12-14? While not all of these questions will be answered—or even treated in detail—in this guidebook, all will certainly be discussed during the course of the field trip. That Johnny could be here!

TOPOGRAPHY AND GEOLOGY OF THE GETTYSBURG BATTLEFIELD

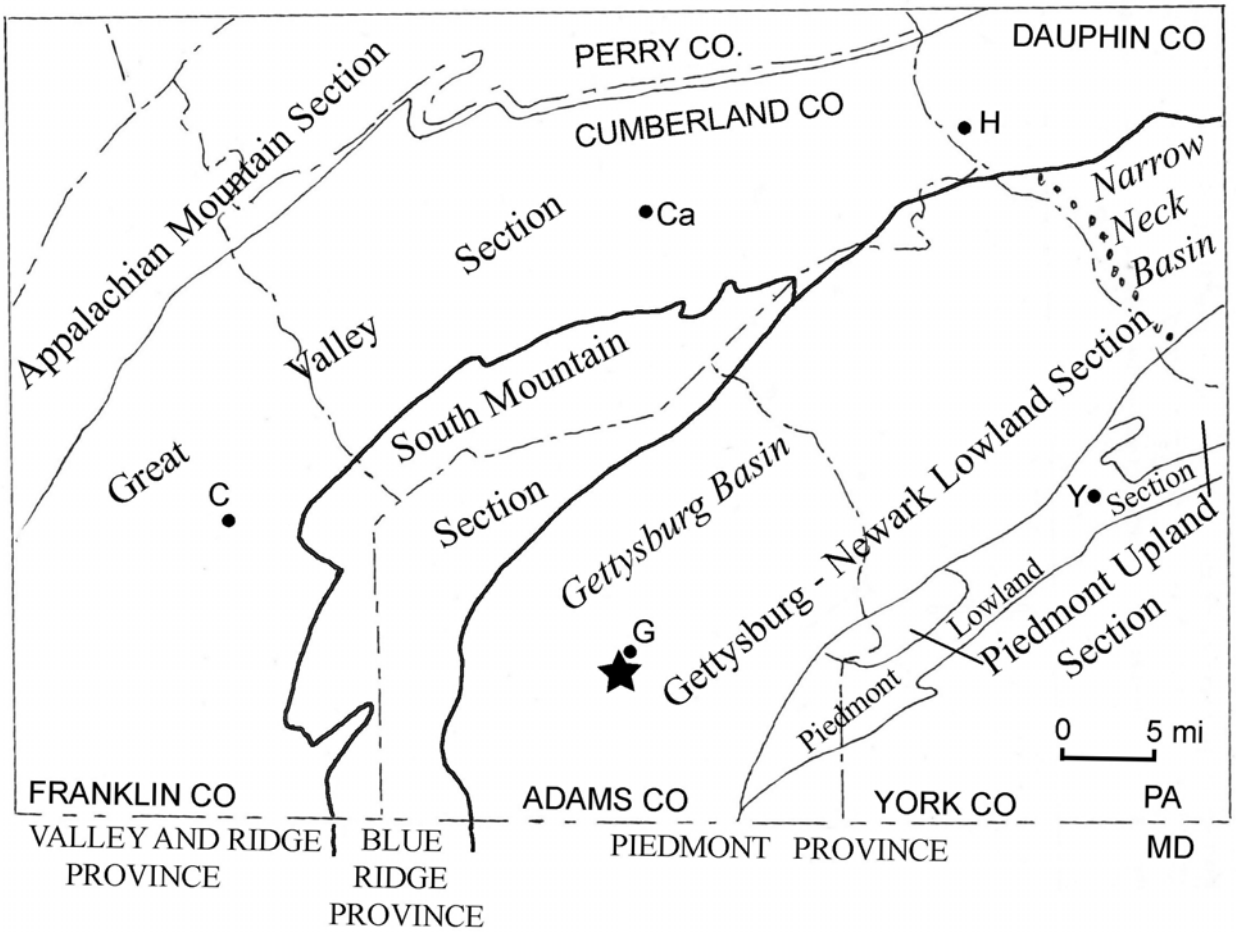

Figure 1. Political, geographic, and geologic setting of the battle of Gettysburg. G = Gettysburg; C = Chambersburg, Ca = Carlisle, H = Harrisburg, Y = York.

Figure 1 shows the location of the Gettysburg Battlefield in reference to various criteria. Politically, it is in Adams County, south-central Pennsylvania. Physiographically, it is situated in the Gettysburg/Newark Lowland section of the Piedmont province. Geologically, it lies toward the south end of the Gettysburg basin, one of numerous Mesozoic rift basins that are strung out along the eastern border of North America from Nova Scotia to Virginia. The present battlefield landscape owes its configuration to a complex series of geological events—from Late Triassic-Early Jurassic continental sedimentation and plutonism, through Early Jurassic structural deformation, and on to vast eons of erosion in the later Mesozoic and Cenozoic—the latter possibly including periglacial breakup of rock masses at Devil's Den (see STOP 5). Man-made aspects of topography are also vital to understanding the battle—the network of ten roads radiating from the borough of Gettysburg in all directions, the unfinished railroad west of town, and the many stone walls and wood fences that divided the farmers' fields and woodlots.

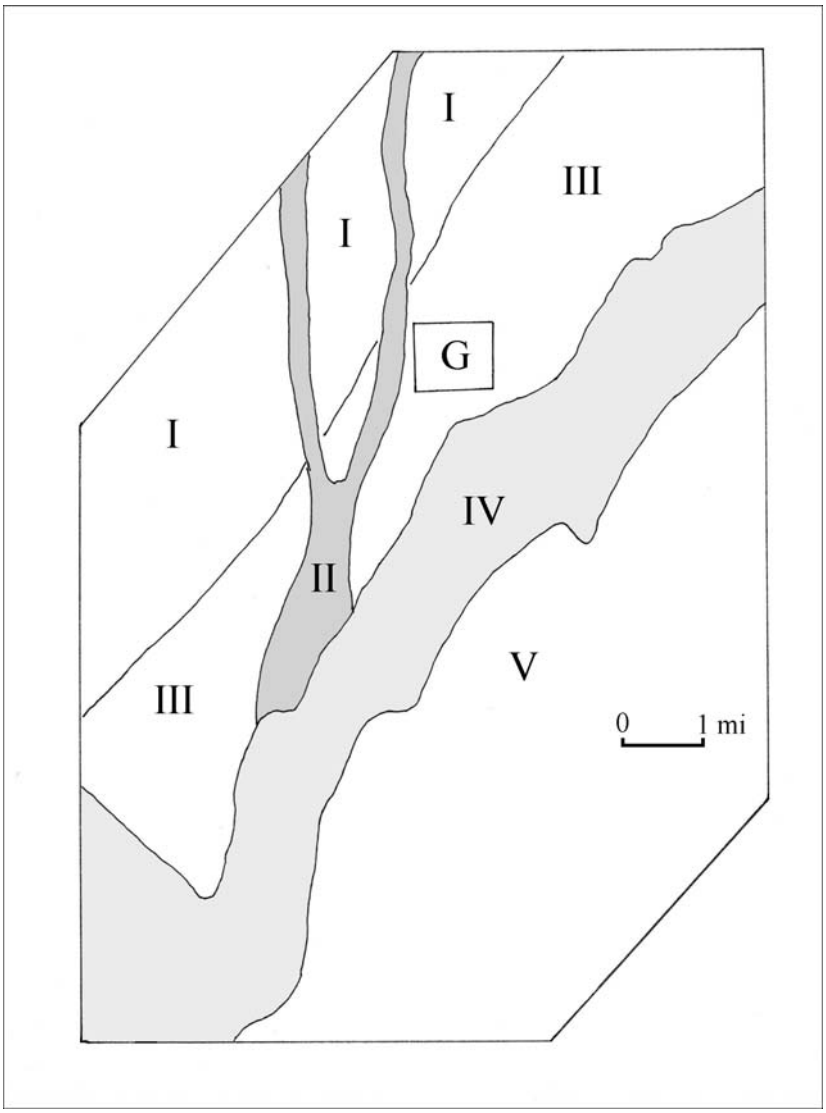

Figure 2. Topographic and geologic subdivisions of the Gettysburg battlefield. See text for Roman numeral identifications. G = Gettysburg.

Topographically and geologically, the battleground at Gettysburg can be conveniently divided into five parts going from west to east, all parts having a mostly northeast-southwest grain (Figure 2). Farthest west is a broad belt of low ridges—Herr Ridge, McPherson's Ridge, etc.—and shallow valleys underlain by mostly red sedimentary rocks of the Late Triassic-age Gettysburg Formation (I of Figure 2; STOP 1). Next is a narrow, crosscutting array of somewhat higher ridges—Oak Ridge, Seminary Ridge, and Warfield Ridge (II). These ridges have relief of 30 to 40 feet and are ribbed by thin, Early Jurassic-age diabase dikes (STOPS 2 and 3). East of this ridgeline is a broad mile-wide tract of "swaley" ground underlain by Gettysburg Formation sedimentary rocks—unaltered, red, and soft to the west, but baked and hardened to gray hornfels to the east (III; STOPS 6 and 8). Next to the east is the most famous section of the battlefield—the "high ground" of rocky hills extending from Culp's Hill south to Big Round Top that is formed on the earliest Jurassic-age Gettysburg diabase sill (IV; STOPS 4, 5, and 7). To the east of the "high ground" is a broad belt of low, relatively featureless terrain underlain by red beds of the lower part of the Gettysburg Formation (V). For two and a half days, this area figured little in the battle, but on the afternoon of July 3, a major cavalry engagement took place there, 3 miles east of Gettysburg (East Cavalry Battlefield).

Maj. Gen. Henry Hunt, Union Chief of Artillery, gave an excellent description of the Union "fishhook" on the "high ground" of V on Figure 2 (see also Figure 3).

> Near the western base of Cemetery Hill is Ziegler's Grove. From this grove the distance nearly due south to the base of Little Round Top is a mile and a half. A well defined ridge known as Cemetery Ridge follows this line from Ziegler's for 900 yards to another small grove, or clump of trees, where it turns sharply to the east for 200 yards, then turns south again, and continues in a direct line toward Round Top, for 700 yards, to George Weikert's. So far the ridge is smooth and open, in full view of Seminary Ridge opposite, and distant from 1400 to 1600 yards. At Weikert's, this ridge is lost in a large body of rocks, hills, and woods, lying athwart the direct line to Round Top, and forcing a bend to the east in the Taneytown road. This rough space also stretches for a quarter of a mile or more *west* of this direct line, toward Plum Run. Toward the south it sinks into low marshy ground which reaches to the base of Little Round Top, half a mile or more from George Weikert's. The west side of this broken ground was wooded through its whole extent from north to south.

Between this wood and Plum Run is an open cleared space 300 yards wide—a continuation of the open country in front of Cemetery Ridge; Plum Run flows south-easterly toward Little Round Top, then makes a bend to the south-west, where it receives a small stream or "branch" from Seminary Ridge. In the angle between these streams is Devil's Den, a bold rocky height, steep on its eastern face, and prolonged as a ridge to the west. It is 500 yards due west of Little Round Top, and 100 feet lower. The northern extremity is composed of huge rocks and bowlders, forming innumerable crevices and holes, from the largest of which the hill derives its name. Plum Run valley is here marshy but strewn with similar bowlders, and the slopes of the Round Tops are covered with them.

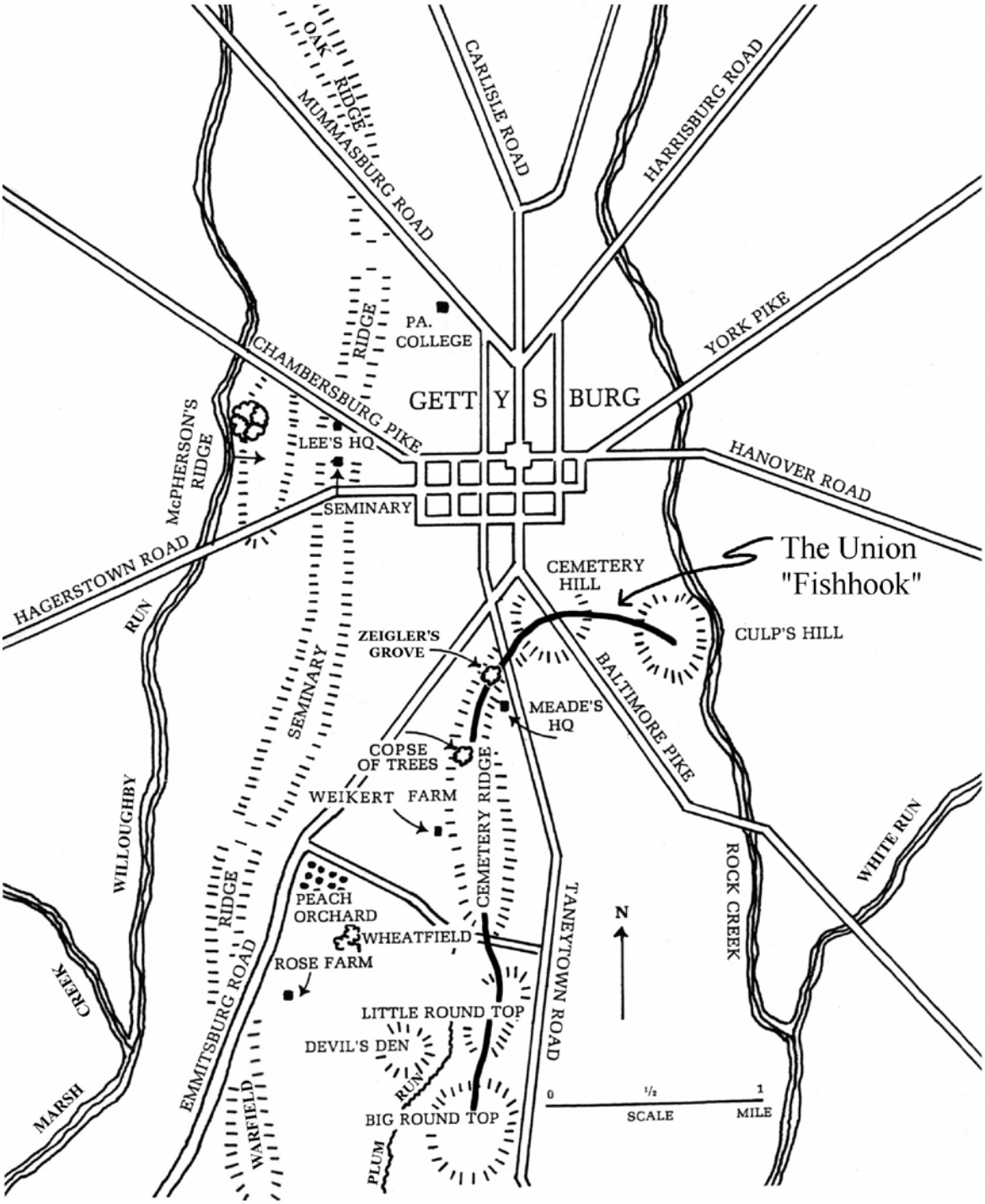

Figure 3. Some physical features of the Gettysburg battlefield, particular those relating to the Union "fishhook (Modified from Frassanito, 1975, p. 11).

One of the major terrain influences on the battle of Gettysburg was the network of ten roads that radiated out from the borough at almost regular intervals toward other communities in Maryland and Pennsylvania (Figure 3). These roads not only provided the means by which both armies concentrated their forces at Gettysburg—though some Union 1st Corps brigades followed a rather circuitous route north from Emmitsburg, MD, on the first day (Kross, 2000; Roth and Kross, 2000)—but two roads to the west of town, the Chambersburg Pike and Fairfield Road, facilitated Lee's retreat on July 5 and probably allowed him to carry off many more of his wounded than if he had to rely on a single road.

Less important—to transportation at the time of the battle, at least—were the railroads of the area. The only operating line into the borough in July 1863 was the Gettysburg Railroad (completed in 1858), which came in from the direction of Hanover, PA, crossing Rock Creek about a mile east of the town square. Nothing of much significance happened on the Gettysburg Railroad until November 18, 1863, when Abraham Lincoln and his entourage arrived on the railroad to participate in the dedication ceremonies of the Soldiers' Nation Cemetery the following day. The station where Lincoln debarked is still standing on Washington Street just north of the Chambersburg Pike (mile 1.05 of Roadlog; see Treese. 2003). Much more important to the battle scenario was Thaddeus Stevens' old "tapeworm" railroad which, though uncompleted at the time, came into Gettysburg from the west (see STOPS 1 and 2 for extended discussion).

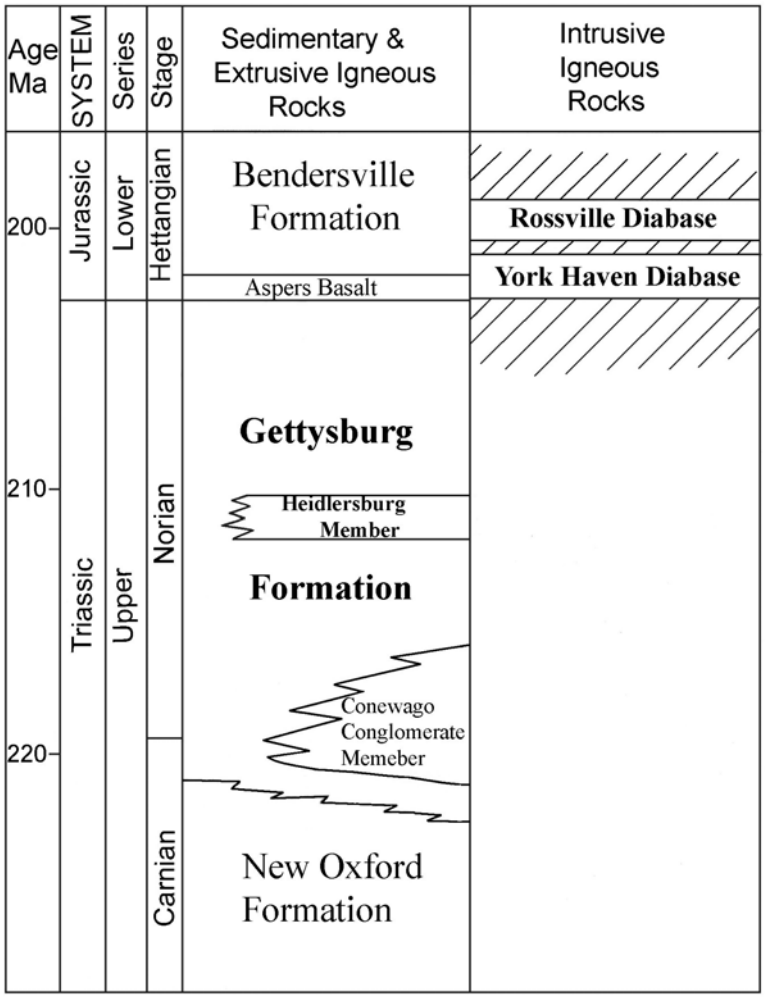

Figure 4. Stratigraphic column showing sedimentary and plutonic rock units exposed in the Gettysburg basin (Smoot, 1999; Faill, 2003).

Stratigraphy and structure of the Gettysburg basin. The ages and stratigraphic relations of the sedimentary and igneous rocks of the Gettysburg basin are summarized in Figure 4. Total thickness of the sedimentary rocks in the basin is more than 20,000 feet (Smoot, 1999). The bulk of this fill is of Late Triassic age and constitutes the New Oxford (older) and Gettysburg Formations. Preserved at the extreme west margin of the basin about 14 miles north of Gettysburg is a 1000±-foot-thick sequence of red mudstone and basalt of Early Jurassic age recently designated the Bendersville Formation and Aspers Basalt (Weems and Olsen, 1997; Faill, 2003). Igneous intrusive rocks in the basin are dikes and sills of Early Jurassic age belonging to the York Haven Diabase (older) and Rossville Diabase (Smith, et al., 1975; Froehlich and Gottfried, 1999). The main diabase body in the southern part of the basin that is pertinent to the battle is the Gettysburg sill of York Haven Diabase (see Appendix A). The major crosscutting intrusions in this part of the basin—the Seminary Ridge and Warfield Ridge dikes—are composed of Rossville Diabase (Smith, et. al., 1975; Froehlich and Gottfried, 1999).

Sedimentary rocks. The New Oxford Formation, which occupies low relief terrain in the southeastern part of the basin beginning about 5 miles east of Gettysburg, consists predominantly of red mudstone and siltstone and gray to reddish-brown arkosic sandstone (with beds of quartz-pebble conglomerate near the base (Stose and Bascom, 1929; Smoot, 1999; Faill, 2003). Thickness of the New Oxford is about 6,800 feet (Smoot, 1999). Jubal Early's Confederate division crossed the northeast-southwest-striking outcrop belt of the formation in marching from Gettysburg to York on June 27-28, but met no hostile military forces along the way.

The much thicker Gettysburg Formation overlies the New Oxford and underlies the central and western parts of the basin, occupying a swath of relatively lowland terrain about 10 miles wide that is broken up by rocky hills and ridges underlain by intrusive diabase (see below). Total thickness of the Gettysburg Formation is about 15,000 to 18,000 feet (Smoot, 1999). The "undivided" Gettysburg Formation consists predominantly of grayish-red sandstone, siltstone, and mudstone (Stose and Bascom, 1929), with several intervals of gray shale and argillite near the contact with the medial Heidlersburg Member west of town (see STOPS 1 and 2). The Heidlersburg Member, 3200-4700 feet thick, is predominantly a cyclic unit composed of red, gray, and black shale, argillite, shale, and siltstone (Faill, 2003; Smoot, 1999), with numerous beds of hard, white sandstone (Stose and Bascom, 1929). This member underlies a distinctive terrain of alternating narrow, low ridges and swampy valleys about 2 miles wide in the west-central part of the basin. Much of the "1st day" was fought over ground underlain by the Heidlersburg and immediately subjacent "undivided" Gettysburg Formation (see STOP 1). The Conewago Conglomerate Member, 7,000 to 10,000 feet of quartzite- and limestone-pebble conglomerate, sandstone, and siltstone (Stose and Jonas, 1939; Smoot, 1999; and Faill, 2003) forms the Conewago Mountains in York County, about 20 miles northeast of the battlefield. Also mapped locally, but unnamed, within the "undivided" Gettysburg formation are several thick and areally extensive limestone conglomerate lentils along the edge of the basin just east of the South Mountain Front (Stose and Bascom, 1929; Smoot, 1999).

Early Jurassic-age sedimentary and extrusive igneous rocks occupy a small area along the northwestern margin of the Gettysburg basin northeast of Gettysburg and beyond the area of military operations. They constitute grayish-red siltstone and mudstone of the Bendersville Formation (about 750 feet thick) and dark-greenish-gray basalt of the Aspers Basalt (200 feet thick) (Weems and Olsen, 1997; Faill, 2003).

The Triassic sedimentary rocks on the battlefield are relatively unfossiliferous. However, blocks quarried from these formations several miles away and brought to construct bridges on the battlefield contain dinosaur footprints (see discussion of Plum Run bridge between STOPS 3 and 4).

Intrusive igneous rocks. Intrusive into the Upper Triassic sedimentary rocks of the Gettysburg basin is a complex network of diabase sheets and dikes of Early Jurassic age (201$\pm$1.3 Ma) (Froehlich and Gottfried, 1999). The diabase is typically medium dark gray to dark gray and is composed of calcic plagioclase and clinopyroxene, with accessory quartz and magnetite; hypersthene, biotite, and olivine also occur in places (Stose and Bascom, 1929; Stose, 1932; Smith et al., 1975). The rock of the large diabase bodies, most prominent of which is the Gettysburg sheet, is coarse grained and granular, with the plagioclase and pyroxene showing up as black and white or gray grains, respectively. The dikes and thin sills are dark and dense.

Two petrologic types of Jurassic diabase—the York Haven and the Rossville (Smith et al., 1975)—occur in the Gettysburg basin and form significant topographic features on the battlefield (see Figure 2). Both are quartz-normative (i.e., silica oversaturated) continental tholeilites. The slightly older York Haven Diabase is characterized by highTiO_2, and the Rossville Diabase by low TiO_2. York Haven Diabase forms the larger intrusive bodies in the basin, including the Gettysburg sheet, these bodies being characterized by thick cumulus orthopyroxene zones in the lower part (Froelich and Gottfried, 1999). Rossville Diabase forms the narrow, steeply crosscutting Seminary Ridge and

Warfield Ridge diabase dikes in the western part of the battlefield. (See STOPS 1, 4, 5, 7, and 9 for further discussion of Jurassic diabase.)

Structure. As is typical of the other outcropping Mesozoic rift basins between New York and Virginia, the Gettysburg basin is a tilted fault block or half graben, with rock strata dipping 20-30° into major normal faults on the northwestern side (Figure 5). Maximum width of the basin is about 18 miles northwest of York, narrowing to a 16-mile-wide cross section at Gettysburg. The straight traces of normal faults across high relief terrain along the northwestern margin suggest high-angle displacements, probably on the order of the 60-70° SE dips of minor normal faults in the basin (Root and MacLachlan, 1999). Gravity data show that the deepest part of the basin lies toward the center (Sumner, 1977). Largely to explain this basin configuration, Root (1988, 1989) models the main border fault as a listric normal fault, being steep at the surface and flattening out at depth. Stose and Bascom (1929) show the main border fault as being buried two to four miles southeast of the faulted margin of the basin, at the edge of a platform composed of Paleozoic carbonates and capped by a thin veneer of Gettysburg Formation shale, sandstone, and limestone conglomerate.

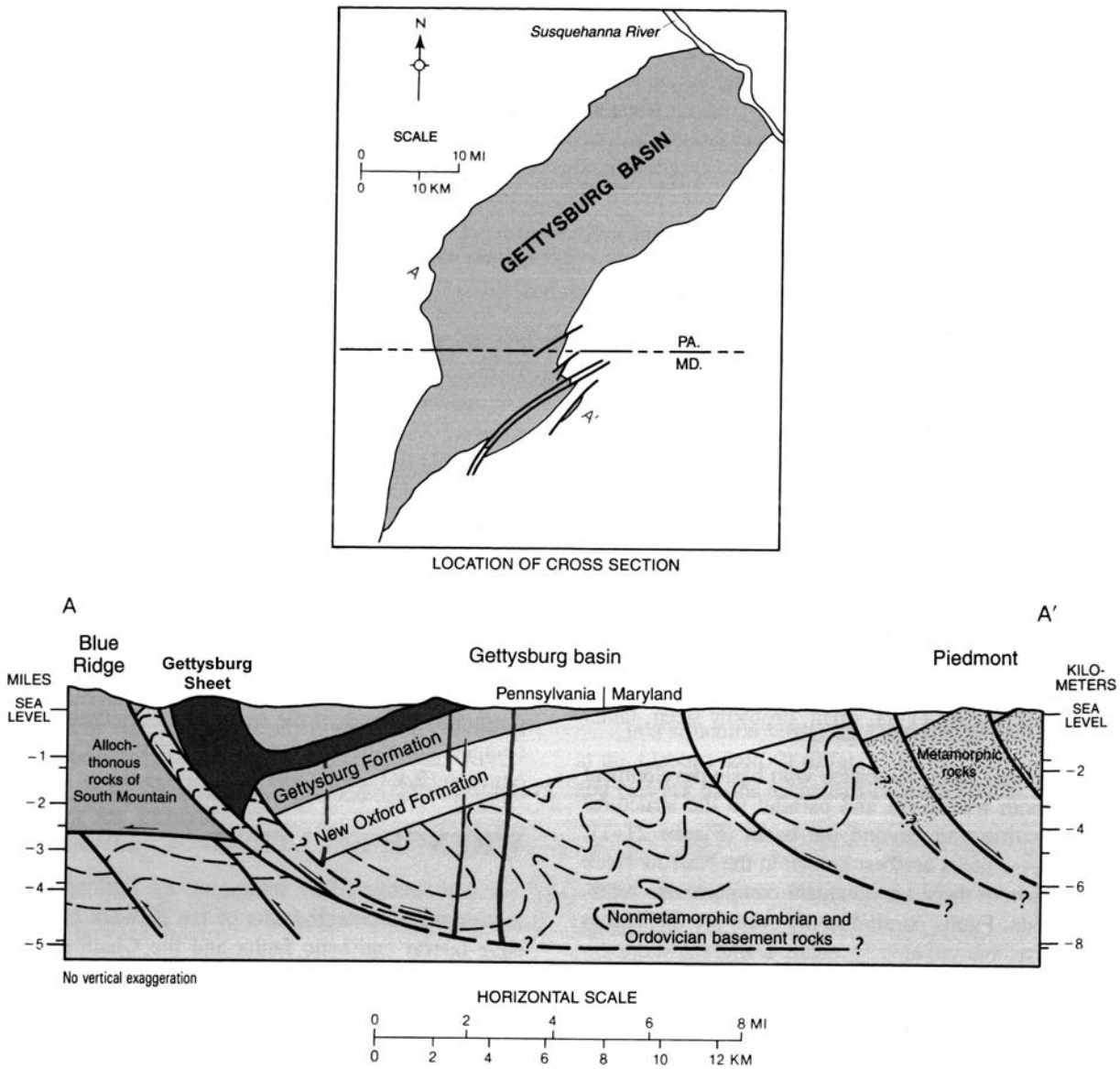

Figure 5. Geologic cross section through the Gettysburg basin (Root and MacLachlan, 1999, Fig. 21-5). The light, vertical lines are diabase dikes, and the heavy, dark lines are faults—the curved ones being listric normal faults.

Most of the fault displacement along the northwest margin took place after deposition of the sediments in the basin, i.e., "syndepositional faulting was negligible" (Root and MacLachlan, 1999, p. 304). In fact, Faill (2003) has recently proposed that the numerous rather discrete Mesozoic basins that snake though the western Piedmont between southeastern New York and southern Virginia originally constituted a single basin, the "Birdsboro Basin." This 325-mile-long trough was then broken up by deformation (tilted, faulted, and folded) in post-Hettangian (Sinemurian) time after the deposition of the youngest preserved sedimentary rocks.

Military geology of the Gettysburg Battlefield. In 1868-69, then Major (a permanent, not brevet rank) Gouverneur K. Warren supervised the preparation of a detailed 1:2400-scale map of the Gettysburg battlefield, showing not only natural features but also fences, buildings (with basic construction materials noted), remains of entrenchments and artillery lunettes, and surveyed contour lines (Frassanito, 1995; which see for an excellent discussions of various pre-battle and post-battle maps of the battlefield and its environs). (The map, more than 12 feet square, is now housed in the archives of the Gettysburg National Military Park.) If engineer-topographer Warren had had the time and inspiration to prepare a *military geology map* of the battleground at Gettysburg, it would have looked something like Figure 6. This effort was inspired by a WWI "engineering geology military map" of the area around Cirey, France, illustrated in Kiersch and Underwood (1998, p. 15).

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See Appendix A for further elucidation of the relationship between topography, geologic history, and military operations in the Gettysburg Campaign.

HISTORICAL CHRONOLOGY OF THE GETTYSBURG CAMPAIGN

(Trudeau, 2002; Cleaves, 1960; Grimsley and Simpson, 1999; Doubleday, 1994; other references as cited.)

June 1 General Robert E. Lee reorganizes the Confederate Army of Northern Virginia, the most significant change being an increase from two to three corps. For his corps commanders, he retained Lieut. Gen. James Longstreet for the 1st Corps; picked Lieut. Gen. Richard S. Ewell for the 2nd Corps ("Stonewall" Jackson's old post); and promoted Lieut. Gen. Ambrose P. Hill to head the new 3rd Corps.

3 Lee opens the campaign that culminates in the battle of Gettysburg a month later by moving elements of his army from positions along the Rappahannock River at Fredericksburg, VA, northwestward toward Culpeper (Figures 7 and 8). By the next day, the Union Army of the Potomac under Maj. Gen. Joseph Hooker realizes something is afoot—but not exactly what.

5 Maj. Gen. J. E. B. Stuart holds an initial formal review of his cavalry forces at Brandy Station on the Orange and Alexandria Railroad northeast of Culpeper, but Lee is unable to attend. So Stuart decides to do it again.

6 After deciding that Federal movements to the south side of the Rappahannock against his depleted forces there was not part of an aggressive movement against him, Lee leaves Fredericksburg—reaching Culpeper early the next morning.

7 Hooker orders his cavalry chief, Maj. Gen. Alfred Pleasanton to cross the Rappahannock River with his whole command (and a detachment of infantry) and march directly on Culpeper. Pleasanton's force moves surreptitiously up to the fords on the evening of the next day.

8 Stuart restages his "Grand Review," this time with Lee present. The commanding general described the review as "a splendid sight," noting that "Stuart was in all his glory."

9 Battle of Brandy Station. Pleasanton (with Brig. Gen. John Buford in command of the northern wing) surprises Stuart at the fords of the Rappahannock and leads an all-day fight at Brandy Station. The Union cavalry fights well and nearly breaks Stuart's line on Fleetwood Hill. Pleasanton pulls back late in the afternoon, judging that his "reconnaissance" mission was completed as ordered.

10 Lee orders Ewell's 2nd Corps into the Shenandoah Valley—choosing Ewell to lead the invasion because of his pre-war posting at Carlisle Barracks in the Cumberland Valley, just 25 miles west of Harrisburg. Over the next two days, Ewell's Corps passes through Chester Gap in the Blue Ridge Mountains and proceeds to Front Royal.

10-13 Hooker's army begins moving from the Fredericksburg area northwestward toward the line of the Orange and Alexandria Railroad around Manassas Junction (Figures 7 and 8).

12 Governor Andrew Curtin of Pennsylvania announces that "a large rebel force" is marching northward to invade the state. His complacent constituents, however, respond sluggishly to his call for increased enlistments in the militia.

14-15 Ewell drives the Union garrison under Maj. Gen. Richard H. Milroy from Winchester, VA, capturing several thousand Union soldiers and opening up the valley.

15 Brig. Gen. Albert G. Jenkins' cavalry brigade (attached to Maj. Gen. Robert E. Rodes' 3rd Division of Ewell's Corps) enters Chambersburg, PA—and Ewell himself reaches Williamsport, MD. At this time, the last of A. P. Hill's Corps (Maj. Gen. William D. Pender's Division) was still in Fredericksburg, facing a largely empty Union position.

16 Hooker, General-in Chief Henry W. Halleck, and President Lincoln exchange a series of telegrams concerning the Union garrison at Harpers Ferry, VA (which Hooker fears is about to suffer the same fate as Milroy's Winchester garrison). The upshot is that, " to remove all misunderstanding," Lincoln unequivocally orders Hooker to subordinate himself to Halleck. This is the "beginning of the end" for Joseph Hooker as commander of the Army of the Potomac.

17 Jenkins is "spooked" out of Chambersburg by a "large enemy force" advancing on him from the north. The "enemy force" proves to be a crowd of citizens from nearby towns who merely want to get a good look at the Confederate invaders.

17-21 Pleasanton's cavalry moves through gaps in the Catoctin Mountains into the Loudoun Valley and clashes with Stuart at Middleburg and Upperville before withdrawing—having satisfied himself that there was no infantry in the valley east of the Blue Ridge Mountains.

19 Union Maj. Gen. George Gordon Meade's 5th Corps arrives in the Loudoun Valley to support Pleasanton's cavalry. Maj. Gen. Winfield Scott Hancock's 2nd Corps follows close behind, entering Thoroughfare Gap in the Catoctin Mountains the next day.

20 Lee sets up his headquarters at Berryville, VA, in the Shenandoah Valley east of Winchester.

22 Lee orders Ewell to advance in force into Pennsylvania, with the Susquehanna River as his ultimate objective. He was instructed to divide his force into three separate columns, so as to maximize the area from which supplies could be commandeered. And further, "If Harrisburg comes within your means, capture it."

23 Two of Ewell's divisions, those of Rodes and Maj. Gen. Edward Johnson, enter Chambersburg. Lee gives "Jeb" Stuart discretion to "pass around their army" with his Cavalry Division "if it can be done without hindrance." He is to link up with Ewell's right flank, the city of York, PA, being a likely rendezvous point (Figure 7).

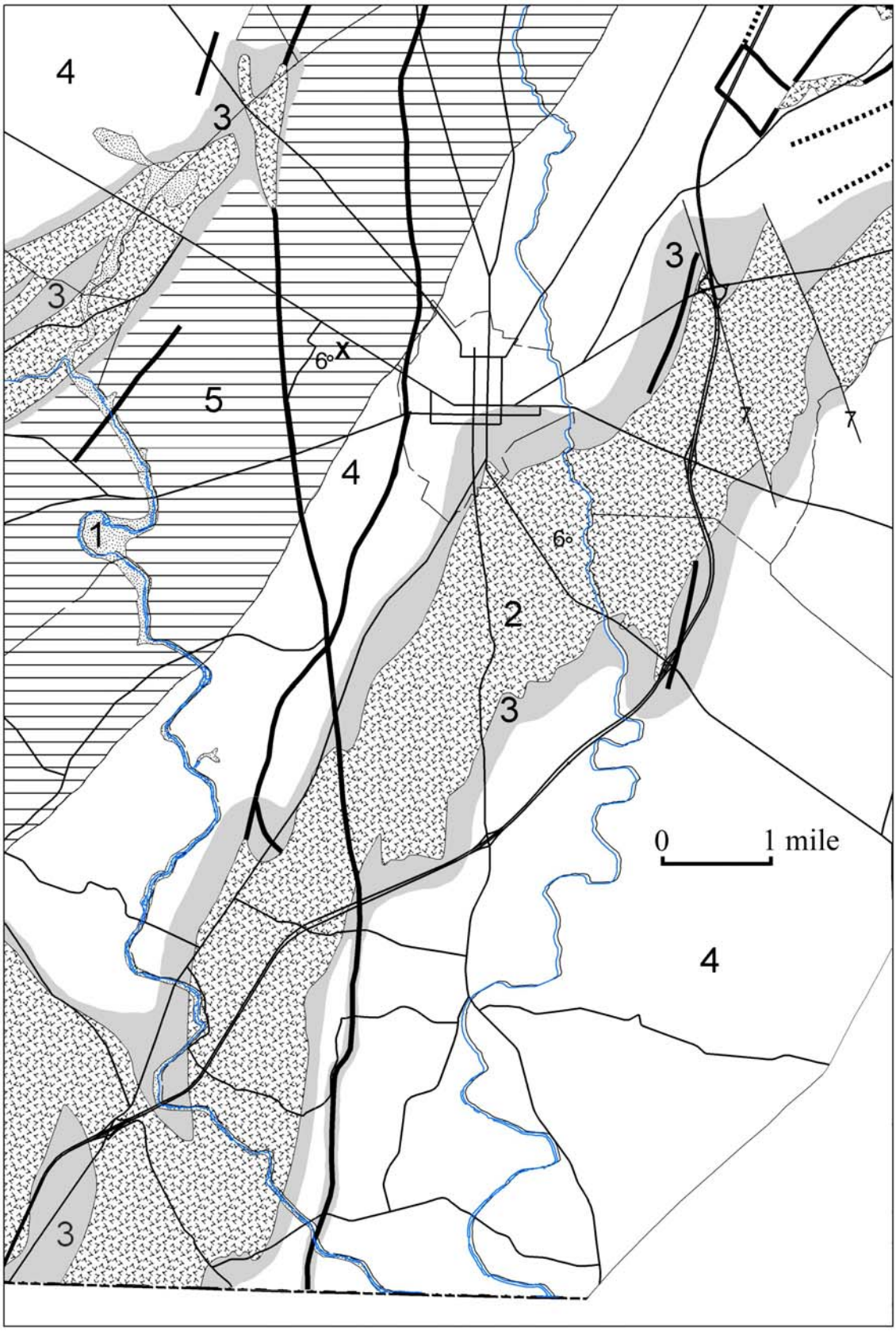

Figure 6. Military geology map of the Gettysburg area. (Based on Stose and Bascom, 1929.) See legend on facing page for explanation.

MILITARY GEOLOGY MAP OF GETTYSBURG AND VICINITY

DESCRIPTION OF FORMATIONS

1

Gravel, sand, and silt, with some clay

The only stream with significant level floodplain composed of unconsolidated sediment is Marsh Creek. Other streams such as Plum Run and Rock Creek flow through generally indistinct bottomlands locally choked with hard, rounded boulders commonly 1 to 3 feet in diameter. Thickness of deposits on Marsh Creek may range up to 6 feet or more.

Poor entrenching ground, wet and subject to floods.

Floodplain and bottomland sediments usually saturated, affording soft footing even during dry periods. Gravel- and sand-floored reaches better drained and more easily crossed, except during floods. Floods can occur in any month, but are more likely between March and May.

