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Gettysburg National Military Park

TREATMENT PHILOSOPHY: THE 1863 LANDSCAPE

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Gettysburg National Military Park

Treatment Philosophy: The 1863 Landscape

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Chapter 1
INTRODUCTION

Gettysburg National Military Park (GNMP) is beginning implementation of landscape rehabilitation, the alternative selected in its approved 1999 General Management Plan/Environmental Impact Statement (GMP). Rehabilitating the nationally significant landscapes at Gettysburg National Military Park is an immense task that will take 15-20 years. The GMP recommends that the most significant missing elements of the battle, commemorative, and Soldiers' National Cemetery landscapes be restored.

Members of the park staff, consultants, regional office staff and others will participate in the process of developing plans needed to implement landscape rehabilitation. Because the significant landscapes at GNMP cover an area of about 6,000 acres, the planning and implementation will of necessity be broken into many phases. If needed, and as management finds it necessary, detailed Cultural Landscape Reports and Treatment Plans (CLRs), including site histories, landscape features analyses, and treatment plans, will be developed. Since many plans will be developed over the next 15-20 years, this treatment philosophy has been developed to ensure that consistent treatment recommendations are applied across the entire 1863 battlefield, and are in accordance with the park's approved 1999 GMP/EIS. A treatment philosophy for the commemorative landscape, and a detailed Cultural Landscape Report and Treatment Plan for the Soldiers' National Cemetery will be prepared in the future.

The following narrative contains five sections: an introduction and methodology, and sections covering the general treatment philosophy for agricultural landscapes, natural landscapes, defense works and industrial sites. The four landscape sections are divided into major features. Each feature discussion includes a description of that feature's historic use and appearance, the feature's influence in the battle, the general treatment philosophy that will be applied to that feature, and examples illustrating how the general treatment philosophy will be applied.

THE GENERAL MANAGEMENT PLAN

The GMP provides guidance for the preservation, rehabilitation and interpretation of resources that contribute to the significance of the park. These include resources related to the Battle of Gettysburg (July 1-4, 1863), resources related to the nationally significant battle commemoration designed and built by its veterans (1863-1938), and resources related to the Soldiers' National Cemetery. This treatment philosophy addresses the principles that will be used to preserve and rehabilitate the resources relating to the Battle of Gettysburg.

To further define and understand these resources, the GMP defined four resource areas, including the Major Battle Action Area, the Battlefield Commemorative Area, the Soldiers' National Cemetery, and the Other Resources Area. This treatment philosophy will be used to develop CLR/Treatment Plans for component landscapes of one of these areas, the Major Battle Action Area.

The Selected Alternative

The Selected Alternative, Alternative C, called for rehabilitation to reinstitute the pattern of open fields and wooded areas present in 1863, as well as the patterns of circulation that were present at the time of the battle, within the Major Battle Action Area. In addition, it calls for the rehabilitation of small scale landscape elements and structures within the Major Battle Action Area that were significant to the outcome of the battle. The GMP acknowledged that "the landscape that results would not fully reflect the conditions present in 1863, but it would convey its history and retain and preserve the features that define its character as a battlefield." The GMP determined that these actions would have "a positive impact on the historic landscape of the 1863 battle."[1]

The GMP included Management Prescriptions, or statements that described the desired future conditions. Management Prescriptions that contribute to this strategy include:

1. ***Managers make decisions based upon professional studies and adequate planning***. This prescription recommends that documents like this one, and other cultural and natural resource plans, be prepared as needed. Adequate research is needed to identify significant 1863 features, determine if they still exist, and if not, to what degree and in what manner they should be rehabilitated.[2]

2. ***Resources, including historic structures, landscapes, archeological sites and collections that contribute to the significance of the park are stabilized, preserved and maintained in good condition***. This prescription is very important to the basic precepts of this treatment plan. The research noted in paragraph 1 of this section will identify 1863 resources. While many are known, other topographic and landscape features have not been clearly identified as significant to the 1863 period. Preservation of these features is the baseline action required to implement the GMP.[3]

3. ***Non-historic or modern structures and intrusions are eliminated***. Although modern intrusions, especially from state roads and automobiles, are a fact of life on the battlefield, NPS will not condone or perpetuate modern intrusions within the Major Battle Action Area of the park. Removing non-historic intrusions, such as power lines, is an important element in the treatment of some features.[4]

4. ***The park's agricultural program is managed to protect cultural and natural resources, and to encourage the preservation of grassland species***. This prescription requires NPS to manage the agricultural program so that it protects remaining natural and cultural resources of the 1863 battlefield to the maximum extent possible. It also recommends that NPS review its existing practices to reverse any negative impacts on soil, water, flora and fauna. In addition, it requires NPS to design its treatment philosophy in such a way as to improve habitat for state listed species whenever possible.[5]

5. ***The major features that organize the landscape—the pattern of open vs. wooded land and the 1863 circulation system—are rehabilitated***. NPS will manage the Major Battle Action Area to reestablish and then sustain the 1863 pattern of open vs. closed—field and woods. This would reinstate key fields of fire and avenues of approach that were pivotal to the battle but that are now obscured or changed.[6]

6. ***The features that were significant to the outcome of the battle of Gettysburg are repaired, rehabilitated or restored.*** This prescription recommends that in addition to the large scale features—circulation and the pattern of open vs. closed—NPS restore the small scale features, such as fences or orchards. This would allow NPS to better represent the conditions that faced the individual units and soldiers who fought on the battlefield.[7]

7. ***The overall mass and arrangement of remaining farm complexes reflect those typical of central Pennsylvania in the 19th century. Missing or damaged buildings that can be adequately documented and that are significant to the outcome of the battle are rehabilitated or otherwise represented.*** Since the time of the battle, the farm complexes that were part of the battlefield have undergone change. In some cases buildings were lost during the battle. In others, since the time of the battle, farmers enlarged, rebuilt, or expanded houses, barns and outbuildings to fit them for continued use. In some cases, the newer structures have become significant in their own right. This prescription suggests that it was the cluster arrangement of these complexes that was important to the 1863 battle, and that later additions and changes that do not alter significantly the cluster arrangement will continue to be preserved.[8]

8. ***Fences, orchards, vegetation, and other documented features define the limits of 1863 house sites and other buildings that acted as obstacles, cover, or points of observation.*** This management prescription acknowledges that although many structures are missing from the 1863 landscape, in most cases there is insufficient evidence to allow accurate recreations of those structures. Since these sites were important to the battle, but cannot be recreated, this prescription recommends that known landscape features, such as fences, orchards, marker trees and other similar features be used to define the limits of these missing farm complexes. In this way, the general extent and cluster arrangement of these missing complexes can be understood.[9]

9. ***The agriculture program is reformulated to support the historic field patterns of 1863.*** This prescription recommends that the agriculture program of the park be reconfigured to support the park's historic landscape as its primary goal.[10]

METHODOLOGY

Features And Characteristics

Nearly every landscape feature, natural and cultural, small scale or large scale, influenced the battle in some way. From a farmer's fence to the largest hill, military leaders and units were forced to react to the surrounding landscape in planning and conducting battles.

Features are any objects that existed on the 1863 Gettysburg landscape. Features can be natural or man-made, large or small. Features possess characteristics, such as height, extent, color, mass, or age. Not every characteristic of a feature is considered necessary for rehabilitation. In some cases, restoration of a characteristic is difficult or impractical; for example, it is not possible to maintain an orchard at the age it was at the time of the battle, since natural systems grow, age and die. The exact placement of trees within a woodlot is not important, but the historic extent of the woodlot may be. The use of modern equipment to prepare fence materials, for example, does not interfere with visitors' ability to understand the impact a fence had on the battle. However, its height, mass and tightness may

be features that should be present in order for visitors to understand appropriately the battle action. This treatment philosophy outlines features that were significant parts of the battle landscape and distinguishes between the characteristics that must be restored in order to interpret the battle and those that do not have to be restored for a visitor to understand what happened here.

Understanding the National Register Significance of a Feature

The GMP/EIS recognized that full rehabilitation and restoration of all historic features throughout the 6,000-acre park could likely not be accomplished within the 15 to 20 year time frame of the GMP. Accordingly, the GMP recommended strategies that could help park staff identify the elements of the landscape that have national register significance and then prioritize actions necessary to rehabilitate the salient characteristics of those elements.

The principle underlying these strategies is that all features remaining from the period of significance would be identified, protected, and preserved in good condition (prescriptions 1 and 2, above). Therefore, the adequate identification of significant historic features is the foundation for all rehabilitation planning within the park.

The park's legislation is specific, and requires that the "natural and artificial defenses, as they were at the time of said battle" and the "important topographic features of the battlefield" be preserved. The park legislation also requires the marking of battle lines and the preservation of memorial structures erected to "commemorate the heroic deeds, the struggles, and the triumphs of their brave defenders."[11]

Standard cultural resource planning has convenient, recognizable methodologies to identify and understand the national register significance of man-made features. However, standardized methodologies that could help catalog the significance of natural features has not been developed. In addition, methodologies for examining and understanding the contributing characteristics and significance of natural features in a battlefield setting were not readily available. Since the park's legislation calls for the preservation of the topography and natural features of the battle landscape, finding a well-understood method to identify them and their salient features was crucial to the development of the GMP/EIS and its subsequent implementation plans.

The methodology ultimately selected for determining national register significance was KOCOA, the military system of terrain analysis that determines the potential of a feature's use during battle as key terrain, observation, cover and concealment, obstacles, and avenues of approach. To ensure that the public could gain a complete understanding of the potential impacts of the alternative, GMP planners determined that the plan would document and analyze the impacts of the rehabilitation of all features present immediately prior to the onset of the battle that were used as or could become key terrain, observation, cover and concealment, obstacles, or avenues of approach. To this end, an assessment of potential KOCOA features was completed and then mapped. Each feature that played a role in determining battle tactics or that created an obstacle or cover during a part of the battle was investigated and mapped. The maps for each category of significant features were combined, so that the general distribution of the features could be understood.[12] This documentation provided the basis for the development of alternatives and of national register documentation that included topographic and natural features, along with man-made features, in its determination of significance.

The KOCOA system also helps to identify characteristics that were important to the battle. Other

standard methods used in cultural landscape planning, such as allowing vegetation to mature and age naturally, are also important considerations in developing the treatment philosophy.

Research Methods

NPS determined that the use of the KOCOA system, in combination with the standard cultural landscape treatment methodologies incorporated in the ***Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*** would be the basis for determining appropriate treatment for the battlefield landscapes. Every feature will be researched to determine if it was present at the time of the battle, its battle appearance and use, its impact on the battle, and then analyzed to understand what characteristics of the feature are crucial for rehabilitation. Every feature must be documented using at least two original sources that provide accurate information about its location and characteristics. For example, the style of a fence might be identified by the combination of information from the 1868 Warren survey and an 1863 photograph showing that site. The location of a gate may be identified from a first person report of the battle confirmed by a later photograph of the site. Where additional sources are available, they will be used to the maximum extent possible to confirm the location, appearance, and use of a feature prior to restoration. This information will be documented in Cultural Landscape Reports, Treatment Plans, and other planning documents.

Setting Priorities

The use of KOCOA provided a second benefit that could not be derived from the then-in-use cultural landscape methodologies—a way to understand in more detail the salient features of the battle landscape. For example, standard cultural landscape inventory and assessment methodologies would note from photographs and post-war surveys the presence of a hedgerow. It would note that the hedgerow was composed of mixed hardwoods, categorize their general size and age, and note the density of growth. However, this standard methodology would likely not lead to the understanding that the hedgerow contained a tree that was used by snipers, and therefore that the significance of this natural feature to the battle landscape was related to that use. In practice, this understanding might lead to different treatments. For example, if the feature was understood simply as a hedgerow, it would be managed to ensure that hardwood trees were present. There would in general be no need to provide specific treatment to any hedgerow trees, since just the continued presence of hardwoods would ensure the continuity of the hedgerow. However, if one of the trees was identified as a sniper tree remaining from 1863, and thus a national register significant element of the battlefield landscape, the NPS would provide additional treatment to it, such as lightning protection, special care to ensure its ongoing health, etc., that would not normally be given to regular hedgerow trees.

Park historians had another major concern, as well, which was to find a way to understand the small scale features that ultimately contributed to the fate of individual combatants and units on the field. Because their writings discuss in detail the way that fences, small topographic changes, buildings, and other battlefield features affected them and the course of the battle, this documentation could assist in the identification of features, extant and missing, that contributed to the nationally significant battle landscape. This identification would be used to help determine which features of the historic landscape should be given priority in the rehabilitation strategies.

However, NPS has also concluded that if a feature can be confirmed as present, but if specific information about its use in the battle cannot be located, that the feature should be replaced. This precept—to err on the side of caution—acknowledges that there may be information on a feature that was not found during the research phase, or that a feature may have had an impact upon the battle that has not yet been understood by historians. Therefore, although the rehabilitation of documented features that are not known to have KOCOA significance may have a lower priority than rehabilitation of features that are currently understood to be crucial for interpretation, they will eventually be restored.

Peer Review of the KOCOA System

The use of KOCOA as the major analysis methodology to set priorities was reviewed by a panel of historians convened by the Gettysburg National Military Park Commission. They concurred with this approach, while cautioning that it was important that NPS consider and understand that there was a difference between KOCOA as a system to determine the potential use of a feature, and KOCOA as a system to determine the importance of a feature after a battle was complete. The KOCOA methodology was developed as a system to determine the potential use of a feature in battle. Reviewers generally felt that the KOCOA system was a reliable method for determining the national register significance of a feature, and could meaningfully be used to understand a feature, its characteristics, their relative importance to rehabilitation, and priority.

The Details: Understanding The K.O.C.O.A. System

Known by the acronym KOCOA (or OCOKA), this system is the instructional method used by modern military armies to analyze topography and its impact on a potential battlefield in an organized and systematic fashion.[13] KOCOA is an acronym that represents:

Key Terrain
Obstacles
Cover and Concealment
Observation
Avenues of Approach

While this acronym did not exist in its current form during the mid-19th century, the basic concept was taught at West Point at that time and was in use during the Civil War. What follows is a brief explanation of each category, using modern military definitions, and examples of how this method might be applied in the analysis of the park's battlefield landscape features.

Key Terrain is "any locality or area that affords a marked advantage to whichever combatant seizes, retains, or controls it."[14] During the Civil War this usually included high ground (i.e., ridges, hills) on which an army's main battle line could be established. Ideally such high ground provided good observation (thus controlling the surrounding terrain by providing clear fields of fire), proved an obstacle to enemy troops and provided cover and concealment to the army's reserve troops and rear areas. Key terrain could also include dense woods, rivers, etc. that were commonly used in the Civil War to anchor the flanks of a battle line. This was especially important since its flanks were the most vulnerable part of any army's battle line. Certain key terrain features hold even more military value. *Decisive Terrain* is a feature that *must* be held in order to achieve victory.

Cemetery Hill was *the* key terrain (indeed *Decisive Terrain*) for the Army of the Potomac for several reasons. Primarily, the hill was the apex of their "fishhook" defensive line on July 2 and 3. Passing over the hill's eastern and western slopes was the Baltimore Pike and Taneytown Road, roads that were vital avenues of approach, communication and supply for the Union army. The nearly unobstructed view from the hill also gave the Union troops excellent observation of most of the field, making it an ideal artillery platform and location for a signal station.