2

Diabase

Hard, gray crystalline rock forming narrow elongate ridges (west and southwest of Gettysburg) and stony hills and broad, bouldery ridges up to 0.5 mile wide (east and south of town.). Locally weathered and eroded to form bouldery lowlands, as along Rock Creek and between the Round Tops and Devil's Den. Abundant rounded cobbles and boulders provide good material for stone walls and breastworks, particularly effective when combined with soil from shallow entrenchments, fence rails, and felled trees. Broken ledges and large boulder accumulations provide limited cave shelters. Poor terrain for cavalry operations.

Soils are typically yellowish- to orangish-brown silty clay loams, thickness varying greatly over short distances but typically 3 feet or less. Soils range from well drained on ridges to poorly drained in low areas, particularly along Plum Run and Rock Creek.

Surface firm on slopes and ridge tops, soft and soggy along streams and in vicinity of springs.

3

Hornfels

Hard, gray to purplish-gray baked shale and sandstone. Forms moderately high terrain adjacent to large diabase masses, as along Emmitsburg Road southwest of Gettysburg. Shallow entrenchment possible, but boulders for construction of breastworks generally lacking.

Soils are dark-brown to dark-gray shaly silty clay loams, thickness typically 3 feet or more, usually well to moderately drained.

Surface firm, but locally may remain soft for considerable time after heavy rain.

4

Red sandstone and shale

Moderately hard (sandstone) to soft (shale), forming low and gently rolling terrain. Shallow entrenchment possible, but ground lacks boulders. Trees for breastworks present along hedgerows and in scattered woodlots, and rail fences are common. Such fences are a major impediment to large offensive movements. Except for fences, excellent terrain for cavalry operations.

Soils are typically reddish-brown, shaly silty clay loams, less than 3 feet deep on higher tracts but 4 feet or more on lower slopes and in swales. Soils are moderately to poorly drained, and tend to hold water near surface for long periods of time after heavy rains.

Surface of ground firm at most times, but stays soft for several days after heavy rain.

5

Gray sandstone, argillite, and shale

Moderately hard (sandstone and argillite) to soft (shale), forming narrow, elongate ridges west of Gettysburg. Shallow entrenchment possible, but ground lacks boulders for breastworks. Trees present along hedgerows and in woodlots, and rail fences are common. Fences may impede offensive movements. Railroad cuts through north-south linear ridges provide shelter for operations parallel to topographic grain, but must be used only if flanks covered as they may constitute traps for large bodies of infantry.

Soils are brown to dark-gray shaly silty loam, less than 3 feet thick on ridge crests. Soils are moderately to poorly drained.

Surface of ground usually firm, but may stay soft for long periods after heavy rain.

O 6

Locus of springs and seeps

These should be avoided as far as possible in the location of field works. Such works should be placed above the lines of springs.

7

Line of dislocation (fault)

Water is likely to occur along these lines, due to the zones of fracture.

X Quarry

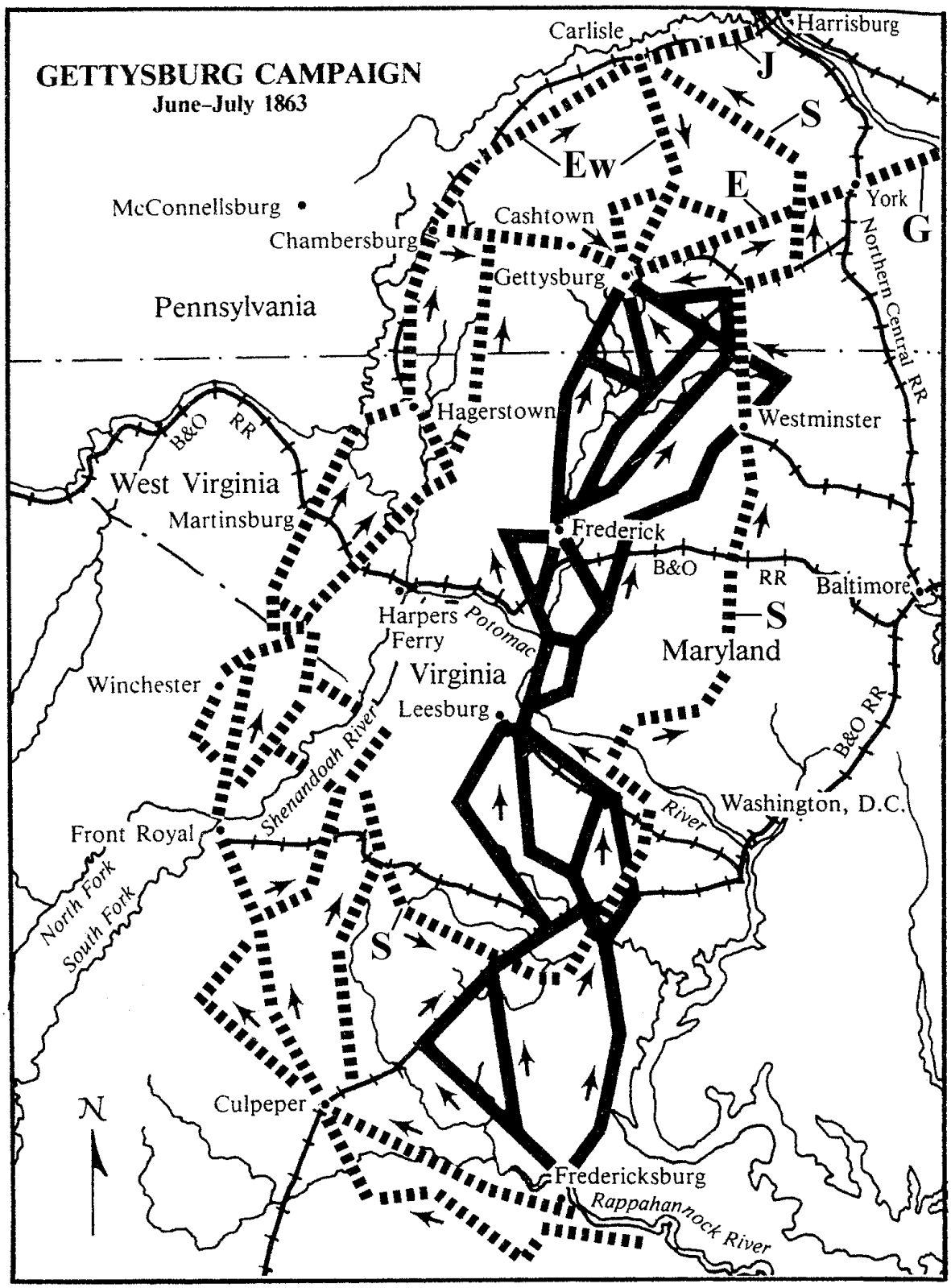

Figure 7. Generalized map showing the various routes followed by Union (continuous lines) and Confederate units (dashed lines) in reaching Gettysburg (Faust, 1986, p. 308). Ew = route of Ewell's Corps from Chambersburg to Carlisle; J = Jenkins' cavalry probe toward Harrisburg; E = route of Early's Division from Gettysburg to York; G = Gordon's probe toward Wrightsville.

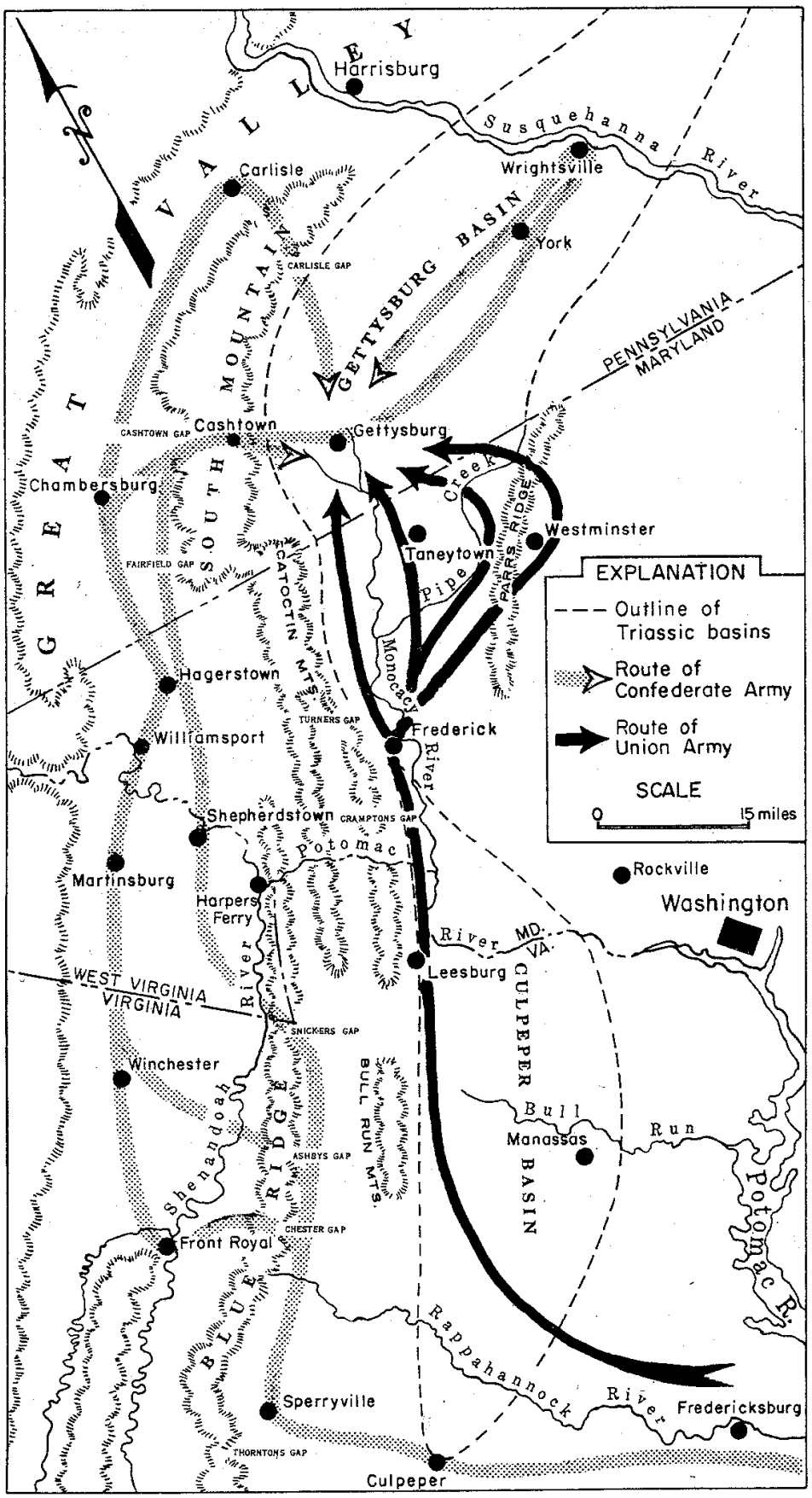

Figure 8. Sketch map of the area covered by the Gettysburg campaign (Brown, 1962, Fig. 1).

24 Obtaining intelligence that "the last of Lee's entire army has passed through Martinsburg [VA] towards the Potomac," Hooker finally realizes that Lee's entire army is headed into Northern territory. He orders the 11th Corps to cross the Potomac the next morning, the rest of the army to follow closely behind.

25 The Union 11th, 1st, and 3rd Corps (constituting a wing of the army under Maj. Gen. John F. Reynolds) cross the Potomac into Maryland at Edward's Ferry, about 12 miles downstream of Point of Rocks. Their immediate objective is to take control of Crampton's and Turner's Gaps through South Mountain, so as to prevent the Confederates from cutting off the Union advance. Hooker prepares to shift his headquarters north to Frederick, MD, over the next two days.

Several regiments of Hancock's 2nd Corps (including the 1st Minnesota) clash with the advance guard of Stuart's cavalry at Haymarket, VA, as the Corps begins to pull back from Thoroughfare Gap.

26 By this time, main body of Lee's Army is north of the Potomac River, much of it having crossed at Williamsport, MD. Lee himself reaches Chambersburg along with Hill's 3rd Corps and most of Longstreet's 1st Corps.

Brig. Gen. Jubal Early's Division of Ewell's Corps advances through the Cashtown Gap in South Mountain, 8 miles northwest of Gettysburg. Early routs a unit of militia (the 26th Pennsylvania Emergency Infantry) in a series of skirmishes and takes possession of Gettysburg later that day (Kross, 2000; Roth and Kross, 2000), but will leave town shortly to move on east toward York.

27 Ewell's Corps (minus Early's Division) occupies Carlisle, having moved up the Cumberland Valley from Chambersburg. Jenkins pushes on to New Kingstown. The Confederates are now just 13 miles from Harrisburg.

Lincoln decides to accept Hooker's letter of resignation from command of the Army of the Potomac (over a dispute concerning the garrison at Harper's Ferry, VA) and appoints Maj. Gen. George Gordon Meade in his stead. The transfer takes place early on the morning of June 28.

28 Early's Division reaches York, the city having "surrendered" the night before. Brig. Gen. John Brown Gordon's Brigade marches eastward through Hallam (Hellam P.O.) to Wrightsville, with the intention of capturing the wooden covered bridge across the Susquehanna River at that point. After a brief firefight, in which Gordon skillfully employs his artillery, Union militia retreat across the river and fire the bridge—which is soon consumed (Eckert, 1989; Gordon, 1993). This is the easternmost point reached by Confederate forces in the campaign.

Stuart's cavalrymen, cut off from Lee by the northward-advancing Union army, capture 125 wagons of booty and numerous prisoners at Rockville, MD, just outside Washington, D.C. The wagons slow the Confederate raiders down, but such replenishment of dwindling supplies was one of the aims of Lee's invasion of the North.

28-30 Brig. Gen. Albert B. Jenkins' Confederate Cavalry Brigade advances as far as present Camp Hill, PA (5 miles west of Harrisburg and the Susquehanna River). Skirmishes with several New York regiments defending the state capital leave 16 Confederates dead and more than 20 wounded (Crist, 1984).

29 Ewell begins moving out of Carlisle toward Gettysburg.

30 The battle of Hanover. Maj. Gen. Judson Kilpatrick's 3rd Cavalry Division spars with Stuart's command in the streets of Hanover, PA, 20 miles southwest of York. By early afternoon, the two sides are about fought out—with Kilpatrick controlling the town and Stuart the high ground to the south.

Lieut. Gen. Ambrose P. Hill's 3rd Confederate Army Corps reaches Cashtown just east of a major pass through South Mountain and only a few miles west-northwest of Gettysburg. That same day, Brig. Gen. John Buford's 1st Division of the Union Army Corps arrives in Gettysburg (about 11:00 AM).

By the end of the day, the Union 1st, 2nd, 5th, 6th, 11th, and 12th Corps are all encamped near the Mason-Dixon Line along a 25-mile-long, roughly west-to-east line from Emmitsburg, MD, to Littlestown, PA, to Manchester, MD).

Brig. Gen. Gouverneur K. Warren, Meade's Chief of Engineers, identifies a 20-mile-long chain of hills along the south side of Big Pipe Creek between Manchester and Middleburg (Thurmont), MD, as possible Union defensive line.

July 1 The first day of the battle of Gettysburg begins at about 7:00 AM as Maj. Gen. Henry Heth's Confederate Division of Hill's 3rd Corps—advancing down the Chambersburg Pike—encounters Buford's dismounted Union cavalrymen about 4 miles northwest of Gettysburg. With the successive addition of the Union 1st Corps (from the south), additional elements of Hill's Corps (from the west), the Union 11th Corps (from the south), and Ewell's Confederate 2nd Corps (from north and northwest) (Figure 7), the battle swings back and forth—the fighting resulting in the rout of the Union forces and their retreat through the streets of Gettysburg to the "high ground" of the Gettysburg sill southeast of the town (see STOPS 1 and 2). Left to his discretion by Lee as to whether to attack the still rather disorganized Northern units on Cemetery Hill late in the day, Ewell decides in the negative—and the Union soldiers begin the development of a strong defensive position.

2 On the second day, Lee continues on the offensive, shifting his focus to the Union left at the south end of the topographic "fishhook." He directs Longstreet and two divisions of his 1st Corps to attack from the southwest along the line of the Emmitsburg Road in an attempt to roll up that part of the Federal line. Late in the morning, however, Maj. Gen. Daniel E. Sickles moves the two divisions of his 3rd Corps out from the south end of Cemetery Ridge to occupy slightly higher ground in his front—at Devil's Den, the Wheatfield, and the Peach Orchard. This disrupts Lee's plan, but also creates a dangerous salient, while at the same time leaving Little Round Top—a key hill on the Union line—undefended. Fierce, bloody fighting takes place from mid-afternoon to early evening—but the Confederate attempt to turn the Union left fails (STOPS 3, 4, 5, and 6). Toward nightfall, the Confederates of Ewell's Corps launch major attacks on the Union right—Culp's Hill (STOP 7) and Cemetery Hill, capturing some entrenchments on the former that had been abandoned by Union forces withdrawn to assist on the left, but failing to make any headway on Cemetery Hill. This day's fighting was intense, but left both armies in essentially their beginning positions, the Confederates on Seminary Ridge, and the Union forces on the "fishhook" from Culp's Hill around to Big Round Top.

At a war council with his corps commanders that night, Meade predicts that tomorrow Lee will attack the Union center, while across town Lee is laying plans to do exactly that.

3 Early on the morning of the third day, the Confederates launch several unsuccessful attacks on Culp's Hill, eventually losing the entrenchments captured the evening before (STOP 7).

Mid-day, however, sees the climax of the battle of Gettysburg. After an hour-long cannonade in which Confederate artillery along Seminary Ridge hammer the Union center on Cemetery Ridge, Maj. Gen. George E. Pickett's 3rd Division of Longstreet's 1st Corps and elements of Hill's 3rd Corps—a total force of 12,000 to 15,000 men—conduct a massive frontal assault on the Union center ("Pickett's Charge") (STOPS 3 and 8). The attack fails—fewer than half of the assaulting column returning unscathed back to Seminary Ridge.

Two significant cavalry engagements also take place that afternoon. Confederate and Union under "Jeb" Stuart and Brig. Gen. David McMurtrie Gregg, respectively, fought a bitter engagement behind the Union right (East Cavalry Field), as Stuart attempted to back up "Pickett's Charge" (see STOP 8). At about the same time on the Union left, Judson Kilpatrick launched an unsuccessful attack on Confederate forces defending a line stretching from Warfield Ridge on the west to Big Round Top on the east (South Cavalry Field).

4 Lee begins his retreat from Gettysburg on a dreary, rainy afternoon.

4-5 Main Confederate army passes through Fairfield Gap to the southwest, while the long wagon train of wounded moves westward through Cashtown Gap.

6 By mid-afternoon, nearly the entire Union army is in motion over muddy roads leading toward the various South Mountain gaps. Advance elements of Lee's retreating columns reach Williamsport, MD, on the Potomac River, and some supplies are ferried across. But the river is high—and still rising.

7 Another day of rain. Meade arrives in Frederick, MD, and is showered with praise by the local citizenry.

7-11 Lee digs in around Williamsport as the Potomac continues to run high. Meade's army converges on the Confederate position.

12 The Union army confronts Lee's fortified perimeter around Williamsport. Meade holds another "council of war," but only Wadsworth of the 1st Corps and Howard of the 11th supported Meade's proposal for immediate assault of the Confederate position.

13 Halleck tells Meade, "You are strong enough to attack and defeat the enemy before he can effect a crossing…Do not let the enemy escape." With the heavy rain continuing and the Potomac at high water, Meade issues orders to merely probe the enemy lines. Under cover of rain, mist, and darkness, the bulk of Lee's army begins crossing a rickety pontoon bridge at Falling Waters late that afternoon and evening.

14 Skirmishers of the Union 12th Corps push forward to Falling Waters early in the morning, engage the rear if Lee's fleeing columns, and capture more than 200 prisoners. But the Army of Northern Virginia escapes to fight for another twenty-one months.

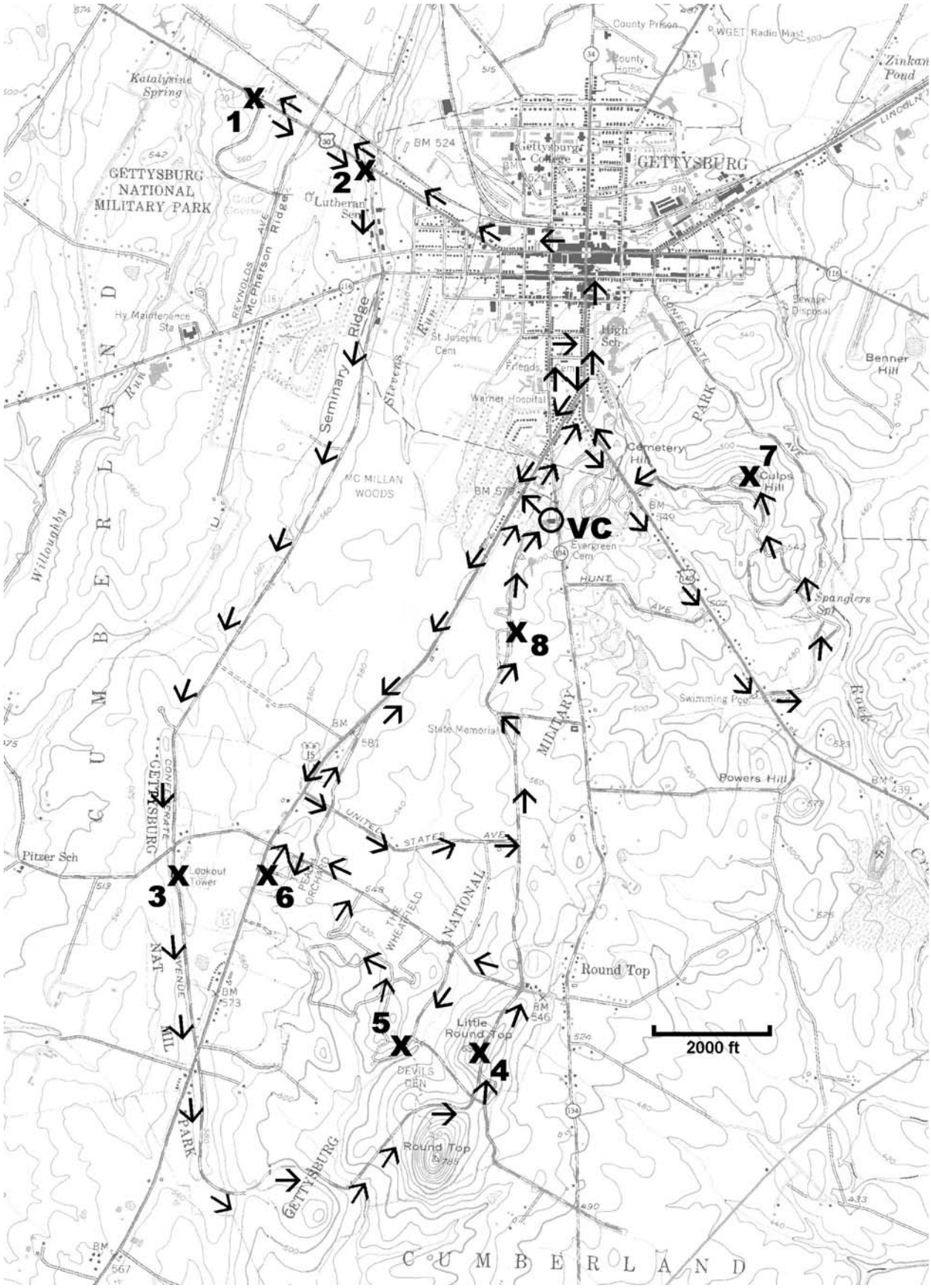

Figure 9. Field trip route and STOP locations. VC = Visitors' Center.

ROADLOG

(Field trip route shown on Figure 9.)

Mileage Int.	Mileage Cum.	
0.0	0.0	Leave parking lot on west side of National Park Visitors' Center (VC on Figure 9), turning right (north) onto Steinwehr Ave. (Emmitsburg Road).
0.2	0.2	Traffic light at Y-intersection of Steinwehr Ave. and Washington St. (Taneytown Road). Continue straight on Steinwehr Ave.
0.2	0.4	Traffic light at Y-intersection of Steinwehr Ave. and Baltimore Street (Baltimore Pike). Bear left (north) onto Baltimore Street (Bus. US 15N).
0.4	0.8	To left is the Adams County Courthouse, erected in 1859 to replace the original courthouse located a block to the right. Like many other public buildings in Gettysburg, the courthouse functioned as a soldier's hospital during the battle and for many days afterward.
0.1	0.9	Traffic circle in Town Square (DANGEROUS SPOT: drive carefully). Go around circle three-fourths of way, then ahead (west) on Chambersburg Street (US 30W). On the southeast corner of the square is the David Wills House, where President Abraham Lincoln lodged and completed the "Gettysburg Address" in November 1863. If you go right at the traffic circle and proceed east on York Street and then on Hanover Street (at the Y-split) for about 3.25 miles, you come to East Cavalry Field where, on July 3, Union cavalry under Brig. Gens. David McM. Gregg and George A. Custer (of "Last Stand" fame) intercepted Lieut. Gen. J. E. B. ("Jeb") Stuart's Confederate cavalry intending to strike the Union lines from behind at the same time as Pickett's Charge.
0.1	1.0	To left is Christ Lutheran Church, built in 1836, which is the oldest continuously active church in Gettysburg. It served as a soldiers' hospital from July 1 until July 29, 1863, when the wounded were moved to Camp Letterman, the consolidated tent hospital east of the borough (see Figure 3).
0.05	1.05	About a block north on Washington Street is the old Gettysburg Railroad Station at which Abraham Lincoln arrived on the evening of November 18, 1863, before delivering the Gettysburg Address the next afternoon.
0.2	1.2	At Y-intersection, bear right (northwest), still following Chambersburg Street/US 30W. Directly to left of the intersection was the home of John Burns (1793-1872), dubbed the "Old Patriot" because he was the only citizen of Gettysburg to take up arms against the invading Confederates. Burns was wounded three times fighting with the Iron Brigade at Herbst Woods on July 1, and lay on the field that night before finding succor behind enemy lines the next day (Frassanito, 1995; Trudeau, 2002).
0.2	1.4	The distinct rise directly ahead is Seminary Ridge, held up by a roughly north-south-striking diabase dike of Early Jurassic age (see STOP 2).
0.1	1.5	Lutheran Theological Seminary (founded in 1826 and moved to this site in 1832) on crest of Seminary Ridge ahead to left.
0.25	1.75	Crest of Seminary Ridge. The stone house to right is Lee's Headquarters (see STOP 2).
0.2	2.0	Traffic light at crest of east McPherson's Ridge (intersection of Chambersburg Pike and Reynolds Ave.). To right just west of the bridge is the middle of the three railroad cuts on the old Western Maryland Railroad (now CSX). To left, just southwest of the intersection, is the monument to the 143rd Pennsylvania Infantry (Figure 10).
0.1	2.1	The stone barn ahead to left is the sole remaining structure of McPherson's Farm (see STOP 1).
0.1	2.2	Turn left into parking lot at National Park Guide Station. Disembark.

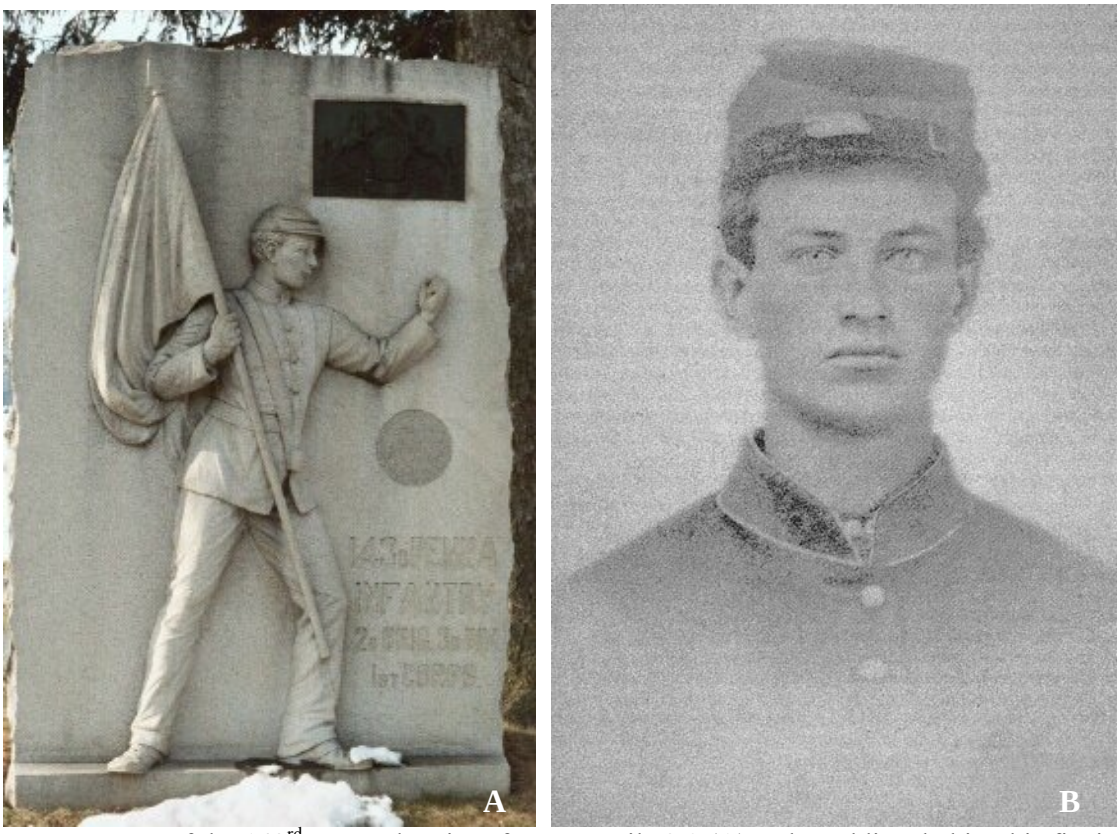

Figure 10. Monument of the 143rd Pennsylvania Infantry at mile 2.0 (A). The soldier shaking his fist is Sgt. Benjamin Crippen (B), color bearer of Co. E. He was shot down soon afterward, as the regiment retreated toward Seminary Ridge on the afternoon of July 1. Even Confederate Gen. A. P. Hill regretted seeing "this gallant Yankee meet his doom" (Tomasak, 2000, p. 65). (B is from Tomasak, 2000, p. 63.) The monument stone is Westerly Granite from Rhode Island (Hawthorne, 1988).

STOP 1. McPherson's Ridge and the "middle railroad cut": Day 1 action (beginning) (I) and the Gettysburg Formation (II).

Leave STOP 1, turning right toward Gettysburg on US 30E.

0.45 2.65 Turn right into parking lot across from Lee's Headquarters and Quality Inn.

STOP 2. Lee's "Headquarters" and the Seminary (Oak) Ridge railroad cut: Day 1 action (climax), the Gettysburg Formation, and the Seminary Ridge dike.

Leave STOP 2, turning right on U.S. 30E.

0.05 2.7 Turn right (south) onto Seminary Ridge road at crest of Seminary Ridge.

0.2 2.9 To left is Schmucker Hall ("Old Dorm") of the Lutheran Theological Seminary (Figure 11). It was in the cupola of Schmucker Hall that the famous meeting between Generals Buford and Reynolds took place at about 10:00 AM on July 1. The brief, but colorful, dialog is now legend—

Reynolds: "What's the matter, John?"

Buford: "The devil's to pay " (Grimsley and Simpson, 1999, p. 14). Within less than an hour, Reynolds lay dead at the edge of Herbst Woods. After the Union forces had been driven from Seminary Ridge late in the afternoon, General Lee made use of the cupola to observe the Union position on the heights south of Gettysburg. The building also became a hospital for the wounded from both sides.

Figure 11. Schmucker Hall of the Lutheran Theological Seminary, erected in 1832 and named for the founder of the seminary, Samuel Simon Schmucker. This is the oldest standing building in America for Lutheran theological education.

About noon on July 1, Maj. Gen. Abner Doubleday, at the time commanding the Union 1st Corps, directed that the 2nd Division of his corps, under Brig. Gen. John C. Robinson, erect a "semicircular [fence]rail entrenchment" in the grove in front of the seminary building [to our right] and to man it as a reserve. Late in the afternoon, after the 1st Corps had been driven off McPherson's Ridge to the west, what was left of the corps "after all this slaughter" rallied for a time behind this breastwork and held it "for a time by firing over the pile of [fence]rails" (Doubleday, 1994, p. 136, 147).

0.1 3.0 Traffic light at intersection with Middle Street (Hagerstown Road). Continue straight ahead, now on West Confederate Ave.

0.1 3.1 Shultz Woods to right. To left and right, note the several Confederate batteries that were posted here at the edge of the woods on July 1 to 4.

0.7 3.7 McMillan's Woods to right. Confederate Lieut. Gen. A. P. Hill's 3rd Corps held this area from the evening of July 1 to July 4.

0.2 3.9 To left is the North Carolina Monument (Figure 12).

Figure 12. A. North Carolina State Memorial at mile 3.9. B. Detail of the bronze work. The sculptor of the monument was Gutzon Borglum (1867-1941), most famous for his Mt. Rushmore carvings of American presidents.

0.05 3.95 To left are Confederate cannons at Pettigrew's position on the 3rd Day (Pickett's Charge). Good view east and southeast of the Union position on Cemetery Hill and the Round Tops.

0.25 4.2 To left is the Virginia Monument, surmounted by a bronze equestrian statue of Gen. Robert E. Lee (1807-1870), commander of the Army of Northern Virginia (Figure 13). This is one of only two statues of Confederate officers on the battlefield, the other being that of Lieut. Gen. James Longstreet at mile 4.9 (see Figure 14).

Note the additional Confederate cannon on the north side, although they are not aimed precisely at what was the target of Pickett's Charge.

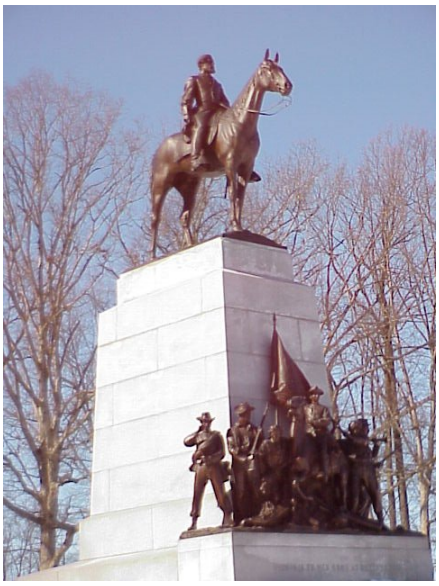

Figure 13. Virginia State Memorial at mile 4.2. Dedicated in the summer of 1917, this was the first of the southern state memorials to be placed on the battlefield. Lee sits astride his beloved horse, Traveller. The seven figures on the pedestal represent the diverse citizenry of the Army of Northern Virginia—youths, mechanics, farmers, etc. (Hawthorne, 1988).

0.2 4.4 Spangler's Woods on both sides of road. Pickett's Division of Longstreet's 1st Corps held this portion of the Confederate line from July 2 to 4.

0.3 4.7 The road to the right here is the "Berdan Loop," which leads northwest about 500 feet into the woods to the site of sharp skirmish (at about noon on July 2) between a Union reconnaissance party of about 300 men (four companies of sharpshooters and the 3rd Maine Regiment) under Col. Hiram Berdan and a Confederate force from Hill's Corps. Berdan had been sent out by Maj. Gen. Daniel Sickles, commander of the Union 3rd Corps, to determine whether the Confederates were moving to envelop the Union left (as they had done to the right at Chancellorsville). Upon receiving word of the clash, Sickles began the fateful movement of his corps out from Cemetery Ridge to the Emmitsburg Road, the Peach Orchard, and Devil's Den (Grimsley and Simpson, 1999).

Late in the afternoon of the 2nd day, Barksdale's Mississippi Brigade began its attack from this area, an attack that overwhelmed the Union 3rd Corps position along the Emmitsburg Road and carried all the way to the slope of Cemetery Ridge.

0.1 4.8 At about this point, the north-northeast-striking outcrop trace of the Seminary Ridge diabase dike intersects the larger, roughly north-south striking Warfield Ridge dike (Bascom and Stose, 1929; Stose, 1932). Confederate Avenue follows south along Warfield Ridge.

0.1 4.9 To right in Pitzer's Woods is the recently erected (1998) bronze, equestrian statue of Lieut. Gen. James Longstreet (1821-1904), commander of the Confederate 1st Corps (Figure 14; see McPherson, 2003, for an interesting discussion of this statue).

Figure 14. A. Equestrian statue of Lieut. Gen. James Longstreet at mile 4.9. B. Close-up of statue.

Though Longstreet was one of Lee's stalwarts throughout the war, he alienated many from the South after the war by becoming a Republican.

0.2 5.1 To left are the Louisiana (Figure 15) and Mississippi Monuments.

0.1 5.2 Stop sign at intersection with Millerstown Road; continue straight ahead, staying on West Confederate Ave.

0.1 5.3 Turn left into parking lot at observation tower. Disembark and climb tower.

Figure 15. Louisiana State Memorial at mile 5.1. This monument is one of the more recent on the field, having been dedicated in 1971. The bronze statue depicts a female figure, "The Spirit of the Confederacy," soaring over a dying soldier, who is clutching a Confederate battle flag to his chest (Hawthorne, 1988).

STOP 3. Longstreet (Observation) Tower: Warfield Ridge dike, battlefield terrain, South Mountain, and Days 2 and 3 action.

Leave STOP 3, continuing south on West Confederate Ave.

0.6 5.9 Stop sign at intersection of West Confederate Ave. and Emmitsburg Road. Continue straight on West (soon to be South) Confederate Ave. DANGEROUS CROSSING: no traffic light; cross traffic does NOT stop.

0.05 5.95 To left are three bronze 12-pound Napoleons at the position of Latham's Battery (Hood's Division of the Army of Northern Virginia) commanding a good view of the Round Tops from the Confederate line (Figure 16). These smoothbore cannons had a maximum range of about

Figure 16. Latham's Battery, with two Napoleons facing Little Round Top, at mile 9.95. Napoleons were smoothbore, 12-pounder, bronze howitzers that had a maximum range of about 1,500 yards with solid shoot (Manucy, 1949). The stone wall is a "dead give-away" that the underlying bedrocks is diabase, in this case the Warfield Ridge dike.

1500 yards using solid shot, spherical case, or shells (Grimsley and Simpson, 1999). From the heights along this stretch of Warfield Ridge Latham's and Reilly's Batteries dueled with the Union guns of Smith's Battery on Houck's Ridge near Devil's Den just before and during Hood's attack on the Union left on the afternoon of July 2 (Adelman and Smith, 1997; see STOP 5).

0.35 6.3 To right is the Alabama Monument. From along Warfield Ridge in this area, Law's Brigade (Hood's Division, Longstreet's Corps) of five Alabama Regiments—the 4th, 15th, 44th, 47th, and 48th—began its assault on the Union left.

0.2 6.5 The two 10-pounder Parrott guns to the right mark the position of Reilly's Battery (Henry's Battalion, Rowen's Artillery, Army of Northern Virginia) during "Farnworth's Charge." This last great tragedy of the battle of Gettysburg started just south of here and was played out in the boulder-strewn, openly wooded (at the time) terrain between the Round Tops and the Emmitsburg Road in the area just to the north and south of South Confederate Avenue.

0.35 6.85 To left are waysides describing "Farnsworth's Charge" (Figure 17) and "The Dead and Wounded at Gettysburg."

Figure 17. "Farnsworth's Charge" wayside at mile 6.85. "Farnsworth's (Cavalry) Charge," ordered by Union Brig. Gen. Judson Kilpatrick (1836-1881), was the last major action of the battle of Gettysburg, occurring late in the afternoon of July 3, just as "Pickett's Charge" climaxed and ebbed on the open fields two miles to the north. The famous dialogue between Brig. Gen. Elon J. Farnsworth (1837-1863), commander of the 1st Brigade (3rd Division) and division-commander Kilpatrick—repeated on the wayside—may never have taken place, at least in its traditional form so damning to Kilpatrick. The most memorable line is Farnsworth's: "General, do you mean it? Shall I throw my handful of men over rough ground, through timber, against a brigade of infantry? The first Vermont has already been fought half to pieces. *These are too good men to kill."* (See Custer, 2003, for an updated account of "Farnsworth's Charge" that raises serious questions about the action as described here—and in many other accounts.)

0.05 6.9 On right is monument to William Wells (1837-1892), at the time a major commanding a battalion of the 1st Vermont Cavalry Regiment in Farnsworth's brigade. Farnsworth rode with Wells, who won a Congressional Medal of Honor for his leadership in the action (Trudeau, 2002).