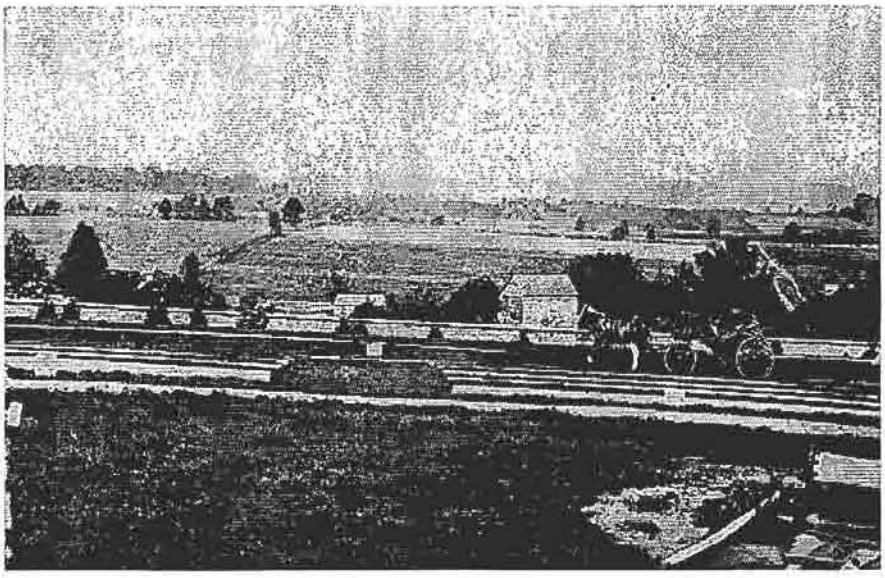


Figure 1-1. "View from Nat. Cemetery—looking to Confederate position on Thursday [July 2, 1863] and Friday [July 3, 1863]—left of Pickett's charge." This 1869 photograph, taken near the center of the Soldiers' National Cemetery (note in the right foreground some of the equipment used in the erection of the Soldiers' National Monument), shows a partial view of the nearly unobstructed panorama available from the crest of Cemetery Hill. The view is west by northwest and clearly reveals the excellent Observation and fields of fire the Union artillery batteries on the west and southwest slopes of Cemetery Hill had during the battle. The Confederate battle line on July 2 and 3 was located on Seminary Ridge, visible in the middle distance and is marked by McMillan Woodlot (on the far left), the McMillan and McDonnel orchards (in the center and right). Thus all the ground over which Confederate troops had to cross during any attack against the hill was clearly under the fire of Union artillery during their entire advance. The left flank of the "Pickett's Charge" on July 3, 1863 crossed the fields seen on the far left edge of this view. (GNMP, Tipton #1883)

Rock Creek, where it ran along the eastern base of Culp's Hill, was key terrain for it served to anchor the right flank of the Army of the Potomac. It also became an obstacle for the Confederates since every Southern soldier who assaulted Culp's Hill first had to wade the creek, thus confusing their ranks and disrupting their attack.

Obstacles are "any natural or manmade [feature] that prevents, delays, or diverts the movement of military forces."[15] Such features can serve either to assist the defenders and/or impede the attackers. Natural obstacles can be high ground, bodies of water (such as rivers, streams or creeks), rough ground, ravines and forest land among others. Man-made features can include fences, farmsteads and stonewalls along with breastworks or entrenchments built during a battle. Obstacles, whether pre-existing or built during the battle, can define avenues of approach, strengthen key terrain and provide cover. For this study, a feature is considered to be an obstacle if it hinders timely and orderly movement under battle circumstances.

The ***Emmitsburg Road*** proved to be an obstacle to Confederate units advancing across it during their assaults on both July 2 and 3. The road was lined on both sides with five-rail-high post and rail fences, which severely slowed the Confederate troops that were forced to pass over them. Lt. Col. S.G. Shepard, commanding a brigade during "Pickett's Charge," reported, "Within 180 or 200 yards of his works, we came to a lane enclosed by two stout post and plank fences. This was a very great obstruction to us...." Probably the best account of these fences comes from Lt. J.H. Moore of the 7th Tennessee, who wrote:

> As the charging column neared the Emmitsburg road volley after volley...aided with dreadful effect in thinning our ranks. We reached the first plank or slab fence and the column clambered over.... The time it took to climb to the top...seemed to me an age of suspense. It was not a leaping over; it was rather an insensible tumbling to the ground in the nervous hope of escaping the thickening missiles that buried themselves in falling victims, in the ground and in the fence, against which they rattled with the distinctness of large rain drops pattering on a roof....[16]

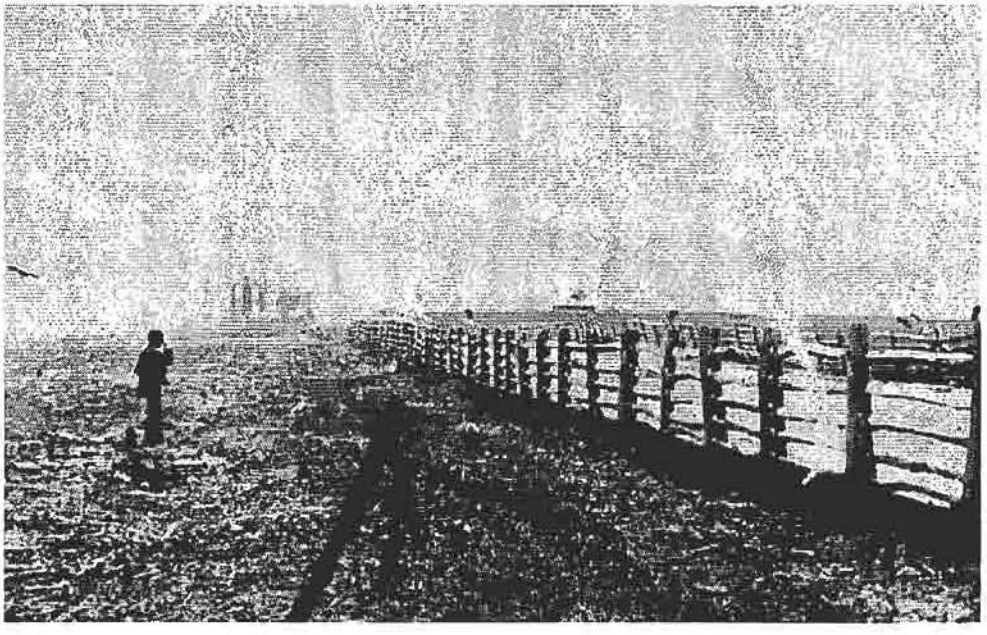


Figure 1-2 View south toward the Nicholas Codori farmstead, ca. 1876-77. The Confederate soldiers in the "Pickett's Charge" crossed this area, from right to left. Obviously the stout post and rail fences lining the Emmitsburg Road, because of their height and sturdy construction, were substantial obstacles to their advance. (GNMP, Tipton #1876)

Cover And Concealment "Cover is protection from enemy fire. Concealment is protection from enemy observation."[17] Based on this definition cover normally is provided by small scale features (i.e., stonewalls, buildings, sunken roads, etc.) and concealment is provided by large scale features (such as the reverse slope of hills and ridges). Once a unit is detected (seen) by the enemy, it can only gain cover from a feature, since that unit is no longer concealed. As an example, the swales located just east of Seminary Ridge provided concealment to Pickett's Division on the morning of July 3. Once their advance began later that afternoon, thus revealing them to the Union army, the subsequent swales the Confederates passed through provided temporary cover, since their presence was already known.[18] On occasion, small scale features can provide concealment to troops. Such was the case for Brig. Gen.

Henry Baxter's Brigade (2nd Brigade/2nd Divison/1st Corps), who remained concealed by the stone wall along Oak Ridge during the approach and eventual decimation of Brig. Gen. Alfred Iverson's Brigade during the fighting on July 1, 1863.[19]

Concealment gained by larger-scale features provide areas where troops can move, muster and rest without detection. It also includes areas where supplies, ammunition and support elements of the army may be placed or stored without fear of enemy fire. On both a small and large scale, cover and concealment is also important in the selection of both defensive positions (for protection from observation and indirect fire) and for offensive avenues of approach (for protection from observation and direct fire).

Cemetery Ridge and stonewalls thereon provided concealment for any Northern units positioned on or beyond its eastern (reverse) slopes on both July 2 and 3. Gen. Henry Hunt reported the crest of the ridge concealed "everything immediately behind it from the observation of the enemy." Brig. Gen. Alexander Webb, commanding a Second Corps brigade reported that "three regiments of the brigade [were placed] under cover of the hill [ridge]."[20] The ridge also concealed the area further to the east, especially the George Spangler farm, where reserve units were placed, including the Fifth Corps and the Artillery Reserve.

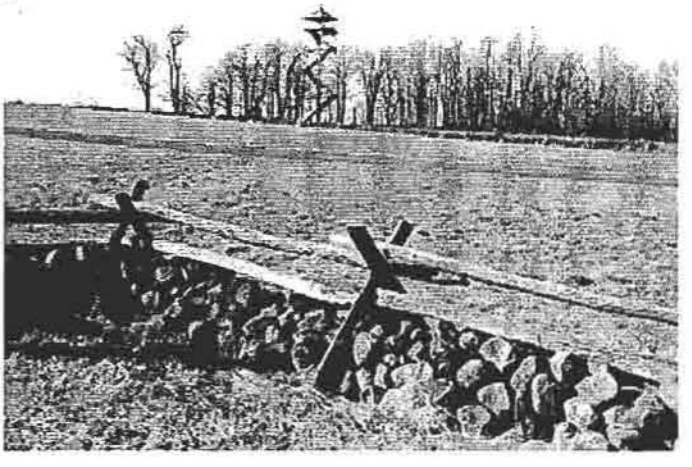


Figure 1-3 The eastern slope of Cemetery Ridge looking northwest towards Ziegler's Grove, 1956. This area was located behind the Army of the Potomac's main battle line on July 2 and 3, 1863, marked by the ridge's crest, and thus concealed from Confederate view. (GNMP, #21P-2226)

The existence of some stonewalls that ran along the length of Cemetery Ridge, along with the earthworks constructed by Union soldiers, provided cover to the Union defenders in this position. Most of the Union Second Corps, which held this section of the ridge, either took advantage of the walls or made some improvements to their position on July 2. Brig. Gen. Alexander Hays reported, "A stone wall just below [to the west of] the crest of the hill gave much strength to the position." They, along with the walls, "offered considerable protection" during the great bombardment of July 3 and during the repulse of "Pickett's Charge."[21]

Observation is defined by what can be seen from a given feature. These can be either natural features (such as high ground) or manmade features (such as the cupola at the Lutheran Theological Seminary). During the Civil War observation applied to two basic elements: signal stations and fields of fire. The placement of signal stations was important for allowing maximum observation of the enemy's movements while also providing rapid communications within the army. Fields of fire applies to both views at long range (i.e., artillery fire) and short range (i.e., infantry fire). This was especially important for Civil War artillery, which was restricted to direct line-of-sight fire. Observation can also apply at shorter ranges, such as infantry fire, when units are located or firing into vegetation features (i. e., woodlots, thickets, etc.) or when topographical features (i.e., hills, ridges, boulder outcroppings, etc.) can fully or partially conceal units.

McKnight's Knoll also known as Steven's Knoll, is located between East Cemetery Hill and Culp's Hill and rises approximately 80 feet above the surrounding landscape. It was an important feature because its observation qualities provided an extensive view not only toward the Confederate positions to the north but also of almost the entire Union line to the south and west. Because of this the knoll served as both an excellent artillery platform and as a signal station. The 5th Maine Battery was positioned on the knoll and greatly assisted in repulsing a July 2 Confederate assault on East Cemetery Hill. The signal station on the knoll was reported to be an "important station of observation" because from it "the whole...left of the rebel army was closely watched." The location also allowed for rapid communication between the Union right (Twelfth Corps on Culp's Hill) and army headquarters behind Cemetery Ridge.[22]



Figure 1-4 "Looking to Round-Top from Stevens' Battery," ca. 1898. View south/southwest from McKnight's Hill clearly reveals the excellent Observation and views from this location. Nearly the entire Union line, including the Round Tops (seen to the right of the cannon) could be seen from this location. (GNMP, Tipton #4272)



Figure 1-5 "Gettysburg from Steven's Battery," ca. 1898. View north-northeast from McKnight's Knoll. The field of fire available to the 5th Maine Battery toward the town and the Confederate lines. On the evening of July 2, 1863 Confederate troops, advancing toward Cemetery Hill crossed these fields from right to left while under the devastating fire from the battery. (GNMP, Tipton # 4171)

Avenues Of Approach include the operational and tactical movement of troops over natural and man-made features. On an operational level major roads dictated the rapid movement of large bodies of soldiers to and sometimes around a battlefield. Logistically road networks were of extreme importance to Civil War armies, who relied upon roads for rapid troop movements and logistical support.

On a tactical level (normally defined as once an engagement begins) avenues of approach included smaller roads or farm lanes that allow maneuvering of troops in preparation for offensive action or for defensive reaction. Tactical avenues of approach can also include or be influenced by natural features, such as topography (i.e. hills, ridges, plains, etc.) or vegetation (i.e., woodlots, woods, etc.). As commanders planned and executed military maneuvers (assaults and/or the placement and maneuvering of troops for defensive purposes) some features, such as plains, were ideal for the effective and efficient movement of troops and therefore were excellent avenues of approach. Conversely, other features (i.e., thick woods, dense farm clusters, rocky hills, etc.) hindered the movement of troops and thus influenced the routes units took while maneuvering into or across a battlefield.

Granite School House Lane, which connects the Baltimore Pike and the Taneytown Road, was an important avenue of approach for the Army of the Potomac. It enabled them to take advantage of their interior lines thus making possible the rapid movement of troops from one wing of their battle line to the other. When the left end of the Union line was under attack on July 2, various units from the Fifth Corps, Twelfth Corps and Artillery Reserve used the road to reinforce threatened points.[23]

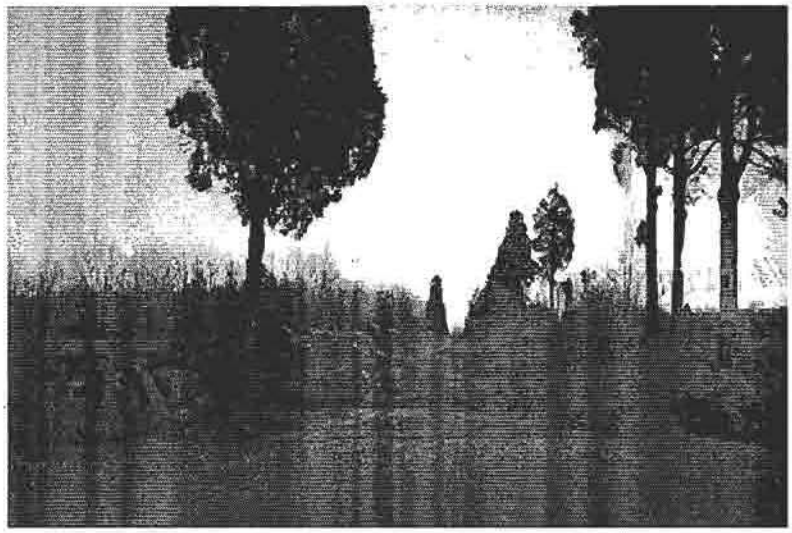


Figure 1-6 Granite School House Lane, view east from intersection of Taneytown Road, 1934. Though photographed over 70 years after the battle, the composition and appearance of the lane was probably similar in 1863. (GNMP #SF-22R-112)



Figure 1-7 Granite School House Lane, c. 1934. (GNMP #SF-22R-111)

Plum Run Valley (the "Valley of Death") is an area of low ground, or small valley, situated between the Round Tops and Houck's Ridge that heavily influenced the fighting on July 2. Being dominated by the higher ground both to the west and east this small valley served as a natural avenue of approach on July 2 for several advancing Confederate regiments and two counterattacking Union regiments.