0.05 6.95 Bridge over Plum Run. (*Brief stop* to observe dinosaur footprints and sedimentary structures.) The National Park Service rebuilt this bridge in the 1930's, using sandstone blocks taken from now long-inactive Trostle quarry along Bermudian Creek, 3.3 miles due east of the US 15-PA 94 interchange at York Springs, Adams County. The blocks came from the Heidlersburg Member in the middle of the Gettysburg Formation and are of Late Triassic age (see Figure 4). Particularly noteworthy are dinosaur footprints in the northwestern corner of the upper surface of the fifth top-block west of the east end of the northern parapet of the bridge. One large rear-foot (pes) print and one small hand (manus) print in front of it, heading southeasterly, can be seen and photographed. (But please do not touch!) These prints, described and illustrated by Santucci and Hunt (1995), are thought to represent an early ("basal") ornithopod dinosaur, with the ichnofossil name *Atreipus milfordensis*. Other specimens, seen in sidewalks elsewhere in Adams County, consist of only rear footprints, and have been called *Anchisauripus sillimani*, interpreted as a small coelurosaur theropod dinosaur instead.

Also present in various blocks top-blocks of the bridge parapets are desiccation cracks, symmetrical and asymmetrical ripples, and "dinosaur skin" (Hoff et al., 1987).

0.25 7.2 To left is the "Devil's Kitchen," a chaotic pile of broken diabase ledges and boulders (Figure 18). The 4th Texas Infantry of Robertson's Brigade passed across these rocks in attacking Little Round Top on the afternoon of July 2. Confederate skirmishers subsequently occupied the Devil's Kitchen until their withdrawal on the evening of July 3 (Adelman and Smith, 1997).

Figure 18. The Devil's Kitchen at mile 7.2. This is one of numerous relatively small York Haven diabase "dens" on the outcrop of the Gettysburg sheet. Several of the large boulders here are connected by stone walls that may date from the time of the battle.

0.1 7.3 To right is head of trail to summit of Big Round Top. Though the higher, more rugged and more heavily wooded of the two Round Tops (elevation about 785 feet) did not figure prominently in the battle, some action between retreating Union sharpshooters and the attacking Alabamans of Law's Brigade took place on its western slopes early in the attack on Little Round Top. After fighting ended on July 2, Union forces occupied the hill to firmly anchor their left flank.

0.1 7.4 To right are monuments to the 39th Pennsylvania Infantry (10th Pennsylvania Reserves) and the 9th Massachusetts Infantry (both 5th Corps). The stone wall snaking up the north slope of Big Round Top here extends all the way to the summit and was originally built by the 5th and 12th Pennsylvania Reserves and the 20th Maine on the night of July 2-3.

0.1 7.5 Stop sign at intersection with Warren Ave. Continue straight ahead on Sykes Ave.

0.1 7.6 Turn left into parking area on Little Round Top. Disembark.

STOP 4. Little Round Top: Day 2 action (Warren, Vincent, Chamberlain, and Oates) and the York Haven Diabase.

Leave STOP 4, continuing north on Sykes Ave.

0.1 7.7 To left is the monument to the 121st New York Infantry (6th Corps), commanded by Col. Emory Upton (1839-1881). A native of Batavia, New York, Upton graduated from West Point in May of 1861. Initially assigned to the artillery, Upton took command of the 121st New York in October of 1862. He was promoted to brigadier general on the field at Spotsylvania's "Bloody Angle" for "innovating a method of rushing assault by column instead of by the standard linear assault" (Faust, 1986, p. 773; see Trudeau, 1989).

0.1 7.8 Stop sign at north base of Little Round Top; turn left (west) onto Wheatfield Road. The bronze equestrian statue atop the granite monument directly ahead before the turn depicts Maj.-Gen. John Sedgwick (1813-1864), commander of the Union 6th Corps (Figure 19). Badly wounded at Antietam, Sedgwick was apparently considered for command of the Army of the Potomac after Chancellorsville. He survived Gettysburg and the Wilderness, but his luck ran out at Spotsylvania in May of 1864. While emplacing artillery before the battle, Sedgwick was killed by a Confederate sharpshooter just after uttering the fateful words, "...[T]hey could not hit an elephant at that distance" (Faust, 1986; Trudeau, 1989).

Figure 19. A. Monument to Maj. Gen. John Sedgwick on Sedgwick Ave. just north of mile 7.8. B. Close-up of statue. Meade held Sedgwick's 6th Corps in reserve, and it saw little action in the battle.

Dinosaur Footprints on the Plum Run Bridge
by
Roger J. Cuffey

The Triassic sedimentary rocks on the Gettysburg battlefield are unfossiliferous. However, a few dinosaur footprints can be seen in the sandstone or siltstone blocks forming the tops of the walls of the road bridge crossing Plum Run on the southern edge of the battlefield (p. 6, 25 in the present guidebook). Those blocks were taken from the long-abandoned Trostle Quarry along Bermudian Creek, 3.3 miles due east of the US 15 - PA 94 exit at York Springs. They came from the Heidlersburg Member.

Visibility of the footprints varies with the angle and intensity of the lighting, and with the dry, damp, or wet condition of the block surface. Identification of footprints is particularly difficult because of morphologic variability of the feet interacting with differences in the sediment surface and diagenetic processes later.

Easiest to recognize is a paired fore-and-hind-print, heading southeasterly, identified (Santucci & Hunt 1995) as the heterodontosaur or "basal" ornithopod *Atreipus milfordensis*, in the northwest corner of the fifth block from the east end of the bridge's north side. On its south side, counting from the west end, the sixth through tenth blocks exhibit prints. The sixth's south edge has a hind-print which is from the coelurosaur theropod *Anchisauripus sillimani* (or is the rear half of an incomplete *Atreipus*), the eighth shows a similar obscure print, the ninth bears two small coelurosaur hind-prints resembling *Grallator tenuis* (as well as another *Atreipus*), and the tenth has a very obscure prosauropod *Otozourn minus* hind-print.

In addition to the footprints here on the Plum Run bridge, more (the paired *Atreipus milfordensis*) can be seen in a farmhouse sidewalk 1.7 miles north-northeast of the York Springs exit.

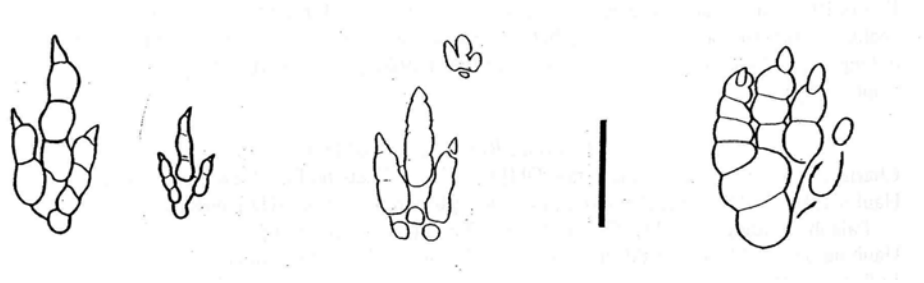

Figure 19C. Plum Run bridge dinosaur footprints: Left**,** *Anchisauripus sillimani* (and smaller *Grallator tenuis),* 3-toed hind-prints 12-15 cm (and 7-8 cm) long; center, *Atreipus milfordensis,* fore- and 3-toed-hind-print (latter 10-12 cm long); scale bar 10 cm; right, *Otozoum minus,* 4-toed hind-print 15-25cm long; (from Haubold 1971, p. 66, Lull 1953, p. 167, Haubold 1971, p. 66, Lull 1953, p. 154; Haubold 1984, p. 155, Olsen & Baird 1986, p. 65-69; Haubold 1971, p. 83,Lull 1953, p. 191; respectively).

Also visible on some blocks are sedimentary structures (especially ripple marks), and millimeter-scale irregularities incorrectly termed "dinosaur skin" but diagenetic, tectonic, or weathering phenomena instead.

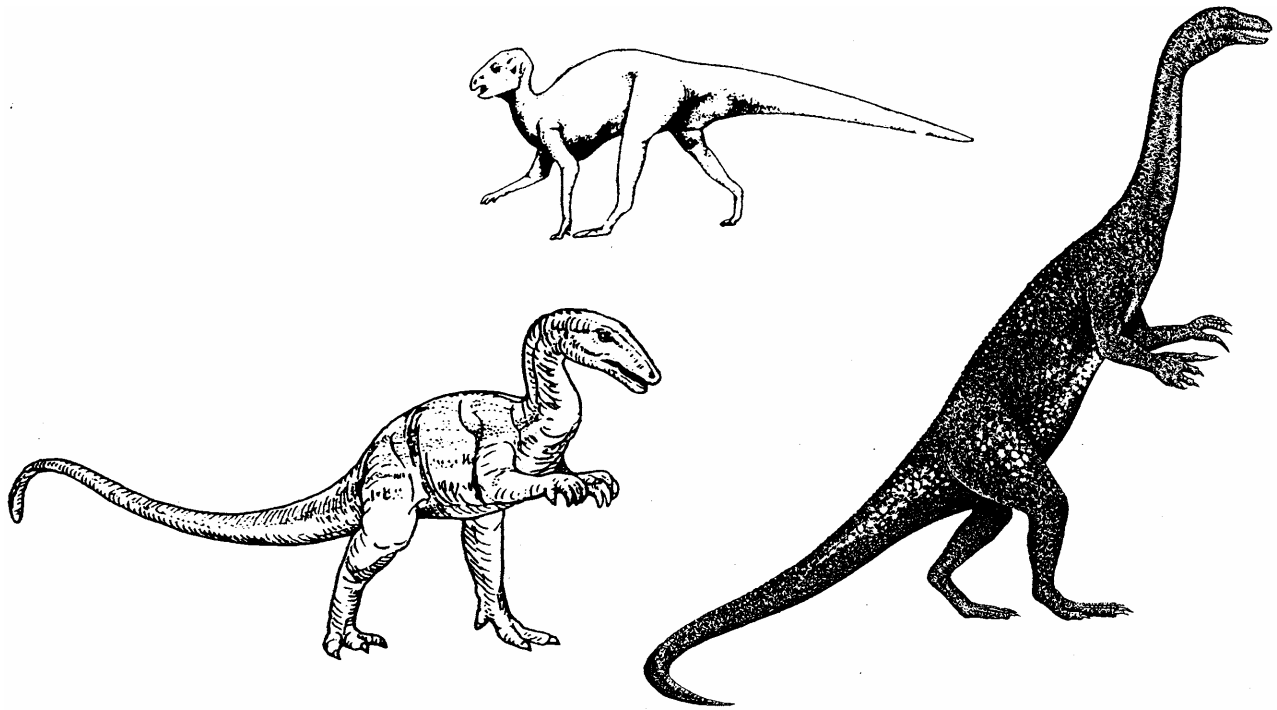

Figure 19D. Likely appearances of the dinosaurs responsible for the footprints: Left to right; coelurosaurian theropod 2-4 m long; heterodontosaurian ornithopod 2-3 m long; prosauropod 3-5 m long; (from Haubold 1984, p. 50; Olsen & Baird 1986, p. 79; Charig 1983, p. 115; respectively).

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0.3 8.1 Turn left (south) on Crawford Ave. into the "Valley of Death."

0.05 8.15 On left is monument to Brig. Gen. Samuel Wylie Crawford (1829-1892), commander of the 3rd Division of the 5th Corps. In a last Federal counterattack on the evening of July 2, Crawford led his division of Pennsylvania Reserves across the "Valley of Death" to dislodge the Confederates from the high ground on the right. This was one of several Union counterattacks that finally checked the Confederate offensive late in the evening (Editors of Time-Life Books, 1996).

A graduate medical doctor (University of Pennsylvania, 1850), Crawford had commanded a battery at Fort Sumter during the siege of April 1861. He fought through the entire war and was brevetted for gallantry at Petersburg (Faust, 1986; Jorgensen, 2002). His missteps at the climactic battle of Five Forks in April 1865, however, probably cost Gouverneur Warren his command of the 5th Corps and his military reputation (Jordan, 2001; see STOP 4).

0.05 8.2 To right is a low diabase knoll referred to by some battlefield guides as "Day Hill," for Col. Hannibal Day, commander of the 1st Brigade, 2nd Division, 5th Corps. Day's five regiments of U.S. Regulars were stationed here during the last phase of the fighting for the Wheatfield. Forced to retreat across the "Valley of Death" by intense pressure from four Confederate brigades, Day's brigade suffered about one-third casualties (Jorgensen, 2002). The granite marker on top of the knoll is to the 2nd Division of the 5th Corps, Brig. Gen. Romayn B. Ayers commanding.

0.1 8.3 The rocky, elongate hill to right (west) is Houck's Ridge, at the southwest end of which is Devil's Den (see STOP 5).

0.15 8.45 Stop sign at intersection with Warren Ave. Just to the left of the intersection on the far side of Plum Run is the monument to the 40th New York Infantry (3rd Corps), the "Mozart Regiment" (Figure 20). Continue straight ahead on Sickles Ave.

Figure 20. Monument of the 40th New York Infantry at mile 8.45. This carved chunk of Westerly granite commemorates the charge of the "Mozart Regiment" down the "Valley of Death" late in the afternoon of July 2. This was one of the last actions of the bitter fight for Devil's Den and Houck's Ridge (see STOP 5), and resulted in the regiment suffering "terrible losses" before being forced to retire (Adelman and Smith, 1997). (For significance of the designation, "Mozart," see Hawthorne, 1988.)

0.05 8.5 Turn left into parking area at Devil's Den.

STOP 5 and Lunch. Devil's Den: Day 2 action and the York Haven Diabase.

Leave STOP 5, continuing ahead on Sickles Avenue, as it winds among large boulders and outcrops. .

0.1 8.8 Confederate "sharpshooter's position" to right (see STOP 5, *Site D*). To left is the "triangular field" (STOP 5, *Site E*).

0.2 9.0 Passing through "The Wheatfield," a 26-acre field of wheat (part of the Rose Farm) that was bloodily contested for nearly six hours in the late afternoon and early evening of July 2 (see Jorgensen, 2002, for an excellent description keyed to landscape features and monuments). Prominent in the middle of the field is the monument to the 1st New York Light Artillery, Battery B, commanded by Capt. George B. Winslow (Figure 21).

Figure 21. Monument of the New York Light Artillery, Battery B (Winslow's) in the Wheatfield at mile 9.0. The six Napoleons of Winslow's Battery (a full complement of guns) were the only artillery, Union or Confederate, placed in the Wheatfield. Wrote Capt. George B. Winslow of his battery's work here, "[B]y using shell and case shot at about one degree elevation, and from 1 to ½ second fuse, I kept the enemy from advancing from the cover of the woods" (Jorgenson, 1999, p. 53).

0.1 9.1 Directly ahead is "Stony Hill," a low diabase escarpment formed by the fine-grained, chilled, northwest margin of the Gettysburg sheet. This hill changed hands several times, most notably when Joseph B. Kershaw's South Carolina Brigade captured it after Tilton's and Sweitzer's brigades were pulled back to Trostle's Woods by Brig. Gen. James Barnes (5th Corps, 1st Division) at about 6:00 PM. (Barnes feared that Kershaw's attack on the Federal artillery position on the Wheatfield Road [to his right] would outflank him.) This precipitous withdrawal put the entire Federal position in jeopardy (Jorgensen, 2002).

0.15 9.25 To left, as Sickles Avenue ascends "Stony Hill," is the "Irish Brigade" (2nd Brigade, 1st Division, 2nd Corps) Monument and to the right—amid a prominent pile of diabase boulders—the site of the 32nd Massachusetts field hospital. The marker to the latter reads:

Behind this group of rocks on the afternoon of July 2nd, 1863 Surgeon Z. Boylston Adams placed the field hospital of the 32nd Massachusetts Infantry, 2nd Brigade, 1st Div., 5th Army Corps. Established so near the line of battle, many of our wounded escaped capture or death by its timely aid. Placed by the Veteran Association of the Regiment.

0.15 9.4 Stop sign; turn left (west) on Wheatfield Road, a road which existed pretty much along its present route at the time of the battle. The diabase boulders in this vicinity mark the approximate northwest edge of the Gettysburg sheet. Most of the open field to the west—extending to the Peach Orchard—is underlain by baked shale (hornfels) directly above the sheet.

0.05 9.45 To right is the granite (Quincy) monument to the 9th Massachusetts Light Artillery (Captain John Bigelow, commanding) of the 1st Volunteer Brigade (Lieut. Col. Freeman McGilvery, commanding). In mid-afternoon of the 2nd day, McGilvery's batteries were lined up along Wheatfield Road facing south between the Peach Orchard and Stony Hill. Several hours later they had been driven back to a position along the base of Cemetery Ridge just east of the Trostle Farm (Hawthorne, 1988; see mile 17.1).

0.25 9.7 Turn left (south) on Birney Ave. at the east edge of the Peach Orchard (continuing on around right angle bend in road).

0.05 9.75 Park on right side of Birney Avenue on the south side of the Peach Orchard. Disembark.

STOP 6. The Peach Orchard: Day 2 action and the Rose Farm.

Leave STOP 6, continuing on Birney Ave.

0.05 9.8 Stop sign; turn right (north) on Emmitsburg Road.

0.1 9.9 To right is the foundation of the Wentz House.

0.2 10.0 To left is the Sherfy House. Farmer John Sherfy owned the "Peach Orchard."

0.2 10.2 To right is the Klingel House. This is approximately the middle of the Union 3rd Corps line that stretched more than half a mile northeastward along the Emmitsburg Road from the Peach Orchard on the afternoon of July 2.

0.2 10.4 To right is a monument to Brig. Gen. Andrew A. Humphreys (1810-1883), commander of the 2nd Division of the 3rd Corps (Figure 22). Humphreys' division held the right of Sickles' line along the Emmitsburg Road (which reached to here). On the opposite side of the road is the site of the Rogers House (see mile 16.4).

0.4 10.6 Pass the Codori Farm on right. On the afternoon of July 2, the Codori Farm lay just beyond the right wing of Humphreys' position along the Emmitsburg Road. To protect that exposed flank, two regiments of John Gibbons' 2nd-Corps division took position near here after Humphreys came under attack (Trudeau, 2002). (See also mile 16.2.)

Figure 22. Monument to Brig. Gen. Andrew A. Humphreys at mile 10.4. In the early evening of July 2, Humphreys led a fighting retreat from a precarious position along the Emmitsburg Road (the Confederates having nearly flanked his line on both the right and the left) back to Cemetery Ridge (evidently the "Round Top ridge" of Humphreys' report) (Luvaas and Nelson, 1986).

The farm was owned by Nicholas Codori, whose brother George J. (1806-1865), a local farmer, was one of nine hostages from Gettysburg and nearby communities taken by Confederate General Jubal Early when he passed through the area in late June on his way to York and Wrightsville. (George was caught wearing Union army-issue trousers, presumably sent to him by his son). These prisoners were sent first to Libby Prison in Richmond, then on to a prisoner-of-war camp at Salisbury, NC. Rather miraculously, eight of them survived to return home in March 1865. George Codori, however, died of pneumonia only three days after his return (Kross, 2000; Roth and Kross, 2000).

0.5 11.1 Enter borough of Gettysburg. Note the several fast-food restaurants along the left side of Steinwehr Ave. here. Until mid-2003, one of these was a Hardee's, bringing to mind a prominent Confederate general not present at Gettysburg. William Joseph Hardee (1815-1873) was a South Carolinian who fought in many major battles in the western theater of the Civil War, including Shiloh, Chickamauga, Missionary Ridge, and Lookout Mountain. Late in the war, he was a central figure in the Atlanta and Carolinas Campaigns. A graduate of West Point in the class of 1838, he was the author of *Rifle and light infantry tactics* (1855), commonly know as "Hardee's Tactics," a tactical manual that took into account the increased accuracy of the foot-soldier's rifle (Faust, 1986).

0.2 11.3 Turn left (north) on Washington Street.

0.2 11.5 Turn right (east) on South Street.

0.1 11.6 Stop sign; turn right (south) on Baltimore Street. On the corner to the right is the Farnsworth House and Tavern, one of the "hang-outs" of the actors and crew during the filming of the movie *Gettysburg* in 1993.

0.1 11.7 Traffic light at intersection of Baltimore Street and Steinwehr Ave. Continue straight ahead on Baltimore Street, which here climbs steeply in approaching Cemetery Hill.

0.1 11.8 To left is the McClain/McClellen House, better known as the Jennie Wade House, site of the only fatal civilian casualty of the battle. Here on the morning of July 3, Mary Virginia ("Ginny," later corrupted to "Jenny") Wade (1843-1863) was killed by a stray bullet while she was baking in the kitchen. The incident occurred in the northern half of an originally double house, the side nearest enemy postings in the town (Frassanito, 1995; Trudeau, 2002).

0.1 11.9 The Soldiers' Memorial Museum to right occupies a considerably modified building that housed the National Soldiers' Orphans' Homestead from late in 1866 until 1869. According to local tradition, the building (originally the Capt. John Myers House) served as the "in-door" headquarters of Maj. Gen. O. O. Howard, commander of the Union 11th Corps, whose field headquarters during the battle is marked by the standard upright cannon barrel on the opposite side of Baltimore Street (Frassanito, 1995).

0.05 11.95 To right is the entrance to the Gettysburg National Cemetery, dedicated in November 1863. The high monument with the bronze figure honors the officers and men from the State of New York who fought at Gettysburg. (Nearly a thousand were killed or mortally wounded.) Just inside the gate is a monument to Maj. Gen. John Reynolds, the only participant to have two statues on the battlefield (see STOP 1).

The state historical marker on the left side of the road reads:

> GETTYSBURG ADDRESS. Nearby, Nov. 19, 1863, on dedicating the National Cemetery, Abraham Lincoln gave the address, which he had written in Washington and revised after his arrival at Gettysburg the evening of November 18.

0.05 12.0 Crest of Cemetery Hill. To right is the gatehouse at Evergreen Cemetery; erected in 1855, it has been considerably modified from its appearance in historic photographs by Matthew Brady, Alexander Gardner, and others (Frassanito, 1975, 1995; see the latter for

interesting historical vignettes concerning the gatehouse, p. 150-152). Like numerous other buildings in Gettysburg, the gatehouse served as a military hospital during the battle. Evergreen Cemetery opened late in 1854 as a community burial ground to replace the town's individual church cemeteries. Though this part of the Union line was under heavy artillery fire on several occasions, particularly during the Confederate cannonade of July 3, numerous post-battle observers noted that damage to the monuments and grounds was surprisingly light (Frassanito, 1995).

0.4 12.4 Shallow roadcut in York Haven Diabase of the Gettysburg sheet.

0.5 12.9 Turn left on Carmen Ave., following signs to Culp's Hill and Spangler's Spring.

0.2 13.1 To right is another of the "dens" of diabase ledges and boulder that characterize the outcrop belt of the Gettysburg sill. The profusion of diabase boulders and ledges here on the right flank of the Union line is similar to ground conditions on the left flank—but not quite so scenically spectacular as Devil's Den and Little Round Top.

0.1 13.2 Stop sign. Turn right, still following Carmen Ave.

0.1 13.3 To left is a monument to the 13th New Jersey Volunteers. At the time of the battle the woodlands here were known as McAllister's Woods.

0.05 13.35 Stop sign; continue straight on Colgrove Ave.

0.05 13.4 Enter Spangler's Meadow, with Spangler's Spring directly ahead (Figure 23).

Figure 23. Spangler's Spring (right) and the rocky northwest edge of Spangler's Meadow as seen from about mile 13.4. Upon receiving orders to charge across this area on the morning of July 2, the commander of the 2nd Massachusetts, Lieut. Col. Charles Mudge lamented, " Well, it is murder, but it's the order" (Archer, 2002, p. 90).

Early in the morning on July 3, the meadow was the site of the suicidal charge of the 2nd Massachusetts and the 27th Indiana Regiments (3rd Brigade, 1st Division, 12th Corps) against Smith's Virginia Brigade entrenched at the edge of the woods to the north. (At the time, these two regiments were under the command of Col. Silas Colgrove.) The Virginians occupied breastworks previously built by the Union forces, but abandoned the day before when some 12th Corps regiments were called to reinforce the embattled Union left. The small marker in the middle of the field marks the farthest advance of the 27th

Indiana. Just previous to the attack of the Indianans, the 2nd Massachusetts succeeded in overrunning the breastworks and holding them for about ten minutes, but were then forced out—suffering 40 percent casualties by the time they reached their own lines (Frassanito, 1975; see Trudeau, 2002, p. 438-440).

The large monument to right here is that of the state of Indiana (1970). The prominent pillars of this monument are granite from Barre, Vermont, while the much of the lower foundation is composed of Indiana limestone (Anonymous, 1999; Hawthorne, 1988), also known in the building trade as Bedford or Oolitic limestone and nationally famous as both a structural and an ornamental stone. In geological parlance, Indiana limestone is the Salem Limestone of mid-Mississippian age.

Spangler's Spring at the far edge of the meadow is, according to tradition, the site where both Union and Confederate soldiers peacefully came together to fill their canteens on the night of July 2-3. There appears to be no really solid evidence to support such fraternization, however.

0.1	13.5	At Spangler's Spring continue ahead, bearing right on Slocum Ave.
0.05	13.55	The 1st Maryland Regiment monument to the right sits on top of one of the many low diabase knolls that characterize the slopes of Culp's Hill.
0.05	13.6	To right is a shallow cut showing a diabase weathering profile, from reddish-brown soil through friable, decomposed rock to solid, but oxidized diabase. The gray granite monuments are those to the 46th Pennsylvania and the 145th New York Infantries (12th Corps).
0.05	13.65	Crest of southern knob of Culp's Hill.
0.1	13.75	Saddle between northern (main) and southern knobs of Culp's Hill. This is the approximate location of the "traverse" westward from the main Union breastworks on the east face of Culp's Hill. To the left, south of the intersection of Slocum Ave. and Geary Ave. (and south of the "traverse") is Pardee Field, named for Lieut. Col. Ario Pardee, Jr., commander of the 147th Pennsylvania Regiment (1st Brigade, 2nd Division, 12th Corps).
0.15	13.9	To left resting on a diabase ledge is a bronze and granite monument honoring Brig. Gen. John White Geary (1819-1873), commander of the 2nd Division of the 12th Corps. Geary was an early post-war governor of Pennsylvania (1867 to 1873).
0.05	13.95	Diabase ledge to right is surmounted by monuments to the 149th New York Infantry (12th Corps) and 122nd New York Infantry (6th Corps) (Figure 24).

Figure 24. Monuments of the 149th (left) and 122nd (right) New York Infantry Regiments at mile 13.95. The east-facing Union line followed outcropping diabase ledges for much of its length along this part of Culp's Hill.

0.5 14.0 To right is the monument to the 78th and 102nd New York Regiments. On the hillside just east and northeast of the monument are two immense diabase boulders that figured prominently in the battle for Culp's Hill on the evening of July 2. As shown on a painting by Edward Forbes for *Frank Leslie's Illustrated Newspaper*, the Confederates made use of one boulder (Figure 25) in their attack while another large boulder not far away (and barely broken from an outcropping ledge) was part of the Union line. Today both of these boulders are easily found, although the one marking the Union position is heavily overgrown (see Frassanito, 1975, p. 130-131).

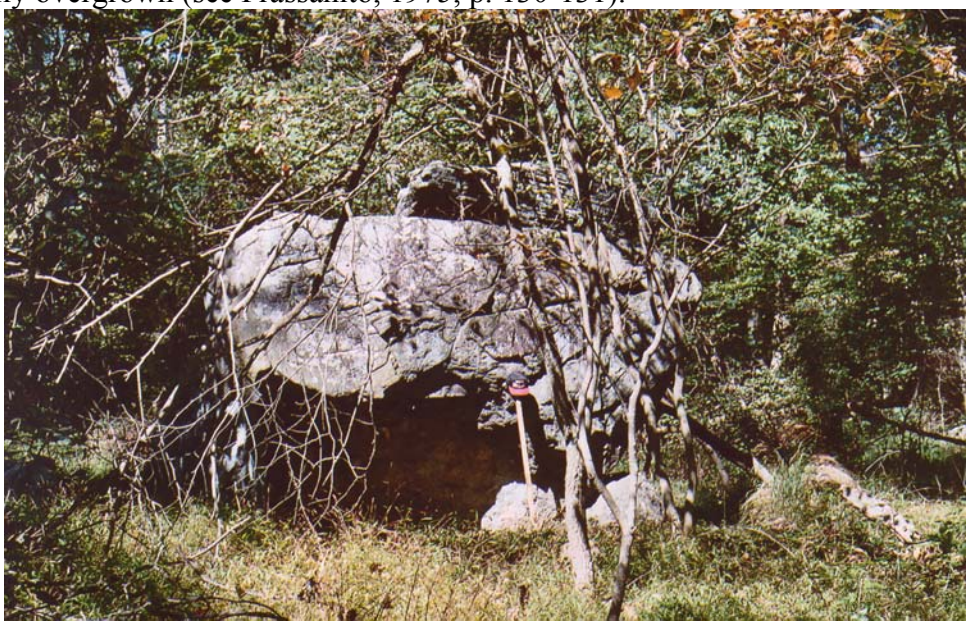


Figure 25. Diabase boulder, about 40 yards in front of the Union line on the east slope of Culp's Hill, depicted in Forbes' painting for *Leslie's* and in numerous historic post-battle photographs (Frassanito, 1975 and 1995; see the cover of Archer, 2002). Site is in woods just east of mile 14.0.

0.1 14.1 Bear right, following sign to Culp's Hill.
0.1 14.2 Turn right into parking area on crest of Culp's Hill. Disembark.

STOP 7. Culp's Hill: Observation Tower, Days 2 and 3 action, and the York Haven Diabase.

Leave STOP 7, continuing ahead on Slocum Ave.

0.3 14.5 Stevens' Knoll (Figure 26). This low hill due west of Culp's Hill is named for Stevens' 5th Maine Battery (at the time, under the command of Lieut. Edward N. Whittier), which, on the evening of July 2 raked Confederate lines attacking East Cemetery directly ahead to the west (see monument and wayside). On top of the knoll is an equestrian monument to Maj. Gen. Henry Warner Slocum (1826-1894), commander of the 12th Corps and the Union right wing (Figure 27). The monument immortalizes Slocum's opinion at Meade's war council on that same evening; "Stay and fight it out."

To right behind a low embankment is a monument to the 24th Michigan Volunteer Regiment of the "Iron Brigade." Of 496 who entered combat on July 1 only 99 answered roll call on the morning of July 3. Most of their losses were on the first day (See STOP 1).

Figure 26. Stevens' Knoll at mile 14.5. Several of the lunettes of the 5th Maine Battery are still intact, though probably reconstructed. In the left background is East Cemetery Hill. On the evening of July 2, the left wing of Jubal Early's attacking Confederates (North Carolinians of Hoke's Brigade) charged up the slope of the hill on the right and was enfiladed by the 5th Maine.

Figure 27. Monument to Maj. Gen. Henry W. Slocum on crest of Steven's Knoll at mile 14.5. Slocum was one of the "iron men" among Union commanders, rising from colonel of the 27th New York Infantry at First Bull Run to head of the Army of Georgia and the left wing of Sherman's army in the last months of the war (Faust, 1986).

0.1 14.6 Bear around to left, staying on Slocum Ave. Directly ahead, running along the lower slope of East Cemetery Hill, is Wainwright Ave. (originally a farm lane). Elements of the 11th Corps—who held the stone wall bordering the avenue—broke and ran when the North Carolinians of Avery's Brigade and the "Louisiana Tigers" of Hays' Brigade (Early's Division) overwhelmed their position at about 7:30 PM on July 2 (Grimsley and Simpson, 1999).

0.2 14.7 Stop sign; turn right (north) on Baltimore Pike.

0.1 14.8 To right on East Cemetery Hill are the equestrian statues of Maj. Gen. Winfield Scott Hancock (1824-1886), commander of the Union 2nd Corps (Figure 28), and Maj. Gen. Oliver Otis Howard (1830-1909), commander of the Union 11th Corps (Figure 29).

A monument to the 14th Indiana Regiment near the Hancock monument is carved from fossiliferous, Mississippian-age Indiana limestone (see mile 13.45). Fenestrate and fistuliporoid bryozoans and endothyrid foraminifera are visible on weathered surfaces of this monument.

This was the position of Battery F of the 1st Pennsylvania Light Artillery under Capt. R. Bruce Ricketts (1839-1918) (Figure 30). At 8:00 PM on July 2, Ricketts' battery fought off a Confederate attack in "a desperate hand-to-hand conflict" which ensued "after every round of canister had been fired." In the early 1940's, the heirs of R. Bruce Ricketts were instrumental in donating scenically and geologically spectacular land holdings in northeastern Pennsylvania to the Commonwealth for Ricketts Glen State Park.

0.25 15.05 Traffic light at Y-intersection; turn sharp left ("120°") onto Steinwehr Ave.

0.85 15.9 At break in fence row to right is a good view of the field of "Pickett's Charge."

Figure 28. Monument to Maj. Gen. Winfield S. Hancock at mile 14.8. This monument seems a bit out of place on East Cemetery Hill, as Hancock's greatest feats were performed on Cemetery Ridge on July 2 and 3. It was probably placed here so as not to draw attention from the monument to Gen. Meade on the crest of that ridge. Largely as a result of his sterling war record, Hancock ran for president of the United States on the Democratic ticket in 1880—but narrowly lost to James A. Garfield (Faust, 1986)

Figure 29. Monument to Maj. Gen. Oliver O. Howard at mile 14.8. Though both Buford and Reynolds also recognized its importance, Howard received a Thanks of Congress citation for selecting Cemetery Hill as the keystone of a Union "fall back" position on July 1. His combat record as commander of the 11th Corps at Chancellorsville and Gettysburg, however, was somewhat less than "sterling" (see for example, Kaufmann, 1999)—but he did compile a creditable war record over the long haul, serving well in commanding the right wing of Sherman's "March to the Sea" and Carolinas Campaign (Faust, 1986).

Figure 30. Monument of Ricketts' Battery of the 1st Pennsylvania Light Artillery. A few weeks before Gettysburg, Ricketts' Battery F was combined with Battery G to form a full strength batter of six 3-inch ordinance rifles. The bas-relief carved into the Westerly Granite monument shows two of the cannoneers awaiting discharge (Sauers and Tomasak, 2002; Hawthorne, 1988).

0.3 16.2 To left is the Nicholas Codori Farm (see also mile 10.6). The Codori Farm lies approximately on a line drawn perpendicular to the midpoint of the original attacking deployment of Pickett's Charge on July 3 (see STOP 8). The farmhouse dates from the time of the battle, a rear extension being added in 1877. The barn was replaced by a larger one early in the 1880's (Frassanito, 1995).

0.2 16.4 To right is the site of the Rogers Farm. The right of Pickett's main attacking line—under Brig. Gen. James L. Kemper (1823-1895) passed across this area in the interval between

Fossils in the 14t Indiana Monument
by
Roger J. Cuffey

One monument, that to the 14"' Indiana Regiment (see p. 35 in this present guidebook), is unique on the Gettysburg battlefield because it is made of fossiliferous limestone, with the tiny fossils now visible on its surface after a hundred years of weathering in the humid Pennsylvania climate. The other battlefield monuments are igneous crystalline rocks, even the more recent Indiana state memorial (granite) near Spangler's Spring (p. 32 herein).

The limestone involved was quarried in south-central Indiana, from the stratigraphic formation known as the Salem (formerly Spergen) Limestone, of mid-Mississippian age (lower Meramecian; 330 million years old). Marketed as the Indiana, Bedford, or Oolitic Building Stone, it was becoming widely used in the eastern United States as a structural and ornamental stone at the time when most of the Gettysburg monuments were built.

The fossils in the Salem Limestone include especially abundant, finely comminuted fenestrate and fistuliporoid bryozoans, and rounded endothyrid foraminifers, all embedded in spar calcite cement. The rock is thus classified as a grainstone, biosparite, or calcarenite. Regional studies indicate deposition as a shallow-marine, near-shore, mobile, carbonate-sand shoal along the eastern margin of the Illinois Basin.

Figure 30A. Left, the 14th Indiana monument: right, its location just north (left) of Hancock's equestrian statue on East Cemetery Hill.

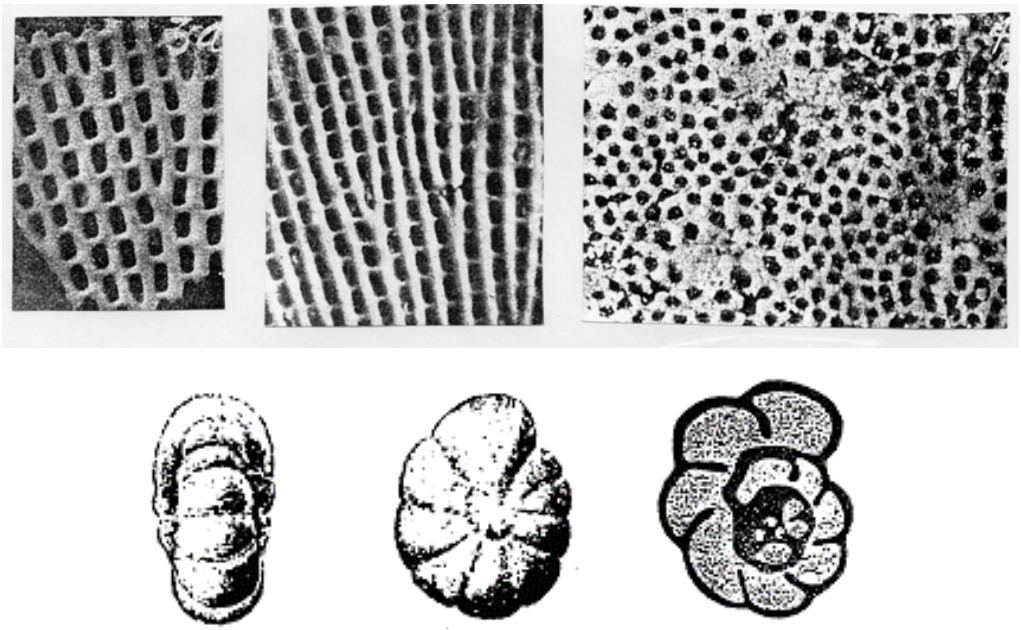


Figure 30B. Fossils whose fragments were seen on the 14' Indiana monument: Upper left and center, the bryozoan *Fenestella serratula,* x8.5; upper right, the bryozoan *Dichotrypclflahellum.* x8.5: lower row. external and thin-section views of the forammifer *Endothyra hculeyi,* x40; (from Cummgs. E.R.. et al.. 1906. Fauna of the Salem Limestone of Indiana; Indiana Department of Geology and Natural Resources. *?* th Annual Report; pi.30. figs. 3a and 2: pi.34. fig.4; pi. 26. figs. 35 and 34: pi. 7. fig. 1; respectively).

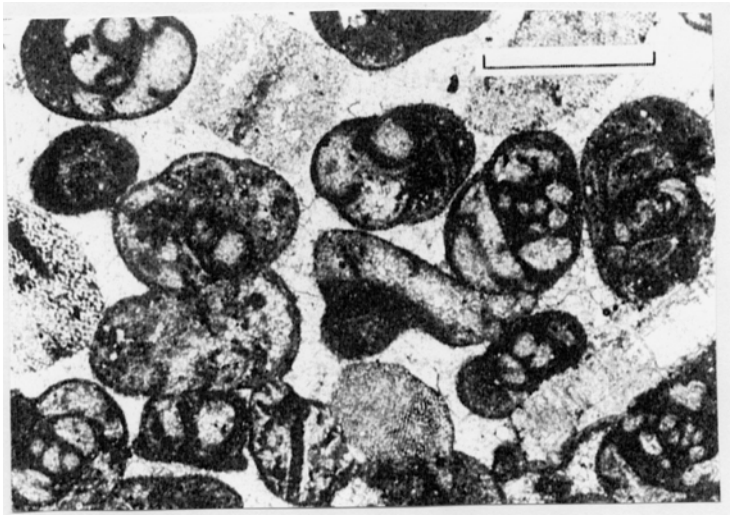


Figure 30C. Thin-section showing microfossils in spar. scale bar 1 mm; (from Patton. J.B., & Carr. D., 1980. Quarrying and milling of the Salem Limestone in the Bloomington-Bedford district: Field Trips 1980 from the Indiana University Campus. Bloomington: Geological Society of America [North-Central Section]. Indiana Geological Survey, and Indiana University. Bloomington, p. 13).

its two left oblique movements to concentrate force on the "Copse of Trees." Though the evidence is unclear, Trudeau (2002, p. 490) believes that General Pickett set up his field post near the Rogers House—he and his staff advancing no nearer to the Union line.

0.2 16.6 To left is the Klingel House (see mile 10.2).

0.1 16.7 Turn left on United States Avenue.