Despite the rocky nature and roughness of this area, the valley itself became a natural avenue of approach for the assaulting Confederates on July 2, who were attempting to turn the left flank of the Third Corps line by passing between Devil's Den/Houck's Ridge and Little Round Top. Brig. Gen. Hobart Ward, commanding the Third Corps troops on the crest of Houck's Ridge reported, "The enemy now concentrated his force on our extreme left, with the intention to turn our left flank through a gorge between my left and Sugar Loaf hill (Little Round Top)." Some of these Confederate soldiers belonged to Brig. Gen. William Benning's Georgia Brigade, one of whom recalled, "The line reached the foot of the hill (Houck's Ridge)...the 2nd and 17th (Georgia) being forced into a gorge that lay between (Houck's Ridge) and the mountain to the right."[24]

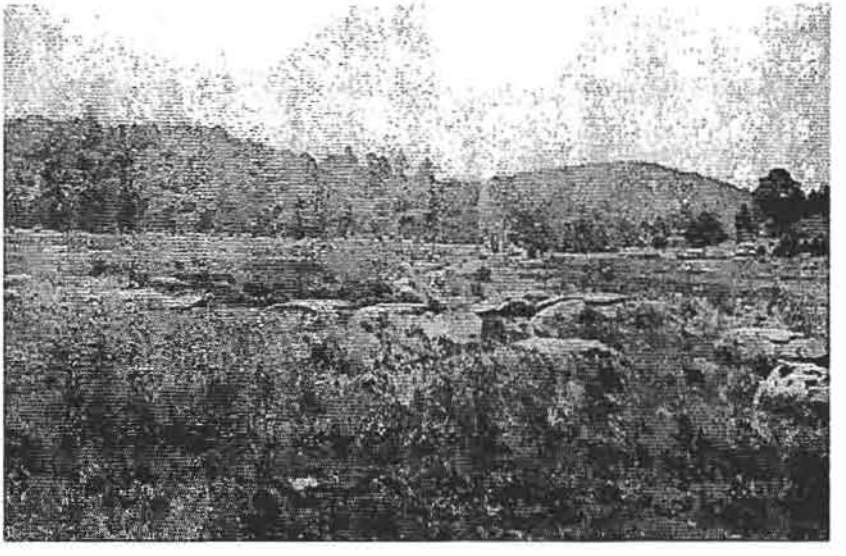


Figure 1-8 Plum Run Gorge, more popularly known as the "Valley of Death," view south towards the Round Tops. On July 2, 1863 Confederate regiments, attempting to outflank the Union line at Devil's Den (marked by the small trees on the far right), advanced through this valley (toward the camera position) between the Den and the Round Tops (Little Round Top on the left and Big Round Top at the right center).
(GNMP #21P-1294)

Many features fall under more than one KOCOA catetory, and thus influenced the battle in numerous ways (i.e. a hill can be key terrain, an obstacle, provide cover and/or concealment and provide excellent observation). Thus some features were especially important to control from a military viewpoint.

[1] Final General Management Plan and Environmental Impact Statement, Vol. 1 (Gettysburg National Military Park, June 1999), pp. 124, 276.
[2] ibid, p. 80.
[3] ibid, pp. 80-81.
[4] ibid, pp. 85.
[5] ibid, pp. 87.
[6] ibid, pp. 112.
[7] ibid, pp. 126-127.
[8] ibid, pp. 114.
[9] ibid, pp. 129.
[10] ibid, pp. 129-130.
[11] ibid, pp. 4.
[12] ibid, pp. 45.
[13] ibid, pp. 444-447.
[14] "Appendix A, Engineer Estimate," (website: www.wood.army.mil/DDD/PUBS/ST5712), p. 7.
[15] John M. Collins, Military Geography for Professionals and the Public, (Brassey's, Washington D. C.), p. 401.
[16] Edwin B. Coddington, The Gettysburg Campaign, A Study in Command (Charles Scribner's Sons, New York, 1968), pp. 192, 261-262, 278, 328-329; "Letter from Adjutant H.C. Moore," 38th North Carolina, as quoted in, Michael W. Taylor, "North Carolina in the Pickett-Pettigrew-Trimble Charge at Gettysburg," The Gettysburg Magazine, Issue No. 8, (Morningside Press, Dayton, Ohio, 1993), p. 90; OR, pt. 2, p. 647 (Lt. Col. Shepard); J.H. Moore, "Longstreet's Assault," The Philadelphia Weekly Times, November 4, 1882, copy in GNMP Library.
[17] "Appendix A, Engineer Estimate," p. 4.
[18] United States War Department, The War of the Rebellion: A Complilation of the Official Records of the Union and Confederate Armies, 70 vols. in 128 parts (Washington, D.C.: Government Printing Office, 1880-1901), series I, Vol. 27, pt. 2, pp. 359, 360 (Lt. Gen. James Longstreet) (hereafter cited as OR. All subsequent notes are from series I, Vol. 27).
[19] Isaac Hall, History of the Ninety-Seventh Regiment New York Volunteers, (L.C.Childs & Son, Utica, New York, 1890), p. 136-137;; George W. Grant, "The First Army Corps on the First Day at Gettysburg," The Gettysburg Papers, (Morningside Press, Dayton, Ohio, 1978), p.50; OR, pt. 2, pp. 553 (Maj. Gen. Robert Rodes), p. 579 (Brig. Gen. Alfred Iverson); John D. Vautier, History of the 88th Pennsylvania Volunteers, (J.B. Lippincott Co., Philadelphia, Pennsylvania, 1894), p. 135.
[20] OR, pt. 1, pp. 232 (Brig. Gen. Henry Hunt), 427 (Brig. Gen. Alexander Webb).
[21] OR, pt. 1, pp. 373 (Maj. Gen. Winfield Hancock), 380 (Brig. Gen. John Caldwell), 427 (Brig. Gen. Alexander Webb), 437 (Col. Norman Hall), 453 (Brig. Gen. Alexander Hays), 467 (Maj. Theodore Ellis).
[22] OR, pt. 1, p. 202 (Capt. Lemuel B. Norton).
[23] OR, pt. 1, pp. 590 (Maj. Gen. George Sykes), 600 (Brig. Gen. James Barnes), 760 (Maj. Gen. Henry Slocum), 872 (Brig. Gen. Robert O. Tyler).
[24] OR, pt. 1, p. 494 (Brig. Gen. Hobart Ward); The Savannah Republican, July 22, 1863, photocopy of handwritten transcription in GNMP Library. The Confederate troops that moved into this gorge consisted of the 44th and 48th Alabama (Brig. Gen. Evander Law's Brigade), and the 2nd and 17th Georgia (of Brig. Gen. William Benning's Brigade).

Chapter 2
CULTURAL FEATURES

The 1863 Gettysburg landscape was a matrix of agricultural, cultural and natural features. Many cultural features heavily impacted the fighting and shaped the final outcome of the battle. These included circulation features, agricultural fields, farm building complexes, woodlots, groves, hedgerows, orchards, individual trees, fences, gates, wells, dams, ponds and improved springs.

CIRCULATION

These features are of extreme importance, both in the pre-battle history and development of Gettysburg and in terms of understanding and shaping the battle. Circulation can be classified into three levels: Roads and Railroads, Local Road Network and Internal Circulation. These features were critical in getting the opposing armies to Gettysburg and also played a significant role during the battle on a tactical level by expediting the movement of troops across and around the battlefield.

ROADS AND RAILROADS

Historic Use and Appearance

These features make up the first level of the circulation infrastructure. Gettysburg's emergence by the mid-19th century as an economic and political center and the seat of Adams County was due primarily to its importance as a major road network and as the terminus of the Hanover and Gettysburg Railroad. With a total of ten roads, including three major turnpikes, intersecting at its square, the town became a vital transportation hub because it provided access to several major cities. These roads not only made local travel easier for the citizens of Adams County but also allowed farmers to ship their surplus produce to wider markets and merchants to obtain goods for sale. The Hanover and Gettysburg Railroad reached Gettysburg in 1858 and increased the county's access to other markets substantially.[1]



Figure 2-1 This 1843 woodcut, the earliest known view of Gettysburg, depicts the town as viewed from the Oak Ridge railroad cut. The lane traversing the central part of the picture is actually the abandoned railroad bed that eventually become the Hanover and Gettysburg Railroad (later known as the Western Maryland Railroad). The railroad was still unfinished in 1863, and as evident here, was being used as a wagon road. This bed was the scene of combat on July 1, 1863 and was also used by Confederate units as an Avenue of Approach (Adams County Historical Society)

The quality of the road depended upon its initial construction and continued maintenance. Three of the roads radiating from Gettysburg were macadamized pikes, being made of "crushed rock of graduated size...laid on a foundation of stones," which made them nearly weather proof.[2] Turnpikes were usually of good quality for they "were privately financed, constructed, operated and maintained" to meet standards set by state regulations.[3]

Construction and maintenance included not only good ***materials*** and ***workmanship***, but also a road's ***alignment***, ***width*** and ***grade***. Turnpikes were usually of better quality than the average road for several reasons. These pikes had been laid out by road engineers and had been developed to prevent sudden changes in grade. Consequently, the construction prevented washouts or road damage by lowering the angle of slope through excavation or filling. This type of road was wide enough to accommodate two passing wagons of the largest kind then used. Tolls were almost always based on the size of the wagon or cart, charging different rates in proportion to the width of the tires. These roads had stone bases, laid on the grade of the roadbed, and the whole was packed with small stone chinking and clay if possible. Finally a layer of coarse dirt and river gravel was rolled into any crevices. The appearance of these roads, especially after heavy use in dry weather was of a solid and almost rut-free surface. Although rains increased the likelihood of rutting from vehicles, this damage generally was shallow due to the compacted stone foundations. Turnpikes were always enclosed on both sides by fencing.

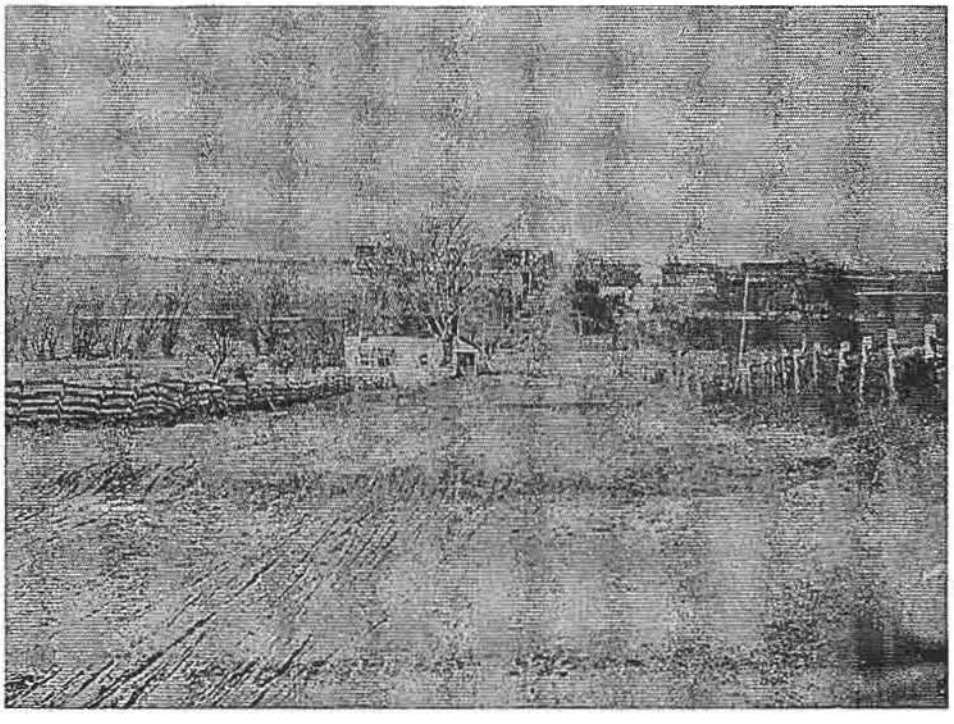


Figure 2-2 This view (ca. 1875-1885), taken from McPherson Ridge and looking westward along the Chambersburg Pike toward Herr's Ridge, provides an excellent example of appearance and composition (including materials, workmanship, alignment, width and grade) of an improved pike in the mid-to-late-19th century. (GNMP #21P-1333)

The lower grade of these primary roads was the county road. County roads were almost always the result of early settlement and of subsequent need to improve local access to markets, churches, water sources, or the turnpikes. These were not maintained by the state but through county assessments. As the community expanded and its population increased, the number of these roads also increased. These roads generally followed Native American trails and were the product of little effort except clearing of adjacent vegetation to provide the wider access necessary for wagons. Once these routes of emigration and trade became established, they *de facto* became roads. Latter settlement led to more of these types of roads—no real grading, road bed, or defined direct route. Steep grades were common. Meandering courses were common to avoid rock outcroppings, existing buildings, water courses, or dense vegetation. Heavy rains or heavy use played havoc with these roads. Extreme rutting, washouts, and mudholes were common. Although most of the latter (non-pioneer) roads were laid out by surveyors, they nonetheless were built with minimal county funds and only were maintained at very wide intervals of time. Examples of this kind of road in addition to those cited included the Harrisburg Road, the Taneytown Road, the Carlisle Road, the Hanover Road, the Low Dutch Road, and the Emmitsburg Road.



Figure 2-3 "Emmitsburg road from Codori house looking south-west," (William Tipton, ca. 1888-1895). The poor condition of the Emmitsburg Road illustrates the result of the initial construction and lack of maintenance of county roads. This was especially true, as seen here, during times of inclement weather or heavy use. (GNMP, Tipton #1886)

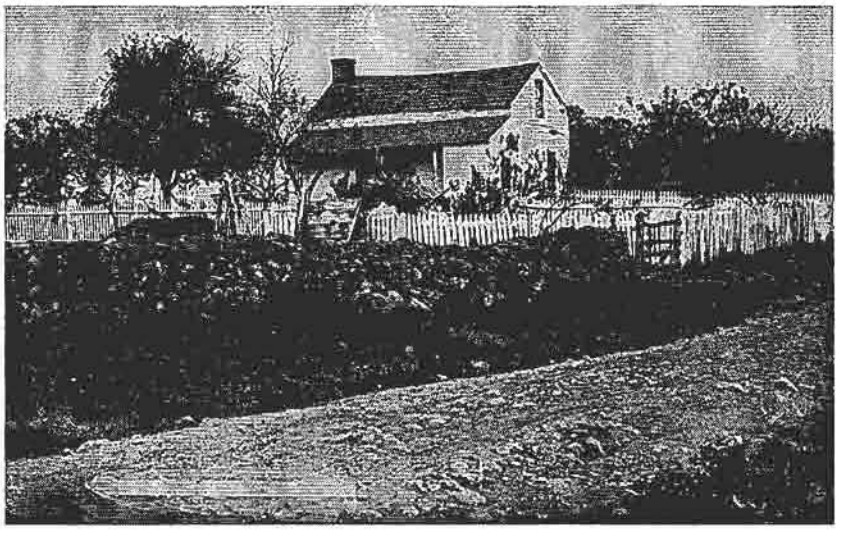


Figure 2-4 Lydia Leister farmhouse, 1863. Note the appearance and composition of the Taneytown Road, one of the county roads present on the 1863 Gettysburg landscape. (GNMP #23S-0252)

How Roads and Railroads Influenced the Battle

Road networks were of extreme importance to Civil War armies who relied upon them for rapid troop movements and logistical support. Therefore, during the Gettysburg Campaign and battle these characteristics made Gettysburg an important strategic military position. Union Maj. Gen. Abner Doubleday described this in his official report:

> Gettysburg...is the junction of seven great roads leading to Hagerstown, Chambersburg, Carlisle, York, Baltimore, Taneytown, and Washington, and is also an important railroad terminus. ...It was, therefore, a strategic point of no ordinary importance. Its possession would have been invaluable to Lee...as a base of maneuvers for future operations.[4]

Using KOCOA analysis it becomes obvious that these features were extremely important as Avenues of Approach, allowing for the quick movement of large units to and around the battlefield. Some, especially those whose grade caused them to be sunken or embanked, also provided Cover and Concealment to the opposing troops, proved to be an Obstacle for troops attempting to cross over them, and also impacted the Observation of units attempting to fire from or through them.

A road's ***alignment, width, grade,*** and ***materials*** all contributed to its value as an Avenue of Approach. The ***alignment*** of the roads was significant for all of them led to or from Gettysburg. This was especially important during the early stages of the battle, since each army attempted to concentrate their scattered forces as quickly as possible. Since the roads led to, or passed through, the town, this process was greatly accelerated.

The ***width*** of a road or railroad bed also impacted its usefulness as an Avenue of Approach. The wider the road or railroad bed, the more troops, wagons, artillery, and other elements of an army could move along it at the same time, thus increasing its carrying capacity.

Grade could affect the value of a road or railroad bed as an Avenue of Approach, since those possessing a lower grade allowed for the more rapid movement of troops. This was especially true of railroad beds for their methods of construction routinely used cuts and fills to avoid excessive grades. Thus railroad beds were fairly level which made travel along them more rapid. The ***grade*** of some roads or railroad beds also caused them to be sunken or embanked and thus influenced the battle on several levels. Primarily, these types of roads and railroad beds provided excellent Cover and Concealment for troops placed in them (sunken) or along their edge (embankments). For troops attempting to cross over a road or railroad bed that was sunken or embanked, it would become an Obstacle. This was especially true for cavalry or artillery batteries, for whom crossing sharp grades was difficult if not impossible, or for infantry that was attempting to turn out of a road or railroad bed that was sunken or embanked. The construction of the Hanover and Gettysburg Railroad bed west of Gettysburg involved the creation of deep cuts through Seminary and McPherson ridges. These cuts proved to be great Obstacles and impacted the Observation of units occupying them.

The ***materials*** used for the construction of a road or railroad bed influenced its relative value as an Avenue of Approach. The three macadamized turnpikes that passed through Gettysburg were extremely important from a military perspective, since they had substantial bases, regularly maintained surfaces, and did not readily deteriorate like other county and township roads. Thus they were capable of supporting the movement of large bodies of troops, including hundreds of wagons and

thousands of horses. Conversely, non-hardened dirt roads produced vast clouds of dust in dry weather and turned into quagmires of mud when it rained. Either condition hampered the movement of troops, thus slowing their pace. Even some of the turnpikes generated enormous amounts of dust, due to the limestone screenings used for the road's surface.

The quality of construction of a road and its subsequent maintenance also influenced its worth as an Avenue of Approach. Even though a road might have good alignment, be fairly wide, have a low grade and be composed of good materials, it still may not be as useful to an army if its construction and maintenance were inferior. Such a road would probably quickly deteriorate under the strenuous use to which a moving army would subject it. Conversely, a road that had good workmanship, such as a macadamized turnpike, was at least four rods wide, was properly crowned and ditched and well maintained, would serve as an ideal Avenue of Approach.[5]

General Treatment Principles

The approved 1999 GMP recommended that the circulation system present in 1863 be restored to the maximum extent possible. However, the majority of the road system is paved and maintained by others and NPS has little control over the management and rehabilitation of the major road and railroad systems. Whenever feasible, NPS would oppose changes in the width, alignment, embankments and/or drainage features of Civil War era roads and railroads that would affect their interpretation. It may be possible to work with the Pennsylvania Department of Transportation to restore some of the Civil War era appearance of major roads. For example, use of park road standards could reduce the width and irregular modern appearance of road shoulders and less frequent shoulder mowing could replicate more of the appearance of a country road. Should it become possible to work with the Pennsylvania Department of Transportation to restore more of the appearance of major roads, NPS will pursue such measures.

Example Illustrating Possible Treatment

The construction of the **Hanover and Gettysburg Railroad** west of Gettysburg created three deep cuts as the railroad bed passed through three ridges (from east to west Seminary Ridge, East McPherson Ridge and West McPherson Ridge) and are known successively as the East, Middle and West Railroad Cuts. During the fighting on July 1, 1863 these cuts impacted the battle several ways. As Brig. Gen. Joseph Davis's Brigade moved perpendicular to the railroad bed the cuts became Obstacles as they cut his line of battle in two. Later Davis' soldiers occupied the Middle Cut to obtain its Cover and Concealment as they reformed their battle line. Sections of this cut were over six feet deep and thus isolated Davis' troops by limiting their Observation. Thus, during the Union counterattack that followed many of Davis' men could not see the threat coming and were

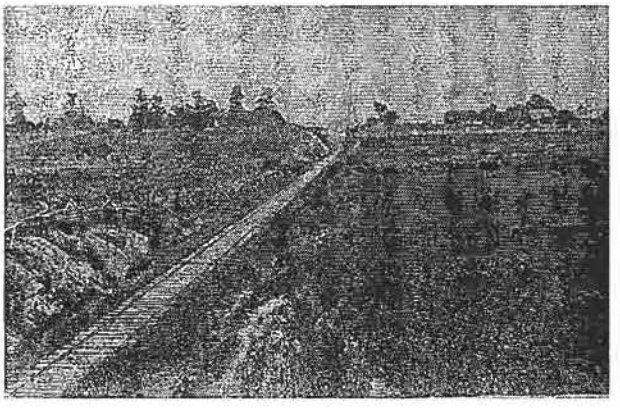


Figure 2-5 "View of the Railroad Cut...first days fight," (Tipton, c. 1885). The Oak/Seminary Ridge (East) Railroad Cut looking east from East McPherson Ridge. The cut in the left foreground (Middle Cut) was the scene where hundreds of Confederates from Brig. Gen. Joseph Davis' Brigade were captured on the morning of July 1, 1863. (GNMP, Tipton #5095)

subsequently captured. The creation of these cuts in order to level the grade for the railroad bed, also made it an ideal Avenue of Approach for troops marching in column. Maj. Gen. Edward Johnson's Division did exactly this as they moved toward their assigned positions east of town on the evening of July 1, 1863.[6]

Possible treatment for all of the characteristics that make up a road or railroad bed, however, is a moot point for all such roads currently on the battlefield are paved and maintained (either by the state, county or NPS) for use by modern vehicles. The incomplete rail line of 1863 west of town has likewise been altered with the installation of tracks and ties. However, when feasible, NPS would oppose major changes in width, grade and alignment of these roads that would impact their interpretation value.

LOCAL ROAD NETWORK

Historic Use and Appearance

This secondary tier of the Circulation infrastructure augmented the public road system and facilitated movement to, from, and through the farms that surrounded the town of Gettysburg. Many of these dated to the early settlement of the Gettysburg area when there was no county road system. This early system was comprised of connected farm lanes, with one farmer putting in an extension to connect his farm lane with that of his neighbor, and the neighbor putting in an extension to get to another adjoining neighbor. These often connected in such a way that they provided access for an otherwise "land-locked" farmer to reach a public road. Some examples of this kind of neighborhood lane system included the Trostle-Weikert-Swisher lane, the Granite Schoolhouse Lane, the McAllister Mill Lane, and the Wills-McPherson-Sheads Lane. Unless there was no way to avoid crossing a stream corridor, these lanes took the most direct route from one point to another without regard to grade, morasses, waterways, forest cover, or rock outcroppings. To avoid expense, these connecting neighborhood lanes used fords instead of bridges, wove between trees and boulders, and had no road bed to speak of. Native rocks and tops of boulders poked out of the ground into the surface of these lanes. Frequency



Figure 2-6 ""Wagon Road to McAllister's Mill," (Tipton, 1903). Although this photograph was taken forty years after the battle, the composition and appearance of this local road had changed very little since 1863. Note the lane's narrow width, its meandering alignment to avoid boulders and trees, along with the rock outcrop visible in the middle of the roadbed. (GNMP, Tipton #2327)

of use for this neighborhood circulation gave these routes the appearance of narrow "roads." Turf was long worn away from the road surface and the soil had been compacted into hardpan. Some of these, like the McAllister Mill lane, warranted subsurface improvement. This particular grist mill was the closest mill source for most of the farmers on the 1863 battlefield (during both settlement and Civil War eras) and therefore attracted heavy use, particularly during harvest times. Cobbles and native stone were consequently and repeatedly thrown into the resulting quagmires in an attempt to solidify the road. These lanes had a similar surface appearance to the county roads but did not have the width of those roads. Most of these lanes barely accepted a single wagon along their routes but were most likely in better condition than many public roads because of the necessity for shared maintenance (particularly by the "landlocked" farmers).

Many other local lanes, however, merely connected one particular cluster of farm buildings to an adjoining public road. These lanes shared many, but not all, of the same characteristics of the farm connecting lanes. The frequency of use over these lanes was proportionately less than the shared farm lanes because only one farmer used them. The surface character and appearance of individual farm lanes therefore was less compacted from use and probably profited less from maintenance. The lanes were narrow, accommodating only one wagon or carriage at a time. They were often as not rutted, had little or no crown, had no sloped surfaces to encourage run-off, and had no base. Consequently, the surfaces of some of these lanes turned into quagmires during periods of rain or snow melt. Some farmers entirely abandoned use of their lanes during these periods, cutting across the fields instead because their crop or turf cover provided a more stable route. Although some farmers had or could borrow graders or rollers, most farmers maintained their lanes with hand tools and with native stone and river gravel where available. Examples of this type of lane would be the McPherson Lane, Slyder Lane, Culp Lane and Forney Lane. Local lanes had the same characteristics as the primary roads, including ***alignment, width, grade***, and ***materials***.

How the Local Road Network Influenced the Battle

Militarily, these lanes were used mostly on a tactical level as Avenues of Approach to move troops around the battlefield. They also provided Cover and Concealment or were Obstacles to troops crossing them. The same characteristics as those described above determined the military impact these local roads had on the fighting.

A lane's ***alignment, width, grade, and materials*** all contributed to its value as an Avenue of Approach. Since the construction of most of these lanes was substandard, their ***alignment*** was not always conducive to rapid movement (e.g., crossing rocky ground or other obstacles, excessive or sharp changes in grade, etc.).

The ***width*** of a lane also impacted a lane's usefulness as an Avenue of Approach. Most lanes were fairly narrow, which severely restricted the number of troops, wagons, artillery, and other elements of an army that could move along it at the same time.

The ***grade*** of some lanes caused them to be sunken or embanked and thus influenced the battle on several levels. Primarily, these types of lanes provided excellent Cover and Concealment for troops placed in them (sunken) or along their edge (embankments). For troops attempting to cross over a lane that was sunken or embanked, it would become an Obstacle. This was especially true for cavalry or artillery batteries, for whom crossing sharp grades was difficult if not impossible, or for infantry that was attempting to turn out of a lane that was sunken or embanked. ***Grade*** could also affect the value

of a lane as an Avenue of Approach, since those possessing a lower grade allowed for the more rapid movement of troops.

The ***materials*** used in the construction of most lanes influenced their relative value as an Avenues of Approach. Materials varied, but most lanes were dirt and at best had a thin layer of gravel on their surfaces or a cobbled base. Lanes made of poorer materials could not hold up under adverse conditions (e.g., wet weather) or the heavy and extended use an army would place upon them. For short tactical movements by smaller bodies of troops around the battlefield, these lanes served to direct and hasten their arrival at a particular point. Some lanes, especially the older, longer routes that connected multiple farms to other public roads, were often improved with a cobbled base, especially as they passed through low areas (e.g., McAllister Mill Lane, Trostle-Weikert Lane, Bushman Lane). These lanes obviously were more attractive for the movement of wagons and artillery as they were less likely to bog down in low areas.

The quality of construction of a lane and its subsequent maintenance also influenced its worth as an Avenue of Approach. Most lanes were constructed over long periods of time by local farmers and were not regularly maintained, although some country roads, as they were called, were better made and maintained. However, most lanes would probably quickly deteriorate under the strenuous use to which a moving army would subject it.

General Treatment Principles

The approved 1999 GMP recommended that NPS restore the circulation system present in 1863 wherever possible. In addition, the GMP recommended that NPS restore local and internal road systems and use them as pedestrian and horse trails. This would allow NPS to remove non-historic trail systems that are currently causing resource damage throughout the park. Some of these local roads are now missing, and NPS will restore them to replicate their 1863 appearance. The GMP recommended that NPS develop the 1863 system of local and internal road using materials that were visually consistent with the landscape yet capable of withstanding the expected traffic. When necessary to create workable trail systems, NPS would create limited non-historic trail segments to connect lanes and provide for loop circulation.[7] In addition, NPS will provide bridges for creeks and watercourses, to protect their banks, water quality and flora. At locations where historic fords existed, they will be improved for modern uses and incorporated within a trail system.

Local Lanes Present in 1863 but now Missing: Although local roads lacked the superior construction of major roads and turnpikes, they were sometimes improved, having a crown and somewhat more width than field lanes. Other local lanes were of poorer construction, lacking a crown or any stabilizing materials. Where lanes are missing, they will be designed to replicate as much as possible the known 1863 conditions. However, the subsurface design of local and internal roads will be suited both to the local environmental conditions and to the expected pedestrian and horse use. In each case, a lane will be restored using subsurface materials that will create a long-lasting road. Surface materials that replicate the historic color and appearance of the local lane will be selected. In many cases, this will require the use of fines or other similar material that will replicate the color and general texture of local soils.[8]

If possible, NPS will construct roads by burying materials no deeper than three inches and building up as needed to create the desired subsurface and surface conditions. This will cause the minimum disturbance to subsurface resources. If environmental or site conditions require additional depth, appropriate archeological investigations will be undertaken to determine the extent of subsurface

resources. If any unknown significant resources are uncovered during ground-disturbing activities, procedures to implement Section 106 of the National Historic Preservation Act will be instituted.

Where local roads were sunken or embanked, and where it is important for interpretation that they be presented as such to the public, archeological testing will be undertaken. Whenever possible, the lane will be restored by removing materials placed in the lane since 1863 to raise its level, leaving the 1863 surfaces undisturbed. The 1863 level will be physically separated from new materials used to create the lane subsurface and surface.

Existing Gravel Lanes: Many local roads still exist, serving houses and farms now as they did in 1863. However, years of modern maintenance have gradually changed the width, surface appearance and other characteristics of the 1863 lanes. When future lane maintenance is undertaken, surface materials will be chosen that replicate the historic color and appearance of the local lane. In many cases, this will require the use of fines or other similar material that will replicate the color and general texture of local soils. Care will be taken to ensure that lane widths are maintained in their historic condition, and excess materials will be removed from the verges of lanes if needed to restore their historic width. Restoration of missing embankments will also be undertaken for interpretive purposes.