0.2 16.9 Directly ahead to the southeast Cemetery Ridge diminishes in height as it approaches Little Round Top. It was the near disappearance of the ridge there that prompted Maj. Gen. Daniel Sickles to move his 3rd Corps line westward to higher ground at Devil's Den, the Peach Orchard, and along the Emmitsburg Road.

Figure 31. Barn of the Trostle Farm at mile 17.1. Note the two shell holes through the brickwork and the damage to the decorative panel just under the roofline.

0.4 17.1 To left is the Trostle House and Barn (Figure 31). After retiring under extreme Confederate pressure from a position along the Wheatfield Road (see STOP 6), Capt. John Bigelow's 9th Massachusetts Battery fought a fierce delaying action here to cover the retreat of other Union batteries to a new line along the west side of Cemetery Ridge. Bigelow himself was wounded, but was rescued by bugler John Reed, who received a Congressional Medal of Honor thirty years later (Gramm, 1997).

0.3 17.4 To right is the G. Weikert House.

0.1 17.5 Turn left onto Hancock Avenue and proceed north along Cemetery Ridge.

0.1 17.6 To right is the Father Corby Portrait Statue. At this spot, Father William Corby, chaplain of the 88th New York Infantry, blessed the 2nd Corps' "Irish Brigade" before it went into action on the afternoon of July 2 to reinforce Sickle's line at the Wheatfield (see mile 9.25).

0.2 17.8 To left is the 1st Minnesota Monument (Figure 32). At 7:15 PM on July 2, as Brig. Gen. Cadmus Wilcox's Brigade of Alabamans (A. P. Hill's Corps) surged up the slope of Cemetery Ridge, Maj. Gen. Winfield Hancock ordered the 1st Minnesota Volunteers into a yawning hole in the Union line. Col. William Colvill led his greatly depleted regiment (262 men) down the slope toward Plum Run with fixed bayonets. Exchanging several murderous volleys with the advancing Confederates, the Minnesotans suffered nearly 70 percent casualties before retiring. Their valiant effort slowed the enemy advance enough for other Union regiments to plug the gap and stop the enemy short of the crest of Cemetery Ridge (Trudeau, 2002; Moe, 1993).

0.1 17.9 To right is the Pennsylvania Monument, the most frequently photographed memorial on the battlefield (Anonymous, 1999; Hawthorne, 1988). Its size and impact reflect the fact that this battle, the largest and fiercest ever fought on the North American continent, took place on Pennsylvania soil. The monument includes plaques containing the names of every Pennsylvania soldier who fought here. It was erected in 1910 and is constructed of light-gray granite from Mt. Airy, North Carolina.

0.1 18.0 To right is the Vermont State Memorial, topped by a portrait statue of Brig. Gen. George J. Stannard (1820-1886), commander of the 3rd Brigade, 3rd Division, 1st Corps.

0.3 18.3 Park along right side of road. Disembark.

Figure 32. Monument of the 1st Minnesota Infantry at mile 17.8. Said Gen. Winfield Scott Hancock of the near suicidal charge of this regiment into a yawning hole in the Union line, "There is no more gallant deed recorded in history" (Faust, 1986).

STOP 8. Crest of Cemetery Ridge: Day 3 action (Pickett's Charge, the "Bloody Angle," and the "High Water Mark") and the York Haven Diabase.

Leave STOP 9, continuing north on Hancock Avenue.

0.2 18.5 To right is the National Park Service's Cyclorama Center, housing the famous 360-foot-long, circular, oil-on-canvas painting of "The Battle of Gettysburg" (also known as "Pickett's Charge" and "The High Tide of the Confederacy") by French artist Paul Philippoteaux (1846-1903). Philippoteaux and sixteen assistants completed this particular version of the painting in 1883, and it was first exhibited in Boston the following year. (An earlier version exhibited in Chicago in 1883 still survives but has no permanent home.) This second "cyclorama" of the battle has been displayed in Gettysburg since 1913. Purchased by the National Park Service in the 1940's, the painting was moved to the Cyclorama Center in 1962. Parts of it have recently undergone a "test restoration" preparatory to a full-scale restoration before it is moved to the new National Park Visitors' Center in 2006.

0.1 18.6 Stop sign; turn left (west).

0.1 18.7 Stop sign; turn right (north) on Emmitsburg Road.

0.1 19.8 Turn right into Visitors' Center parking lot.

End of field trip. (Take some time to visit the excellent bookstore at the Visitors' Center, but remember—we have to be back in Washington, D.C., by 6:00 PM.)

STOP DESCRIPTIONS

STOP 1. McPherson's Ridge and the "middle railroad cut": Day 1 action (beginning) (I) and the Gettysburg Formation (II).

I. Brig. Gen. Buford and Maj. Gen. Reynolds, Army of the Potomac, vs. Maj. Gen. Heth and Maj. Gen. A.P. Hill, Army of Northern Virginia, and the "first" battle for the high ground, July 1, 1863.
Leaders: Robert C. Smith, II and Richard C. Keen.

See Figure 2-1 for a location map of STOP 1.

Much of our presentation at the first STOP is intended to introduce you to what many consider the most important day of the battle- the first day. The desperate struggle to retain control of the high ground southeast of town that many associatate with the 2nd day actually begins at 7:30 a.m., July 1, 1863.

For approximately 4 hours two brigades of Union cavalry, and a division of the 1st Corps struggled to keep Confederate forces west of town; ensuring that the heights southwest of Gettysburg would remain in Union hands.

A. First, a brief commentary on the monuments surrounding you. On your right is a statue of Brig. Gen. John Buford (Figure 1-1), commander of the 1st Cavalry Division, Army of the Potomac. It is ironic that Buford, a cavalry commander, is shown with binoculars in hand *standing* beside the Chambersburg Pike. Behind Buford's statue is an equestrian statue dedicated to the memory of Maj. Gen. John Reynolds (Figure 1-2), commanding the left wing of the Army of the Potomac, who was killed that morning. Finally, beside the road and to the left of Reynolds statue is a monument to Hall's Maine Battery (Figure 1-3) the first battery of the 1st Corps to arrive on the field.

From this STOP we can see portions of the terrain visible to Buford that morning. Keep in mind that much of the terrain, open at the time of the battle, is now heavily wooded or built up. To the west the bridge over Willougby Run is just visible. Herr's Tavern on the crest of Herr's Ridge is located to the left of the Chambersburg Pike. The middle unfinished railroad cut sits under the bridge just to the northeast of our position. If we look to the southeast we can see the Seminary cupola Buford used as an observation post. Herbst's Woods, south of the Chambersburg Pike, borders the field where McPherson's barn stands.

Figure 1-1 Brig. Gen. John Buford commanded the 1st Cavalry Division during the Gettysburg Campaign. Credited by many with choosing the battlefield, Buford would fall ill in November, and die in Washington, D.C., December 16, 1863.

Figure 1-2. Maj. Gen. John Reynolds commanded the 1st Corps and Meade's left wing during the Gettysburg Campaign. Reynolds decision to support Buford's command ensured that the battle would be fought at Gettysburg. Reynolds, leading his troops from the front, was killed on July 1, 1863.

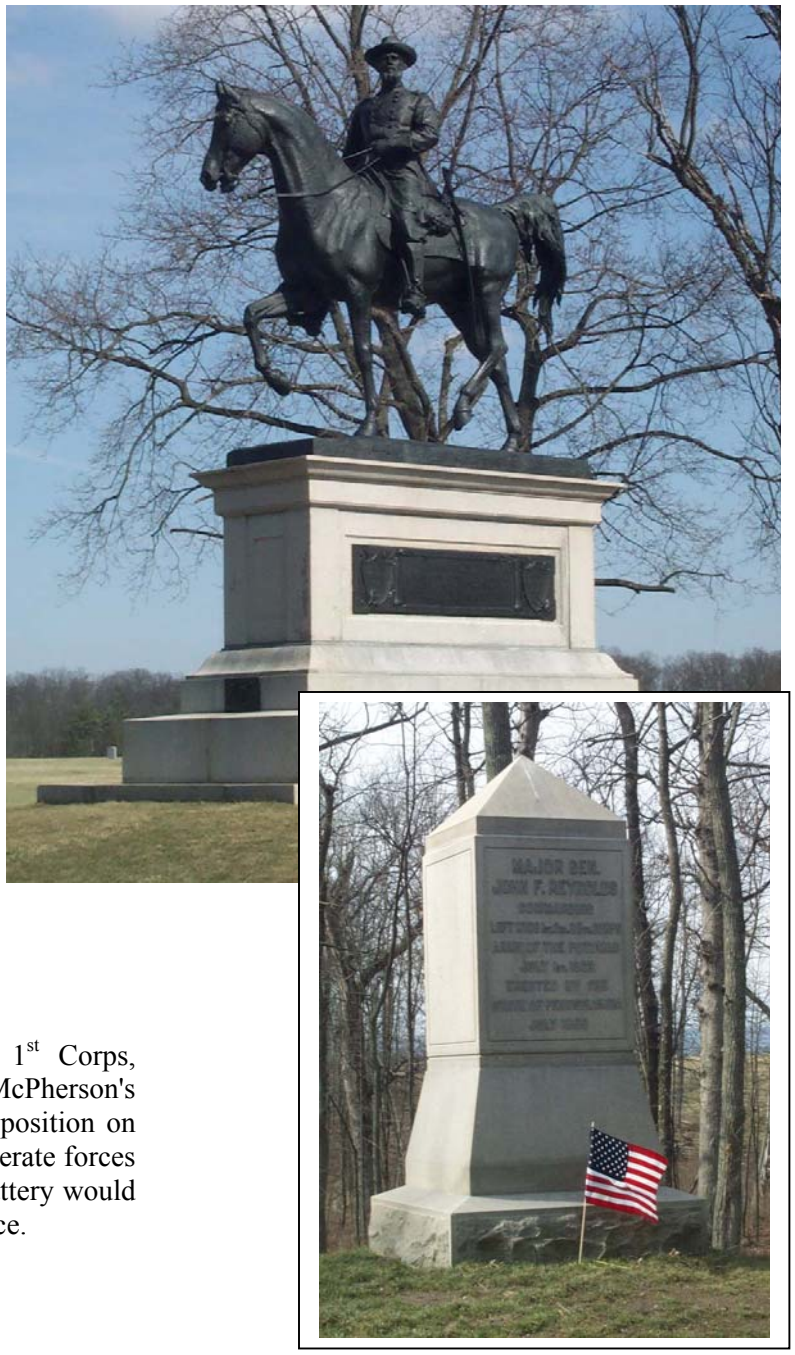


Figure 1-3 Hall's Maine Battery, 1st Corps, replaced Calef's, 4th U.S. Artillery, on McPherson's Ridge. The battery would remain in position on the battlefield until approaching Confederate forces threatened to overrun the unit. Hall's Battery would lose one gun withdrawing through a fence.

On the morning of June 30, 1863, Union troopers under the command of General Buford (1st Cavalry Division) arrived in Gettysburg. His scouts, moved to the western edge of town, sighted General Pettigrew's column, Army of Northern Virginia, marching east on the Chambersburg Pike. Pettigrew was leading a foraging party into Gettysburg to acquire shoes for Heth's division. After sighting the Union cavalry, Pettigrew, under orders not to start a fight, halted his column and fell back towards Cashtown with Buford's scouts carefully shadowing his column

Buford was busy that day sending out scouting parties, interviewing local townspeople and conducting his own reconnaissance of the terrain west of Gettysburg. Pettigrew's withdrawal to the west, and reports from his scouts and civilians, suggested that strong Confederate forces were either in or near Cashtown only 9 miles from Gettysburg. By late evening Buford was ready to send a dispatch detailing the results of his division's efforts. He reported to Pleasanton that Hill's Corps was at Cashtown with Longstreet's nearer Chambersburg and Ewell's Corps in Carlisle and Dillsburg after being recalled from York by Lee (Official Records, 1889)

In Buford's post-battle report to General Meade he wrote that he made dispositions to entertain the advancing Confederate units until relieved by General Reynolds troops. Cols. Gamble (1st Brigade) and Devin (2nd Brigade), the 1stCavalry Division, established picket lines and vedette outposts in an arc approximately 3-4 miles to the west, north, and northeast of Gettysbug. Gamble, whose units covered the area from Fairfield Road to the Chambersburg Pike, established a vidette line on Knoxlyn Ridge (erroneously identified as Schoolhouse Ridge on Figure 1-4). Both commanders were given freedom to choose their main line of resistance with the provision it be sufficiently west of town..

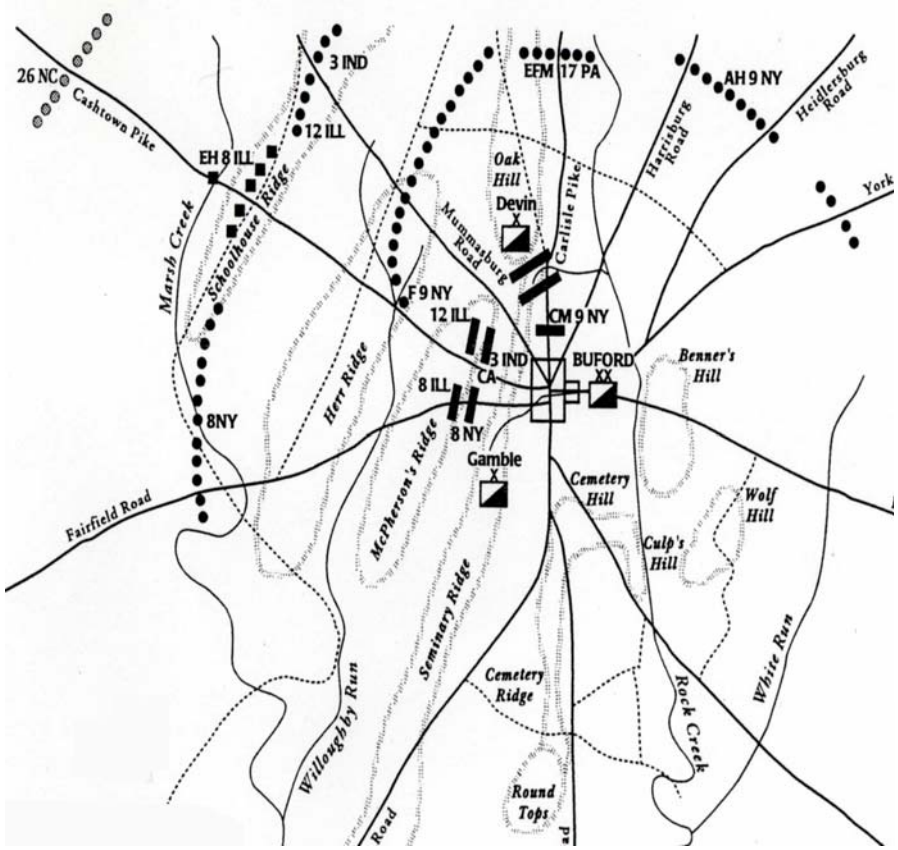


Figure 1-4 (Martin, 1995).
Setting out picket lines when units encamped was intended to prevent units from being surprised. Gamble and Devin placed vedettes along any avenue of approach. Of special note is the number along or beside the Chambersburg Pike, used by Pettigrew that afternoon when withdrawing across Marsh Creek. Gamble established five vedette posts or near the Chambersburg Pike with one located on the pike near the crest of Knoxlyn Ridge.

Buford's staff reported he was extremely nervous on the evening of June 30. He told Devin, that the Army Of Northern Virginia must know the importance of the crossroads leading into town and that he should expect heavy skirmish lines in the morning. His force, only two brigades numbering

approximately 2500 men, was numerically inferior to the Confederates massing at Cashtown. Until Reynolds's 1st Corps reached the field his only alternative was to delay the advance of the Confederate forces until Reynolds reached the field.

Terrain and operational planning

Knoxlyn Ridge (called Schoolhouse Ridge on map 1-4) and Herr's Ridge served as a sort of speed bump to the Confederate advance. The relief between Knoxlyn Ridge and Herr's Ridge was not as pronounced as the better known portions of the "fishhook" line; for example, none of the ridges exceeded 620 feet in elevation, the average rise was only 60 feet while the average slope was around 2%. The rolling terrain, crops within fenced lots, and wood lots provided Buford's troopers with enough cover and concealment to delay the advance of the Confederates. Buford's men slowly withdrew from one defensive position to another when the Confederate skirmishers threatened to flank them. Buford's plan was daring. He hoped to persuade Heth that his line of skirmishers shielded Union infantry on McPherson's Ridge. It was risky, any determined Confederate assault could push through his thin line of troopers. Ultimate success or failure depended upon how quickly Reynolds arrived in the morning.

Gamble's decision to place the main line of resistance on McPherson's Ridge was a fortunate choice. Herr's Ridge, although slightly higher, was not as suitable. A cavalry brigade withdrawing from Herr's Ridge would have had difficulty retreating through the heavily tangled underbrush on both sides of Willoughby Run and up the slopes of McPherson's Ridge. Calef's Battery, 4th U.S. Artillery, would be forced to use the narrow bridge Willoughby Run; making the withdrawal of six guns, under fire, very difficult.

McPherson's Ridge, at least on the southern side of Chambersburg Pike, was more suitable as the division's main line of resistance. The first obstacle Confederate troops faced was Willoughby Run; approximately 15' wide and only 1-2 feet deep but with thickets and heavy underbrush on both sides, (Figures 1-5, 1-6, and 1.7). Once across Willoughby Run Confederate troops were forced to climb up McPherson's Ridge under fire. Although not particularly steep the slope was greater than Knoxlyn or Herr's Ridge. So much so that many Confederates wrote later that they climbed a bluff. Devin's units, to the north of Willoughby Run Bridge, were not as lucky as Gamble. Willoughby Run, as it flows north, swings to the west before returning to a more northerly course. After crossing Willoughby Run Confederate troops only had to march up a gentle, and mostly open, slope of McPherson's Ridge.

Figure 1-5

Gettysburg was the hub for a number of roads leading into town. Two roads bordered the Chambersburg Pike; Fairfield and the Mummasburg Roads were dirt packed. The Chambersburg Pike was a major turnpike heading east from Chambersburg, through the Cashtown Gap, and on into Gettysburg. The surface was all weather, possibly macadam.

Geology (see Figure 6)**.** Gamble's advanced outpost was located on the north edge of what became U.S. Route 30, on a subtle ridge, locally known as Knoxlyn Ridge. Based on mapping by Stose and Bascom (1929), the trooper's post, overlooking a bridge crossing Marsh Creek, was likely standing on hornfels of the western edge of the Triassic Heidlersburg Formation which here supports the southeastern half of Knoxlyn Ridge. The bridge was on a portion of the lowermost Jurassic York Haven Diabase sheet, which supports the northwest half of Knoxlyn Ridge in this area. This diabase also provided the heat to bake the sediment adjacent to the diabase into more resistant hornfels.

Figure 1-6. Willoughby Run, looking west across the run. Herr's Ridge is in the background as well as the Gettysburg Golf Course. Confederate troops crossed through underbrush and thickets to cross the run. One soldier wrote that the water was clear, cold and about 1-2 feet deep.

Figure 1-7. Looking along the eastern bank of Willoughby Run. The creek bank is similar to the west bank. But just beyond the edge of the photograph you can see where the slope begins. There were reports that the east bank was steep enough for Archer's troops to find cover after crossing Willoughby Run.

Herr Ridge, parallel to and located about a mile east of Knoxlyn Ridge was mostly held up by sandier-than-normal beds in the Heidlersburg Formation. An exception is the north-south spur extending from 0.3 miles north of U.S. Route 30 to 0.6 miles south. It is held up by a Jurassic Rossville Diabase dike and minor, associated hornfels. Approximately 1 ¾ mile to the south-southeast of U.S. Route 30, this dike cuts the lowermost Jurassic Gettysburg sheet of York Haven Diabase.

McPherson Ridge trends parallel to Knoxlyn and Herr ridges and crosses U.S. Route 30 about another mile southeast of Herr Ridge. As mapped by Stose and Bascom (1929), McPherson Ridge is held up by sandy beds of the western portion of the undivided lower part of the Triassic Gettysburg Formation. Another Rossville Diabase dike (part of the same swarm as the portion of Herr Ridge near Route 30) and associated hornfels supports Seminary Ridge (see STOP 2B). The segment of the dike around the Lutheran Theological Seminary provided the topography for the last major Army of the Potomac defensive position on July 1. A segment of this same dike south of the seminary provided the main jumping off position for "Pickett's Charge" on July 3.

The first battle for the high ground—Phase 1: 7:30 a.m. – 11:30 a.m.

On the evening of June 30, General A. P. Hill, Army of Northern Virginia, met with General Heth to discuss his plan to march into Gettysburg the next morning to locate shoes and determine what militia troops were in his front. Both officers discounted Pettigrew's report suggesting the presence of veteran cavalry in the area. Lee's intelligence on the movement of Union forces suggested the Army of the Potomac was still in Maryland. Hill did, however, sent Lee a dispatch outlining his decision to determine what troops were in his front. When Heth's Division marched the following morning they were supported by Pender's Division as well as battalion of artillery –18 guns in all. A remarkably strong show of force for a reconnaissance and resupply foray against local militia (Trudeau, 2002)

Early on the morning of July 1, *0500 hours*, Heth's command marched from their camp near Cashtown. The weather that morning had been quite pleasant, and there was no indication of trouble as they neared Marsh Creek. Their peaceful stroll past the bucolic fields of Adams County was about to come to an end. As the leading elements approached the bridge over Marsh Creek, a Union officer, Lieut. Marcellus Jones, 8th Illinois Cavalry, borrowed a weapon from Sgt. Shafer and fired at a Confederate officer mounted on a gray horse.

0730-0830 hours

Although surprised, Heth's command quickly responded to the threat in their front and pushed out skirmishers as they crossed Marsh Creek. Members of the picket reserve quickly rushed to support the outnumbered pickets on the vedette line. Capt. Dana, 8th Illinois, reported that his men used fence lines to slow down Heth's advance, pulling back "when the true character and length of our line became know to the enemy, and they promptly moved upon our front and flanks. We retired, and continued to take new positions, and usually held out as long as we could without imminent risk of capture. We were driven from three positions in less than hour" (Martin, 1995)

Buford and Gamble were busy completing their troop dispositions on McPherson's Ridge, their main line of resistance. Buford directed Lieut. Calef, commanding his only artillery support, the 4th U.S. Artillery, to place two sections of four 6-inch rifled cannon on either side of the Chambersburg Pike. The third section was sited approximately 100 yards to the south. Calef, in comments written after the war, believed that Buford was intending to deceive the enemy on the number of artillery units on the field. Gamble, as his outnumbered troopers moved closer to Herr's Ridge, decided to send nearly 300 additional troopers to reinforce his units on Herr's Ridge. This reinforced line gave the troopers a temporary numerical advantage and stopped the Confederate advance.

Heth reinforced his skirmish line and resumed the offensive. Union troopers resisted desperately using "every stone, stump, tree and fence" to slow Heth's advance. The sheer weight of his skirmish line resulted in Gamble's troopers being forced off the crest of Herr's Ridge, (Martin, 1995). Heth

stated, in his after action report, that he believed his troops faced a small number of Union cavalry and two brigades of infantry on McPherson's Ridge. After securing Herr's Ridge, Heth brought up artillery support and commenced shelling suspected Union positions on McPherson's Ridge. He decided to deploy his troops in a battle line with skirmishers on both sides of the Chambersburg Pike. Unfortunately, an additional thirty minutes was required for this order to be completed and his troops ready to advance.

0930 hours

At 0930, the brigades of Archer and Davis advanced down the east slope of Herr's Ridge, Davis to the north of the Pike and Archer to the south. Buford, in the meantime, was anxiously looking for General Reynolds's 1st Corps. Atop the cupola at the Lutheran Seminary, a signal corps officer had observed flags approaching from Emmittsburg and notified Buford that Reynolds units were approaching. While the exact location of this meeting is unknown, we do know that Buford and Reynolds discussed the need to quickly support the hard-pressed troopers of his command. After their meeting Reynolds rode back to the leading elements of the 1st Corps (Pfanz, 2001)

1030 hours

Davis' troops, crossing easier terrain, were nearing the crest of McPhearson's Ridge. Devin's brigade, outnumbered and under increasing pressure from Davis' Brigade, was forced to pull his units back behind a stone wall. The situation was becoming desperate when leading elements of Wadsworth's Division were sighted by Reynolds' aide, Col. Kress. Kress, following Reynolds' orders, instructed General Wadsworth to send Cutler's Brigade to the north of Chambersburg Pike to support Devin's troopers who were under pressure from Davis and falling back. Wadsworth met Cutler's Brigade near the Codori Farm. He directed Colonel Cutler (1600 troops of the 56th Pennsylvania, 76th New York, 147th New York, 95th New York, and 14th Brooklyn, plus Hall's 2nd Maine Artillery), to move his troops into the low lying area between the western base of Seminary Ridge and McPherson's Ridge. Cutler's units crossed Chambersburg Pike and the unfinished railroad, with the 95th New York and 84th New York moving directly westward to support the left flank of Hall's Battery. The 56th Pennsylvania and 76th New York, moving further north, came under attack from the advancing troops of Davis's Brigade (55th North Carolina, 2nd Mississippi and the 42nd Mississippi) moving east. The 55th North Carolina succeeded in swinging a portion of their line around the flank and rear of the 76th's New York line threatening to surround them. General Wadsworth, observed their situation, ordered them to withdraw from this exposed position back to Shead's Woods on Seminary Hill (Martin, 1995)

The 147th New York was ordered by Wadsworth to support Hall's Battery. They crossed the unfinished railroad, in a low area between the western railroad cut and the middle railroad cut, moved up the slope of a wheatfield and into a line nearly abreast of Halls Battery but separated by the unfinished railroad cut. They received heavy fire from the remaining units of Davis's command. Unfortunately, the withdrawal of the 56th Pennsylvania, the 76th New York, and Hall's Maine Battery left the 147th New York virtually surrounded and fighting desperately to maintain their position.

1045 hours

Archer's Brigade (7th Tennessee, 14th Tennessee, 1st Tennessee, and 13th Alabama) marching down the eastern slope of Herr's Ridge reached Willoughby Run but were ordered not to cross by General Archer. Archer realized that the wooded slope of McPherson's Ridge made it difficult to determine the number and position of the troops opposing him. He was reluctant to advance until properly supported by reserves. Heth, anxious to resume the offensive, ordered him to resume his attack (Trudeau, 2002)

The 13th Alabama and 1st Tennessee of Archer's Brigade crossed Willoughby Run. Stymied by the marshy areas on both sides of the creek, his other two regiments (7th Tennessee and the 14th Tennessee)

on the left, which were under fire from Calef's four guns, pushed up the hill but moved to the left. Archer, separated from the two regiments on the left stayed with the two regiments on the right, effectively lost control of half of his brigade. Those regiments with Archer, sliding past the left of Gamble's line, then turned north to assault Herbst's Woods from the south. The situation was deteriorating rapidly for the hard-pressed troopers of the 1st Brigade when Meredith's Brigade (2nd Wisconsin, 6th Wisconsin, 7th Wisconsin, 19th Indiana, and the 24th Michigan) reached the field. The 6th Wisconsin was ordered into reserve near the Seminary while the remainder moved up to relieve Gamble.

Advancing through Herbst's Woods Archer's units run into troops from the Iron Brigade (19th Indiana, 7th Wisconsin, 2d Wisconsin, and 6th Wisconsin) and were rudely pushed back. The 13th Alabama on the far right was met by the 19th Indiana and pushed down the hill toward Willoughby Run. The 24th Michigan, coming in on the left flank, was able to flank the 13th Alabama adding to their confusion while they attempted to withdrawal. A soldier from the 2nd Wisconsin captured Archer, who was attempting to regain control of his troops withdrawing in disorder toward the creek.

1115 hours

The Iron Brigade's timely arrival stabilized the Union line south of the Chambersburg Pike. However, the 147th New York was isolated with no support and in a very precarious situation, and the 14th Brooklyn and 95th New York were still holding but under heavy pressure. The situation on the Army of the Potomac's right flank, north of the pike, was critical.

Wadsworth now decided to throw the 6th Wisconsin in to support 14th Brooklyn and 95th New York Regiments. The 6th Wisconsin, held in reserve at the Seminary, moved north crossed the post and rail fence along the Chambersburg Pike and through the field between the unfinished railroad and the pike. Confederate troops, chasing the remnants of Cutler's units from the field, were surprised by the appearance of Union troops on their flank and sought cover in the unfinished middle railroad cut. Colonel Dawes, ordered the 6th Wisconsin regiment to charge the Confederates, now hidden from sight and firing at his troops. His unit was joined by the 95th New York, and 14th Brooklyn who moved down the slope of McPherson Ridge to support Dawes. Rushing into the unfinished cut both forces were soon involved in hand to hand combat. Union forces cut off the retreat of remaining Confederate forces at both ends of the cut forcing a large number of troops to surrender. With the surrender of Confederate troops at the cut the fighting quickly wound down. Both sides would take this opportunity to rest units, direct reinforcements to positions, and prepare for the next onslaught.

Summary of afternoon action

The fighting in the morning had preserved, for the moment, the favorable terrain southeast of Gettysburg for the Army of the Potomac—but only if Yankees could retain its tenuous position west of the town. Their story requires another field trip; a brief summary is offered to provide some continuity in understanding the fight for the high ground on July 1.

By early afternoon reinforcements had arrived on the field for both combatants. McPherson's Ridge and Herbst's Woods were the scene of some of the fiercest fighting of Day 1. The Iron Brigade, living up to its name, continued to hold its position. Wadsworth and Rowley, the commander of the 2nd Division, 1st Corps, Army of the Potomac, reported suffering 50 percent casualties. Generals Pettigrew and Brockenbrough of Heth's Division launched a major offensive across Willoughby Run. The fighting was heavy with Heth's two brigades attempting to negotiate, once again, the marshy terrain around Willoughby Run.

The Iron Brigade was forced from its first defensive position, only to retire to a second and then a third. Doubleday, watching the battle from Seminary Ridge, decided to send his last reserve unit, the 151st Pennsylvania, to their aid. A nine month unit, it had never seen action but in the battle to come proved its mettle, its determined stand permitted what was left of the Iron Brigade to withdraw to Seminary Ridge. Once again the 1st Corps would rally and with the help of Gamble's cavalry resist

another assault but the sheer numbers finally forced them to withdraw back to Cemetery Hill. Although, Lee wanted to continue the attack on the remnants of the 1st and 11th Corps on Cemetery Hill and, later, Culp's Hill, nothing would come of it. The 1st day's fight was over, reinforcements were arriving, and the high ground preserved. The cost was heavy, on both sides, with the four highest regimental losses of the entire three days battle occurring on July 1: the 11th and 26th North Carolina regiments, and the 24th Michigan and 151st Pennsylvania regiments.

II. Stratigraphy of a part of the Gettysburg Formation.

Leaders: Jon D. Inners and Lewis Butts.

B. Middle Railroad cut. The middle and western railroad cuts on the CSX line into Gettysburg provide excellent exposures of the uppermost part of the undivided Gettysburg Formation that lies below the mapped Heidlersburg Member (Stose and Bascom, 1929; Berg, 1980). The cuts are excavated in East (middle) and West (western) McPherson's Ridge, with both exposing thick, gray, argillite-bearing sequences that indicate gradation into the Heidlersburg Member (Figure 1-8). In fact, it is hard, gray, silty argillite that forms the resistant "backbone" of both ridges (Figure 1-9). The argillite and gray shale unit represents deposition in shallow lakes on the playas and distal alluvial fans that formed the dominant features of the Late Triassic landscape of the Gettysburg Basin (Smoot, 1999; Faill, 2003). We will visit the middle cut, which has slightly better exposure of the rocks—and also has greater significance to the Day-1 battle.

Bedding in the cut strikes N27°E and dips 25° NW. Typical joint orientations are N52°E/82°SE (argillite) and N32°W/71°NE (red sandstone at top).

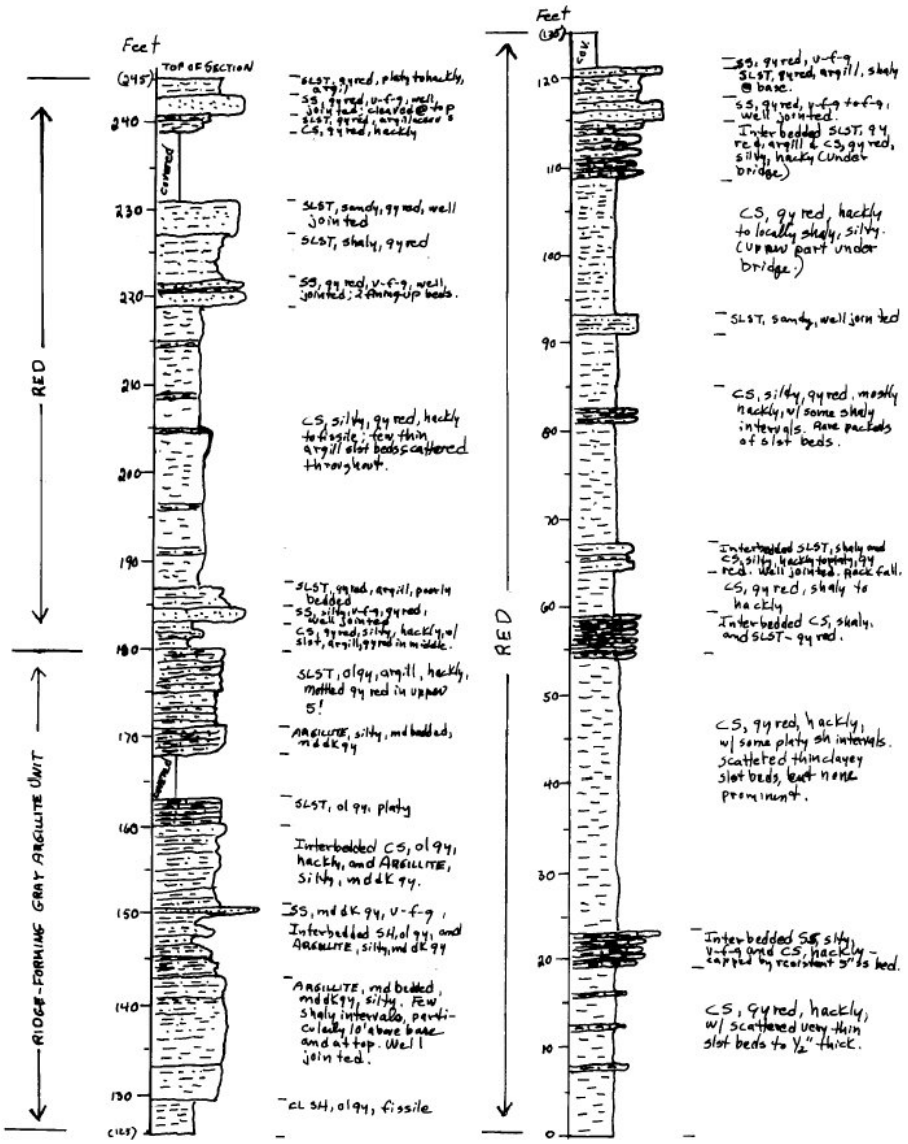
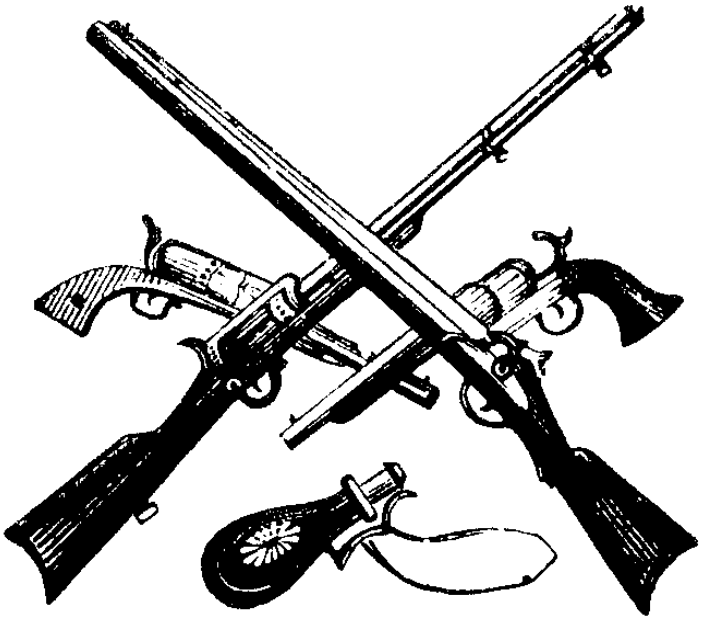


Figure 1-8. Measured section of Gettysburg Formation (part) exposed in middle railroad cut (**B**).

Figure 1-9. The middle railroad cut in the Gettysburg Formation (**B**). Erosionally resistant gray argillite and shale unit in the foreground, weaker red shale and sandstone in the background. In the distance is the western railroad cut, which exposes a similar section.

Some notes on the railroad. The original railroad bed along the present line west of Gettysburg was constructed in 1836-38 as part of the "Tapeworm" railroad promoted by local attorney and abolitionist (and later, congressman) Thaddeus Stevens (1792-1868). The railroad was never completed, and after funding for the project was cut off in 1839, the abandoned grade—which included the three deep cuts at STOPS 1 and 2—became a wagon road. Tracks were finally laid in 1885, the route being taken over by the Western Maryland Railroad (Frassanito, 1995). The railroad is now part of the CSX system.



STOP 2. Lee's "Headquarters" and the Seminary (Oak) Ridge railroad cut: Day 1 action (climax), the Gettysburg Formation, and the Seminary Ridge dike.

Leaders: Jon D. Inners and Robert C. Smith, II.

Like our initial STOP on McPherson's Ridge, STOP 2 consists of two "sub-STOPS"—**A** being Lee's "Headquarters" on the Chambersburg Pike near the crest of Seminary Ridge and **B** being the Seminary (Oak) Ridge railroad cut about 400 feet to the north (Figure 2-1). The latter, easternmost of the three cuts on the unfinished railroad northeast of Gettysburg, was to the Union 1st Corpsmen what the "middle railroad cut" was to their Confederate counterparts in Hill's Corps—scene of the ignominious capture of scores of men and, in this case, several battle flags.

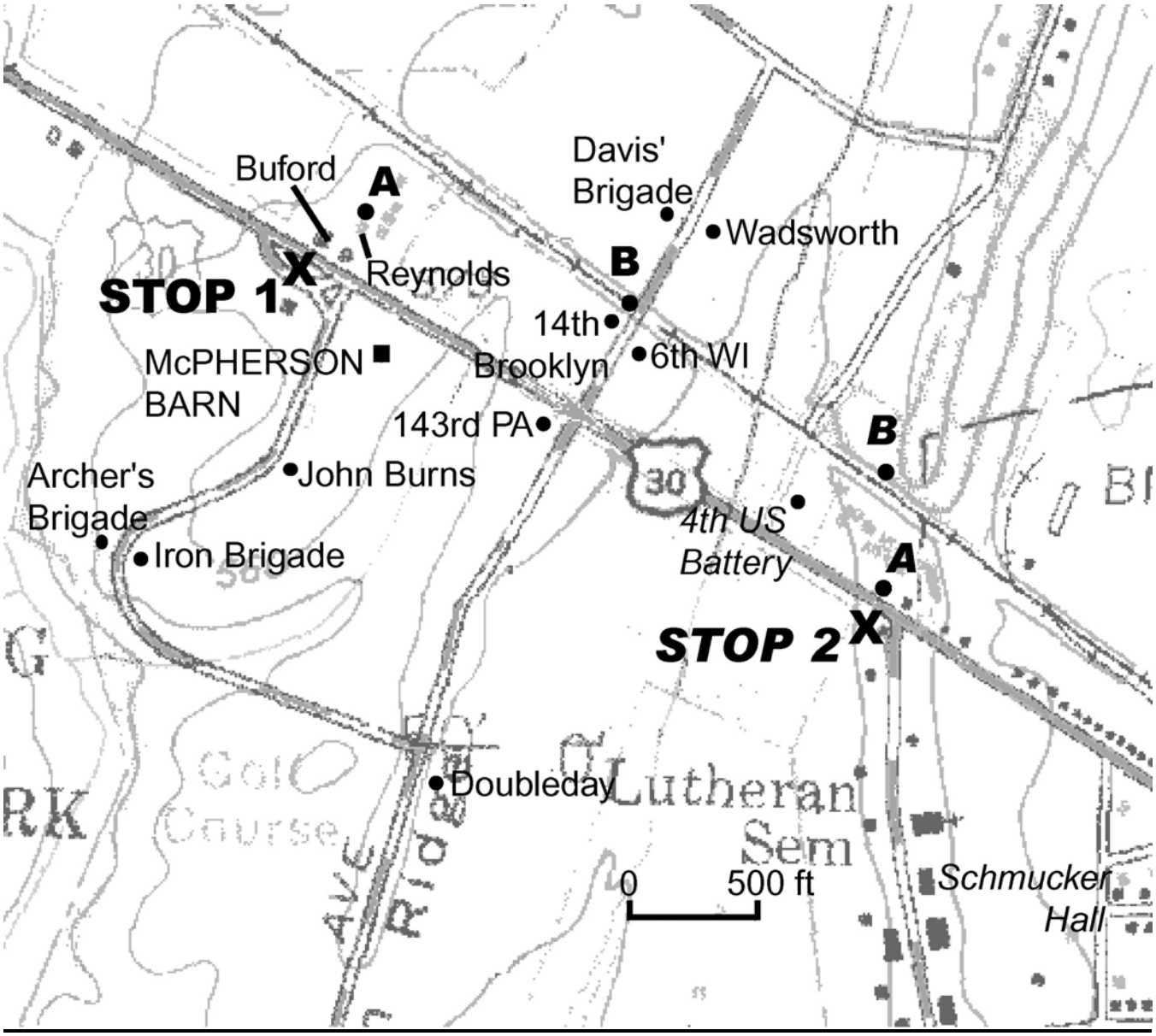


Figure 2-1. Location map for STOPS 1 and 2.