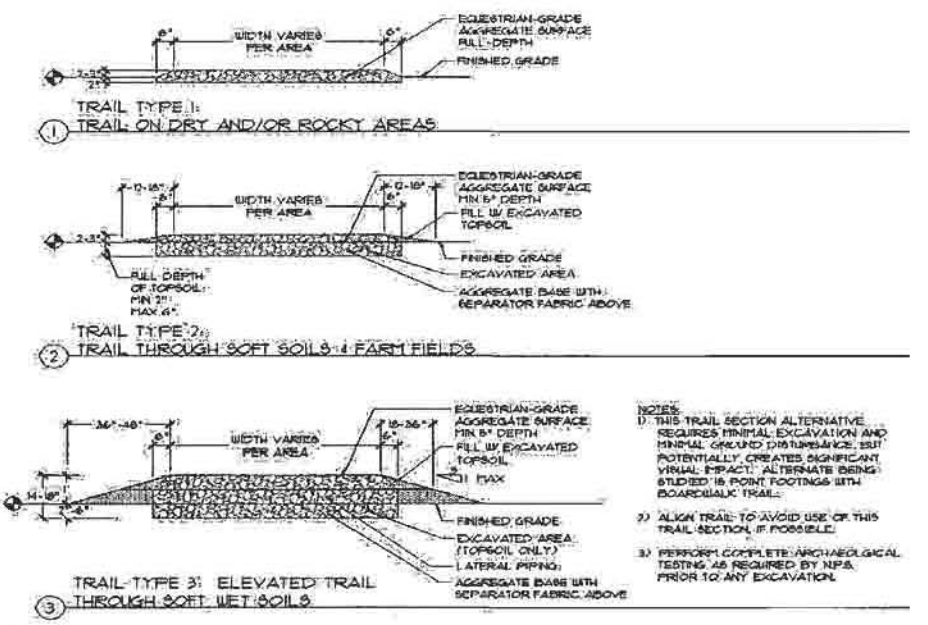


Figure 2-7 Schematic elevation designs for the treatment of historic local lanes to be used as horse trails based on soil types. (Rhodeside and Harwell Inc., 2002)

Example Illustrating Possible Treatment

Trostle-Weikert-Swisher Lane, which connected the Emmitsburg Road and the Taneytown Road, was an important Avenue of Approach for various units of the Army of the Potomac, both on July 1 and 2, 1863. Since the western half of the lane was improved, it was an attractive Avenue of Approach on the evening of July 1 and morning of July 2 as the army consolidated itself and formed its battle line. On the afternoon of July 2, as the left end of the Union line came under attack, the lane allowed the Union army to take advantage of its interior lines by allowing the rapid movement of troops to the front. This was especially

true for batteries of the Artillery Reserve who moved from behind the main line toward the front. These units used this old improved route, instead of the less attractive, poorly constructed Wheatfield Road to move into position during the second day of the battle. One Union soldier recalled the batteries "galloped down the old, half hidden road along the rear of Sickles' line of battle toward the [salient] angle."[9]

Based on the above analysis the Trostle-Weikert-Swisher Lane influenced the battle as an Avenue of Approach. Therefore, recommended treatment of the lane might be the restoration of it ***alignment, width*** and ***grade***, since these characteristics made it valuable as an Avenue of Approach. Since the western half of the lane has been transformed into United States Avenue, restoration of its 1863 characteristics is not possible. However, the surface of the lane's eastern half can be restored using materials that can be maintained, but which will replicate its historic appearance. The subsurface of the lane should be developed to permit modern horse trail and pedestrian use. For the portions of the lane within the Trostle and Weikert house fences, the gray gravel could be replaced with materials that replicate its historic appearance.

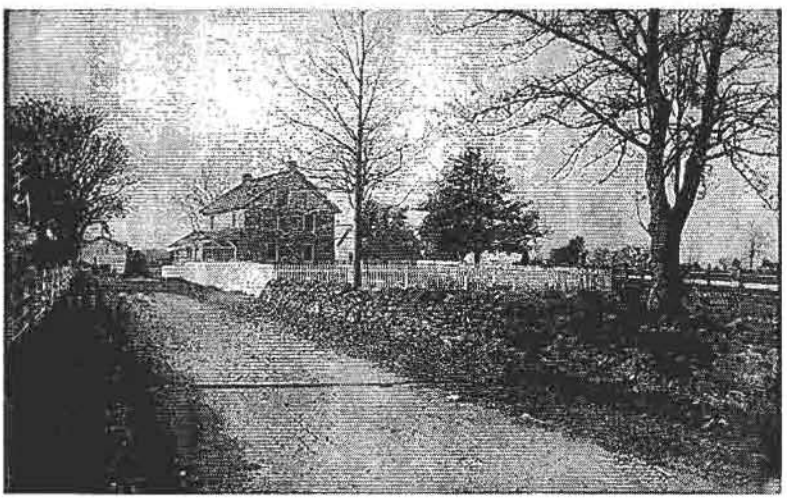


Figure 2-8 The Weikert-Trostle Lane looking west toward the George Weikert farmstead. Although taken around 1900, this image still provides a good depiction of the appearance of the lane at the time of the battle. (GNMP, Tipton #2405)

Another example of a local lane was the McKnight-Culp-Spangler woodlot lane that ran generally southeast from the James McKnight farmstead to Spangler Meadow. This dirt track passed along the western edge of Culp's Woods and was used by Union troops from the 1st Corps, 11th Corps and 12th Corps as an Avenue of Approach to either take up their assigned positions on Culp's Hill or to speed their arrival along that section of the line as reinforcements during the fighting on the evening of July 2, 1863.[10]

Based on this analysis this lane impacted the battle as Avenues of Approach since it was used on a tactical level to provide troops either easy or concealed access to different points on the field. Possible treatment of this lane might include restoration of its ***alignment, width*** and ***grade***, as well as using surface materials that will replicate its 1863 appearance.

INTERNAL CIRCULATION

Historic Use and Appearance

These features make up the third tier of the Circulation infrastructure and can be defined as either field access lanes or woodlot access lanes that were used by farmers on an intermittent basis. A *field access lane* was a simple farm lane that normally traced their alignment along a fence line, and provided access to a particular field, pasture or even residence. A *woodlot access lane* was a track

that gave farmers access to, or passage through, a woodlot or woodland. These lanes were used so infrequently that they are not even recognized as such and do not always appear on any official maps of the battlefield. It is doubtful if any of these types of lanes were developed in any kind of way except through use. Where possible the farmer planned the route of these access lanes to take the best advantage of grade and to avoid boulder outcroppings, low ground and morasses. In some instances, this was impossible, particularly where a farmer had to negotiate a waterway between his farm buildings and his crop fields or woodlands. (John Slyder was compelled to build a bridge over Plum Run in order to access his woods and pasture.) As a general rule, the surface appearance of these lanes was markedly different than the farmstead lane that provided access to the public roads. Because of the seasonal and intermittent nature of their use by the farmer, these access lanes were permitted time to recover between use. As a result, most of the crop access lanes were in turf. Forest cover within woodlots prevented a cover of turf but they were identifiable by the absence of trees or substantial vegetation inside of the lane's route. Because woodlots generally were located in the farm's worst possible soils (wet or rocky), the lanes that ran through the woodlots sometimes became impassable due to the erosion of soils and displacement of rocks caused by the farmer's use. When the lanes there deteriorated to that point, the farmer merely found another route through the forest growth, removed undesirable vegetation, and had a new access lane. The number of lanes that appear on historic maps of the Bushman and Big Round Top woods—where erosion was high—testify to the need to relocate these lanes on a rotating basis. Exceptions to this general rule occurred, especially where more than one farmer may have used the access lane or where an access lane provided a common route to both cropland and woodland. In these instances, a well-defined road appearance was likely, with a compacted surface and no turf. An example of this kind of exception were the Codori fields access lanes. The majority of these internal lanes were inferior, compared to the roads and lanes of the areas primary and local road network, in nearly all characteristics including ***alignment, width, grade***, and ***materials.***

How Internal Circulation Lanes Influenced the battle

Militarily, field and wood access lanes were used mostly on a tactical level as Avenues of Approach to move troops around the battlefield. The same characteristics as those listed above, along with the battle movement and action that occurred around each lane, determined the military impact each lane had on the fighting.

A field or wood access lane's ***alignment, width, grade,*** and ***materials*** all contributed to its value as an Avenue of Approach. Since the construction for most of these tracks was substandard, their ***alignment*** was not always conducive to rapid movement (e.g., crossing rocky ground or other obstacles, caused excessive or sharp changes in grade, etc.).

The ***width*** of these internal circulation lanes also impacted a lane's usefulness as an Avenue of Approach. Most lanes were narrow, which restricted the number of troops, wagons, artillery, and other elements of an army that could move along them at the same time.

The ***grade*** of some of these lanes affected their value as an Avenue of Approach, since those possessing a lower grade allowed for the more rapid movement of troops.

Because internal lanes were rarely surfaced with durable ***materials*** their relative value as an Avenue of Approach was low. Most field and wood access lanes were dirt, or at best had sections of their surface corduroyed with the trunks of small trees. Lanes made of poor materials did not hold up

under adverse conditions (e.g., wet weather) or the heavy and extended use an army placed upon them. For short tactical movements by smaller bodies of troops around the battlefield, these lanes served to direct and hasten their arrival at a particular point.

The quality of construction of these internal lanes also influenced their worth as Avenues of Approach. Since most of these lanes were simply created as the result of intermittent use by local farmers over a long period of time they were not regularly maintained. Most field and wood access lanes probably quickly deteriorated under the strenuous use to which a moving army placed upon them.

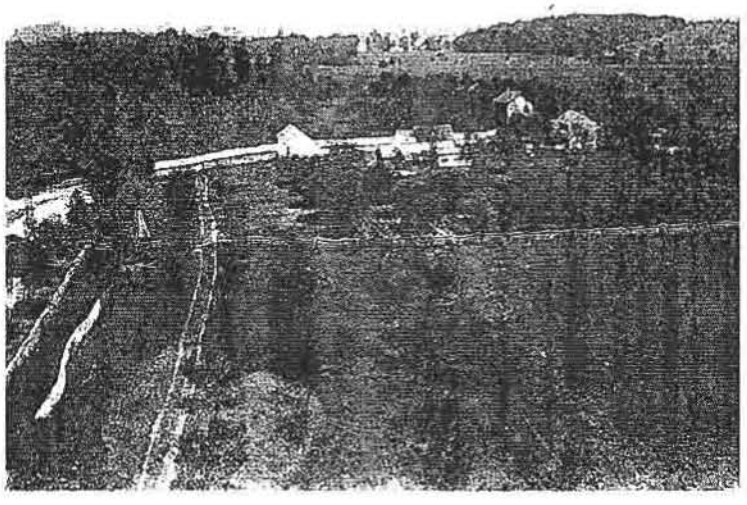


Figure 2-9 This c. 1900 view looking northward from Longstreet Tower, includes an excellent example of a field access lane. Located just to the left, or west, of the Warfield farmstead, this lane is clearly visible as the parrellel wagon ruts (the white lines). This internal farm lane ran north-south and provided Warfield access to the fields located south of his farmstead. (GNMP, Tipton #3325)

General Treatment Principles

The approved 1999 GMP recommended that NPS restore the circulation system present in 1863 wherever possible. In addition, the GMP recommended that NPS restore local and internal road systems and use them as pedestrian and horse trails. This would allow NPS to remove non-historic trail systems that are currently causing resource damage throughout the park. Many internal circulation routes are now missing, including field lanes, woodlot lanes, and other connections to the local or regional road system.

The GMP recommended that NPS develop the 1863 system of local and internal road using materials that were visually consistent with the landscape yet capable of withstanding the expected traffic. When necessary to create workable trail systems, NPS would create limited non-historic trail segments to connect lanes and provide for loop circulation.[11]

Field and Woodlot Lanes Present in 1863 but now Missing: Field and woodlot lanes were used intermittently by farmers, and were generally only wide enough for a cart and not improved. They were dirt roads, often with grass growing up to and between the cart tracks. Some of these internal lanes still exist, and serve fields as they did in 1863. However, because field and woodlot configurations have changed substantially since 1863, most are now missing.

Where field and woodlot lanes are missing, they will be designed to replicate as much as possible the known 1863 conditions. However, the subsurface design of internal roads will be suited both to the local environmental conditions and to the expected pedestrian and horse use. In each case, a lane will be restored using subsurface materials that will create a long-lasting road. Surface materials that replicate the historic color and appearance of the local lane will be selected. In many cases, this will require the use of fines or other similar material that will replicate the color and general texture of local soils.[12]

If possible, NPS will construct roads by burying materials no deeper than three inches and building up as needed to create the desired subsurface and surface conditions. This will cause the minimum disturbance to subsurface resources. If environmental or site conditions require additional depth, appropriate archeological investigations will undertaken to determine the extent of subsurface resources. If any unknown significant resources are uncovered during ground-disturbing activities, procedures to implement Section 106 of the National Historic Preservation Act will be instituted.

Existing Field and Woodlot Lanes: In general, existing field and woodlot lanes are dirt tracks created by farmers to access fields. Most are not maintained. Where these lanes will continue to serve agricultural uses on an intermittent basis, they will be left as they are. However, when existing field and woodlot lanes are slated for use in pedestrian or horse trail systems, they will be improved to withstand those uses with little maintenance, using the methods described under Local Road Systems above. Care will be taken in the design of improvements to field and woodlot lanes to ensure that they continue to have the appearance of 1863 internal roads.

Examples Illustrating Possible Treatment

The section of the lane that passed through the Emanuel Pitzer/Henry Spangler Woodlot is an example of a wood access lane that affected the battle. This dirt track, running from north to south through this woodlot, was a section of the lane that connected the two farmsteads. The men of Maj. Gen. George Pickett's Division used this lane as an Avenue of Approach on the morning of July 3, 1863 as the moved into their assigned position in preparation for their attack later that day.[13]

Based on this analysis this woodlot access lane impacted the battle as Avenues of Approach since it was used on a tactical level to provide troops either easy or concealed access to different points on the field. Possible treatment of this lane might include restoration of their ***alignment, width*** and ***grade***, as well as using surface materials that will replicate its 1863 appearance. The type of subbase to be used depends upon what other uses—such as pedestrian or horse trails—the lane will have.

AGRICULTURAL LANDSCAPES

The 1863 Gettysburg battlefield was almost entirely agricultural, being made up of subsistence farms that consisted of a variety of features, such as agricultural fields, managed vegetation (orchards, woodlots, hedgerows, etc.) and farm building complexes, constructed water features (wells, springs, ponds, etc.), circulation features and small scale features. These gave the landscape a patchwork appearance of open areas interspersed with the natural and man-made features listed above. The vast majority of the troop movement and combat took place on and across this agricultural setting on the

privately owned farms that dominated the landscape. This agricultural setting gave the battlefield a mostly open appearance and affected the battle in a number of ways.

SPATIAL ORGANIZATION

According to ***The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes***, spatial organization is:

> ...the three-dimensional organization and patterns of spaces in a landscape, like the arrangement of rooms in a house. Spatial organization is created by the landscape's cultural and natural features. Some form visual links or barriers (such as fences and hedgerows); others create spaces and visual connections in the landscape (such as topography and open water). The organization of such features defines and creates spaces in the landscape and often is closely related to land use. Both the functional and visual relationship between spaces is integral to the historic character of a property.[14]

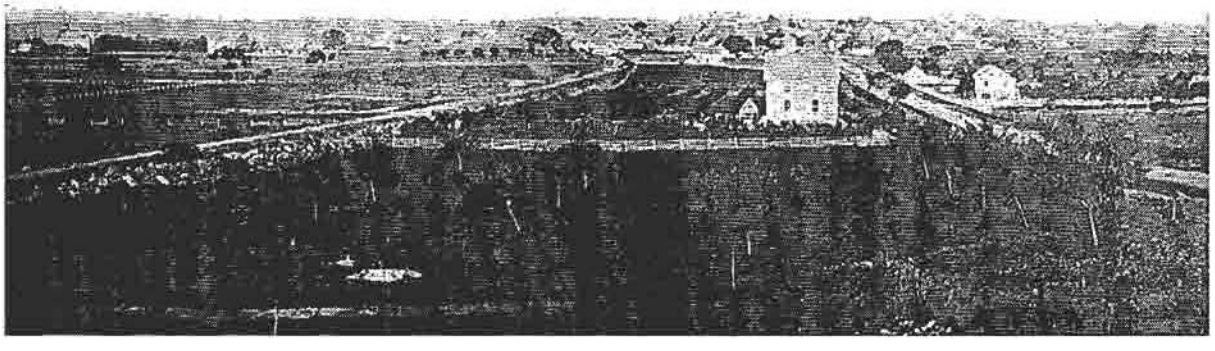


Figure 2-10 Gettysburg as seen from Seminary Ridge (Mathew Brady & Co., July 1863). This excellent photograph of Gettysburg and some of the fields to its west, northwest and north, captures perfectly the spatial organization of the various features that comprised the 1863 agricultural landscape. These include circulation features (Chambersburg Pike on the right, the Hanover and Gettysburg railroad bed on the left and an internal farm field access land crossing through the orchard in the lower foreground), a wide variety of farm fields, farm buildings complexes and some individual buildings located on the outskirts of town, several orchards (of various sizes and ages), random individual trees, numerous fences of different styles, and many topographical features. (GNMP #2B-2017)

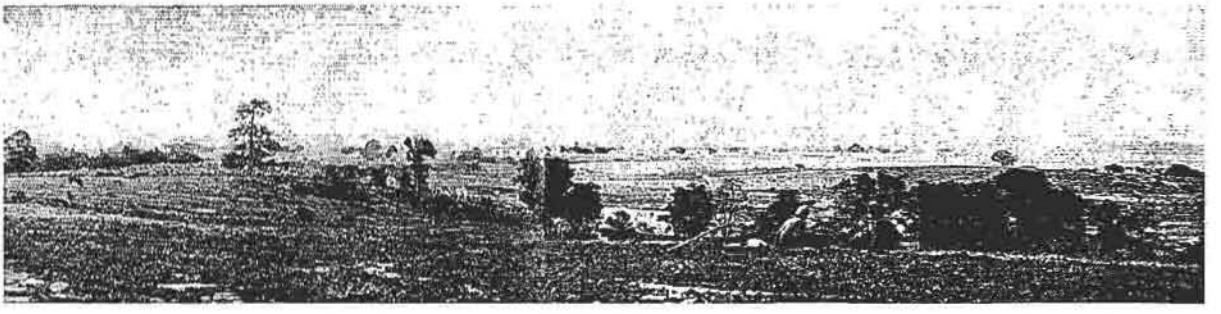


Figure 2-11 East Cemetery Hill, view northeast, 1863. This image showing the outskirts southeast of Gettyburg clearly shows the numerous features (farm fields, farm building complexes, orchards, hedgerows, random individual trees, fences and topographical features) and their spatial organization that made up the 1863 battlefield landscape (GNMP, #2B-2022 and 2025)

This includes the size, configuration, proportion and relationship of the various features listed above, including topography, fields, managed vegetation (orchards, woodlots, hedgerows, etc.), farm building complexes (including all their associated structures and small scale features), constructed water features (wells, springs, ponds, etc.), circulation systems, and small scale features. These component landscape features "define individual spaces or the overall pattern of the cultural landscape."[15] The arrangement of the various elements listed above and their relationship with each other created the agricultural landscape upon which the Battle of Gettysburg was fought. Maintaining the spatial organization present in 1863 is the baseline action recommended in the GMP.

AGRICULTURAL FIELDS

Historic Use and Appearance

Nearly all of the fields that made up the Gettysburg landscape were used for agricultural purposes such as crops, pasture or meadow. The majority of these fields were fairly small (less than 15 acres).[16] This was the result of a combination of several factors. Most of the farms were worked by their owners or by their tenants as subsistence farms. Thus most of the farms themselves were small in size, since most farmers lacked the funds to buy additional land. This in turned forced farmers to divide their land into small fields for the diversified use required for a subsistence farm (i.e., pasture for farm animals, oats for animal feed, crops for food or sale, woodlots, etc.). The labor intensive techniques used in subsistence farming also limited the amount of land that could be farmed by a farmer and his family. The quality of the soil also could restrict the size of the fields, since many farms contained limited areas that could be cultivated. All of these factors determined not only the ***historic limits*** of each field, but also the type of vegetation and therefore the ***height*** and ***density*** of the vegetation in a field.

How Farm Fields Influenced the Battle

The impact that each farm field had on the battle depended on how the characteristics described above affected the evolution of the battle and battle movements. Fields, depending on their characteristics, could affect Observation from, into or over them, provide Cover and Concealment, become Obstacles to troops moving through them and could become Avenues of Approach. Farm fields also impacted the value of certain topographical features as Key Terrain.

The ***historic limits*** of a field were important for several reasons. Since some type of fencing bordered nearly all the fields, their size determined the number and length of the fences present in that area (see

"Fencing" below). Field size also impacted Observation and fields of fire. Larger fields increased the observation across or over it, along with giving defenders a clearer field of fire into it. Lastly, this characteristic was important in determining possible Avenues of Approach for it was easier to move across, or conduct maneuvers in, larger fields since they contained fewer obstacles. Conversely, adjoining smaller fields, with their consequent fencing, had more Obstacles and restricted and hindered troop movements.

A field's agricultural use (i.e., crops, pasture or meadow) also impacted the battle. The ***height*** and ***density*** of vegetation affected Observation into or over a particular field, affected its use as Cover and Concealment for troops (attacking or defending), and affected its impact as an Obstacle. Some crops, such as wheat, hay or even corn, grew to a ***height*** and ***density*** that could partially Conceal military units, particularly skirmishers and sharpshooters. The ***height*** and ***density*** of vegetation also influenced the use of a field as an Avenue of Approach. Tall and dense vegetation (i.e., wheat, hay, corn, etc.) could slow the movement of troops attempting to pass through it. Other vegetation, such as oats, clover, or those used as pastures offered no Cover and had very little impact on the movement of troops. Pastures and meadows, being more open, offered no Cover but were usually located where the soil was poor (i. e., numerous boulder outcroppings, thickets, wetlands, etc.) and therefore presented a different set of Obstacles. The combination of agriculture fields, along with topography (see "Topography below), could determine if a particular topographical feature (i.e., hills, ridge, etc.) was Key Terrain. As an example, a tall elevation covered with crops of low ***height*** (e.g., Cemetery Hill) provided excellent Observation for units occupying it, thus making it Key Terrain. Conversely, an elevation covered with woods (e.g., Bushman Knoll) would not provide the same Observation and would be less likely to be Key Terrain.

General Treatment Principles

In general, farm fields will be maintained so that visitors can understand their size and open character. The GMP recommended the restoration of field boundaries, using fences, vegetation patterns, hedgerows and other mechanisms. The open character of these fields, meadows and pastures will be reestablished and maintained.[17]

In addition to these measures, which are intended to make the landscape more understandable to visitors, the GMP also recommended that the park's agricultural fields be managed to protect cultural and natural resources, and to encourage the preservation of grassland species.[18] Where fields are rehabilitated by the removal of non-historic woods, the GMP recommended that land be maintained as good pasture or meadow, even if in 1863 it was a crop field, to reduce soil erosion and impacts to the Chesapeake Bay. In addition, the GMP recommended that where non-historic vegetation was removed along streams, 35 foot buffers of woody vegetation be maintained to improve the land's capacity to hold soils and limit erosion.[19]

Fields Present in 1863 but now Missing: After the removal of non-historic vegetation, meadow and good pasture land will be established. In some cases, a sufficient seed source will be present to ensure the establishment of a meadow. In other cases, NPS will have to seed the newly reestablished fields in order to ensure the rapid development of grass cover. In general, NPS will seed fields using a mixture of native warm and cool season grasses. When feasible, NPS will reestablish cool season hay in the fields that were cool season hay in 1863. For crop fields, NPS will use a variety of warm season grasses. Warm season grasses are green during the periods when crops are green. Land that was used as meadow or pasture will be planted with a variety of grasses, wildflowers, and other forbs. This

strategy will provide the matrix appearance of farm and hay fields present in 1863, while still providing for erosion control and improved habitat for upland and open land species. In general, these fields will not be used to pasture cattle, because of the erosion caused by that use and the fact that many of these fields contain runs or streams that would be negatively impacted by that use.

In 1863, there would sometimes have been some shrubby vegetation along creeks and runs. In other cases, however, cattle grazing and other practices that are no longer considered acceptable would have meant that there was little or no vegetation along creeks and runs. However, in order to mitigate for the removal of non-historic vegetation, NPS will plant woody borders along creek and runs. The height of this vegetation will be controlled, to ensure that lines of sight and avenues of approach are maintained and can be understood by the public.

Shrubs will be selected based upon the environmental conditions present in the thicket location. Native shrubs found within the park or the region that self-seed and that will attain a mature height of no more than fifteen feet will be chosen. A variety of species to ensure diversity will be selected. Areas where thickets are to be reestablished will be treated to control invasive exotics before and after a thicket is replanted to ensure that the selected species are able to become established. Bareroot shrubs grown in open field conditions will be planted in mixed plots according to a planting plan developed by a qualified forester. The thicket will be monitored, and trees that exceed a height of ten to fifteen feet will be periodically removed.

Existing Fields: NPS will manage existing fields so that they reflect their 1863 size and open character. Where it is possible to maintain the field through the agricultural leasing program, NPS will do so. Agricultural leases will be modified to ensure the protection of cultural and natural resources, and to encourage the preservation of grassland species. These actions include use of low or no till farming, limited use of pesticides and herbicides, prohibition against the installation of new field drains, and mowing to protect nesting habitats for upland and open land species.

Where continued agricultural use creates conflicts with visitors, NPS will use the same warm and cool season grass planting strategy described above. This will limit visitor contact with farm chemicals, damage to field crops, and the intrusion of modern farming equipment and practices into the historic scene in areas of high visitor use.

Examples Illustrating Possible Treatment

During the fighting west of town on the morning of July 1, 1863 the 147th New York Infantry was positioned north of the West Railroad Cut. When they moved forward toward the crest of West McPherson Ridge the Confederates came into view. J. V. Pierce remembered, "The field was covered with wheat. I could see innumerable heads of rebels bobbing up and down on the north side of the wheat, at the top of the ridge." Finding themselves greatly outnumbered, attacked from two directions (front and right) and nearly surrounded the regiment was in danger of being destroyed. One factor in their favor, and to some extent helped to save them, was the tall wheat fields around them. Lt. James Coey recalled, "The line of the [regiment] was lying...in a wheatfield ready for harvest. The fire of the enemy, the zipping of their bullets cut the grain, completely covering the men who would reach over the ridge, take deliberate aim, fire and then slide back under the canopy or covering of straw; reload and continue their firing"[20]

On the morning of July 3, 1863 men of the 14th Connecticut served on the skirmish line located on the William Bliss farm west of the Emmitsburg Road. During this time the height of the crops in which the soldiers were positioned in gave them Concealment, one soldier later writing, "We were stationed two or three fence lengths apart...although we could hardly see each other, for...the standing grain afforded considerable protection from view." This same "standing grain" also protected these Connecticut soldiers by concealing them from Confederate Observation and fire.[21]

Based on the above analysis the vegetation in these farm fields gave Cover and some Concealment to the troops positioned in or moving through them. It also hindered the Observation of these same troops in that position and movement of other units around them.

Possible treatment of these features would obviously involve either maintaining or restoring the ***historic limits*** of each field. The open character of pastures and meadows throughout the battlefield will be maintained or restored. Possible treatment might involve planting grasses that have a similar height and density to that of wheat.

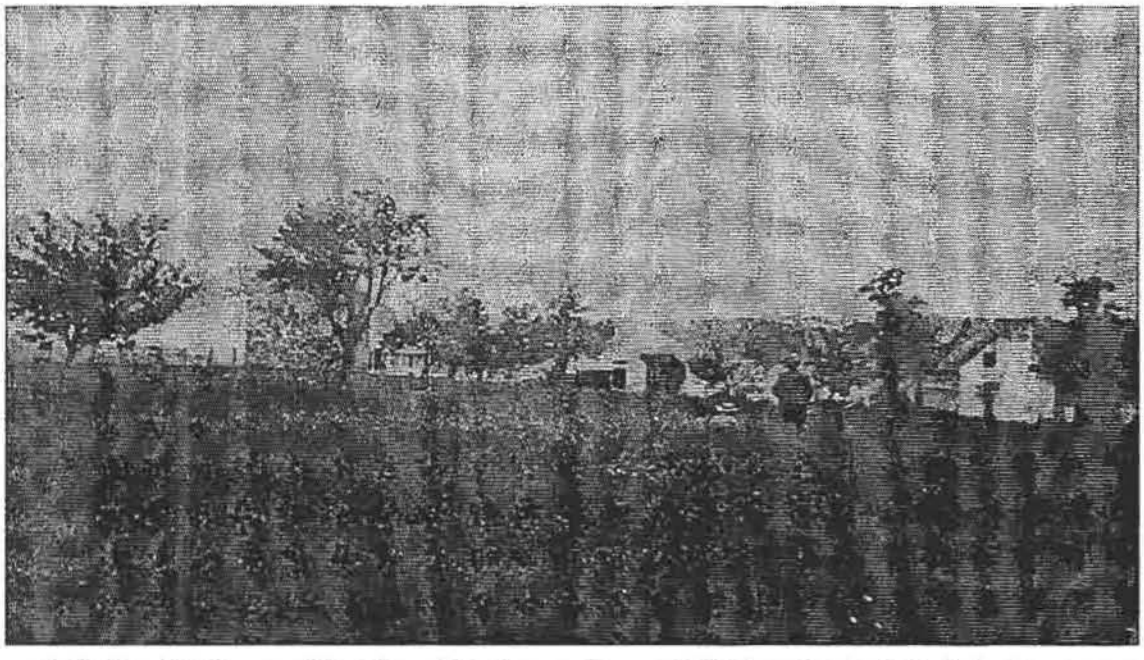


Figure 2-12 This 1863 image of the Edward McPherson farmstead (Mathew Brady & Co.,) depeicts many of the features that comprised a typical 19th-century farm building complex. These include (from right to left) the main farm house, the wagon shed and barn. Inter-spaced among these features and completing the complex's spatial organization can be seen dooryard and barnyard fencing, dooryard and barnyard trees and an orchard. (GNMP #23S-0340)

FARM BUILDING COMPLEXES

Historic Use and Appearance

Scattered across the landscape are many ***buildings and structures*** associated with individual farmsteads. The majority of these structures were clustered to form the individual farmsteads typical

of a 19th-century agriculture landscape. These farmstead building complexes included a variety of structures, including the main farm house, a barn, a wagon shed, corn cribs, pig pens, chicken coops, smokehouses, blacksmith shops, springhouses, summer kitchens, wood sheds, privies, dooryard fencing, barnyard fencing and others. A number of factors, such as the size of the farm, the wealth of the farmer, and location of the farm complex, determined the ***historic limits*** of each farm complex. ***Small scale features***, such as fences, ornamental or shade trees, gardens and other similar characteristics, completed the farm complex. Together these features created the ***cluster arrangement*** of the complex.