A. Lee's "Headquarters."

The stone house on the north side of Chambersburg Pike was the headquarters of Confederate General Robert E. Lee from the evening of July 1 to about midnight on July 4-5 (Figure 2-2). At the time of the battle the house (built of local, vari-colored Triassic sandstone—probably in the 1830's) was the residence of the widow Mary Thompson (1793-1873). As observed by Professor Michael Jacobs of Pennsylvania (now Gettysburg) College in an 1864 article, it occupied "an elevated position from which the Federal lines could be seen with a field glass" and yet was "at a safe distance from our guns" (Frassanito, 1975, p. 66).

The actual headquarters of the Army of Northern Virginia was a group of tents in an apple orchard on the south side of the Chambersburg Pike, as noted on the monument just west of the parking lot. (Such vertical cannon barrels mark all army headquarters on the battlefield.) Lee apparently spent much of his time there and in the cupola of the Lutheran Seminary, sleeping and taking his meals in the widow Thompson's house.

Figure 2-2. Lee's "Headquarters" on the Chambersburg Pike at **A**.

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*To get from **A** to **B**, walk north across the motel lawn parallel to the Chambersburg Pike to the hedgerow that marks the edge of the motel property. Turn right and follow the partially paved path along the hedgerow back to the railroad cut.*

The two cannons and the monument on the west side of the motel lawn mark the position of Battery B, 4th U.S. Artillery of the 1st Corps Artillery Brigade—six 12-pounder Napoleons under Lieut. James Stewart. In the late afternoon of July 1 (3:00 PM and later), the battery was split in half by the railroad cut. In fierce fighting here, it sustained the "second highest casualties of all the 68 Union batteries that served at Gettysburg" (Frassanito, 1995, p. 70)—2 men killed, 2 officers and 29 men wounded, and 3 men missing. Despite such severe losses, Steward successfully retired to East Cemetery Hill, setting up four of his guns (two had been disabled) to command the approach from town along the Baltimore Pike.

****

B. Seminary (Oak) Ridge railroad cut.

Frassanito (1995, p. 68) notes that "the famous ridge today known as Seminary Ridge was referred to locally as 'Oak Ridge' for its entire length prior to the battle" and that the ridge northward to Mummasburg Road is still commonly referred to as Oak Ridge by locals. (On the current Gettysburg 7.5' topographic map, "Oak Ridge" starts at the Eternal Light Peace Memorial north of the Mummasburg Road.) Hence the "double name" for this easternmost of the railroad cuts that played a role in the 1st Day's fight. Like the two cuts at STOP 1, the Seminary (Oak) Ridge cut was originally excavated as part of Thaddeus Stevens' "Tapeworm" railroad in 1838. Old pre-war woodcuts (c.1840) and post-war photographs (1867) show masses of diabase boulders excavated from the cut in the early preparation of the railroad grade. (They were probably removed from the scene when tracks were laid and the railroad was completed in 1885.) (See Frassanito, 1995, p. 69, 73.) As a result of a land trade between Gettysburg College and the National Park Service, a railroad spur was constructed at the east end of the cut in 1991. Excavation for this spur resulted in "massive destruction of the northern face" (Frassanito, 1995). The Seminary Ridge dike, which was once almost completely exposed on this north face, is now hidden behind a large gabion.

Geology. Although not quite as instructive an exposure as it was before the recent addition of the railroad spur, the Seminary (Oak) Ridge cut is still one of the best geologic sites on the battlefield. Red shale and sandstone typical of the undivided Gettysburg Formation can be seen at the west end; contact metamorphosed shale and claystone (hornfels) crops out in the middle; and the Seminary Ridge diabase dike is at the east end. Although the gabion conceals the dike/hornfels contact, the gradational red shale/hornfels contact is still well exposed.

Gettysburg Formation. About 90 feet of Late Triassic-age Gettysburg shale, claystone, siltstone, and sandstone is exposed in the cut. Except for a few thin, olive-gray shale bands (the most prominent being a 6-inch bed about 70 feet above the base), the rock is entirely grayish red (Figure 2-3). The claystones are hackly to subfissile. Red shale and thin red sandstones at the top are distinctly burrowed. Hoff et al. (1987) note an interesting 5-inch-thick bed of pale-red to reddish-brown, calcareous siltstone near the top of the unaltered Gettysburg. They report that the calcite in the siltstone is distributed as interstitial grains, pseudomorphs after glauberite, and partial fillings in desiccation cracks. Both the former presence of glauberite and the desiccation cracks strongly suggest that the sediments originated under arid climatic conditions (p. 12).

The Gettysburg beds strike N30^{o}E and dip 20-25°NW. The dominant joint fractures are N75^{o}W/78°SW, N75^{o}E/85°SE, and N62^{o}E/85°NW.

Hornfels. The baked zone is about 30 feet thick (Figure 2-3). Most of the exposed hornfels is very dusky purple, grading off into unaltered grayish-red shale to the northwest and probably intensely baked to a grayish-black color next to the dike on the southeast. Malachite and other copper minerals occur along the now-hidden hornfels/diabase contact.

The dike. The Seminary Ridge dike is fine-grained Rossville Diabase, a low TiO_2, quartz-normative continental tholeiite. In thin section, the rock can be seen to be composed of a groundmass of anhedral plagioclase (labradorite, $An_{57\pm2}$) and pyroxene (augite, hypersthene, and pigeonite), with common phenocrysts of euhedral bytownite-anorthite (Smith et al., 1975). The fine grain size indicates rapid cooling of the dike, as would be expected of an intrusion less than 100 feet thick (Hoff et al., 1987). Like the York Haven Diabase, the Rossville is Early Jurassic in age, but somewhat younger as Rossville dikes locally cut the York Haven sheets.

Figure 2-3. North side of the Seminary (Oak) Ridge railroad cut (**B**), showing the unaltered Gettysburg red shale and sandstone on the left, the 30-foot-thick hornfels zone in the middle, and the massive gabion that covers the Seminary Ridge diabase dike on the right.

At this locality the Seminary Ridge dike is about 92 feet thick and dips 50° to the east (Figure 2-4; Stose and Bascom, 1929, p. 12). It strikes approximately north-south. The main joints in the dike are oriented N45^{o}W/60°SW (Figure 2-5), N-S/35°W, and N-S/50°E. The Seminary Ridge is one of a swarm of related diabase dikes that can be traced 60 miles north-northeastward from here to near Berrysburg, Dauphin County, in the Valley and Ridge province. (Berg, 1980; Hoskins, 1976). Other dikes in this swarm are exposed along the Pennsylvania Turnpike east of Carlisle in Cumberland County (cutting Cambro-Ordovician limestones) and along US 11-15 south of Liverpool in Perry County (cutting the Mississippian-age Pocono Formation).

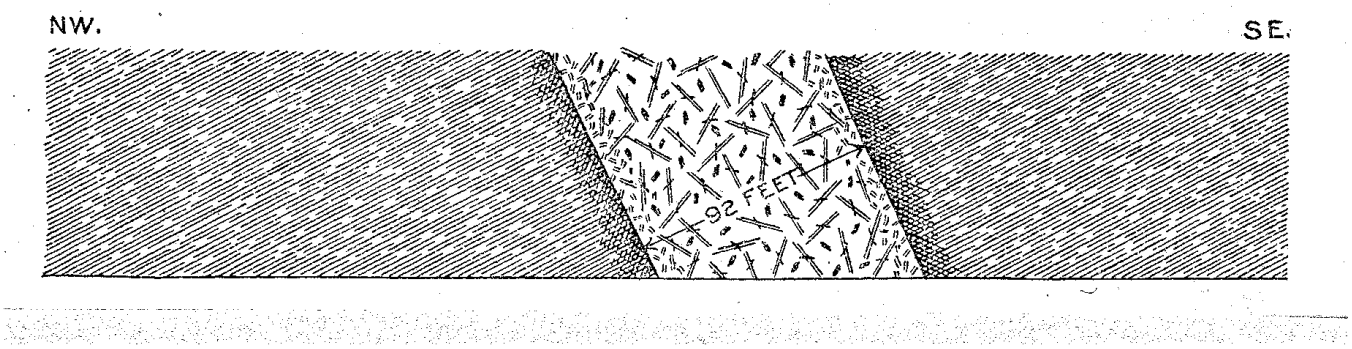


Figure 2-4. Geologic cross section of the Seminary Ridge diabase dike (Stose and Bascom, 1929, p. 12).

Figure 2-5. The Seminary Ridge dike (Rossville Diabase) exposed on the north side of the main line tracks in the cut (**B**). The prominent, striated joint strikes N45^{o}W and dips 60°SW.

The fight at the eastern railroad cut, afternoon of July 1. Seminary (Oak) Ridge was the final defensive line for the Union 1st Corps. Stewart's Battery B (see above) positioned itself at the northwest end of the railroad cut, attempting to protect the railroad line as an escape route for Union troops. At about 4:30 PM, as the fight northwest of Gettysburg climaxed, Confederate forces converged on the Seminary (Oak) Ridge cut and captured several hundred enemy infantrymen. According to one Rebel veteran of Ewell's Corps, " We had the Yankees like partridges in a nest" (Frassanito, 1995, p. 70). One of the 1st Corps units caught up in this Confederate sweep was the 16th Maine Infantry (1st Brigade, 2nd Division). Wrote a Northern eyewitness of the capture of the 16th Maine (Frassanito, 1995, p. 70):

> The two Confederate battle lines, closing together, struck the regiment simultaneously. Ewell's men appeared upon the north side of the cut and Hill's upon the south side so nearly at the same time that both line, with leveled muskets, claimed the prisoners….

The regimental commander of the 43rd North Carolina (Daniel's Brigade, Rodes' Division, Ewell's Corps) noted that 400 or 500 prisoners (more than 100 of whom were from the 16th Maine) surrendered in the cut and that several stands of colors were captured (Frassanito, 1995, p 70).

Once the fighting here and along Seminary Ridge to the south had ended, the Confederates held the entire 1st-Day's field until they retreated from Gettysburg on July 4/5.

STOP 3. Longstreet (Observation) Tower: Warfield Ridge dike, battlefield terrain, South Mountain, and Days 2 and 3 action.

Leaders: Jon D. Inners, Roger J. Cuffey, and Robert C. Smith, II.

> [On the morning of July 2] *I received instructions from the commanding general to move, with the portion of my command that was up, around to gain the Emmitsburg Road, on the enemy's left.*
>
> Lieut. Gen. James Longstreet, C.S.A

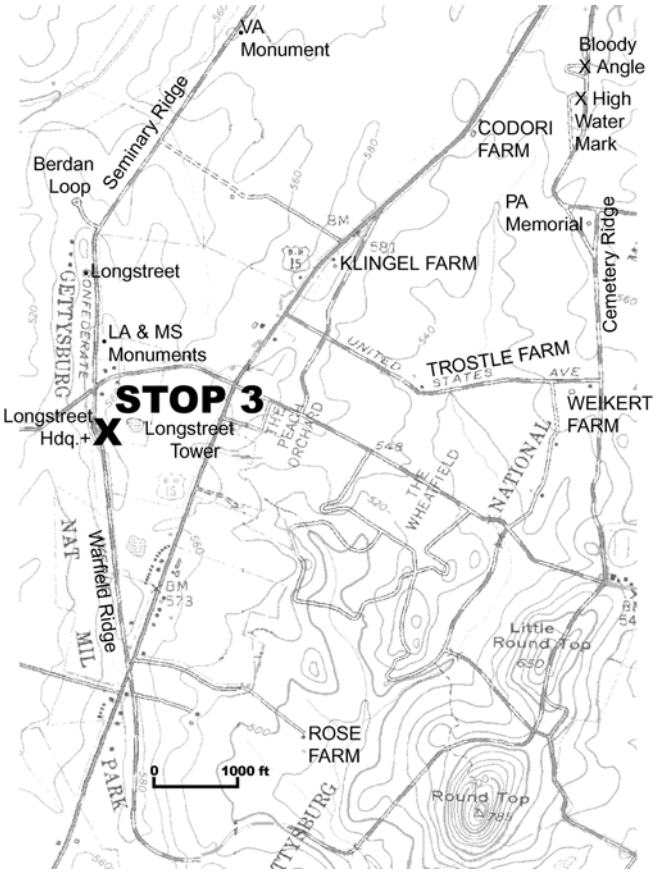


Figure 3-1. Location map for STOP 3.

With the demolition of the 393-foot-high, privately owned Gettysburg National Tower (located on Cemetery Hill east of Taneytown Road) on July 3, 2003, the only remotely comparable spot for viewing the terrain of the entire battlefield is this National Park Service tower on Warfield Ridge (Figure 3-1). (The top of the Park Service tower on Culp's Hill to be visited at STOP 7 stands only a few tens of feet above tree level and is especially limited in its "viewscape" from late Spring to early Fall.) The view from Longstreet Tower is especially effective in illustrating the effect of South Mountain in forming a shield between the movements of the Confederates in the Great Valley to the west of the mountain range and the Federals in the Piedmont to the east. Both gaps used by the Confederates in their advance and retreat from Gettysburg are visible from there, though neither one shows up especially well (see below). The tower also provides a good viewpoint for analyzing geological influences and terrain considerations for action on the Confederate right/Union left on July 2 and the Confederate/ Union center on July 3.

At the top of the Longstreet Tower (so named because Confederate Lieut. Gen. James Longstreet's headquarters was located on the back side of Warfield Ridge at the upright cannon barrel just west of the tower), a small metal disk in the center of the platform is set up like a gunsight pointing to numerous points of interest on the battlefield and in the surrounding terrain. Approximate azimuths of some of these points are:

S65^{o}W	Monterey (or Fairfield) Gap in South Mountain (Just east of the gap within the line of sight is McKee Hill, site of Ski Liberty.)
N45^{o}W	Cashtown Gap in South Mountain.
N0^{o}E	McPherson's Ridge and scene of 1st Day's battle.
N15^{o}E	Seminary Ridge and site of Lee's Headquarters.
N30^{o}E	Borough of Gettysburg
N50^{o}E	Codori Farm (near) and Cemetery Hill (far)
N55^{o}E	Culp's Hill
N60^{o}E	Pennsylvania Memorial on Cemetery Ridge
N65oE	Wolf Hill

N85°E	Peach Orchard
S60°E	Rose Farm and Little Round Top
S45°E	Devil's Den and Big Round Top

(Note that compass bearings from the tower are rendered inaccurate by its steel framework: the bearings were taken off the Adams County 1:50,000-scale topographic map.)

Warfield Ridge dike. The Longstreet Tower sits on the Warfield Ridge dike, one of two Rossville (Early Jurassic-age) diabase dikes that intrude the western part of the battlefield (the other being the Seminary Ridge dike [see STOP 2]). At this point, the Warfield Ridge dike strikes approximately N-S. It cuts across the Gettysburg sheet about a mile to the south, and intersects the Seminary Ridge dike about 0.5 miles to the north. About 4.5 miles north of the Longstreet Tower, the Warfield Ridge dike ends in a Y-shaped diabase body east of Seven Stars.

South Mountain. As noted previously, South Mountain is a broad anticlinal range that marks the northern end of the Blue Ridge physiographic province (Fenneman, 1938; Potter, 1999). In Pennsylvania, it extends from Maryland north-northeastward to Dillsburg, York County, 20 miles to the northeast of Gettysburg, where it "simultaneously" plunges out beneath younger Paleozoic strata and is cut off by faults along the northwest side of the Mesozoic basin (Berg, 1980). About 7 miles west of the tower, the mountain front rises abruptly from the Gettysburg-Newark Lowland (Figure 3-2), the

Figure 3-2. View west from Longstreet Tower. In the distance is South Mountain, the higher ridges on the horizon being underlain by resistant quartzites of the Early Cambrian-age Chilhowee Group and the somewhat lower hills just to the east (particularly evident on the extreme right) being developed on less resistant Late Precambrian-age Catoctin volcanics. The prominent, lens-shaped ridge to left center is Jacks Mountain (elevation about 1600 feet), a fault block of Chilhowee quartzite. The hill just to the south and somewhat nearer the observer is McKee Hill (or Knob) (1160 feet) and is underlain by York Haven Diabase occurring in a "finger" trending southwest off the edge of the Gettysburg sheet. The low hill east of the north edge of Jacks Mountain is McGinley Hill (910 feet), formed of baked Gettysburg shale and sandstone ('hornfels"). The elongate, generally somewhat lower, wooded ridge in the middle distance, extending along most of the length of the view, marks the western, crosscutting part of the Gettysburg sheet. The low, gently rolling terrain between the outcrop of the Gettysburg sheet diabase and the tower is underlain by shales, sandstones, and argillites of the Gettysburg Formation (including the Heidlersburg Member). In the right foreground on the right is the Millerstown Road, a pre-battle road that to the east is now known as the Wheatfield Road.

boundary being a continuous series of steeply east-dipping normal faults that down-drop mostly lower Paleozoic strata on the southeast limb of the anticline. The highest mountain ridges are mainly underlain by resistant quartzites of the Precambrian-Lower Cambrian Chilhowee Group, with lower ridges typically formed of less resistant Precambrian Catoctin metavolcanics (Potter, 1999). This distinction in the heights of the ridges underlain by the two main rocks sequences forming South Mountain can be seen clearly from the tower, the lower ridges (elevation 1400-1500 feet) along the

Figure 3-3. View east from Longstreet Tower. The prominent monument in the left distance is the Pennsylvania State Memorial. The high, wooded hill farther back and to its right is Wolf Hill-Sheep Haven (maximum elevation 680 feet), underlain by York Haven Diabase of the Gettysburg sheet. The woods directly south of the memorial mark Cemetery Ridge, also York Haven Diabase. In the middle distance directly east of the tower is the Peach Orchard (elevation 580+ feet) (STOP 6), with the Emmitsburg Road along its northwestern edge. The Peach Orchard and the Emmitsburg Road are on hornfels along the northwest edge of the diabase sheet. When Sickle's moved his 3rd Corps out from the south end of Cemetery Ridge, he formed a salient, the apex of which was at the southwest corner of the Peach Orchard (where the Emmitsburg Road intersects the right most park road visible in the photo). Kershaw's South Carolina Brigade attacked Sickles' salient across the open fields in the foreground. Barksdale's Mississippi Brigade struck the Union line along the Emmitsburg Road to his left.

eastern side being underlain by the metarhyolite and metabasalt and the higher ridges along the horizon (elevation 1800-2000 feet) being underlain by quartzites.

For a detailed discussion of the importance of South Mountain in the overall Gettysburg Campaign, see Appendix A.

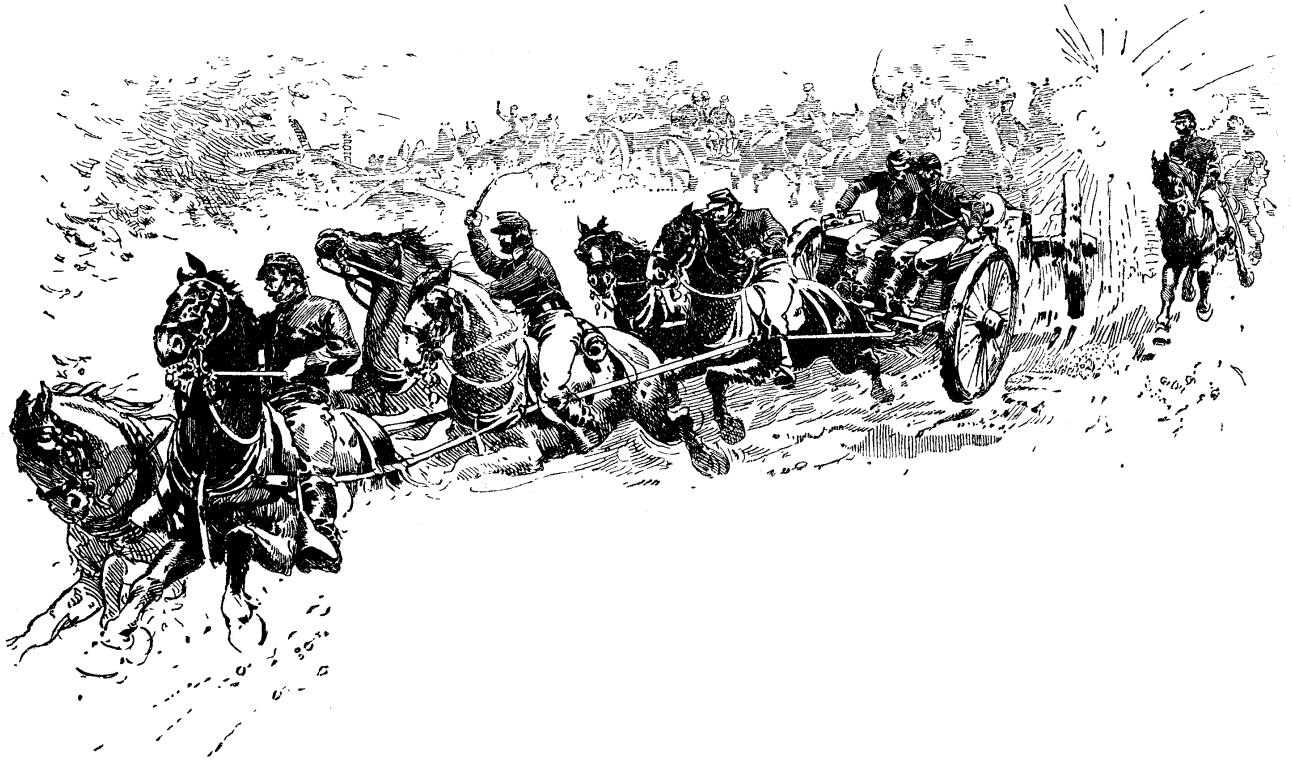
The battlefield from the tower. The Longstreet Tower provides a particularly good view of the field of action of the 2nd and 3rd days of the battle. As noted above, all of the main topographic features of the Union "fishhook" are visible—from Culp's Hill at the barb to Big Round Top at the eye. Though not very prominent topographically, Cemetery Ridge—the long shank of the hook—is marked by numerous monuments, the most prominent being the domed Pennsylvania State Memorial and the high obelisk of the United States Regulars Monument. On the afternoon of July 2, the two division of Longstreet's Confederate Corps (McLaws' and Hood's) attacked the Union left across the fields from the Codori Farm south to beyond the Peach Orchard (Figure 3-3, see STOP 6). On July 3 Pickett's Division of Longstreet's Corps (augmented by parts of Hill's Corps) struck the Union center on Cemetery Ridge north of the Codori Farm ("Pickett's Charge") (see STOP 8).

The action of July 2 was initiated by Lee's attempt to hit the Union left (with an attack also to be mounted against the Union right [see STOP 7]). Though Longstreet wanted go around the Union left, outflanking the enemy and forcing him to retreat southeastward toward Washington, Lee decided to attack the Union left and defeat the enemy in place. But he based his plan on a faulty reconnaissance, and instead of working out as he had originally planned (Figure 3-4A), or even as Longstreet had interpreted it (Figure 3-4B), the attack ultimately developed as Maj. Gens. John B. Hood and Lafayette McLaws carried it out (Figure 3-4C; Trudeau, 2002) (see STOPS 4, 5, and 6).

Much of the confusion in the approach of the Confederates to the "turning" of the Union left arose because of Sickles' movement out to the Peach Orchard and ultimately to the Emmitsburg Road *after* Lee's initial reconnaissance (Trudeau, 2002). Because of the subtle elevation differences involved, it is difficult to grasp—even from this excellent vantage point—the rational for Sickle's movement to the west in the morning and early afternoon of July 2. Certainly he had in mind May the 3rd at the battle of Chancellorsville, when Confederate artillery battered the Union position from Hazel Grove—high

ground that Sickle's himself was ordered to abandon early on the morning of that day (Doubleday, 1994). As will be evident at STOP 8, the main Union line on Cemetery Ridge (which trended north-south just to the *west* of what is now Hancock and Sedgwick Aves.) is generally about 20 to 40 feet lower (elevation 540-560 feet) than the Peach Orchard. The crestline of the ridge is actually 1000 feet or more *east* of the avenues. (This figures prominently in the Confederate cannonade of July 3, as discussed at STOP 8.) At the south end, the high part of Cemetery Ridge was also apparently wooded and would not have provided as clear a field of fire as from stone breastworks on the gentle west slope. Sickles described his initially assigned position as "an unsatisfactory line because of its marked depression and the swamp character of the ground between Cemetery Ridge and Little Round Top" (Trudeau, 2002, p. 294). Be that as it may, even if Sickles was "right" in his topographic analysis, he still made some grievous military errors. Not only did he create a dangerous salient in the Union defensive position (see STOP 6), but he also formed a line that was too long for his two divisions (under Maj. Gen. David B. Birney and Brig. Gen. Andrew A. Humphreys) to defend. Even though Union artillery chief Brig. Gen. Henry J. Hunt saw certain topographic advantages to Sickles new position, he noted "that it would so lengthen our line…as to require a larger force than the Third Corps alone to hold it" (Trudeau, 2002, p. 301-302).

Sickles paid a high personal price for his audacity. In the fighting that ensued once Longstreet launched his attack late on the afternoon of July 2, Sickles was seriously wounded, losing his leg. (The amputated leg was preserved on public display where one of us [Cuffey] passed it every day coming to work.) In the parking lot below, note the Confederate cannons oriented to bombard the Union lines on Cemetery Ridge, as part of the massive artillery preparation for "Pickett's Charge" (see STOP 8).



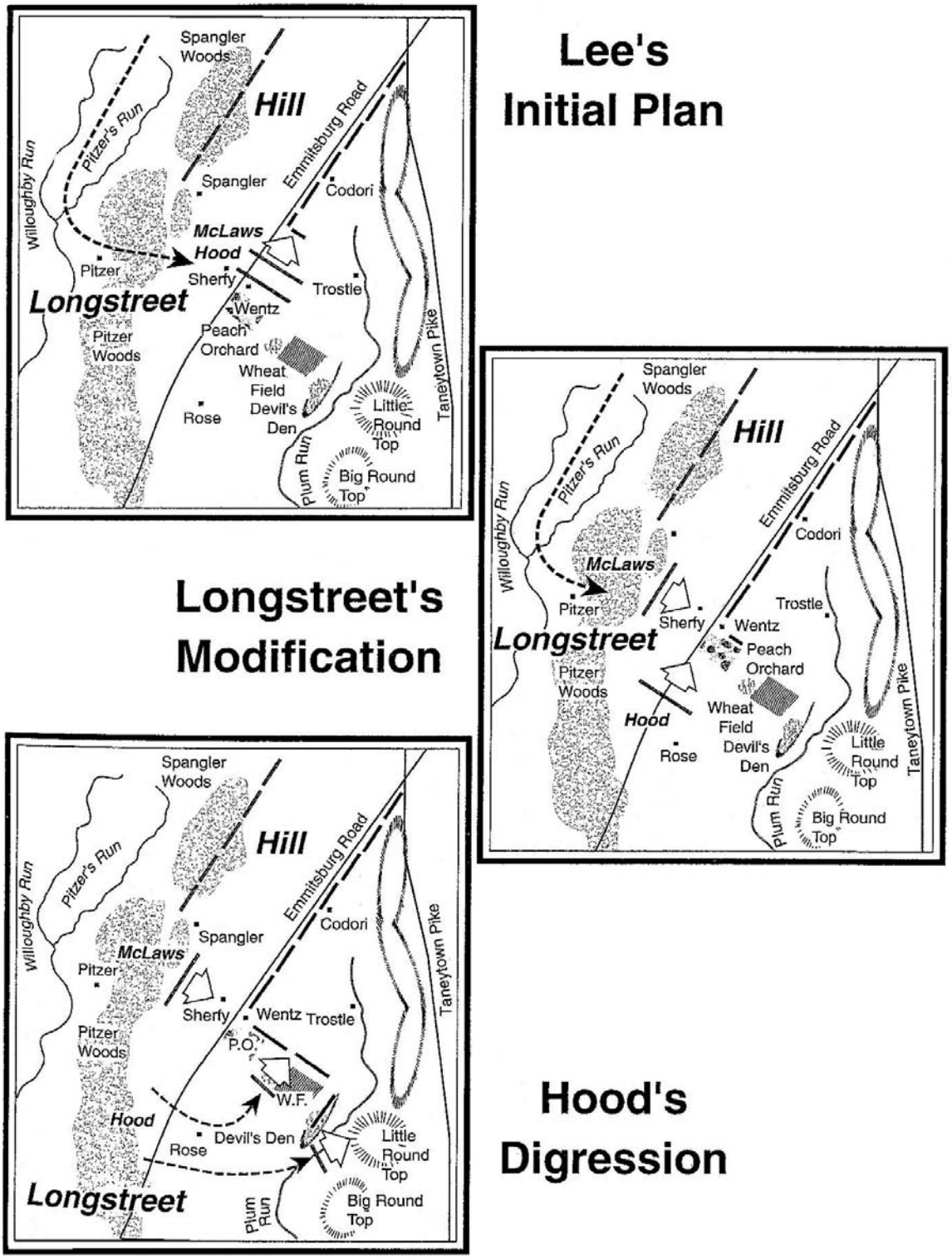


Figure 3-4. "Variations on a Military Theme": the Confederate attack on the Union left, July 2 (Trudeau, 2002, p. 323).

STOP 4. Little Round Top: Day 2 action (Warren, Vincent, Chamberlain, and Oates) and the York Haven Diabase.

Leaders: Jon D. Inners and Gary M. Fleeger.

I saw that this was the key to the whole [Union] position.
Maj. Gen. Gouverneur K. Warren, U.S.A.

Thanks to Ted Turner's movie *Gettysburg* (1993), Little Round Top has become as well known a part of the battlefield as the "High Water Mark" and the "Bloody Angle." The exploits of Col. Joshua Lawrence Chamberlain and the 20th Maine on this little diabase hill are probably familiar to almost everyone who has even a casual interest in American history. But there is much more to Little Round Top than Chamberlain and his regiment, important as was their successful defense of the extreme left of the Union line. We will attempt to visit eight specific sites on the hill (Figure 4-1), passing many more that may elicit comments about the battle here. This brief walking tour is based heavily on Adelman (2000), an excellent guide to both sites and historic events on Little Round Top.

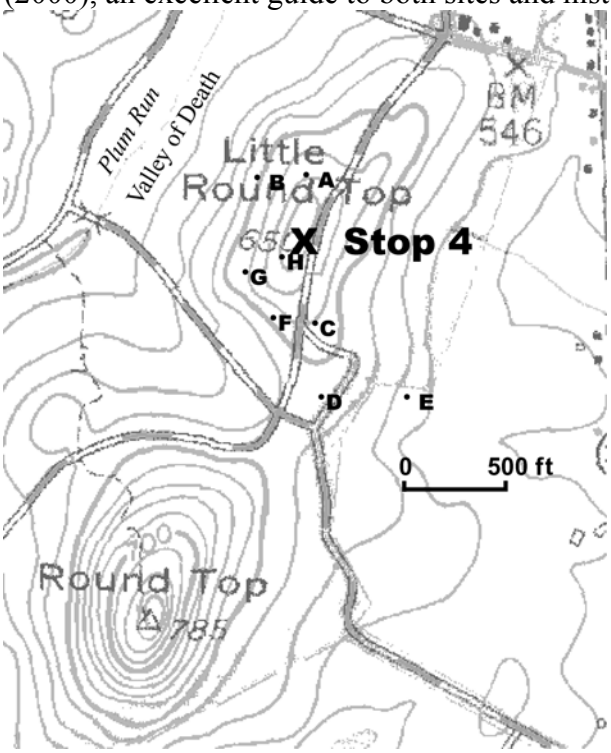


Figure 4-1. Location map for STOP 4, showing *Site* locations.

Terrain. On the second day of the battle of Gettysburg, Little Round Top was arguably (see STOP 7) the most vital position on the Union "fishhook." This rocky knob has an elevation of about 665 feet, its summit being about 150 feet above the valley of Plum Run directly to the west. Variously called Sugarloaf or Signal Hill at the time of the battle and shortly thereafter (Trudeau, 2002, p. 281), it eventually took its name from Round Top, the much higher (elevation 785 feet) hill adjacent to the south—the latter becoming Big Round Top and the other Little Round Top. Because its western face was cleared of trees the year before the battle, the summit of Little Round Top "afforded the finest panorama of the countryside south of Gettysburg then available" (Frassanito, 1975, p. 154). It is likely that had the hill not been partially deforested, Warren would not have been drawn to it on the afternoon of July 2nd, the Confederates would have occupied the hill, and the Union forces would have been outflanked on their left.

Geology. Both Little and Big Round Tops are underlain by diabase of the northwestward-dipping Gettysburg sill, which in this part of the battlefield has a mile-wide outcrop belt stretching from about the midpoint of the field between the Peach Orchard and Stony Hill in the west to a little beyond the far base of the Round Tops in the east (Stose and Bascom, 1929). The diabase is York Haven-type—mostly fine to medium grained, and composed predominantly of white or gray plagioclase and black pyroxene. Jointing is well developed and blocky, with spacing and orientation generally irregular. Physical and chemical weathering along the joints tends to create rounded boulders and cobbles ranging in size from a foot or less to twenty feet or more. These detached masses form great ramparts at the top of the hill and thickly strew the slopes (Figure 4-2). The surfaces of the larger boulders typically exhibit an "alligator-skin" like texture caused by cracking of thin concentric weathering rinds that develop through swelling of oxidized minerals, daily and seasonal temperature changes at the rock surface, and freezing of water in fine fractures.

Figure 4-2. Rock-strewn west slope of Little Round Top as seen from across the "Valley of Death." The prominent tower-like monument to the right center on the summit of the hill is that to the 44th New York Infantry (see *Site H*).

The fight for Little Round Top (afternoon of July 2). Throughout the night of July 1 and the morning and early afternoon of July 2, Little Round Top was virtually unmanned except for a small party of signalmen. On the morning of the 2nd, Maj. Gen. Daniel Sickles' 3rd Corps occupied the south end of Cemetery Ridge and the low topographic swale between that ridge and Little Round Top—but Sickles made no attempt of extend his line farther south. Maj. Gen. Gouverneur K. Warren, Chief Engineer of the Army of the Potomac, arrived on Little Round Top at about 3:30 PM, just as Hood was deploying for action in the woods on Warfield Ridge, and found only a small detachment of signalmen on the summit. He immediately recognized the critical importance of the hill in defending the Union position. According to Warren's later statements, he asked (signaled?) the commander of an artillery section in his front (probably Captain James Smith of the 4th New York Light Artillery [see STOP 5]) to fire a shot into the woods on Warfield Ridge. (At that time the area beyond Devil's Den was much more open then now.) The glint of sunlight off the enemy's muskets when they moved as the shell passed over gave away their position! Warren then dispatched members of his staff to bring reinforcements. Col. Strong Vincent's 5th Corps brigade (20th Maine, 83rd Pennsylvania, 44th New York, and 15th Michigan) arrived first and deployed his men along the "military crest" on the south side of the hill (i.e., downslope from the summit where his men would have the maximum "field of fire") in facing the extreme right of the Confederate attacking force (Figure 4-3; Grimsley and Simpson, 1999, p. 74). Warren himself then brought the 140th New York of Brig. Gen. Stephen Weed's 5th Corps brigade and Battery D of the 5th U.S. Artillery to the summit just in time to halt a sweep of the 4th Texas Regiment of Brig. Gen. J. B. Robertson's brigade around Vincent's left (Figure 4-3). The rest of Weed's brigade then took up positions to the right of Vincent's line, facing west (Figure 4-4). Farther details of the action on Little Round Top are given in the accompanying Walking Tour.

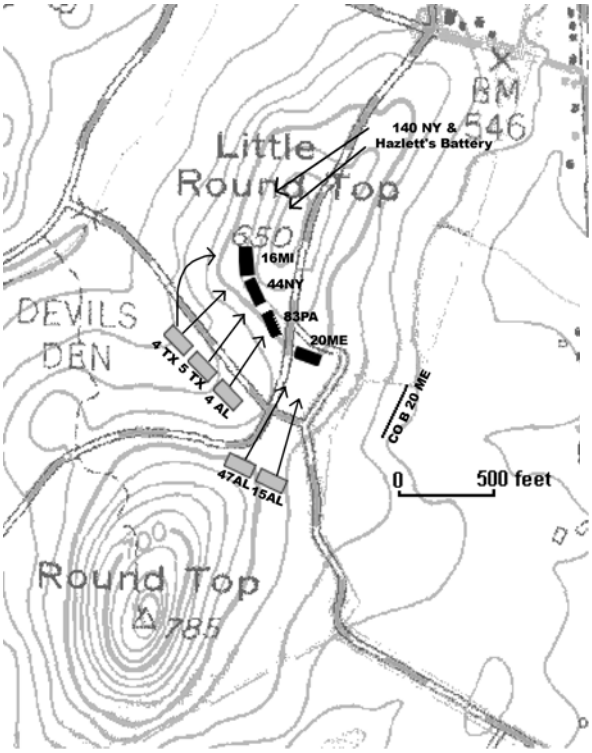


Figure 4-3. Map showing Union and Confederate troop dispositions in the early phase of the fight for Little Round Top—July 2, late afternoon (after Adelman, 2000, p. 13).

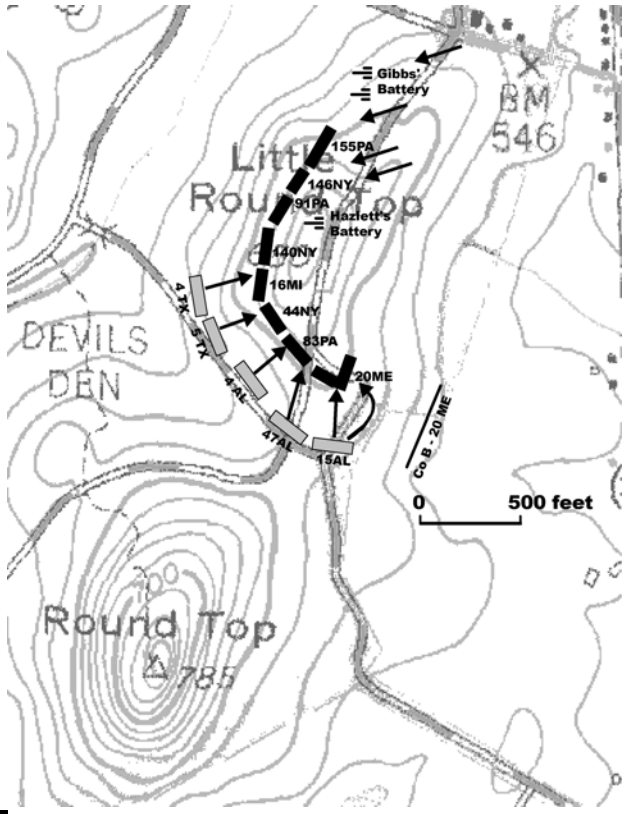


Figure 4-4. Map showing troop dispositions in the closing phase of the fight for Little Round Top—July 2, early evening (after Adelman, 2000, p. 14).

Walking Tour of Little Round Top

A. Signal Rock and Warren Rock. These two large diabase boulders on the northwest side of the summit are presumably "where it all began." U.S. Signal Corpsmen assigned here to the Round Top Mountain Signal Station were visible to most of the various Union headquarters located on the "fishhook" to the north and northeast (*frontispiece*). On the morning and early afternoon of July 2, their presence here may also have given the enemy the impression that the Union occupied the hill in force. The plaque on Signal Rock honors the 36 men of the U.S. Signal Corps who manned six stations at Gettysburg under the overall supervision of Capt. Lemuel B. Norton, chief signal officer. It was dedicated in May 1919 (Adelman, 2000; Trudeau, 2002).