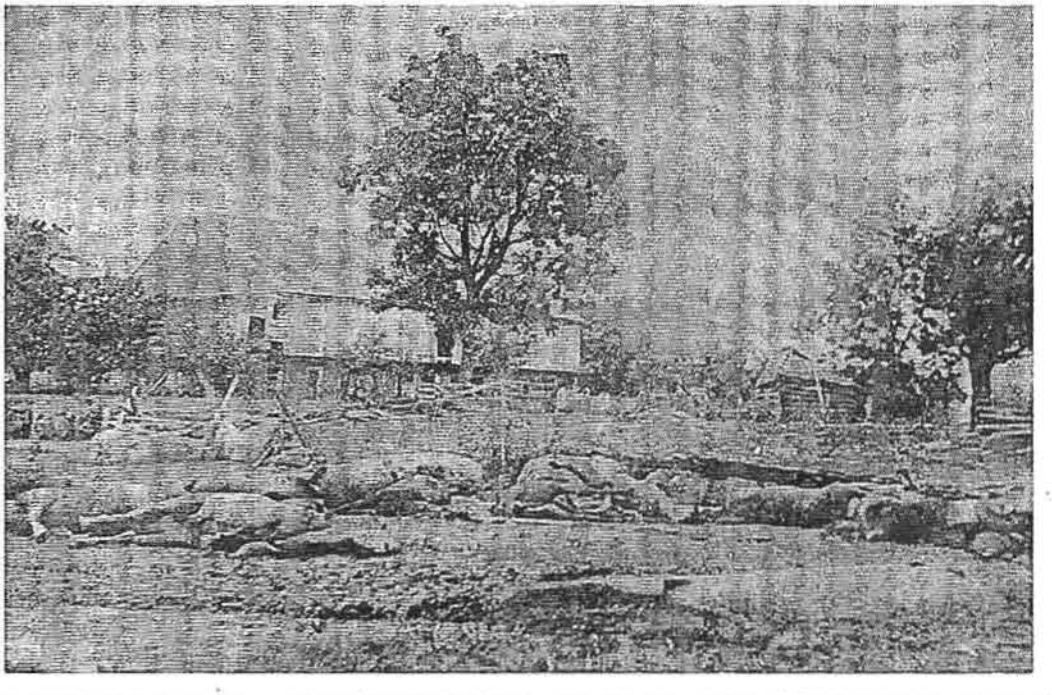


Figure 2-13 Abraham Trostle barn (Timothy O'Sullivan, July 1863). Although famous for capturing the carnage of battle, especially the dead horses in the foreground, this photograph also reveals the features and spatial organization associated with a mid-19th-century barn. These include the barn, the hog pen (the stacked hewn log structure to the right), hog pen fencing (seen between the right end of the barn and the section of picket fencing to the left of the hog pen), barnyard fencing, the barnyard gate (partially dismantled and located between the large tree and the large boulder on the far left), and several individual barnyard trees. (GNMP #2B-2052)

How Farmstead Clusters Influenced the Battle

From a military perspective these farm building clusters impacted the battle as Obstacles and by providing Cover and Concealment. A few individual buildings also offered limited Observation for individual soldiers or small bodies of men.

The ***historic limits*** and ***cluster arrangement*** of a complex determined how and to what degree a farm building complex impacted the battle. The larger the ***historic limits*** of a farm complex, the more of an Obstacle it became to movement, especially to infantry moving in line of battle. ***Cluster arrangement*** affected a complex's use as Cover and Concealment. The more buildings within a farmstead, the greater the Cover and Concealment it might provide and the more difficult an Obstacle it could become. Tighter or compact clusters covered less area and therefore posed less of an Obstacle to

military units, since could more easily bypass the farmstead. However, densely arranged farmsteads provided better Cover and Concealment for those units who occupied or were positioned behind them.

The ***small scale features*** of a complex included structures associated with both dooryards and barnyards. The number of ***small scale features*** included within a complex directly impacted the amount of Cover and Concealment it provided and the degree to which it became an Obstacle. This is especially true of dooryard structures since most were too small to provide good Cover, but could easily be Obstacles by disrupting the formation of a unit passing through or around the farmstead. The barnyard fencing that enclosed each farm complex and connected the various outbuildings together with the house marked the historic limits of the complex. Since the area of a barnyard was usually larger than that of a dooryard, the degree to which the barnyard and its ancillary yards became an Obstacle would normally be greater.



Figure 2-14 Lydia Leister farm house (Timothy O'Sullivan, November 1863). Many features associated with mid-19th-century farm houses and their immediate surroundings are visible in this photograph. These include the house itself, the bake oven (the semi-circular object located under the wooden shelter roof to the right of the house), a dog house (the small wooden box partially hidden by the four upright wooden beams), the bird house (the small box on the top of the pole attached to the bake over shelter), the picket dooryard fencing, dooryard trees and the small orchard (a part of which is visible in the immeadiate foreground). (GNMP #23S-0254)

General Treatment Principles

Extant Farm Complexes: Because farm ***buildings and structures*** continued to be used after the battle, and are used today, they have changed over time. Houses have been modernized by the addition of kitchens, bathrooms, and in some cases, by wings. In other places, small houses were replaced by larger structures as families became more prosperous during the Victorian era. A few major barns were burned during the battle and replaced immediately thereafter, or were replaced later by larger structures. Smaller buildings, like equipment sheds, garages, chicken coops and pig houses were ephemeral in nature, changing as a farmer's needs changed. In many cases, later houses and barns stand on the site of their 1863 predecessors, and together with later sheds generally represent the spatial organization present in 1863. In some cases, later structures, such as the Codori Barn and the Eisenhower Farm 1 Barn, have achieved significance in their own right. In addition, in many cases, little is known about the 1863 structures, since they were generally not documented in any way by their owners, who viewed them as utilitarian buildings to be replaced and changed as needed. This lack of specific information means that in many cases the reconstruction of an accurate 1863 complex is not feasible.

The GMP acknowledged this condition, and specified that "the overall mass and arrangement of remaining farm complexes [will] reflect those typical of central Pennsylvania in the 19th century." This management prescription "encourages the preservation of newer historic structures where those structures still reflect the general mass and appearance of the complex as it appeared during the battle." It also suggests that missing structures that were significant to the outcome of the battle be reconstructed, when they can be documented and such work can be completed with a minimum of conjecture. The addition of modern and incompatible uses are prohibited.[22] Therefore, the general treatment for building complexes is to preserve, maintain and rehabilitate the historic Civil War era structures and later historic buildings that are sited at locations of Civil War structures and that contribute to the general ***cluster arrangement*** of farm complexes.

In addition, the GMP also recommended that "historic buildings [be] managed to produce income that defers the cost on their ongoing maintenance."[23] The park currently owns 99 historic buildings; another 40 historic structures will eventually be added to the park, once the land upon which they are built is purchased. The costs of keeping these nationally significant structures in good condition, while necessary, are great. The park's leasing program is one of the primary mechanisms to raise income that defrays the cost of these structures' maintenance. Therefore, NPS will not remove the modern additions—bathrooms and kitchens—that have been added to farm houses since the time of the battle, because these additions are necessary if the structures are to be leased. In a few rare instances, such as the Brian farm house and the Lydia Leister farm house, and when these structures are used for interpretive purposes, they will be restored to their 1863 condition.

Small scale features, such as dooryard and barnyard fencing, gardens, orchards and ornamental and shade trees, contributed greatly to the ***cluster arrangement*** of a farm complex and also often defined its ***historic limits***. Where these features are well understood, and contribute to the interpretive understanding of a farm complex, they will be restored.

Missing Farm Complexes: Several farm complexes that were present in 1863, such as those associated with the Bliss, Rogers, Wentz and G. W. Weikert farms, have been lost either during or since the time of the battle. In some of these cases, these farm complexes were significant to the battle, and their interpretation may be considered important. The GMP recommended that "fencing, orchards, vegetation and other documented features would define the limits of missing 1863 house sites and other buildings that acted as obstacles, cover, or points of observation."[24] This would provide an understanding of the general scale and historic limits of a farm complex, since in most of these cases, there is insufficient information to attempt an historically accurate reconstruction. In other cases, well documented structures have been lost to fire or to storm damage. In those cases, such as the Rose Barn, the structures may be rehabilitated so that they reflect once again their 1863 condition.

Examples Illustrating Possible Treatment

The **George Weikert farmstead** is located along Cemetery Ridge approximately 650 yards north of the Wheatfield Road. This complex consists of a stone farm house, wooden barn, wooden summer kitchen, and frame carriage house and corn crib. The house, barn and summer kitchen pre-date the battle. The only building missing from the original complex is a wood spring house. Much of the dooryard and barnyard fencing is also represented in its original location. Overall, the Weikert farm building complex is well preserved and represents the ***historic limits*** and ***cluster arrangement*** of the 1863 farmstead very well.[25] Preservation is the only treatment required for this complex.

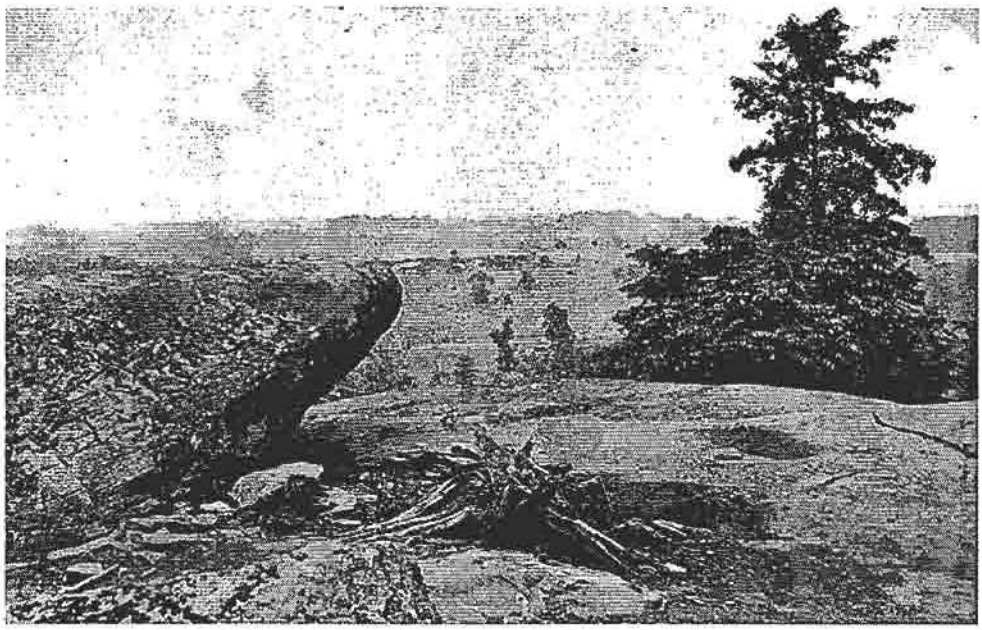


Figure 2-15 The spatial organization of the George Weikert farmstead can be seen in this Mathew Brady view taken from the crest of Little Round Top. The more prominent features associated with this farm building complex, located just to the right of the large boulder (see enlarged view below), include (from left to right) the barn, the barnyard fencing (a large stonewall in front of and to the right of the barn), the white roof of the summer kitchen, the main house and the orchard (behind and to the right of the house and barn). Also visible is the dooryard fencing, individual dooryard and barnyard trees and a segment of the Weikert-Trostle Lane (the light streak located below and to the right of the house and lined with a stout stonewall). (GNMP #2B-2100)



The **D. Klingel farmstead** serves as an example of an historic farm building complex that has been altered since the battle. Not only are the main house and bake oven the only structures left that pre-date the battle, but the historic spatial organization has also been altered. Changes include the removal of some historic structures, including buildings and fencing, along with the construction of numerous late 19th and mid-20th century buildings. These changes have given the farmstead a much greater size and mass than it had in 1863. Possible treatment could include retaining the post-war buildings that represent ancillary small outbuildings associated with the1863 farmstead, rehabilitate the dooryard and barnyard fencing, and the removal of the modern buildings that do not contribute to the 1863 ***historic limits*** and ***cluster arrangement*** of the complex.[26]

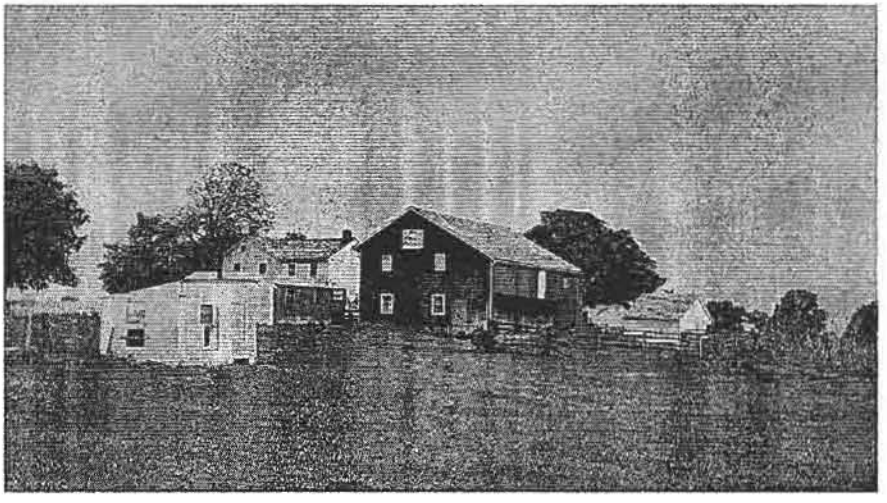


Figure 2-16 The Daniel Klingel farmstead, 1958. Changes over time, including the construction of many late-19th-century and mid-20th-century structures, have greatly altered this building complex's historic limits and cluster arrangement. (GNMP #23S-KL-025)

MANAGED VEGETATION

A central part of a 19th-century farm were areas of managed vegetation. These included woodlots, groves, hedgerows, orchards, nurseries and individual trees, among others. These features were significant because many were essential in providing materials, food, cash reserves and other items necessary in the every day operation of a subsistence farm. Because of their usefulness, most of these vegetation features were actively managed by farmers, unlike natural vegetation features such as woodlands and thickets (See "Woodlands" and "Thickets" below).

WOODLOTS AND GROVES

Historic Use and Appearance

Woodlots and groves were a critical part of a subsistence farm and were needed to provide material for a variety of needs, including fencing, firewood, housing and general carpentry over the life of a farm. Woodlots and groves were also cut and sold to raise revenue. The money raised through the sale of wood often paid for taxes and other expenses, and provided a cash reserve in case of hard times. Although most woodlots were parts of farms, town residents also owned some of the woodlots found on the battlefield.