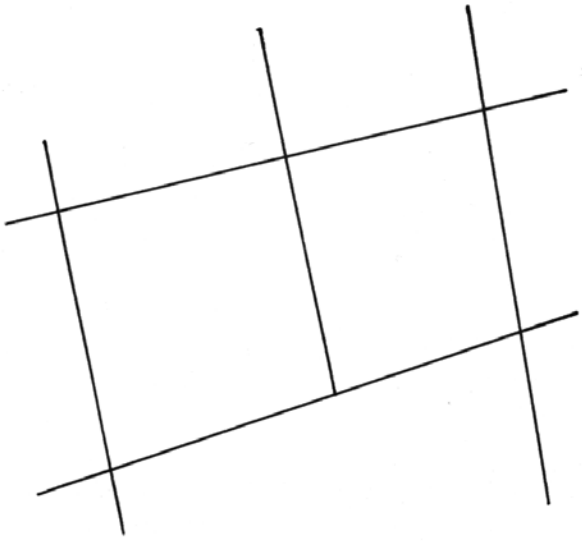
The adjacent Warren Rock is surmounted by the statue of then Brig. Gen. Gouverneur K. Warren (1830-1882), at the time chief of engineers in the Army of the Potomac. As noted above, it is difficult to overstate Warren's contribution to the Union victory at Gettysburg. Indeed, the noted historian Shelby Foote called Warren's directing of Union troops to the summit of Little Round Top "the single most important tactical decision in the American Civil War" (Jens, 2003, p. 2). Maj. Gen. Abner Doubleday wrote that "[Little Round Top] was the key to field…and nothing but Warren's activity and foresight saved it from falling into the hands of the enemy" (1994, p. 178). Though Gouverneur Warren rose to command the 5th Army Corps for the last year of the war, he gradually fell out of favor with Meade and Grant, and Phil Sheridan was authorized to remove him from command at Five Forks on April 1, 1865. Warren stayed in the army, doing distinguished work as a civil engineer in the Midwest (see Appendix C), but fought for the rest of his life to recover his military reputation. Effectively exonerated by a court of military inquiry in November 1882, Warren had died three months earlier (Jordan, 2001). Knowing this, one can "read between the lines" of the inscription on the bronze plaque below the statue and sense the tragedy of Warren's life:

> Led to this spot by his military sagacity on July 2nd, GENERAL GOUVERNEUR KEMBLE WARREN, then chief engineer of the Army of the Potomac, detected General Hood's flanking movement and, by promptly assuming the responsibility of ordering troops to this place, saved the key of the Union position. Promoted for gallant services from the command of a regiment in 1861, through successive grades to the command of the 2nd Corps in 1863, and permanently assigned to that of the 5th Army Corps in 1864, Major General Warren needs no eulogy. His name is enshrined in the hearts of his countrymen. This statue is erected under the auspices of the veteran organization of his old regiment, the 5th New York Vols. Zouaves in memory of their beloved commander. Dedicated August 8, 1888.

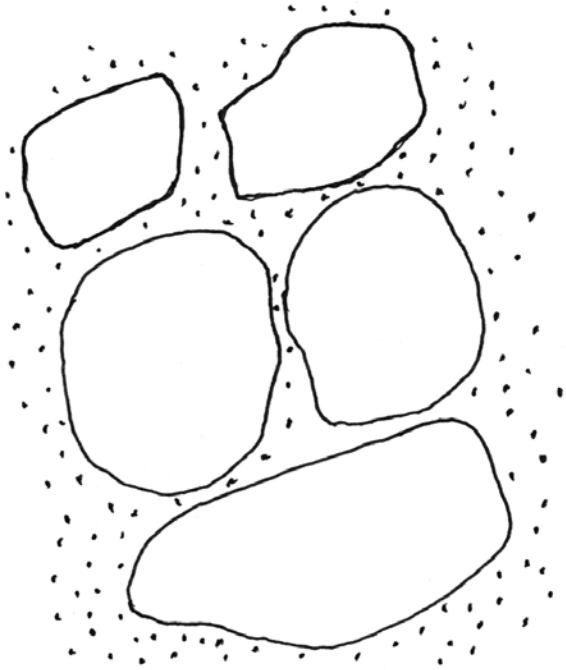
The right of Weed's line, marked by the monuments to the 146th New York and the 155th Pennsylvania ahead to the north-northwest did not come under attack during the main battle for Little Round Top. These regiments were threatened, however, by the last Confederate attack repelled by Crawford at the end of the day (Grimsley and Simpson, 1999, p. 73; see mile 8.15).

B. The "Curious Rocks." This crude "runic arc" of several large diabase boulders is one of the oddest natural phenomena on the battlefield (Figure 4-5). Its origin is somewhat problematical, though it may have formed through deep chemical weathering below ground, followed by subaerial erosion—as depicted in Figure 4-6.

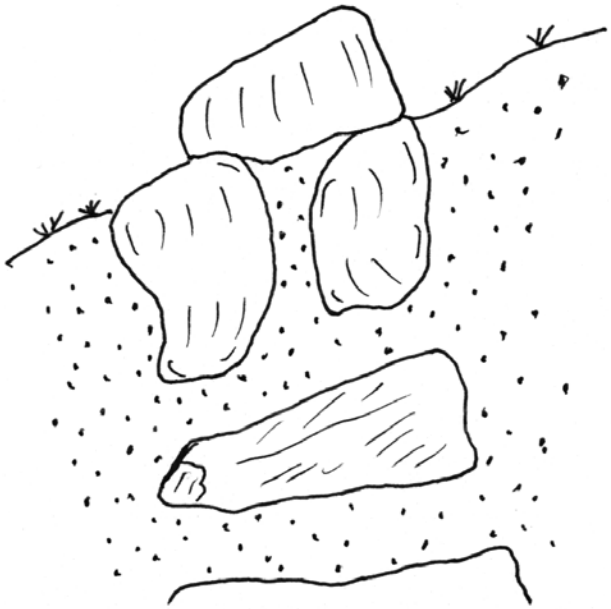
Figure 4-5. The "Curious Rocks" on the west slope of Little Round Top (*Site B*), looking downslope. The Warren Map of the battlefield suggests, but does not conclusively show, that this small natural arch may have been included into the original stone breastworks constructed by Weed's brigade (Adelman, 2000).



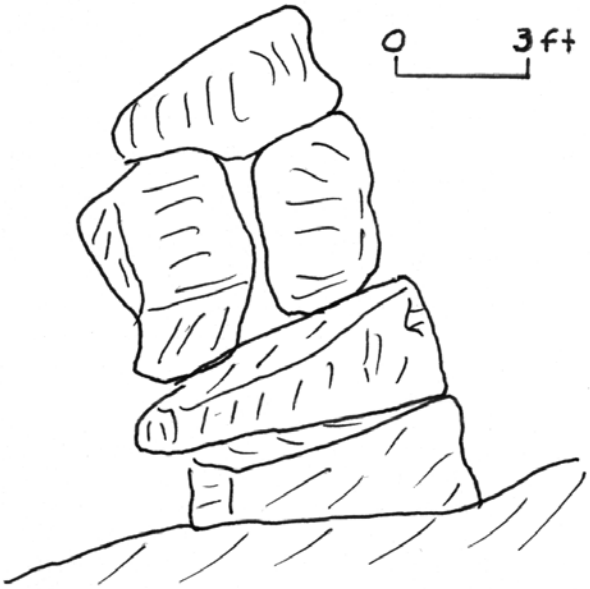
Fractured diabase bedrock, 10's of feet below ground surface.



Chemical weathering of diabase within soil zone results in formation of crudely rounded boulders surrounded by orange-brown, silty clay loan soil.



As hillslope erosion takes place, boulders are gradually let down to rest on those underneath.



While most boulders become detached and tumble down slope as erosion proceeds, a few remain in contact with their neighbors, and form the "Curious Rocks."

Figure 4-6. Generalized diagram showing possible stages in the development of the "Curious Rocks."

C. The stone wall on old Chamberlain Avenue. As noted by Adelman (2000), most stone walls on the battlefield were erected by farmers before the Civil War. While nearly all of the walls on Little Round Top were erected by soldiers to serve as breastworks, none were in place at the time of the fighting—there just was not enough time after the arrival of Union troops on the hill before the Confederates attacked. The stone wall here was mostly like put up on July 3 by the Pennsylvania Reserves under Col. Joseph Fisher. For more details on the times of construction of walls on the battlefield, see Adelman (2000, p. 23).

D. The 20th Maine Monument. On the late afternoon of July 2, the 20th Maine, mustered into United States service in August 1862, held the extreme left of the Union line (Figure 4-7). Their stalwart defense of the south slope of Little Round Top against repeated assaults by the 15th Alabama regiment under Col. William C. Oates (1833-1910) concluded in a more or less spontaneous bayonet charge down hill that put the exhausted Alabamians to flight (Chamberlain, 1994; Perry, 1997). Though Col. Joshua Lawrence Chamberlain may not have specifically ordered the charge that has sealed his fame in military annals (Desjardin, 1999; Trudeau, 2002), his actions early in the fight were calculated and effective. Acting on a suggestion by Major Ellis Spear, his second in command, Chamberlain decided to "refuse" the line on his extreme left (that is, to bend it back at a right angle [see Figure 4-4]). But his front did not extend far enough along the hill to do this effectively. His solution is well described by Trudeau (2002, p. 354):

> Faced in the heat of battle with a tactical problem requiring a quick solution, he coolly came up with an unconventional riposte. Ordering his men to maintain a steady fire to their front, he simultaneously directed them to sidestep to their left, so the second rank merged with the first. By this means, the standard-double ranked lines of battle were transformed into a much longer single line, which Chamberlain then bent back at the place where his left flank had formerly ended. This enabled him to extend his refused flank along a larger perimeter than would have obtained if he had merely bent back the double line, as Ellis Spear had proposed.

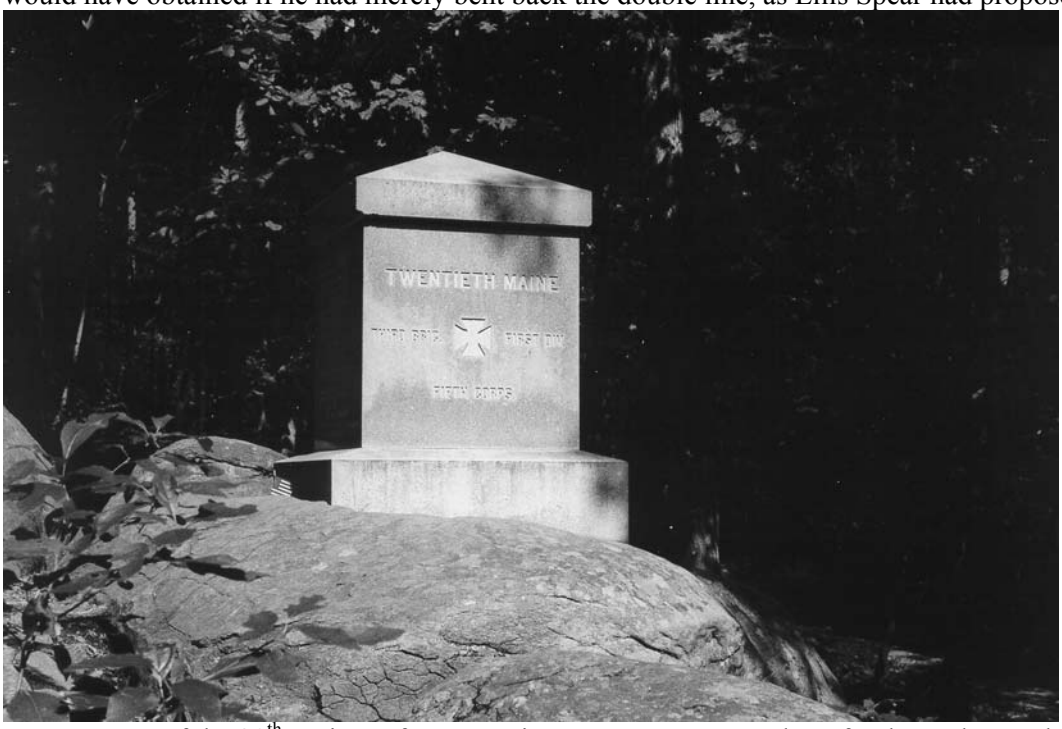


Figure 4-7. Monument of the 20th Maine Infantry Regiment at *Site D*. Note how far down the south slope of Little Round Top the 20th Maine was positioned. This spot gave a good view of the ravine running between Big and Little Round Top, providing better protection for an enemy flanking movement. The monument (of Maine Hallowell granite) was erected in 1886 on the boulder where Color Sgt. Andrew stood with the regiment's flag (Hawthorne, 1988). Note the Maltese cross, insignia of the 5th Corps, which appears on many monuments on Little Round Top.

Though Chamberlain was an "amateur" soldier, he undoubtedly had an exceptional military mind. His unorthodox decision to lengthen his line during the thick of the fight on Little Round Top set the stage for the grand concluding maneuver, later described by an observer as "a great right wheel swinging as a gate on a post" (Desjardin, 1999). Joshua Lawrence Chamberlain won a Congressional Medal of Honor for his actions at Gettysburg, rose to command a brigade in the 5th Corps, fought like a lion through the Overland Campaign and Petersburg (where he was severely wounded twice), and as a brevet major general accepted the formal surrender of Lee's veterans at Appomattox (Chamberlain, 1993).

E. Oates' Ledge of Rocks and the stone wall at the Company B Marker. In the woods within about 500 feet of the 20th Maine Monument are two features—one natural, the other man-made—that figured prominently in the fight between the Mainers and the Alabamians. First encountered along the path leading east is a north-south running, bouldery ledge of diabase from which the Confederates poured an enfilading fire upon the left flank of Chamberlain's men, forcing him to refuse his line as noted above (Adelman, 2000).

About 200 feet farther on is a granite monument, backed by a north-south-aligned stone wall (Figure 4-8). This marks the position of Company B of the 20th Maine (42 men under Capt. Walter Morrill), which was deployed by Chamberlain (under orders from Vincent) to add further protection to the Union flank. Morrill's men (reinforced by about a dozen U. S. Sharpshooters who had been driven off Big Round Top) hid behind this wall until the final regimental bayonet charge—and then rose up to deliver a devastating volley into the fleeing Confederates. Unlike the wall at **C**, this one was erected prior to the battle and once divided the woods from an open field to the east (Adelman, 2000; Trudeau, 2002).

Figure 4-8. Marker to Co. B of the 20th Maine (*Site E*) in front of the stone wall behind which the men (including some marksmen from the 2nd United States sharpshooters) concealed themselves until the climactic Union bayonet charge led by Col. Chamberlain. The inscription reads:

> Position of Company B 20th Me. Vols. Capt. Walter G. Morrill, detached as skirmishers, attacking the enemy's right flank, afternoon of July 2, 1863.

F. The 83rd Pennsylvania Memorial. This imposing granite monument is surmounting by a bronze statue of Col. Strong Vincent (1837-1863), commander of the brigade that so stoutly defended Little Round Top. The 83rd was posted just to the right of the 20th Maine and fought off repeated attacks of the 4th and 47th Alabama Regiments. Most of the men in the regiment were from western Pennsylvania. Prior to the reorganization of the Army of the Potomac after the battle of Chancellorsville, Strong Vincent, himself from Erie County in the extreme northwest corner of the Commonwealth, had been commander of the 83rd. Vincent fell mortally wounded on the brigade's right at about 5:45 PM as he tried to rally the 16th Michigan. He died five days later, having been promoted to brigadier general on July 3 (Adelman, 2000, Trudeau, 2002; Faust, 1986, p. 786).

G. 16th Michigan Monument. The 16th Michigan, the smallest of Vincent's regiments with only 263 men (Trudeau, 2002, p. 573; Adelman, 2000), held the right flank of the brigade's position. Heavy pressure from the front and a flanking movement by the 4th Texas (see Figure 4-4), forced the 16th Michigan back to the crest of the hill and would have broken the Union line had not the 140th New York (Site H) arrived just in time to push the Confederates back.

On the slopes east and southeast of the 16th Michigan Monument are stone breastworks originally probably built by the 140th and 44th New York (Site H) on the night of July 2 (Figure 4-9; Adelman, 2000; Frassanito, 1975). Also in this area is the Vincent Marker, marking the "officially recognized" spot where Strong Vincent was mortally wounded rallying the 16th Michigan (Figure 4-10).

H. The 44th and 140th New York Monuments and Hazlett's Position. The two granite monuments honor infantry regiments from two different brigades, each of whom had vital roles in the successful defense of Little Round Top. The 44th New York, the largest of Vincent's Brigades (Trudeau, 2002, p. 573), was positioned between the 83rd Pennsylvania and 16th Michigan. Commander of the 44th was Brig. Gen. James C. Rice, who took charge of the brigade after Vincent was wounded and kept the defensive line intact.

The 140th New York (Figure 4-11) was one of four regiments assigned to Brig. Gen. Stephen H. Weed's 3rd Brigade (2nd Division, 5th Corps), the others being the 146th New York, the 91st Pennsylvania, and the 155th Pennsylvania). Weed's Brigade was summoned to Little Round Top by General Warren himself, who claimed not to have seen Vincent's men arrive on the scene (Jordan, 2001). Just as the 16th Michigan began to give way, the 140th New York, under Col. Patrick O'Rorke burst over the crest of the ridge and pushed the 4th Texas back. O'Rorke sacrificed his life in the effort (Trudeau, 2002). Monuments to the other three regiments, who were not as heavily engaged as the 140th, are situated on the slope to the north (see Adelman, 2000, p. 41-44).

The four Parrott Rifles and plaque at the summit of Little Round Top here mark the position of Lieut. Charles E. Hazlett's Battery D, United States Artillery. Just after Vincent's Brigade arrived on the south slope, Hazlett's battery was brought into position on the summit through the almost superhuman assistance of infantrymen from Weed's Brigade. (Movement of the battery to this position was apparently in part on Hazlett's own initiative, as Warren was of the opinion that the top of the steep western slope was a poor place to bring artillery to bear on attacking troops [Trudeau, 2002].) Not long after the battery's six 3-inch Parrott guns began blasting away at the Confederates in the Plum Run Valley below, both Hazlett and brigade commander Stephen Weed (1831-1863), who was directing the battery's fire, were killed (Adelman, 2000; Faust, 1986).

Figure 4-9. Stone breastworks on slope of Little Round Top between *Sites G* and *H.* How much of this stonework is original is debatable, but the walls are apparently in their original positions as built by men of the 44th and 140th New York on the night of July 2/3 (Adelman, 2000).

Figure 4-10. Monument to Col. Strong Vincent about 50 yards east-southeast of *Site G,* the "officially recognized" of two spots where he was supposedly killed. (The other is marked by a inscription carved into a boulder just north of the 44th New York Monument at *Site H*.)

Figure 4-11. Monument of the 140th New York Infantry at *Site H*. Though the monument is to the entire regiment, the bronze bust of and inscription to Col. Patrick H. O'Rorke are its most prominent features. He was fatally shot near this spot as he led his men over the brow of the hill and down into the maelstrom on the west slope.

STOP 5 and Lunch. Devil's Den: Day 2 action and the York Haven Diabase.

Leaders: Jon D. Inners, Robert C. Smith, II, and Helen L. Delano.

> [The enemy] *battery was situated…on a rugged cliff which formed the abrupt termination of a ridge that proceeded from the mountain, and ran in a direction somewhat parallel with it, leaving a valley destitute of trees and filled with immense boulders.*
>
> Col. William F. Perry, C.S.A.
> (Quoted in Luvass and Nelson, 1986, p. 94)

Devil's Den (Figure 5-1) is for good reason the most storied site on the Gettysburg battlefield. In a three-or-four-hour period in the afternoon and early evening of the 2nd day, this spectacular, broken outcrop of bare rock witnessed some of the bloodiest fighting of the battle, well documented by the names given to parts of the adjacent Plum Run valley—the "Valley of Death" and the "Slaughter Pen." The Den itself is well described in writings of some of those who fought there. To a Pennsylvania soldier it appeared "as though nature in some wild freak had forgotten herself and piled great rocks in mad confusion together." A New Yorker was somewhat more descriptive: "[I]ts huge boulders, some of them as large as a small house, rest in an irregular, confused mass, forming nooks and cavernous recesses suggestive of its uncanny name" (Trudeau, 2002, p. 314-315).

Figure 5-1. Location map of STOP 5, showing *Site* locations. Some other monuments and features, noted on the Roadlog, are also marked.

Geology. Because of the sheer size of the outcropping ledges and boulders here, Devil's Den in the best place on the Gettysburg battlefield to observe the York Haven Diabase *en masse* and to examine details of its mineralogy, weathering, and mass wasting. The York Haven Diabase is a high TiO_2, quartz–normative, continental tholeiite (Froelich and Gottfried, 1999). Dominant minerals are clinopyroxene (pigeonite in the groundmass, augite as microphenocrysts) and calcic-plagioclase (labradorite, $An_{57\pm 3}$), with orthopyroxene abundant in the "stratigraphically" lower part of the York Haven sheets (Smith et al., 1975). At Devil's Den the rock is coarsely crystalline, with the mineralogy being particularly evident on weathered surfaces—the pyroxene crystals standing in relief as the plagioclase crystals weather back (see *Site B*). The most striking weathering features of the diabase at Devil's Den, however, is the extensive open-fracture network that divides the rock mass into huge blocks (typically with rounded edges). Another weathering phenomenon here, not quite as prominent but clearly visible to an observant eye, is the massive exfoliation of the ledges and boulders. The rounded weathering partings not only form as thin scales on the surface, but also occur several feet down in the diabase masses (see Figure 6-4). Disruption of the exposed diabase mass takes place by gradual opening of the large-scale fractures and breakage of the rock along the exfoliation surfaces. It is possible that much of the break-up of the rock at Devil's Den is a relict of periglacial conditions that existed in this area about 18,000 years B.P.

The fight for Devil's Den. On the 3rd Corps' advance from the south end of Cemetery Ridge westward to higher ground to the west between about noon and mid-afternoon of July 2, Brig. Gen. J. H. Hobart Ward's 2nd Brigade of Maj. Gen. David Birney's 1st Division occupied Devil's Den and Houck's Ridge. Ward's brigade—about 1500 men—reached their position about 3:30 PM. The first Confederates—from Robertson's Brigade—appeared about 4:50 PM (Grimsley and Simpson, 1999). In defending Devil's Den-Houck's Ridge area, Ward's brigade lost one-third of its men, but inflicted heavy losses on the attacking enemy. After Ward was driven out, Devil's Den was held by the 17th and 20th Georgia of Brig. Gen. Henry L. Benning's Brigade. Supporting troops of Brig. Gen. George T. Anderson wheeled north to support the Confederate attack in the Wheatfield (Editors of Time-Life Books, 1996).

Grimsley and Simpson (1999) give a good analysis of the military significance of the area defended by Ward's brigade:

> Although the Confederates needed to seize it so as to continue Longstreet's main assault, the Houck's Ridge-Devil's Den position was of little intrinsic importance. Riflemen took up positions among the boulders from which to blaze away at Little Round Top, but the open Plum Run valley offered poor ground for a direct attack on that vital Union bastion. The position also had scant effect on the fighting that continued unabated to the north, in the Wheatfield and Peach Orchard (p. 85).

Details of the fighting at Devil's Den are given below at the individual *sites* of the Walking Tour.

Walking Tour of Devil's Den

A. Overview from parking area. The "rugged cliff" of Devil's Den—25 to 30 feet high—is directly west of the parking area on Sickles Ave. (Figure 5-2). Just to the east are Plum Run and the "Slaughter Pen," a bouldery area along the creek that extends up to the foot of Big Round Top. Though it is uncertain whether the latter name was coined by soldiers or early observers, it is significant that Alfred Waud (1828-1891), "the most prolific of Civil War combat artists," noted in the caption for a sketch of the area that it was "called by the soldiers the Slaughter Pen" (Faust, 1986; Adelman and Smith, 1997).

B. The "Devil's Den." According to Adelman and Smith (1997), this open fracture in the face of the massive diabase outcropping is the actual "Devil's Den" from which the entire feature now takes its name (Figure 5-3). Late 19th-century Gettysburg historian John Batchelor, who was instrumental in the founding of the National Military Park, pinpointed this exact spot as the origin of the name, describing it as "a hole in the ground" which is "very difficult to get into." He noted that a spring once flowed through the opening. Considering all of the many fracture openings in the entire "rock formation"—

Figure 5-2. Devil's Den, looking west from the nearby parking area (*Site A*). Note the rounding, due to exfoliation, of all the large diabase masses.

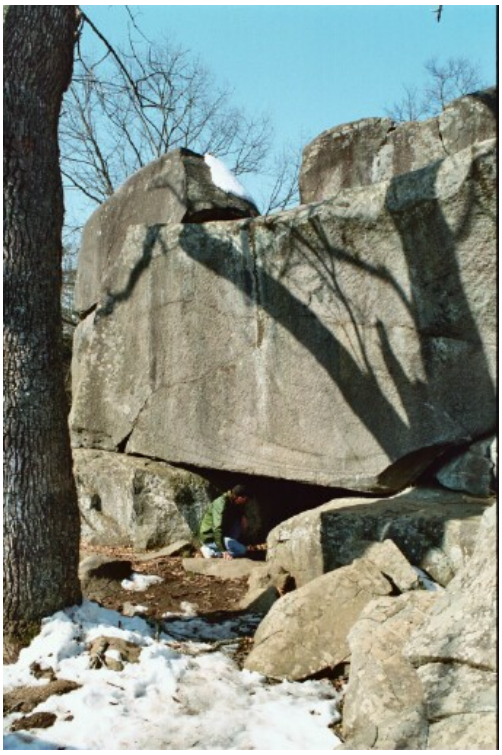


Figure 5-3. The real "Devil's Den," according to historian John Batchelor (*Site B*). This joint cave can be followed back for at least 20 or 25 feet. Note the curved exfoliation surfaces in the caprock of the opening.

several of which seem more impressive than this one, such specific identification rings somewhat hollow. It seems more likely that the name was always more or less applied as it is today.

On the irregular ledge above and to the left of the "Devil's Den" is a good surface to observe the micro-weathering of the diabase (as described under **Geology**). Just to the right of that, a large block has broken off an overhanging ledge, one of the fracture surfaces being a curved exfoliation parting (Figure 5-4).

C. Table Rock. This interesting formation could also be dubbed "Charles Atlas Rock" as one's first impulse for a "photo op" here is to pose in the open fracture and attempt to "lift" the large, flat boulder overhead (Figure 5-5). This was also a favorite spot for 19th-century photographs (Frassanito, 1975, p. 170; 1995, p. 302-305; Adelman and Smith, 1997, p. 91, 93, 113, etc.), and, indeed, the preferred name comes from the caption of a stereo-view taken by a local photographer in 1867. On these old photographs can be seen numerous "scratch-outs," marking spots where late 19th-century, carved graffiti was removed after the creation of the Gettysburg National Military Park in 1895 (see especially Adelman and Smith, 1997, p. 98-100). Table Rock is basically a larger-scale version of "The Curious Rocks" at Little Round Top and probably formed in a similar manner (see STOP 4, *Site B*).

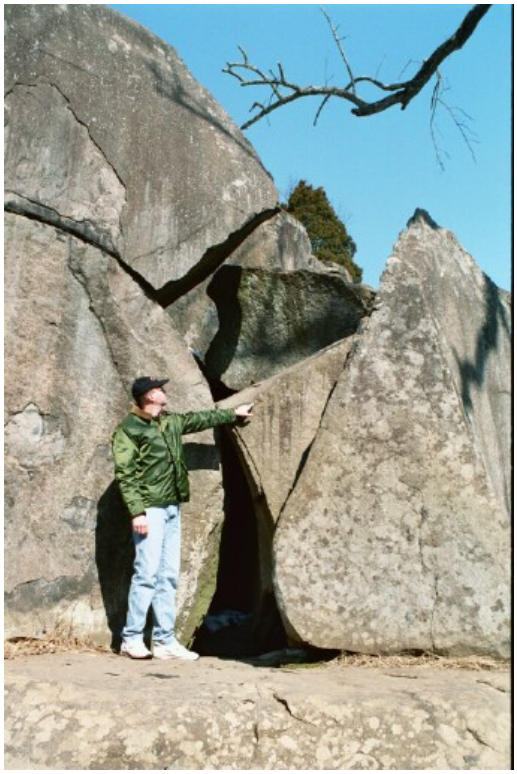


Figure 5-4. Exfoliation in action near *Site B*. Note the triangular block that has fallen from the huge xfoliated "sheet" above the person's head.

D. The top of the Den. At this point, a wooden bridge crosses a large open, subvertical fracture trending N30°W. An intersecting open fracture here trends N70°E and is also subvertical. Note the profusion of polygonal exfoliation cracks, as well as the presence of numerous parallel grooves trending N20-35°W. This spot also affords an excellent view of Little Round Top, the crest of which (at about 665 feet) towers over Devil's Den (at 520 feet). Though we often hear of how Confederate sharpshooters on Devil's Den made life miserable for Union infantrymen and artillerymen on Little Round Top, consider also that the Yankees, firing down from an eminence more than 125 feet higher, must have made it quite hazardous for any Rebel to stick his head out (Adelman and Smith, 1997).

Immediately after the battle, the crevasses of the Den provided temporary graves for many Confederate soldiers who died there—the bodies being simply tossed into the open fractures "in lieu of burial" (Adelman and Smith, 1997, p. 118). Although there exist several "posed" pictures of supposed dead at Devil's Den (see Frassanito, 1995, p. 296-297), apparently none of actual dead are known.

E. The "sharpshooter's position." This is the site of one of the most famous photographs of the Civil War, the dead Confederate sharpshooter behind a stone rampart on the back side of Devil's Den (Frassanito, 1975, p. 190; 1995, p. 269). Though taken only a few days after the battle and actually

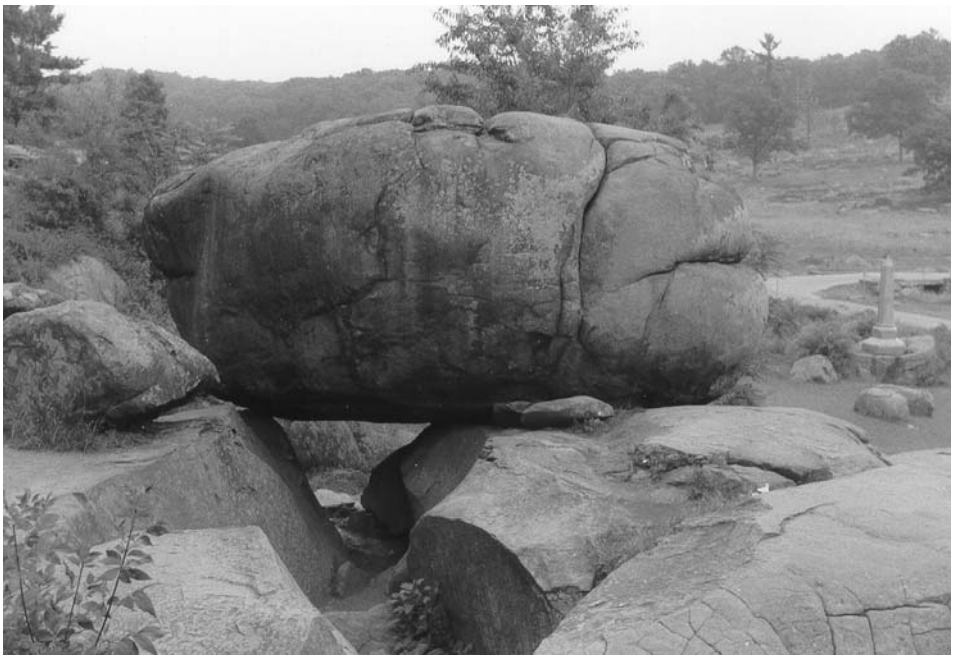


Figure 5-5. Table Rock (*Site C)*, looking northeast. On the right is the monument to the 4th Maine Infantry. Behind that can be seen the bouldery lower slope of Little Round Top on the other side of the Valley of Death.

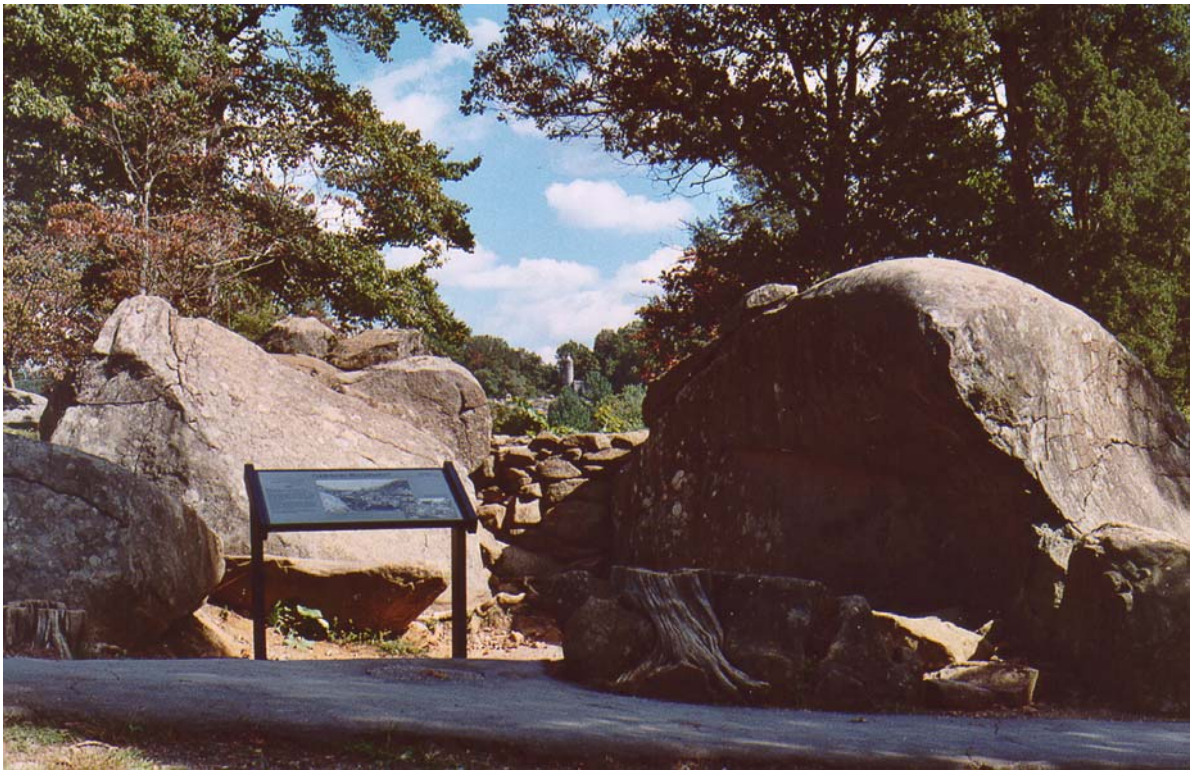


Figure 5-6. The "sharpshooter's position" (*Site E*). Note the splendid view of the summit of Little Round Top, the monument tower being that of the 44th New York Infantry (*Site H* of STOP 4).

picturing a dead Rebel soldier behind a wall almost certainly constructed during the night of July 2/3, the photo is an "historical distortion." Through the analysis of a series of photographs taken by Alexander Gardner and his assistants, William A. Frassanito (1975, 1995) has shown that the body was actually dragged from a spot 72 yards away and placed in the "sharpshooter's coven." The picture was completed by propping a rifle (not the kind a sharpshooter would use) against the wall.

As shown in Figure 5-6, the position does provide an excellent view of the summit of Little Round Top. Certainly someone "hid" here and fired at the enemy about 500 yards away—a distance that approximates the maximum effective range of a Civil War rifled musket (Grimsley and Simpson, 1999, p. 192).

F. The "triangular field." At the time of the battle, this diabase-strewn field (Figure 5-7) was owned by farmer George W. Weikert, who may have used it as a cattle or hog pen. Low stone walls bounded the tract on the north and southwest side, with a wooden fence on the east side next to the present road (later replaced by a stone wall). Across this small, relatively inconspicuous real estate, both Rebels and Yankees launched bloody attacks and counterattacks that left the ground strewn with the bodies of dead and wounded men. Initially the 1st Texas struck from the west against the 124th New York at the south end of Houck's Ridge. Then the 124th New York hit back and drove the Texans back beyond the edge of the field, but were themselves then driven back to the crest of Houck's Ridge (see *Site H*)—with the Texans capturing Devil's Den. As the confusing melee continued, the 4th Maine pushed the Texans into the woods northwest of the "triangular field." At this point, Benning's Georgia Brigade arrived on the scene, and the 20th Georgia (under Col. John A. Jones) attacked across the open field. Though initially stalled by withering fire from the 4th Maine and Smith's Battery (see *Site G*), the 20th Georgia and other units of Benning's and Brig. Gen. Evander M. Law's Brigades eventually drove the now greatly outnumbered Northerners from Devil's Den and off Houck's Ridge. The remnants of the 4th Maine, the 124th New York, and the rest of Ward's Brigade retired to the south end of Cemetery Ridge, where, with other shattered 3rd Corps units, they took up a position not far from where they had been early on the

Figure 5-7. The "triangular field," looking west (*Site F*). During the proper season, when the trees are in leaf and the grass is green, this open, rocky slope probably looks much like it did at the time of the battle. Here fell Col. Ellis and Maj. Cromwell of the "Orange Blossoms." Brig. Gen. Henry L. Benning (1814-1875), whose Georgians charged across this field, was aptly and affectionately known as "Old Rock."

afternoon of July 2—before Sickles had ordered his ill-fated advance to the "high ground" on his front! (Adelman and Smith, 1997; Grimsley and Simpson, 1999; Trudeau, 2002).

G. Monument to the 4th New York Independent (Smith's) Battery. Captain James E. Smith's battery played a pivotal, though somewhat controversial role in the battle for Devil's Den and Houck's Ridge—as is well documented in Adelman and Smith (1997). The 4th New York Battery consisted of six Parrott rifles, manned by more than 120 men. Two sections of the battery (four guns) went into position near the south end of Ward's line on the crest of Houck's Ridge, apparently just north of the exposed, rocky ramparts of Devil's Den and in front of the 124th New York and 4th Maine (Adelman and Smith, 1997, p. 26). The other section was placed with the caissons and horses 150 yards in the rear to cover the Plum Run gorge (Luvass and Nelson, 1987). (According to Smith, the position atop the hill had room for only four of his guns.) After an artillery duel lasting about 45 minutes, in which Smith's men suffered little because of the many protecting boulders, the Confederates launched a ferocious attack on the Union position. By the time the surging Confederates of the 3rd Arkansas and 1st Texas (Robertson's Brigade) neared his guns, the Union artillerymen had exhausted their case shot and shrapnel. Informed of this, Smith exhorted, "Give them shell; give them solid shot; damn them; give them anything!" (Adelman and Smith, 1997, p. 29). Smith's four main guns were eventually captured, then retaken—and finally at about 5:45 PM, Benning's and Anderson's Georgians drove Ward's Brigade off Houck's Ridge and finally captured three of Smith's advanced cannons—the fourth having been sent to the rear disabled (Grimsley and Simpson, 1999; Luvass and Nelson, 1987). Smith himself had previously left the position on the crest of the Houck's Ridge to go to his rear section of guns, which fired on the Confederates advancing northward through the Plum Run gorge before falling back.

Adelman and Smith (1997) note that the position of this monument is most likely in error, Smith's four advanced guns probably having been positioned on the crest of the Houck's Ridge near where the monument of the 99th Pennsylvania now stands.

H. Monuments to the 99th Pennsylvania and 124th New York Regiments. The 99th Pennsylvania was recruited mainly from Philadelphia and Lancaster Counties and numbered 339 officers and men at Gettysburg, 110 of whom where casualties. The regiment—commanded by Maj. John W. Moore—was originally posted along Houck's Ridge at the extreme right of the 2nd Brigade's line, but was later moved to the left between the 124th New York and the 4th Maine (posted in the "Slaughter Pen" along Plum Run) where they took a position "as firm as the rocks beneath their feet" on top of Devil's Den. From this elevated rampart, the 99th blasted away at the 44th and 48th Alabama Regiments below and temporarily stabilized the Union line (Adelman and Smith, 1997). The monument itself is coarsely crystalline, black-speckled, hornblende granite that contains a high percentage of quartz. Note that this granite appears to be spalling faster than some of the other monument stones, such as the Westerly and Quincy granites, probably due in part to its coarse grain-size.

The 124th New York (Figure 5-8) was a three-year regiment raised mainly from Orange County in the "Tri-States area" along the Delaware and Neversink Rivers. Their first action was at the battle of Chancellorsville, where they suffered 40 percent casualties and were immortalized (though unnamed) in Stephen Crane's *The Red Badge of Courage* (LaRocca, 1995). In the course of that battle, their commander, Col. A. Van Horne Ellis had dubbed his men "the Orange Blossoms"—and this colorful name has fittingly come down through history (Grimsley and Simpson, 1999, p. 80). After the "Orange Blossoms" fought off repeated attacks of the 1st Texas, Col. Ellis and Maj. James Cromwell, both mounted, led a charge across the Triangular Field at about 5:00 PM that momentarily broke the Texas line. At the far end of the field, the Texans turned and fired a withering volley that killed or wounded a quarter of the New Yorkers, including Cromwell (killed). Benning's Brigade then hit the Yankees and drove them back to the crest of Houck's Ridge, Ellis falling dead along the way, a bullet through his head (Grimsley and Simpson, 1999; Adelman and Smith, 1997).

I. Houck's Ridge. Looking north from this highest point on the ridge encompasses much of the field of action of some of the later fighting on Sickles' left flank (Figure 5-9). Ward's original line angled off through the woods to the left, its right (just south of the Wheatfield) being held originally by the 99th Pennsylvania and later by the 20th Indiana (Adelman and Smith, 1997). After the Union forces had been driven from the Wheatfield early in the evening, Brig. Gen. Samuel Crawford led part of his 3rd Division of the 5th Corps on the spirited counterattack described at mile 8.15. Though Crawford's charge carried to the Wheatfield, his Pennsylvania Reserve Regiments were soon driven back. From then till their retreat on July 4/5, the Confederates retained possession of Devil's Den, Houck's Ridge, and the Wheatfield (Adelman and Smith, 1997; Jorgensen, 2002).

In 1872 Crawford himself purchased Devil's Den and much of the land visible from here. Up to the time of Crawford's death in 1892, this 47-acre tract of land was known as Crawford Park. He never followed through on his promise to deed or will his land over to the Gettysburg Battlefield Association—an omission that resulted in gross commercialization of this part of the battlefield (see Adelman and Smith, 1999, p. 78-91).

Figure 5-8. Monument to the 124th New York Infantry (*Site H*). Col. Ellis calmly surveys the "triangular field," waiting for the Confederates' next attack. According to Hawthorne (1988), this monument—carved from St. Johnsbury Vermont granite—is the only one on the battlefield that contains a full-length portrait stature of a regimental commander.

Figure 5-9. Houck's Ridge (left) and the Valley of Death (right) from *Site I*. The woods in the right distance mark Cemetery Ridge. Many of the granite monuments and markers on Houck's Ridge are to U.S. Infantry Regiments of Brig. Gen. Romeyn B. Ayres 2nd Division of the 5th Corps. The Regulars fought over this ground as part of the hours long engagement at the Wheatfield—and in retiring across the Valley of Death after being driven off Houck's Ridge, suffered "staggering" casualties (Jorgensen, 2002).

STOP 6. The Peach Orchard: Day 2 action and the Rose Farm.

Leaders: Jon D. Inners and Richard H. Howe.

I took up that line because it enabled me to hold commanding ground.
Maj. Gen. Daniel Sickles
(Quoted in Grimsley and Simpson, 1999, p. 117)

The Peach Orchard (Figure 6-1) is the center of one of the major controversies of the battle of Gettysburg. Late in the morning and early in the afternoon of July 2, Maj. Gen. Daniel E. Sickles shifted his two-division-strong 3rd Corps from its original position on the Union left to higher ground on his front. His assigned line was to run along the south end of Cemetery Ridge to the crest of Little Round Top (Trudeau, 2002, p. 295). By the time he had established his final line to the west, it stretched for twice the distance of the original and formed a dangerous salient. The stage was now set for some of the bloodiest fighting of the entire battle, with action extending from the Emmitsburg Road southeastward to Little Round Top, a frontal distance of nearly two miles.

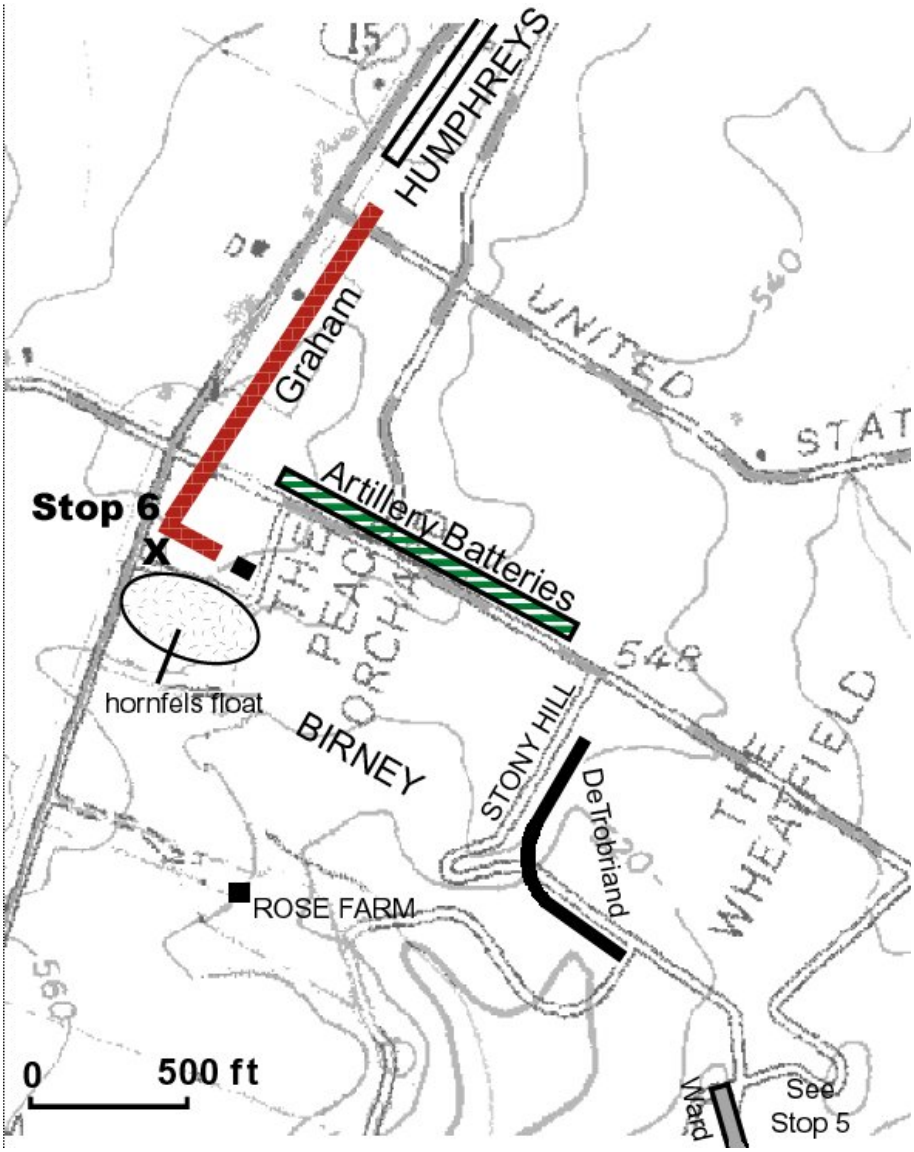


Figure 6-1. Location map for STOP 6, showing disposition of 3rd Corps DIVISIONS and brigades.

Terrain. The Peach Orchard is situated along the Emmitsburg Road about 4000 feet west of Cemetery Ridge. (The Peach Orchard of the battlefield was part of a larger orchard owned by the Sherfy family that originally extended beyond Wheatfield Road to the northeast [Grimsley and Simpson, 1999].) With an elevation of a little over 580 feet, it is 35 to 40 feet higher than the low spot on the 3rd Corps line that was vacated by Sickles in his unauthorized movement to the west. The low ridge at the Peach Orchard is uninterrupted northeastward along the Emmitsburg Road for 3000 feet, but to the southwest it is scalloped by two small streams that form the headwaters of Rose Run.

As noted by Gramm (1997), the Peach Orchard occupies a significant elevation relative to the surrounding terrain:

> From the Rose Farm, Kershaw's men [Confederate] had to go up a hill-slope steep enough that you can't see the peach trees from the rivulet north of the [Rose] farm [Figure 6-2]. From the Peach Orchard you have a long view of Pickett's Charge—all of which is lower. The land slopes down toward the Trostle Farm and the main Union line. From Seminary Ridge, the Peach Orchard appears as an eminence (p. 113).

Besides the higher elevation of the Peach Orchard, another rational cited by Sickles for taking a position forward of Cemetery Ridge was the fact that woods on his original front (northeast of the Trostle Farm) partially obscured his view to the west (Doubleday, 1994; see Trudeau, 2002, p. 295).

As discussed in some detail at STOP 3, Sickles was afraid the Confederates would place artillery at the Peach Orchard and have a relatively free hand at shelling the Union forces only a little more than one-half mile away. He was not going to allow Meade to duplicate Hooker's mistake at Chancellorsville (see Kaufmann, 1999, p. 215).

Geology. The Peach Orchard is underlain by shale and sandstone of the Gettysburg Formation baked to hornfels by the diabase of the Gettysburg sheet to the southeast (Stose and Bascom, 1929). The hornfels zone is mapped as about 1800 feet wide and extends from just northwest of Sickles Road at the "Stony Hill" to slightly beyond the Emmitsburg Road. No outcrops occur in the vicinity, but gray hornfels float litters the surface of the soybean field just south of the orchard. Unlike areas underlain by diabase, the Peach Orchard apparently had no preexisting stone walls—and the battle here was fought by lines of men out in the open.

Figure 6-2. View south from the Peach Orchard toward the low ground at the head of Rose Run. The Rose farmhouse is partially hidden by trees on the left.

Sickles and the Peach Orchard salient (July 2). Sickles began his redeployment late in the morning by sending three regiments of Brig. Gen. Hobart Ward's 2nd Brigade out to the Wentz Farm, just northeast of the Peach Orchard. By 3 PM he had completed the repositioning of his troops, having moved his right out to the Emmitsburg Road, his center to the Peach Orchard and his left to Devil's Den (Trudeau, 2002; see STOPS 3 and 5). At the Peach Orchard, the regiments of Brig. Gen. Charles K. Graham's 1st Brigade formed a salient, facing west across the Emmitsburg Road and south toward the Rose Farm (see Figure 6-1). But as Doubleday (1994) observes, "The disadvantages of this position are obvious enough."

> It is impossible for any force to hold its ground when attacked at once on both sides which constitute the right angle. The diagram [Figure 6-3] shows that the force A will have both its lines a^1 and a^2 enfiladed by batteries at b^1 and b^2, and must yield. The ground, however, may be such that the enemy cannot plant his guns at b^1 and b^2; but under any circumstances it is a weak formation and the enemy easily penetrate the angle. When that is the case, and it was so in the present instance—each side constituting the angle is taken in flank, and the position is no longer tenable (p. 163).

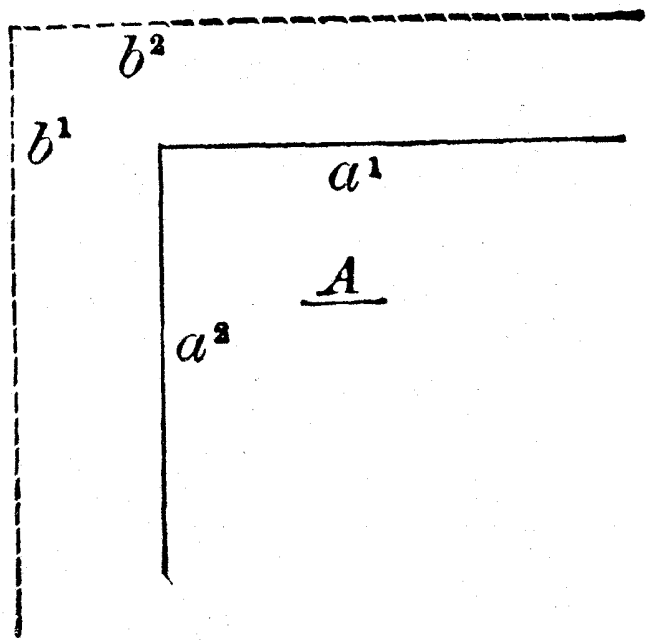


Figure 6-3. The weakness of a salient as illustrated by General Abner Doubleday (1994, p. 163). The letters are explained in the text.

To Graham's right was the 2nd Division of Brig. Gen. Andrew Humphreys and to his left, along Wheatfield Road (at that time, the Millerstown Road), was a line of artillery batteries extending east to the "Stony Hill" (see Figure 6-1), the 15th Battery, New York Light Artillery, nearest the Peach Orchard on the right, and the 9th Battery, 9th Massachusetts Light Artillery (see mile 17.1), on the left. In all there were seven Union batteries in the Peach Orchard salient (Figure 6-4)—42 guns in a solid line along the Emmitsburg Road and across the Orchard (Gramm, 1997) and another dozen or so at right angles down the Wheatfield Road toward the Wheatfield.

Late in the afternoon, the Confederates on Warfield Ridge opened an intense artillery barrage against the two sides of the Peach Orchard salient. At 5 PM, Brig. Gen. Joseph Kershaw's Brigade (McLaw's Division, Longstreet's Corps) struck across the fields a little south of the orchard, his right heading eastward toward "Stony Hill," and his left swinging around to the north to attack the Union artillery lined up along Wheatfield Road. His men took fearful losses as they advanced (Trudeau, 2002). Further confusion in the Confederate ranks, due to miscommunication of orders, led to even worse casualties on Kershaw's left, as his men pulled back from the cannons and "turned their flank and rear toward the Yankee gunners." A private in one of Kershaw's regiments later wrote of "the awful deathly surging sounds of those little black [canister balls] as they flew by us, through us, between our legs and over us." Said Kershaw himself, "Hundreds of the bravest and best men of Carolina fell, victims of this fatal blunder" (Trudeau, 2002, p. 352).

Figure 6-4. Monument to Hampden's Battery F, Pennsylvania Light Artillery along the northeast edge of the Peach Orchard. Because of its high losses in previous battles, Capt. Robert Hampton's battery fought as part of another battery at the Peach Orchard (Hawthorne, 1988). The prominent monument in the middle distance to the left is that to the 73rd New York Infantry (the 2nd Fire Zouaves) of the 2nd Brigade, 2nd Division, 3rd Corps. Behind the New York monument the ground can be seen sloping down toward Cemetery Ridge on the skyline. The white dome, capped by a bronze statue, barely visible above the trees is the Pennsylvania State Memorial.

Despite this initial setback, it was soon the Union forces that were in trouble. At about 6:30 PM Barksdale's Mississippi Brigade (the 13th, 17th, 18th, and 21st Regiments) attacked the apex of the salient, drove the enemy out of the Peach Orchard, and seriously threatened Humphrey's left flank. Caught up in the maelstrom were the 141st Pennsylvania (Figure 6-5) and the 3rd Michigan Infantries. The former (one of Graham's regiments) suffered horrendous casualties in Peach Orchard, both to artillery and in Barkdale's final assault. According to Faust (1986), "By its tenacity on the field, the regiment enabled its brigade to hold the line for some time after supporting units gave way, winning the admiration of participants and observers on both sides." The 3rd Michigan (Figure 6-6), one of Col. Regis de Trobriand's regiments that was detached from the rest of the 3rd Brigade, was the leftmost infantry unit in the orchard itself.

Although the Confederates controlled the Peach Orchard on July 3, and could have used it—as Sickles feared—to site artillery for the great cannonade that preceded "Pickett's Charge," their line of batteries along the Emmitsburg Road stopped short of the Sherfy Farm. The orchard fielded no guns that afternoon (Trudeau, 2002, p. 445; see Figure 8-2).

The Rose Farm. Bordering the John Sherfy farm on the south at the time of the battle was the farm of John P. Rose and his family, the house being located about 1,200 feet south of the Peach Orchard.(see Figure 6-1). The Rose farm was quite extensive, including within its bounds "Stony Hill," the

Figure 6-5. Monument to the 141st Pennsylvania Infantry at the northeast corner of the Peach Orchard. Note that in this direction also the ground slopes down before rising again toward the tree-covered "Stony Hill." Hornfels underlies the foreground. The hornfels/diabase contact lies approximately at the treeline on "Stony Hill."

Figure 6-6. Monument to the 3rd Michigan Infantry at the southeast corner of the Peach Orchard.

Wheatfield, and Rose Woods. The present notoriety of the Rose Farm and Woods is due in large part to the detective work of William A. Frassanito (1975, 1995), who has conclusively demonstrated that a series of famous photographs of Confederate dead, taken just a few days after the battle by noted Civil War photographer Alexander Gardner (1821-1882) and his crew, originated there. Gardner's "death studies" were sited at the edge of Rose Woods about 1000 feet southeast of the farmhouse (Figure 6-7). The forty-four dead soldiers in the photographs apparently belonged to three of the Georgia regiments in Brig. Gen. Paul J. Semmes' Brigade and one of the South Carolina regiments in Kershaw's Brigade (both brigades being in McLaw's Division). They fell in the Confederate counterattack against the five Union regiments of Col. John R. Brookes' Brigade (Caldwell's 1st Division, 2nd Corps), who had driven the Confederates completely out of the Wheatfield and Rose Woods. Brooke's brigade was unable to advance beyond a diabase ledge at the west edge of the woods (marking the west edge of the Gettysburg sheet) and was soon forced to give way, making a hasty retreat—along with the rest of Caldwell's command—back across the Wheatfield and Houck's Ridge to Little Round Top.

Figure 6-7. Confederate dead at the southwestern edge of the Rose Woods, looking southwestward toward Warfield Ridge (Frassanito, 1995, p. 343, Photo 111). Note the large diabase boulder.

STOP 7. Culp's Hill: Observation Tower, Days 2 and 3 action, and the York Haven Diabase.

Leaders: John C. Neubaum and Victor A. Neubaum.

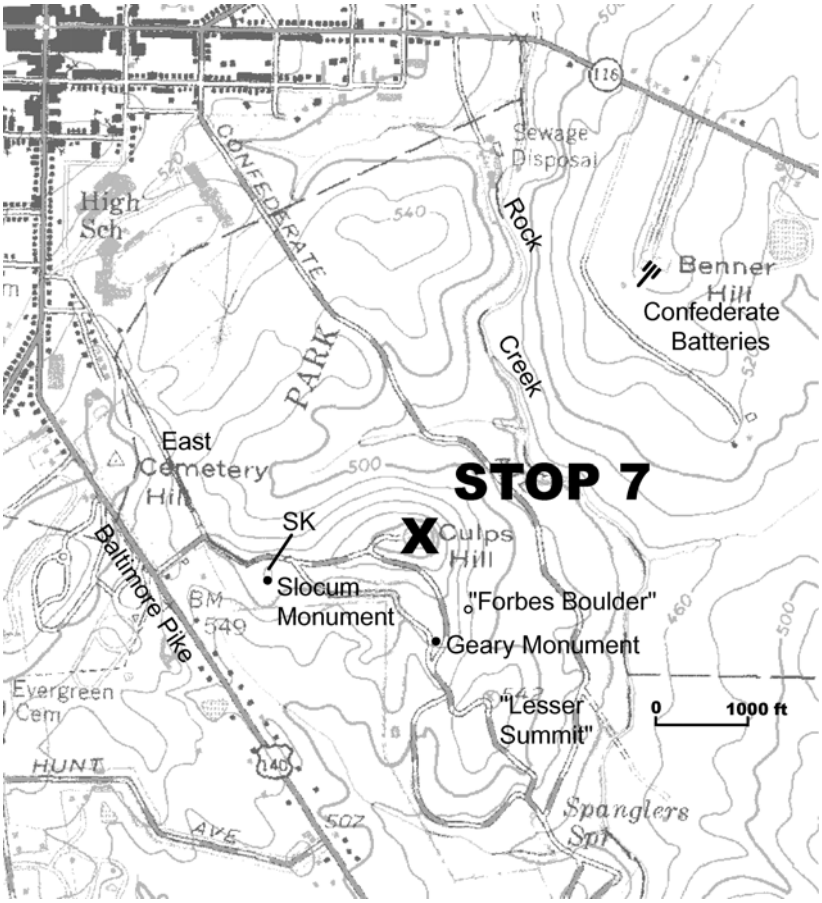


Figure 7-1. Location map of STOP 7. SK = Stevens' Knoll.

We will spend most of our time at this STOP in the Observation Tower (Figure 7-1)—which should be designated "Greene Tower" as will be made abundantly clear in the discussion below. Hopefully, there will be some time left to look around on the ground. Many spots on Culp's Hill mentioned in the Roadlog (including the Spangler's Spring area, the diabase boulders at mile 14.0, and Stevens' Knoll) are definitely worth visiting.

The view from the tower. Although trees obscure some of the view from the top of the Culp's Hill Observation Tower (especially from late Spring to Early Fall), much can still be seen from here that gives insight into the action along this part of the Union "fishhook" and the overall effects of terrain on the Gettysburg Campaign (Figures 7-2 and 7-3). As at STOP 3, a metal disk in the center of the platform serves as a "gunsight" pointing to various points of interest.

Azimuths to some of these are as follows:

N 90°W	South Mountain
N85°W	Cemetery Hill and Gatehouse (partially obscured by trees)
N55°W	Lutheran Seminary and Cashtown Gap
N30°W	Eternal Light Peace Memorial on Oak Hill (The hill is underlain by the roughly north-south-striking Warfield Ridge diabase dike.)
N40°E	Benner Hill (Confederate artillery position on July 2 and 3—Johnson's Division of Ewell's Corps.)
N80°E	East Cavalry Field
S80°E	Wolf Hill
S40°E	Sheep Heaven
S10°E	Powers Hill
S25°W	Little Round Top and Big Round Top
S60°W	Cemetery Ridge and field of "Pickett's Charge"
S70°W	Seminary Ridge

Cemetery Hill, Cemetery Ridge, Benner's Hill, Wolf Hill, Sheep Heaven, Powers Hill, and the Round Tops (as well as Culp's Hill) are all underlain by York Haven Diabase of the gently northwest-dipping Gettysburg sheet, the outcrop belt of which is up to two miles wide in this vicinity (Bascom and Stose,

1929). Flowing through a wooded, boulder-strewn valley about 0.3 miles east of the tower is south-flowing Rock Creek.

Figure 7-2. View south-southwest from the Culp's Hill Observation Tower. Big Round Top, the dark eminence left of center, anchors the Union left as the "eye" of the "fishhook." The Union defensive line extends almost due north from there along Cemetery Ridge to Cemetery Hill (out of view to the right) before bending around to Culp's Hill. South Mountain forms the skyline on the right. The narrow belt of trees clearly defined against the distant mountains is probably Warfield Ridge.

Figure 7-3. View northwest from the Culp's Hill Tower, with Gettysburg (held by the Confederates throughout the battle) in the middle distance. This section of the Confederate line was manned mostly by Early's Division of Ewell's Corps (including Gordon's Brigade, which saw little action after figuring so prominently in the 1st Day's fight). South Mountain runs the entire length of the skyline, with Cashtown Gap approximately in the middle.

Figure 7-4. Monument to Brig. Gen. George Sears Greene (1801-1899) at the crest of Culp's Hill. After the war, Greene resumed his career as a civil engineer. A two-ton boulder of Culp's Hill diabase rests on his grave in Warwick, RI, as he had requested (Hawthorne, 1988).

The battle for Culp's Hill. When reviewing action on the 2nd Day, places like Little Round Top, Devil's Den, the Peach Orchard and the Wheatfield get the lion's share of attention—and Culp's Hill is relegated to a footnote in history. Culp's Hill, however, deserves greater attention and is no less important to the outcome of the battle than other more famous locations. This York Haven Diabase hill anchors the right flank of the Union line and was hotly contested on July 2 and 3. It is no less strategically important than the ground defended by Joshua Lawrence Chamberlain and the 20th Maine, for the Union line could have been turned if Culp's Hill had been taken and Meade would likely have been forced to abandon his position. It was only about three quarters of a mile from the top of Culp's hill to the Baltimore Pike, the main supply route and line of communication for the Union army. Here also took place a bayonet charge by Union forces, the only known suicide on the battlefield, and the only place where Northern and Southern forces from the same state, Maryland, exchanged direct fire.

Culp's Hill is not one giant hill, but rather two hills 400 yards apart forming one large elevation. The north hump is what is known as Culp's Hill and is 180 feet above Rock Creek (Figure 7-1). The south hump is the lesser summit, some 80 feet high where the only Confederate success took place. Between the two hills is a narrow saddle going from east to west. Some 850 yards from the higher summit was a marshy meadow bordering the southern end of the hill.

Some impressive breastworks were built on Culp's Hill under the direction of Union Brig. Gen. George Sears Greene, who—at 62—was the oldest Union general serving at the time (Figure 7-4). He employed his engineering knowledge from when he taught at West Point to direct the construction of the fortifications. Maj. Gen. John Geary (see mile 13.9), Greene's boss and division commander, was opposed to building rifle pits saying it would make the men unfit to fight in the open. Fortunately, Greene prevailed.

Culp's Hill was remembered by Confederate Maj. Gen. Edward ("Allegheny Ed") Johnson (1816-1873), whose division assaulted Culp's Hill, as "a rugged rocky mountain, heavily timbered and difficult of assent; a natural fortification rendered more formidable by deep entrenchments and thick *abatis*." There does not seem to be any remaining evidence of deep entrenchments mentioned by Johnson and it would have been difficult and time consuming to dig deep into the rocky soil and diabase. Rather than attempt to dig down deeply, the Union troops probably felt it was easier to build up fortifications using the natural terrain and plentiful trees and rocks. (Frassanito [1995] contains several early post-war photographs of breastworks and shallow entrenchments on Culp's Hill.) Colonel Fox of the Union 12th Corps recalls, "The men immediately commenced the construction of breastworks, for which the woods and rocky condition of the ground furnished ample material. Profiting by their experiences at Chancellorsville, the troops constructed works of a substantial character." Capt. Jesse Jones of the 60th New York Volunteers described the building of the breastworks on the morning of July 2 this way:

> This regiment was largely composed of men accustomed to woodcraft, and they fell to work to construct log breastworks with unaccustomed heartiness. Culp's Hill was covered with woods; so all the materials needful were at our disposal. Right and left the men felled the trees, and blocked them up into a close log fence. Piles of cordwood which lay near by were quickly appropriated. The sticks, set slanting on end against the outer face of the logs, made excellent battening. All along the rest of the line of the corps a similar defense was constructed. Fortunate regiments, which had spades and picks, strengthened their work with earth. By 10 o'clock it was finished.

Greene should be given the lion's share of the credit for the successful defense of Culp's Hill. It was Greene's trained engineers eye that directed earthworks be tied in with terrain and interlocking fields of fire that subjected attackers to a withering crossfire.

This deliberate concentration of firepower was a precursor of modern warfare.

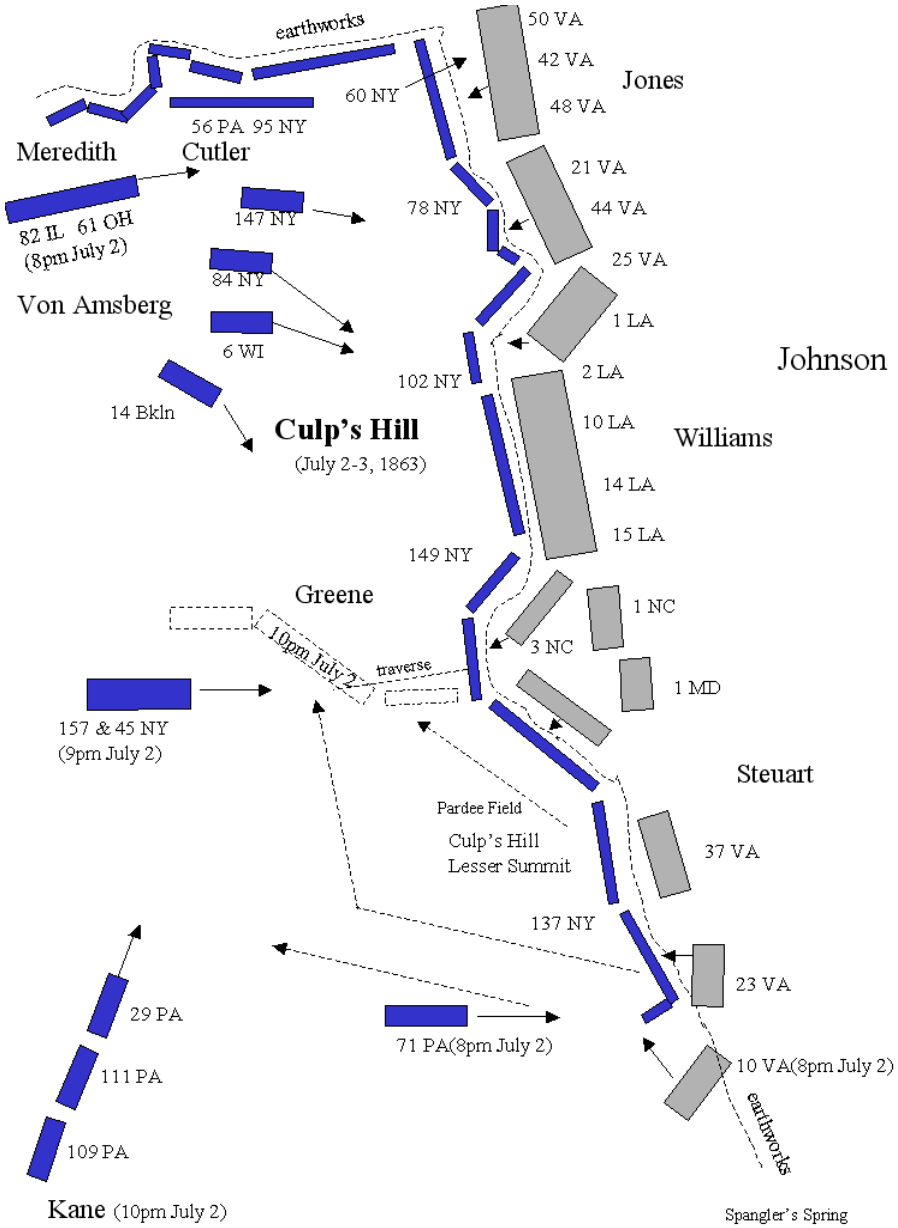


Figure 7-5. Approximate Union and Confederate positions on Culp's Hill, evening of July 2. Union troops of the 12th Corps, withdrawn to support the Union left beginning at 6 PM, began filtering back between 8 and 10 PM. (Greene's brigade had held its position.) Confederates attacked about 7pm. Sporadic and sometimes heavy fighting continued until midnight. Sporadic fighting continued until midnight. The bloody contest resumed early the next morning and lasted until noon, with the Union recapturing breastworks on the "lesser summit" lost the night before. This permanently expelled the Confederates from Culp's Hill and ended their only limited success on the Union right.

The Confederate attack started around twilight on July 2 (Figure 7-5) and was apparently delayed by Lee in order to coordinate with Longstreet's attack on the Union left. Normally Confederate officers would lead their men on horseback, but the terrain was so rough and strewn with boulders that they had to dismount and lead them on foot. Even as the attack began, 44th Virginia commander Capt. T.R. Buckner recalled that "all was confusion and disorder." Most fighting took place in the dark and lasted up until midnight. The rebels had a difficult time with the steepness of the terrain, but with great determination pushed to within 100 yards of the Union line and in some places got close enough to grasp Union regimental flags, dying as they did so. According to Capt. T. R. Buckner, "The works in front of our lines were of a formidable character, and in some places they could scarcely be surmounted without scaling ladders." One Union officer compared the large diabase boulders dotting the terrain to "a herd of sleeping elephants", gray masses that must have loomed even larger in the darkness. All of this hampered the Confederate attack.

In the confusion of darkness, one Confederate brigade, that of Brig. Gen. George H. Steuart (1828-1903), became separated moving far to their left and took some breastworks that had been accidentally left unoccupied by 12th Corps troops. Meade had withdrawn most of Slocum's 12th Corps from Culp's Hill about 6 pm on July 2 to reinforce the Union left wing, leaving only Greene's brigade. This was on some flatter easier ground, the lesser summit mentioned earlier, and would prove to be the rebel's only success. However,

they could not hold that section of the breastworks when counterattacked the next morning by reinforcements rushed back to deal with the attack.

Early's attack on Cemetery Hill, two brigades forward and one in reserve, used a wide ravine between Culp's and Cemetery Hills as an avenue of attack but were beaten back, in no small part by cannons placed on Steven's Knoll (see mile 14.5). The Confederates had some limited success, however, breaking through part of the Union line and capturing a few guns, but could not hold them as Union reinforcements advanced (see miles 14.6 and 14.8). Gordon's brigade was called to support the attack but was too far to the rear to make it in time. Early's attack also lacked coordination with Rodes' Division, which hampered them further. Rodes' Division, depleted by the 1st Day's action, made a half-hearted advance on Early's right to support him after his attack had already begun and then retired.

Basically, it was too steep and too dark for the Confederate attacks to succeed even though they had the Yankees outnumbered about three to one. Breastworks built under General Greene's direction were a key factor in the Union's ability to repulse repeated Confederate attacks. Greene's one reinforced brigade held off Johnson's Confederate division the night of July 2/3. Also, the rebels' inability to properly support their advantages at Cemetery Hill and on the lesser summit of Culp's Hill helped doom them to failure.

According to Meade after the war, Confederate 2nd Corps Commander Lieut. Gen Richard Ewell told him that he had 20,000 troops in column ready to attack Culp's Hill at 4 PM on July 2, but was restrained by Lee. Lee was purportedly concerned about reports of the Union 5th Corps moving up the Hanover Road heading for Culp's Hill. Ewell asked Meade what he thought would have happened if he had taken Culp's Hill and Meade responded that the entire Union position would have been compromised since Culp's Hill and Cemetery Hill are commanding positions.

Near Slocum's Monument on Stevens Knoll, named for Capt. Greenleaf Stevens, whose 5th Maine Battery was placed there, are earthen artillery lunettes that offered some protection to the field pieces and cannoneers (see mile 14.5). The Union guns had the advantage during an artillery duel preceding the Confederate attack for there was only one adequate but small location, Benner's Hill, on which the Confederates could place their cannon—and it was exposed to devastating cross fire from both Culp's and Cemetery Hills. East Cemetery Hill also has some good examples of artillery parapets right in front of the entrance to Evergreen Cemetery (mile 14.8).

Meade proposed to attack Lee from Culp's Hill on July 2, but was advised against it by Chief Engineer G. K. Warren and Union right-wing commander Henry Slocum since it was deemed more suitable for defense and too few troops were available. Meade dropped the plan.

After the battle, General Slocum attributed "the failure of the enemy to gain possession of our works…entirely to the skill of General Greene and the heroic valor of our troops."

STOP 8. Crest of Cemetery Ridge: Day 3 action (Pickett's Charge, the "Bloody Angle," and the "High Water Mark") and the York Haven Diabase.

Leader: Roger J. Cuffey.

I tell you there is no romance in making one of these charges…..When you rise to your feet…, I tell you the enthusiasm of ardent breasts in many cases ain't there*, and instead of burning to avenge the insults of our country, families and alters and firesides, the thought Is most frequently,* Oh*, if I could just come out of this charge safely how thankful* would I be!

John Dooley, 1st Virginia
(Quoted in Trudeau, 2002, p. 476)

The climax of the battle of Gettysburg came on July 3 on Cemetery Ridge at STOP 8 (Figure 8-1). Preparations on both sides continued and took the entire morning. (Nobody in the Civil War could get going before noon because of the complex logistics). By 1:00 PM, the main battlefield was ready. Each side had lined up 100 to 150 cannon along each of the two ridges, the Confederates on Seminary Ridge (Rossville Diabase), the Union on Cemetery Ridge (York Haven Diabase) (Figure 8-2). The Confederates opened fire and bombarded the Union line for about an hour; the Union artillery fired back; the noise was horrendous, and reportedly was heard 100 miles to the west in Johnstown, and 200 miles west in Pittsburgh. The Union artillery commander, Brig. Gen. Henry J. Hunt (1819-1889) remembering Meade's supposition about a center attack, told his people to save about half their ammunition for an impending infantry assault. Longstreet's artillery chief, Col. Edward Porter Alexander (1835-1910), noticing that Union fire was slackening, assumed that the Confederate cannonade had savaged the Union guns and their crews. He told Longstreet and Pickett that they should charge now. Alexander apparently hadn't thought of the possibility that the Union might have been hoarding their ammunition supplies.

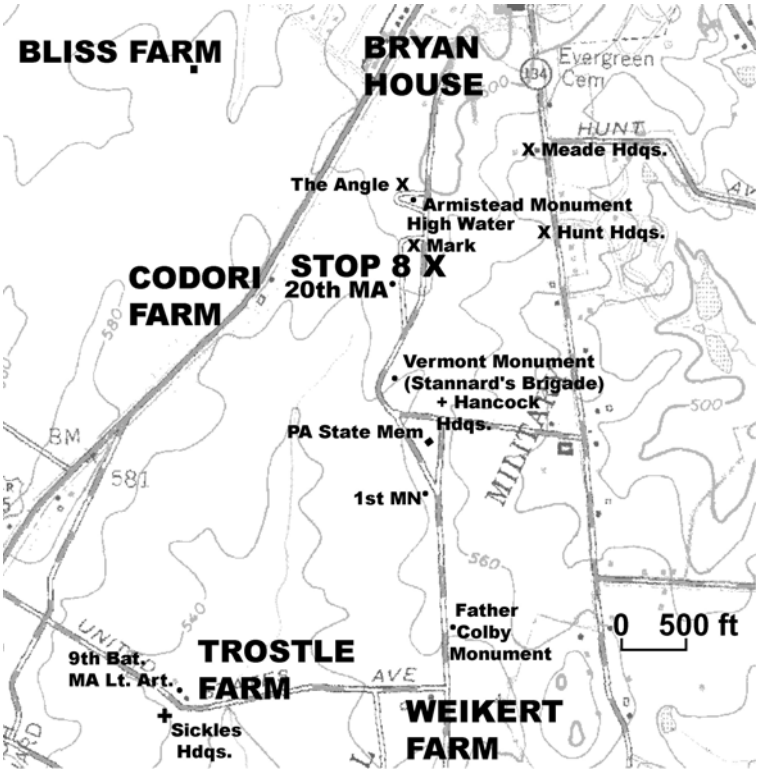


Figure 8-1. Location map for STOP 8, showing some important features and monuments.

Figure 8-2. Confederate and Union artillery alignments for the "great cannonade." Arrows indicate Confederate battery advancements during "Pickett's Charge" (Trudeau, 2002, p. 445).

Between 2:00 and 3:00 PM, the Confederate infantry formed wide-line ranks, 3-4-5 lines and marched out from Seminary Ridge's woods onto the open grassy lowland. Three divisions were involved (Figure 8-3). The lead on the Confederate right end was Pickett's Virginia Division, and Pickett was in overall command (hence the attack is known as "Pickett's Charge"). The lead on the left was a division from North Carolina, and the rear lines were another North Carolina division; the two North Carolina divisions were under Brig. Gen. J. Johnston (1828-1863) and Maj. Gen. Isaac R. Trimble (1802-1888). Longstreet saw that there was essentially no cover for his troops as they would go across the grassy lowland toward Cemetery Ridge. He tried to persuade Lee to call it all off.

Lee persisted. Why? Some suggest he thought his Confederate infantry was invincible; more likely, he knew about and was imitating a similar frontal assault over in Europe four years earlier that had succeeded. In 1859 Napoleon III's French army had attacked the Austrians at Solferino, with an opening cannonade followed by a massive frontal attack. The assault broke through the Austrian line, effectively ending that war in France's favor—on the spot (Uffindell, 1999). The fatal difference, however, was that the Union had much more artillery than the Austrians had had, and Lee couldn't see that from his vantage point across on Seminary Ridge.

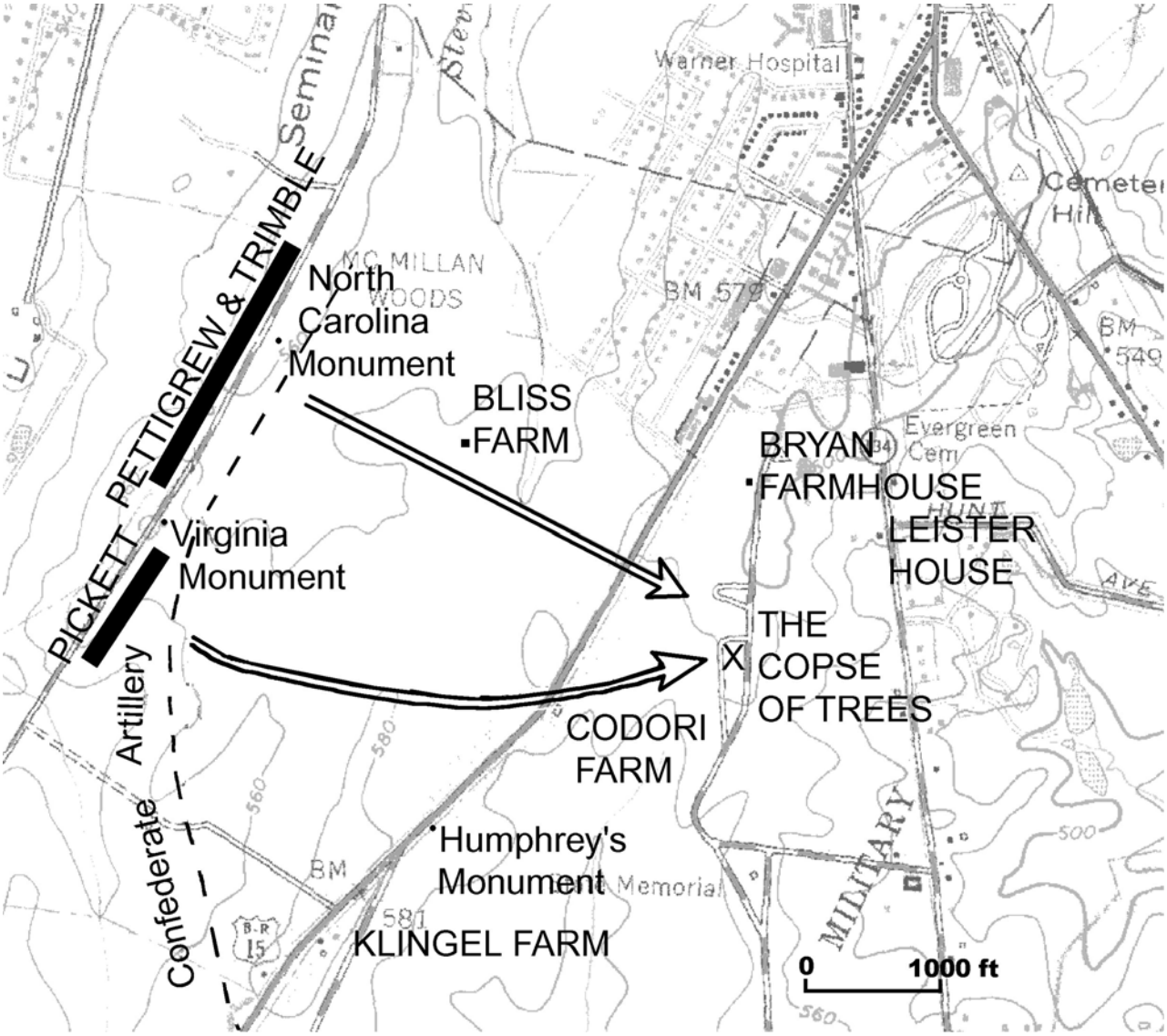


Figure 8-3. "Pickett's Charge."

Pickett's ranks stepped off in almost parade-like fashion. The Union troops were hushed; they said later it was an awesome spectacle, to see these 15,000 men coming toward them. About halfway across the lowland runs a road (Emmitsburg Road), northeast-southwest into town. When the marching troops reached that road, they had to break up ranks and climb over wooden rail fences on both sides of the road. Seeing the resulting disorganization and slow-down, as well as realizing the Confederates were now in cannon range (not yet in musket range—this battle is about to be decided largely by the artillery), the Union cannon opened fire (again), and tore huge swaths of destruction thru the Confederate ranks. The Union cannoneers loaded their guns with shotgun-pellet-like "canister," especially destructive against troops in the open. As shown in Figure 8-3, Confederate cannon on the right followed the advancing troops, firing over their heads toward the Union line. But the enemy return fire was too concentrated, and little advantage resulted to the Confederates.

Pickett's troops tried to keep their ranks close together, angling their line of march as they came through (Figure 8-2) the withering bombardment, narrowing the front line of the charge as they came up the slope to the crest of Cemetery Ridge, narrower and narrower the more Confederates fell dead. After 15-20 minutes of all this, a group of about 100 Confederates jumped over the stone wall (led by General Armistead) at what's called "The Angle" from the bend there in the stone wall's course) but were immediately surrounded by about 10,000 Union soldiers and killed or captured in a couple of minutes. This was the "high-water mark" of the Confederacy, but had no military consequence because of the small number of men who “made it over the wall” (Figure 8-3). The Union soldiers at the point of crossing the wall waved their flags violently. The remaining Confederates saw this signal, stopped where they were, coming across the lowland, and they all turned around and headed back west to Seminary Ridge, in individual fashion, rather than as organized ranks. As the Confederates retreated away, the Union soldiers just stood along the top of the wall and yelled after them, "Fredericksburg! Fredericksburg!"

Figure 8-4. Detail of “July 1863—Gettysburg” (1870) by Peter Frederick Rothermel (1812-1895). (Pennsylvania State Museum.)

The next day, July 4, turned rainy, with heavy downpours. Such rainfall had occurred immediately after several other Civil War battles. Apparently all the smoke and dust particles acted like "cloud seeding," furnished meteorological nuclei far more than would regularly have been the case.

That evening, Lee set his army on the road south. It was the morning of the following day before Meade realized that the enemy was in full scale retreat.

Meade did not pursue vigorously, probably a wise decision. The victory was so narrow and costly that, even though Lee's army was wounded, it could well turn, fight, and defeat the equally wounded Union army. They're leaving - let 'em go!! At least they won't now be able to threaten Washington. Lincoln's displeasure at Meade not pursuing reflects Lincoln's lack of understanding of the realities of these difficult battles, rather than any cowardice or loss of nerve on Meade's part. Also, again, remember that Meade had not yet had time to get ANY maneuvering experience running his own command around effectively, whereas Lee had two full years of experience in handling the Army of Northern Virginia..

Why didn't President Jefferson Davis sack Lee after this battle? Probably because Lee was still the best they had, and sometimes a loss teaches a receptive commander enough that he becomes a better leader thereafter.

The Battle of Solferino (24 June 1859)
by
Roger J. Cuffey

Four years before Gettysburg, the village of Solferino in what is now north-central Italy (then "Lombardy") saw one of the biggest battles of mid-19th -century Europe, one which was decisive to the outcome of the war then between France and Austria (Uffindell, A., 1999, Glory costs too much: Military History Quarterly 12(1): 102-111). Robert E. Lee, the Confederate commander at Gettysburg, was a professional soldier 20 years into his military career, and thus would seem likely to have heard about this important battle. Moreover, similarities between that action and Picket's Charge climaxing Gettysburg suggest that Lee may have had Solferino in mind when planning his 3rd day's operations at Gettysburg (see p. 90 in this present guidebook). However, Lee's final outcome was unfortunately different, because the Union artillery had many more cannons than the Austrian defenders against Napoleon III had had.

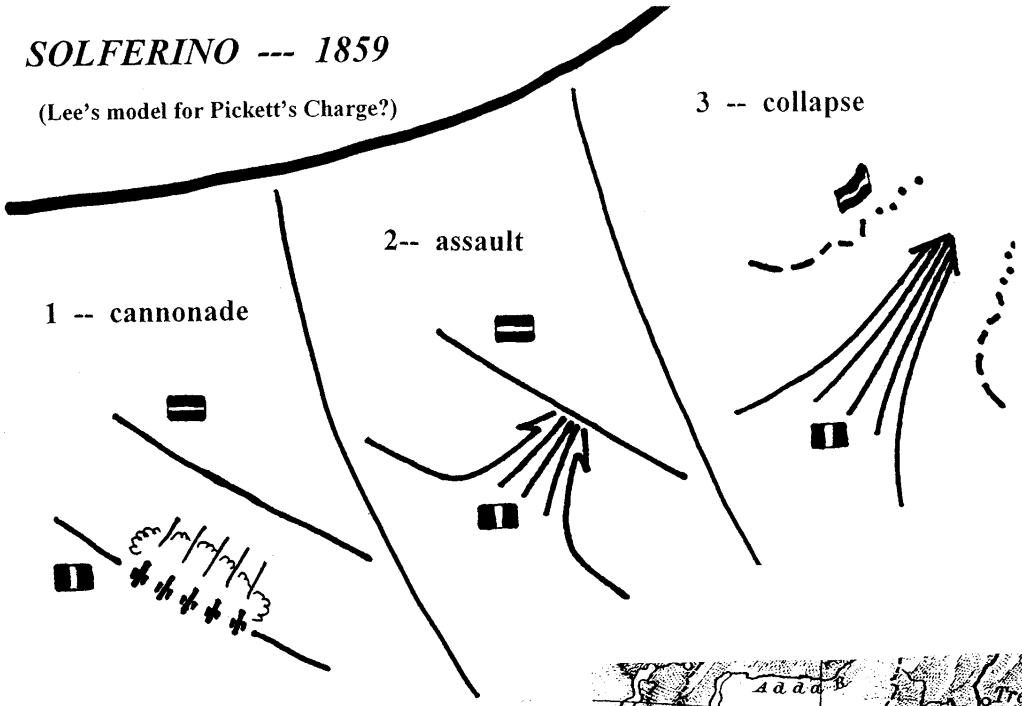


Figure 8-5. Diagrammatic summary of critical phases in the Battle of Solferino. Location (inset; from Shepherd, W.R., 1929, Historical Atlas, 7th ed.; Henry Holt, New York, p. 158).

Figure 8-6. "Emperor Napoleon III at Solferino", painted by Meissonier, who witnessed the battle and later extensively researched it (Salamida. J.C., 2005. Meissonier's passion for the military: Military History' Quarterly 17(3):56). Napoleon III sits on his horse as Lee did on Seminary Ridge, French guns (right foreground) are positioned like the Confederate artillery, the shallow valley in front resembles that crossed by Pickett's Charge, and the distant hill on the skyline (where the Austrians are dug in) compares with the Union position on Cemetery' Ridge.

Pickett's Charge (p. 16, 22, 29-30, 35-38, 88-91 herein) has been much written about (Clark, C., et al., 1985, Gettysburg - The Confederate High Tide; Time-Life Books [Civil War Series], Alexandria, 176 p.; Georg, K.R. & Busey, J.W., 1987, Nothing but Glory - Pickett's Division at Gettysburg; Longstreet House, Hightstown, 693 p.; Stewart, G., 1983, Pickett's Charge - A Microhistory of the Final Attack at Gettysburg, July 3, 1863; Morningside Press, Dayton, 354 p.; Turner, T., 1993, Gettysburg [movie; 2nd half]).

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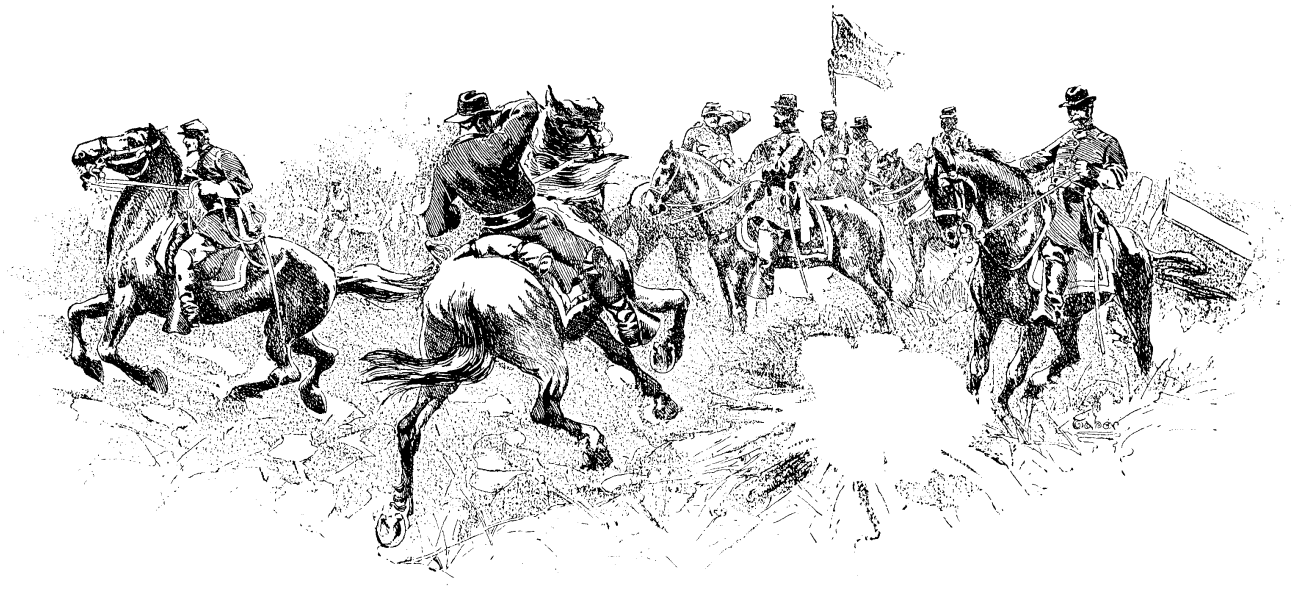


APPENDIX A

REGIONAL RIFTS AND THE BATTLE OF GETTYSBURG

by
R. C. Smith, II, and R. C. Keen

Not counting the rift between the North and the South, there is evidence for five periods of rifting in the mid-Atlantic region of eastern United States. The second and fourth of these directly bear on the Battle of Gettysburg. The first had a minor influence on the prelude and postlude to the battle but adds new meaning to "south."

Traditionally, historians date the rift between the North and the South to the firing on Fort Sumter, South Carolina, on April 12, 1861, or possibly earlier with the introduction of slavery to produce labor-intensive crops. Geologists on the other hand, recognize much earlier rifting in the mid-Atlantic states beginning with Mount Rogers A-type granites and minor, possibly related basalts at 768 Ma (Rankin, 1993). As noted by Rankin, Mount Rogers is overlain by the glaciogenic Konnarock Formation. This together with Scotese's (2003) reconstructions place the mid-Atlantic states *far* south with only one way to go. The northward drift of Laurentia over the Mount Rogers hotspot yielded a trace marked by the Robertson River Igneous Suite (RRIS, so named after the Rob*inson* River) of central and northern Virginia at 735 to 702 Ma (Tollo and Aleinikoff, 1996). It produced a series of hills from near Charlottesville on the south to Ashby Gap, Virginia on the north-northeast. Ashby Gap itself is underlain by Catoctin Metabasalt but the foothills between it and Upperville to the east are underlain by the Cobbler Mountain Member of the Robertson River Igneous Suite (Table A-1). Confederate General. "Pete" Longstreet used the Ashby Gap during Lee's northward march up the Shenandoah Valley on the west side of the Blue Ridge. The RRIS appears to retain its geochemical identity as far northeast as the Reading Prong of Berks County, Pa. Here, bimodal volcanics include 602 Ma A-type felsite dikes having RRIS-like geochemistry and continental initial rifting tholeiite (CIRT) basalts (Smith, 2003). Iron mining around these dikes supported the Union cause as it had previously supported an older rebel cause against Great Britain.

The second, ~570 Ma Catoctin rift (Aleinikoff et al., 1995), produced the Catoctin Mountains from near the latitude of Charlottesville, Virginia, nearly to Harrisburg, Pennsylvania. The portion of the Catoctin having a largely basaltic core extends from near Charlottesville to the Jacks Mountain-Tunnel Hill fault system (Fauth, 1978) southwest of Gettysburg and was effectively used by Lee to screen the Army of Northern Virginia from Union eyes. The portion of the Catoctin having a more rhyolitic core is located northwest of the Jacks Mountain-Tunnel Hill fault system and provided the final screen.

One of General Lee's columns under the command of General A. P. Hill marched east from Cashtown around 5:00 A.M. on July 1st, essentially following the present trace of U.S. Route 30. This modern highway follows the Alleghanian-age Carbaugh-Marsh fault zone through South Mountain. At its crest, it crosses Catoctin Metarhyolite (Table A-1). Confederate General "Pete" Longstreet's Corps followed A. P. Hill's late on July 1st. Some of Pennsylvania's oldest quarries are located on the ridges south of Caledonia State Park overlooking the route of A. P. Hill's Corps. These quarries were begun about 12.5 Ka b.p. by Native Americans and were worked extensively into the Late Woodland Period ending with Colonial contact. Weapons-grade metarhyolite occurs close to the trace of U.S. Route 30 suggesting a fairly narrow fault zone. The linearity of the zone (Hoskins and Root, 1977) suggests a high angle fault. Except for this Cashtown Gap route which crests at approximately 1400 feet (425 m), but had a good pike with gentle slopes through it, most other routes over the Catoctin metarhyolite and capping Cambrian quartzites provided rough ground having typical elevations of 1600 $\pm$ 100 feet (450 $\pm$ 30 m). The potential route from south west of Fairfield to Gettysburg would have required a crossing of

Table A-1. Composition of rift volcanics associated with the battle of Gettysburg. RRIS dates from Tollo and Aleinikoff (1996), Catoctin dates from Aleinikoff et al, (1995), and Mesozoic dates from Sutter (1988) and Dunning and Hodych (1990).

RIFT	FIRST	SECOND	SECOND	SECOND	FOURTH	FOURTH
Sample Locations	Robertson River I.S., Cobbler Mountain Member, ~ 7 mi. S Ashby Gap	Catoctin Metabasalt, Pa. Rte. 16, W. Fountain-dale	Catoctin Meta-rhyolite, Pa. Rte. 94	Catoctin Meta-rhyolite, U.S. Rte. 30, Cashtown Gap	York Haven Diabase, base sheet at type locality, York County.	Rossville Diabase, RR cut through Seminary Ridge
Nearest Troop Move-ment	Ashby Gap to N. held by Longstreet	J. Buford passed 6/28.	Part Ewell's Corps passed Pa. 34 1.33 mi. to W 7/1.	A.P. Hill's Corps passed early 7/1.	No samples from GNMP proper, but underlies Union fish-hook.	Area exchanged hands ~4 times 7/1.
Presumed Age, Ma	~722	~575	~575	~575	201.2	201.0
SiO_2 %	72.45	44.41	77.72	78.39	51.51	50.55
Al_2O_3	12.63	17.26	10.87	10.70	14.70	16.20
Fe_2O_3*	3.72	13.14	2.95	2.91	11.51	10.83
CaO	.27	8.49	.03	.06	10.53	11.15
MgO	.08	7.73	.09	<.01	6.48	6.80
Na_2O	4.45	1.79	2.37	4.12	2.23	N.A.
K_2O	4.83	.84	4.90	3.49	.65	.30
TiO_2	.22	1.64	.21	.20	1.12	.70
MnO	.03	.19	.02	.01	.18	.13
P_2O_5	.02	.16	.02	.01	.17	.10

*Total Fe expressed as ferric iron.
N.A. = Not analyzed, but typically 1.95+/- 0.2%.

1300 feet (400 meters) at Blue Ridge Summit and is not known to have been used by infantry during the advance. Horses, however, were not given a vote in selecting routes and Union General John Buford's calvary used this route to ride to Gettysburg leaving Waynesboro encamping on June 28 at Fountain Dale at approximately 750 feet (230 m) on Catoctin Metabasalt.

General Richard S. Ewell's 2nd Corps was also forced to cross South Mountain. Ironically, much of the 2nd Corps approached Gettysburg from Carlisle to the north. Ewell's corps generally followed what is now Pennsylvania Route 34. Unlike Hill, Ewell didn't have a linear fault to follow and had to cross elevations of up to 1000 feet (300 m) on more primitive, rural roads. Earlier, to get into the Shenandoah Valley on his approach to Gettysburg from Culpepper, Va., by way of Chester Gap, Ewell likely had to pass from the area underlain by the 4th rift to the 2nd , to the 1st, to the 2nd rift in an effort to support the 6th, a political rift. Snickers Gap through Catoctin Metabasalt, approximately 27 miles (43 kilometers) to the northeast of Chester Gap was also held by Longstreet.

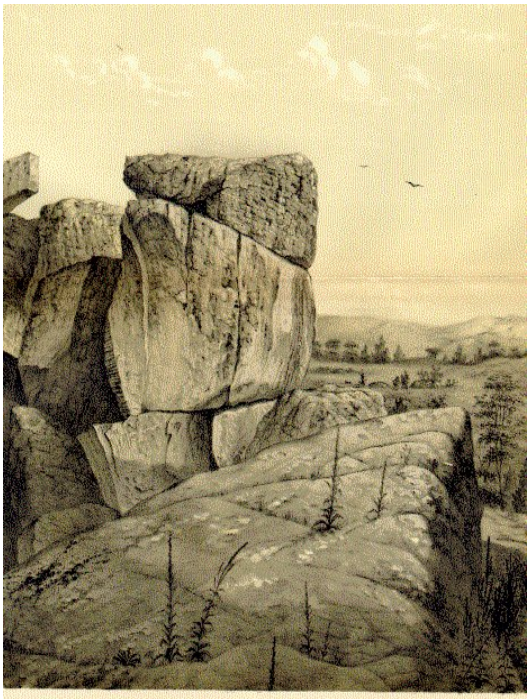
The third known rift occurred in the Lower Silurian and is not known to have directly affected the battle of Gettysburg. The third rifting may be a relaxational phase of the Taconian orogeny. The allochthonous Hamburg Klippe was emplaced during the Taconian orogeny and its western edge was

briefly encroached upon by General Jenkins Confederate cavalry during skirmishing in the general area of Camp Hill, Cumberland County, and a brief reconnaissance thrust to Enola.

The fourth, known rift was the Early Mesozoic. The Triassic sediments in the Gettysburg basin provided the lower elevations preferred by armies, but they managed to converge on an area of Triassic sediments much affected by two lowermost Jurassic formations. These latter two diabases cut generally fine-grained reddish mudstones and shales. The belt of the poorly defined Heidlersburg Formation from 1 to 3 miles west-northwest of the center of Gettysburg in particular shows evidence of an arid climate. Dinosaur footprints (Stose and Jonas, 1939), mud cracks, glauberite salt casts, and probable aeolian sand grains and are all consistent with an arid, sometimes lacustrine depositional environment for the Heidlersburg Member (Faill, 2003). Parts of the unit may be chemical precipitates somewhat similar to portions of lacustrine Lockatong Formation in the Newark Basin. Minor interbedded sands in the Heidlersburg formed two gentle northeast-southwest trending gentle ridges to the northwest of town. At the opening of the battle on July 1st, Confederate General A. P. Hill's divisions deployed on the western of these, Herr Ridge, and made first sustained contact with Union General Buford's cavalry on the eastern of these, McPherson Ridge. The trend of both Herr and McPherson Ridges reveal the typical northeast strike of bedding.

Confederate positions for the second and third days of the battle were largely confined to the Gettysburg Formation. Like the Heidlersburg, the Gettysburg Formation is largely red shale and siltstone, but with less convincing evidence of an arid climate and is probably not lacustrine. The Gettysburg Formation supported decent to good roads for the final approach of the Union's main column from the southeast and south, but Union positions on Culp's Hill looked down on the Confederate positions on the Gettysburg Formation northeast of town on the second and third days.

The Triassic red shale and siltstones in the area of the battlefield proper was first cut by locally crosscutting intrusive sheets of York Haven Diabase. In the battlefield area, Big Roundtop, Little Roundtop, Devil's Den, Cemetery Hill, Cemetery Ridge, and Culp's Hill, all noted Union positions that with the exception of Devil's Den successfully resisted repeated Confederate assaults July 2nd and 3rd, are underlain by York Haven Diabase (Table A-1). In the Gettysburg Basin, the York Haven Diabase sheet has been estimated to be about 2,500 feet thick at the type locality (Smith, 1973). Outside the battlefield area, but still in the Gettysburg Basin, the York Haven Diabase also formed numerous 10 to 20-m-wide dikes (Berg, 1980) and one small basalt flow near Aspers, Adams County (Stose, 1932).



OUTCROP OF TRAP AT THE DEVIL'S DEN NEAR GETTYSBURG, ADAMS CO. PA.

The York Haven Diabase is resistant to weathering relative to Triassic sediments and incredibly durable. Fractures through it must propagate through randomly oriented plagioclase and pyroxene laths, each in itself having complex cleavages. Today, York Haven Diabase is a highly desired dimension stone and provides high quality, durable railroad ballast. At the high radon Index House in the Reading Prong of Berks County, it was even used to provide shielding outside basement walls from a high gamma flux from daughters of thorium and uranium (Smith et al., 1987). Throughout the battle, the York Haven Diabase, as Devil's Den or more typically as field stone fences, provided what little natural protection was available to the troops.

The York Haven Diabase has been dated at 201.2 Ma (median of three 40Ar/30Ar dates for lateral equivalents, Sutter 1988) and 201.2 Ma (best, clear fragments of zircon by 206Pb/238U, Dunning and Hodych, 1990). The Rossville Diabase has similarly been dated at 201.0 Ma (median of 7

preferred zircon analyses for a small, unrecognized Rossville Diabase sheet, Dunning and Hodych, 1990). Rossville Diabase forms thin sheets elsewhere in Pennsylvania and Virginia. Unfortunately for Lee, no unoccupied sheets were available in the area of Gettysburg and even those elsewhere in the Gettysburg Basin are much less resistant to erosion than York Haven Diabase. Typically, the Rossville Diabase occurs as subvertical, ~10 to 20m-wide dikes. Hill's 3rd Corps had hard work against General Buford early on during the morning of July 1st and by approximately 10:30 AM against newly arrived General John F. Reynolds 1st Corps. To ultimately gain this one Rossville Dike, known as Seminary Ridge in the area of the battlefield, the North Carolina 11th and 26th Regiments suffered the highest percentage losses of the entire three-day battle at McPherson's Ridge. The Army of the Potomac's 1st Corps was decimated defending McPherson's Ridge with 24th Michigan Regiment under Col. Morrow and the 151st Regiment under Lieut. Col. McFarland suffered the Union's highest percentage losses of the entire three-day battle. All this to gain a dike that rose only on the order of 50 feet (15 m) above the surrounding Gettysburg shales and siltstones! Heavy Confederate pressure forced the units in the Union 1st and 11th Corps to withdraw through Gettysburg, where under the direction of Generals Hancock, Howard, and Doubleday, remnants of the Union's 1st and 11th Corps, respectively, secured the York Haven Diabase sheet at Cemetery Hill and Culp's Hill. This was followed not long afterward by arrival of General George Meade and Union occupation of the remainder of the York Haven Diabase hills in this area. The chemical compositions of the York Haven and Rossville diabases are shown in Table A-1 from Smith et al. 1975.

Just as the rift between states began in the south, so too the rifting and drifting that resulted in the Mesozoic Basins progressed from south to north (Wythjack et al., 1998). On the other hand, diabasic igneous activity of any one composition was synchronous along the entire length of the Mesozoic Basins.

Union artillery largely positioned on the York Haven Diabase heights and under the excellent command of General Hunt was able to dominate much of the field during the battle. Shelling with properly set elevation could skim the west slope of Seminary Ridge and cause much destruction. Artillery aimed high by CSA General Alexander in preparation to Pickett's Charge on July 3rd caused relatively minor damage to the rear of the Union lines on Cemetery Ridge.

The difficult to impossible excavation characteristics of diabase generally prevented significant earthworks and likely contributed to both the effectiveness of Hunt's artillery and high battle casualties in general. An exception was on the northeast side of Culp's Hill where Union earthworks were effective when manned. Fortunately for the Union, General Greene did not dissuade his troops from fortifying their position despite the opposition of General Geary. Hand-dug wells in York Haven Diabase are virtually unknown, adding to the misery of troops cut off from water but provided a few opportunities for brotherly compassion.

Results of the 5th period of rifting during the Eocene consist of bimodal volcanics and doming believed to continue to the present day. However, these are presently recognized mostly in the areas of Highland County, Virginia and Pendleton County, West Virginia (Southworth et al., 1993). Quite possibly, the rough topography at McDowell, Virginia, used so skillfully by General Thomas J. "Stonewall" Jackson at the battle of McDowell, May 8, 1862, was in part the result of Eocene uplift. After Jackson's death in May 1863, the Confederacy seemed to lack a general having his phenomenal sense of topography. His replacement, Gen. R. S. Ewell was slow to utilize topography during his command of the CSA 2nd Corps. In the Battle of Gettysburg, it was Union Generals Buford, Hancock, Howard, Warren, and others that seemed to most recognize the value of topography. General Warren (1872), for example, recounted: "At my suggestion, General Meade sent me to the left to examine the condition of affairs, and I continued on till I reached Little Round Top. There were no troops on it, and it was used as a signal station. I saw that this was the key to the whole position, and that our troops in the woods in front of it could not see the ground in front of them, so that the enemy would come upon them before they would be aware of it. The long line of woods on the west side of the Emmitsburg road

(which road was along a ridge) furnished an excellent place for the enemy to form out of sight, so I requested the captain of a rifle battery just in front of Little Round Top to fire a shot in the direction of it. He did so, and the shot went whistling through the air the sound of it reached the enemy's troops and caused everyone to look in the direction of it. This motion revealed to me the glistening of gun-barrels and bayonets of the enemy's line of battle, already formed and far outflanking the position of any of our troops; so that the line of his advance from his right to Little Round Top was unopposed . . . I immediately sent a hastily written dispatch to General Meade to send a division at least to me, and General Meade directed the Fifth Army Corps to take position there." If Ewell recognized it, he lacked the drive to utilize it. As a result, other Confederate generals may have been ultimately intimidated by it. After the war, "Pete" Longstreet lamented "The enemy cast his lines on ground too strong for lead and steel, …"

Years after the Battle of Gettysburg, retired CSA generals were frequently asked why "the cause" was lost at Gettysburg. General Pickett is reported to have provided the slyest answer: "I have always been of the opinion that the Yankees had something to do with it." Perhaps the York Haven Diabase did, too.

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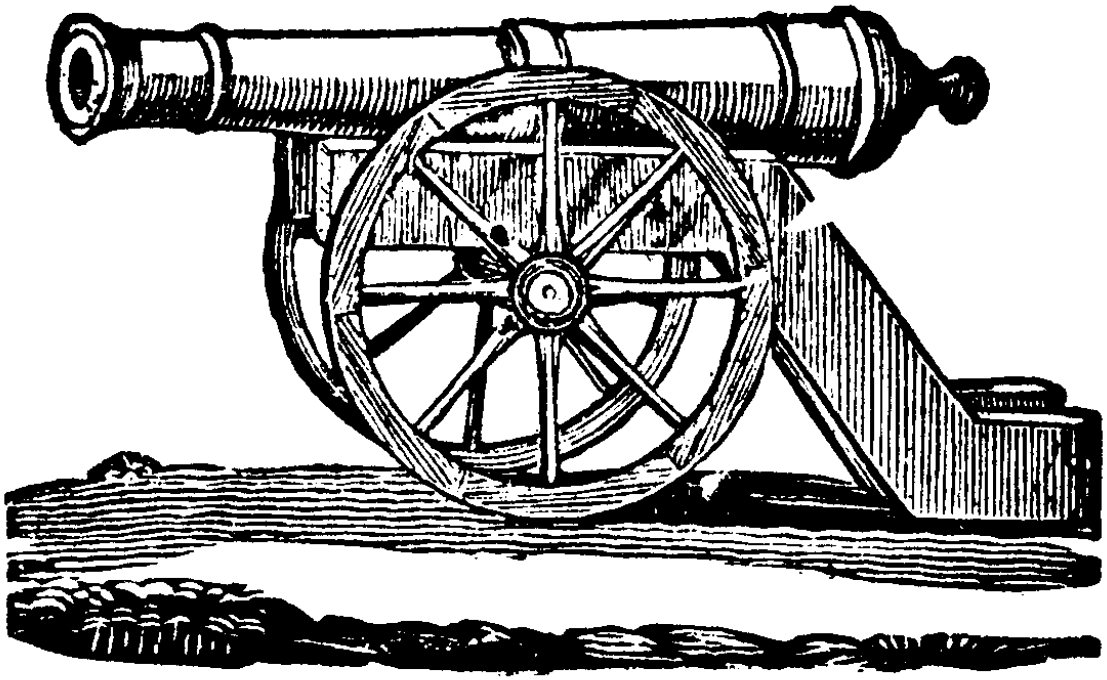

APPENDIX B

GENERAL JOHN BROWN GORDON'S EXPOSITION ON WATERLOO AND GETTYSBURG

(Gordon, 1993, p. 169-170)

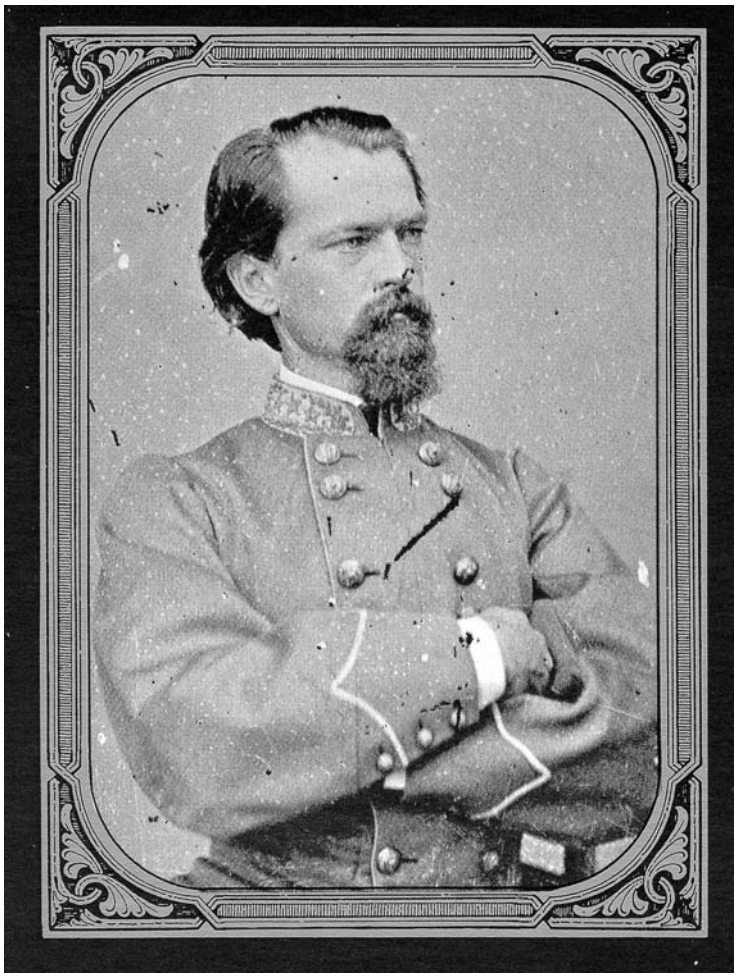

Figure B-1. John Brown Gordon (1832-1904)

Wellington at Waterloo and Meade at Gettysburg, each held the highlands against his antagonist. Wellington on Mont-Saint-Jean, and Meade on Cemetery Ridge, had the bird's eye view of the forces of attack. The English batteries on the plateau and the Union batteries on Cemetery Heights commanded alike the intervening undulations across which the charging columns must advance. Behind Mont-Saint-Jean, to conceal Wellington's movements from Napoleon's eye, were the woodlands of Soignies. Behind Cemetery Ridge, to conceal Meade's movements from the field-glasses of Lee, was a sharp declivity, a protecting and helpful depression. As the French under Napoleon at Waterloo, so the Confederates under Lee at Gettysburg, held the weaker position. In both cases the assailants sought to expel their opponents from the stronger lines. I might add another resemblance in the results which followed. Waterloo decreed the destiny of France, of England, of Europe. Gettysburg, not so directly or immediately, but practically, decided the fate of the Confederacy.

There were points of vast divergence. The armies which met at Waterloo were practically equal. This was not true of the armies that met at Gettysburg. [Confederates about 60,000, Union at least

80,000.] Napoleon's artillery far exceeded that of Wellington. Lee's was far interior to Meade's, in the metal from which the guns were moulded, as well as in number. Napoleon, in the ensuing panic, was a deserted fugitive. Lee rode amidst his broken lines calmly majestic, the idol of his followers. With no trace of sympathy for Napoleon's selfish aims, with righteous condemnation of his vaulting ambition, one cannot fail to realize the profound pathos of his position on that dismal night of wildest panic and lonely flight. Abandoned by fortune, deserted by his army, discrowned and doomed, he is described by Hugo as having not an organized company to comfort him, not even his faithful Old Guard to rally around him. In Lee's army there was neither panic nor precipitate retreat. There was no desertion of the great commander. Around him still stood his heroic legions, with confidence in him unshaken, love for him unabated, ready to follow his lead and to fight under his orders to the last extremity.

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APPENDIX C

FROM LITTLE ROUND TOP TO THE FALLS OF ST. ANTHONY: THE TOPOGRAPHIC AND GEOLOGIC INSIGHTS OF GENERAL GOUVERNEUR KEMBLE WARREN (1830-1882)

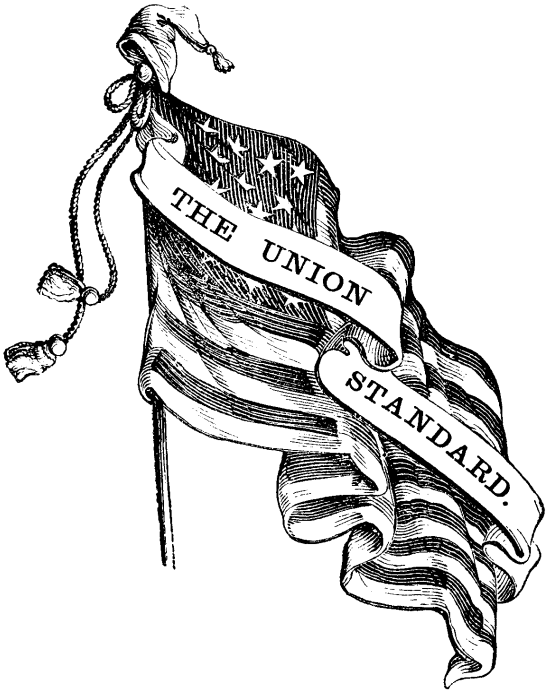
by
Jon D. Inners

Figure C-1. Bronze portrait statue of Maj. Gen. Gouverneur K. Warren on the summit of Little Round Top (*Site A* of STOP 4).

General Gouverneur K. Warren is well remembered in American history as the "Savior of Little Round Top," the military engineer whose "eye for ground" rescued the left flank of the Union diabase fishhook at the Battle of Gettysburg. Less known are the successes and failures of his later Civil War career; and largely unrecognized is the fact that the hero of Gettysburg is the same G. K. Warren whose topographic and geologic insights helped to decipher the complex physiographic history of the upper Mississippi River region.

Born and raised at Cold Spring, NY, Warren graduated from West Point second in the Class of 1850 (but first in geology and mineralogy). Assigned to the Corps of Topographic Engineers, he surveyed and charted both the lower and upper reaches of the Mississippi River, explored the Nebraska and Dakota Territories, and led [an early expedition into the Black Hills]. In 1861 Warren entered the Army of the Potomac as a lieutenant-colonel, rising to Chief Topographic Engineer, Chief Engineer, and finally commander of the 5th Corps. But in the closing days of the war, his engineering mentality put him on a collision course with Phil Sheridan—and he was cashiered at Five Forks just days before the final Union victory at Appomattox. In his post-war career as a major of engineers, Warren performed distinguished service in supervising official and construction projects on the Mississippi and other Midwest rivers. On 21 November 1882, a military court of inquiry effectively vindicated Warren's conduct at Five Forks, but he had died "a disgraced soldier" and been buried at Newport, RI, three months earlier.

Warren's insights relative to the geology of the upper Mississippi River region included recognition of: the Minnesota River valley as the former outlet of a large lake in the Red River of the North-Winnipeg basin (Glacial Lake Agassiz); initiation of the Falls of St. Anthony by outflow from this lake; and origin of Lake Pepin on the Mississippi River and similar lakes on the Minnesota River through deposition at the mouths of downstream tributaries. In 1884 Warren Upham fittingly named the ancient Ice Age river that initiated the present valley of the Minnesota the River Warren "in honor and *in memoriam* of Gen. G. K. Warren." The "G. K." would cause some confusion in future years—with one noted Minnesota historian crediting "George K. Warren" with the general's work on Midwest rivers and other historians and geologists referring merely to "G. K." Gouverneur Warren's contributions to geology and engineering are substantial and warrant clarification of the historical record concerning this capable, but tragic individual.

Figure C-2. The valley of the Minnesota River at New Ulm, MN (looking north from Riverside Park). Warren's observation on the grossly underfit nature of the Minnesota River from Brown's Valley to St. Paul led him to speculate that its great valley had been carved in late glacial/postglacial time by southward discharge of a vast lake in the basin of the Red River of the North.

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