In most cases, a woodlot was located on the poorest land on a farm (rocky, thin or steep soils, etc.) and its ***historic limits*** would depend on the amount of such land available to the farmer. Woodlots usually consisted of slow-growing upland trees, but because they had to furnish materials for a wide variety of uses—e.g., hard wood for fuel, light smooth wood for lumber and construction, durable wood for fence posts and rails, small trees for farm tools and implements— they would be actively managed by their owner to contain a wide variety of species and age. The ***health*** of a woodlot was also an important characteristic managed by farmers, for the trees harvested met their need for materials over the life of a farm. Because they had to manage their woodlots to encourage health, composition and appropriate ***age distribution*** of the trees within it, woodlots were more open in nature to allow for the passage of wagons and teams. In addition, woodlots were cleared of underbrush, shrubs, deadwood, and trees that were not healthy or that were undesirable.[27] This led to an appearance that was more orderly than would be found in naturally occurring woodlands. Therefore, the ***species distribution*** (the type of trees it contained), ***age distribution***, and ***density*** of a woodlot were important characteristics that contributed to its historic appearance. The management of a woodlot and its overall age affected the ***height*** of the trees it contained; in younger woodlots, and in woodlots that were heavily managed, a tree might never reach the full height common for its species, and the overall height of the woodlot might be less than found in naturally occurring woodlands.

Scattered throughout the battlefield were groups of trees similar to woodlots, but smaller in size. Groves had the same characteristics as woodlots (***historic limits***, ***species distribution***, ***age distribution***, ***density***, ***height*** and ***health)***. The only difference between the two features was their appearance. Because some groves were used by civilians as gathering spots, such as picnic areas, their appearance was more clean, orderly and open, almost park-like, than that of woodlands or woodlots.



Figure 2-17 Confederate burial trench, Culp's Hill (Peter S. and Hanson Weaver, 1864). Although the burial trench was the obvious focus of the photographers, this view is also important for it provides an excellent rendition of the appearance and some of the important characteristics (including age distribution, density and health) of a typical woodlot found on the 1864 Gettysburg landscape. Particularly important is the managed, orderly appearance of the woodlot, being cleared of underbrush, shrubs, deadwood, and undesirable trees and consisting of a low density that would allow for the passage of wagons and teams. (GNMP #SF-2B-081).

How Woodlots and Groves Influenced the Battle

The impact a woodlot had on the battle depended on how the characteristics described above affected the evolution of battle and battle movements. Many woodlots were commonly used for Cover and Concealment during the battle, along with providing shade and a location for respite and recovery. Other woodlots were Obstacles to the rapid movement of troops and hindered Observation of units attempting to fire through or beyond them.

Some woodlots played a greater role in the battle, especially when they were the site of actual combat. In some instances, the woodlots were Obstacles to troops moving through them and provided Cover to troops. Sometimes the presence of a woodlot impacted the Observation of units firing from, into, or over them. In these cases woodlots shaped the battle on an even greater scale, since they were not only the scenes of combat but also heavily impacted observation from various points within the major battle action area.

The ***historic limits*** of a particular woodlot determined how much Cover and Concealment could be gained by troops occupying it and also the degree to which it became an Obstacle. The size of a woodlot also determined how much area behind it was screened from enemy Observation.

The ***species distribution*** of a woodlot probably did not heavily impact the battle because nearly all species of deciduous trees are similar in nature (i.e., foliage, browse lines, height, trunk diameter, etc.). Thus nearly any species of deciduous tree that made up a woodlot would represent the historic appearance of, and the military influence, of a woodlot during the battle.

However, ***age distribution*** and ***density*** of a woodlot affected not only the quality of Cover and Concealment it provided, but also to what level the woodlot became an Obstacle and affected Observation. For Observation, density impacted not only long range views, but also the ability to see and fire within a woodlot. Though this short range Observation value is much more limited, it was a critical factor that allowed for intense and bloody combat in several woodlots on the battlefield—e.g., Herbst, Rose and Culp woodlots. During combat military units advanced in battle line (by rank) through several woodlots. Almost invariably these occasions were during the heat of battle, when commanders were trying to get into position quickly. By its very nature, a woodlot was not an ideal place for such quick movements because the ***age distribution*** and ***density*** of the trees created Obstacles to orderly movement. The higher the concentration of trees, particularly of the large, mature trees, the harder it was to keep the battle line in regulation alignment.

During the course of the battle, the armies moved (by file) through other woodlots en route to their positions on the front line. Because the units advanced four abreast in column, the ***density*** of the woodlot was not particularly significant to these movements. It was not necessary for the trees within the woodlot to be more than 6-8 feet apart, or just enough to allow the passage of these four-abreast columns.

Age distribution and ***density*** of a woodlot also affected Observation and Cover and Concealment. The tighter the arrangement and/or the larger the trees, the more limited the Observation for troops in the woodlot became. On the other hand, these characteristics would provide more Cover for these same troops.

The ***height*** of the trees within a woodlot affected line of sight for Observation, including fields of fire, by determining how much area beyond the woods would be Concealed. The higher the trees, the more

area beyond that woodlot would be screened from enemy Observation and fire. This factor became important when observers were located at the higher elevations, such as Little Round Top, looking down, or vice-versa. A woodlot's height also impacted the direct line-of-sight Obersvation of of units attempting to fire over them.

Farmers maintained the ***health*** of their woodlots because, needing a long-lasting and dependable source of material, these features were crucial to the survival of their subsistence farms. Although the health of trees did not influence the outcome of the battle, longevity and continued health of woodlots is an important treatment goal for NPS as it was for mid-19th century farmers. Because it is the goal of NPS to ensure that features that influenced the battle are maintained in perpetuity, the health of a woodlot is critical for their continued maintenance and existence.

Since groves shared the same characteristics as woodlots, from a military standpoint, they influenced the battle in much the same way, by providing Cover and Concealment and affecting Observation. However, because groves usually had cleaner, or less cluttered grounds, they were less of an Obstacle to troops moving through them. This lack of ground clutter could impact the Cover and Concealment the grove provided in two ways. At short range, troops positioned within a grove would have less cover. At long range a grove would provide good cover and/or concealment for units within it, while at the same time allowing them, especially artillery batteries, to fire by providing excellent Observation or fields of fire. Groves with open grounds would also allow for increased Observation, at close range by enabling troops to see better into or through it.[28] Characteristics that could be considered under any treatment are the same as woodlots.

General Treatment Principles

The 1999 approved General Management Plan directs NPS to maintain in perpetuity the patterns of open vs. closed land present in 1863. Therefore, the general treatment principles established for woodlots and groves are intended to establish and keep these features within their historic boundaries, and to ensure their health and sustainability over time.

Woodlots and groves present in 1863 but now missing: Historic sources, such as maps, surveys, photographs and written reports from combatants and residents will be used to establish the historic boundaries of woodlots and groves. Where woodlot or grove areas were present in 1863, but have now disappeared, new woodlots and groves will be established.

Early successional, native species currently growing in the park or region will be planted. Likely species include black cherry, staghorn sumac, sycamore, and yellow poplar. These species will grow rapidly and thus will create the appearance of woodlots and groves within the shortest possible time. Trees will be planted with a density of 680 bare-root seedlings per acre at an average spacing of eight and a half feet by eight and a half feet. After five years, this should produce a woodlot or grove of about 400 trees per acre with an average height of ten feet. Within eight to ten years these woodlots will be managed as per the recommendations for long term care. This would include supplemental planting of permanent hardwoods (such as oak and hickory), health cuts and other management practices.[29]

In some areas that are now heavily used by visitors, another planting strategy is needed. These areas will be planted with containerized sapling-sized trees that are four feet to eight feet in height. These areas will be planted at a density of 400 trees per acre in an irregular design. This will help ensure that these woodlots and groves will survive heavy visitor use.[30] In areas where natural succession

towards forest cover is now occurring, this growth will be augmented by the addition of 100 bare root seedlings per acre to enhance the natural regeneration process. [31]

Woodlots and groves that exceed their historic boundaries: Where the 1863 boundaries of a historic woodlot or grove area have been exceeded, all non-historic shrubs and trees will be removed. NPS will treat these areas to ensure that invasive exotic plants are controlled, both prior to the removal and afterwards. NPS will prepare sedimentation and erosion control plans to ensure that erosion is controlled appropriately when non-historic vegetation is removed.

In cases when control of the height of a woodlot is crucial to interpretation, selected removal of taller trees will be occur. Witness trees will be protected, even if their height now exceeds that at the time of the battle. Other trees that block critical observation, important views or fields of fire will be cut using chain saws or other manual methods and felled directionally during the height of the winter to avoid damage to other trees. Trees that are cut will be limbed and left in the woodlots and groves, to provide habitat for woodlot or grove species. Generally in woodlot areas limbs will be cut and left as habitat until they degrade naturally.

Within 35 feet of streams that now have non-historic woody vegetation, woody vegetation will be maintained. Woody vegetation will be maintained at a height (generally less than 10') that will not interrupt key lines of sight and observation that was important at the time of the battle. This action was proposed by the 1999 GMP to ensure that NPS meets it obligations under the Chesapeake Bay Compact.

Ensuring the health and sustainability of woodlots and groves: The park's GMP requires that areas that were wooded in 1863 remain wooded in perpetuity. Therefore, it is essential that woodlots and groves be maintained in a healthy condition, and contain trees of various ages and species to ensure their continuity over time. In general, woodlots will be managed so that their age and species distribution contributes to a healthy, sustainable woodlot or grove.

In 1990, Fairweather and Cavanaugh recommended a structure—that is, the number of trees in each age class, or the age distribution—that would ensure that these woodlots and groves can be maintained in a healthy condition over time. Both the White-tailed Deer Management Plan/EIS (1995) and the GMP/EIS (1999) adopted these standards as necessary to restore, maintain and sustain the park's historic woodlots over time.[32]

When necessary, NPS will intervene to establish and maintain healthy trees in the uneven aged structure recommended for the park's woodlots and groves. Woodlots and groves will be managed to sustain:

- Native herbaceous, shrub and tree species that are ecologically adapted to the environmental conditions in each woodlot or grove.
- Trees with trunks that have the strength potential to support a well-balanced crown.
- Trees with a balanced crown structure that is centered above the trunk.
- Witness trees.
- Density and age structure recommended by Fairweather and Cavanaugh.

To ensure the health and sustainability of historic woodlots and groves, each woodlot or grove area will be inventoried to determine the current density by species, diameter and physical sustainability.

An initial sustainability plan to reduce the numbers of non-sustainable plants will be tailored for each woodlot. Stems that are not physically sustainable, i.e., that do not meet the conditions noted above, will be removed as needed to reach the desired stocking and age distribution levels. Woodlots will be monitored to ensure that these interventions are resulting in a stand structure that is close to that recommended for the park. To the greatest extent possible, invasive exotic vegetation will be controlled or eliminated in historic woodlots and groves.[33]

As noted above, witness trees will be protected and preserved. Trees that are not healthy will be cut using chain saws or other manual methods and felled directionally during the height of the winter to avoid damage to other trees. Trees that are cut will be limbed and left in the woodlots and groves, to provide habitat for woodlot or grove species. Generally in woodlot or grove areas limbs and smaller unhealthy trees will be cut and left as habitat until they degrade naturally.[34]

Woodlots and groves where the historic density must be maintained: In those cases where woodlots became the sites of major battle action, the maintenance of the recommended density and age may not provide for adequate interpretation of the 1863 condition. Historians have estimated that in 1863 in those woodlots where battle action occurred, about 25 % of trees were one to four inches in diameter to breast height (dbh), 35% were five to eight inches in dbh, 30% were 9-12 inches in dbh, and 10% were over 13 inches in dbh. Karish (1991) estimated that use of the uneven-age model would yield woodlots where about 75.3% of the trees were one to four inches in dbh, 18.6% were five to eight inches in dbh, 4.5% were 9-12 inches in dbh, and 1.6% were over 13 inches in dbh.[35]

Woodlots and groves where major battle action occurred will first be managed by providing a health and sustainability intervention. The resulting woodlot will be more open than is the case now. In the those cases where interpreters believe that the health and sustainability intervention does not provide sufficient openness to provide for adequate interpretation, then additional trees will be removed as needed to achieve the 1863 condition and structure.

Each woodlot or grove area will be inventoried to determine the current density by species, diameter and physical sustainability. An initial historic restoration plan to create the desired 1863 stand structure will be tailored for each woodlot. Stems that are not physically sustainable will be removed before any healthy trees, but additional healthy trees may also be removed as needed to reach the desired stocking and age distribution levels. Witness trees would be protected and preserved. Woodlots will be monitored to ensure that these interventions are resulting in a stand structure that is close to that recommended to meet the interpretive goals of the park.

Examples Illustrating Possible Treatment

Three woodlots provide an ideal case study in how KOCOA can assist in determining the different methods and levels of treatment in the rehabilitation of the park's battle landscape. These are the W. Patterson Woodlot, J. Herbst Woodlot and the G. Rose Woodlot.

W. Patterson Woodlot was approximately seven acres and composed of deciduous trees. It was located on the eastern slope of Cemetery Ridge and directly west of the intersection of the Taneytown Road and Granite School House Lane. Infantry of the Union Second Corps, placed in support of Union artillery on July 2 and 3, 1863 occupied the woods and thus gained its Cover. This woodlot also partially Concealed Union positions and reserves on the Taneytown Road and the George Spangler farm from Confederate Observation.[36]

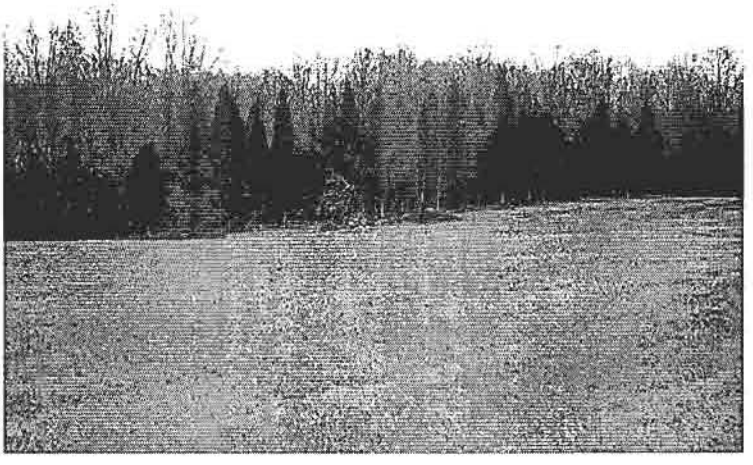


Figure 2-18 Patterson Woodlot (NPS, 1974). National Park Service management policies over the preceding decades have allowed this feature to change so drastically that it no longer resembles the managed woodlot it was in 1863. Nearly all of its important characteristics have been altered, including its historic limits, species distribution, age distribution, historic height, health and density. Possible treatment of this woodlot, based on its impact upon the battle might include restoration of its historic limits. Its health, species distribution, age distribution and density might be managed to ensure its longevity. (GNMP #23S-A-018)

Based on this analysis, the W. Patterson Woodlot influenced the battle by providing Cover and Concealment and affecting Observation. Therefore, recommended treatment of the woods might be the restoration of its ***historic limits***, since these characteristics are crucial to understand the ways in which this woodlot provided Cover and Concealment and limited Observation. However, since this woodlot was not the site of combat, restoration of its historic ***species distribution***, ***age distribution*** and ***density*** would not be necessary. Because this woodlot did not significantly impact the Observation or fields of fire of any unit during the battle, the restoration of the historic ***height*** of the woodlot is not needed. Since this woodlot influenced the battle, NPS would manage it for ***health***, and decisions about ***species distribution***, ***age distribution*** and ***density*** would be made to ensure its longevity.

Herbst Woodlot was an 18-acre rectangular shaped deciduous woodlot located west of Gettysburg on both West and East McPherson Ridges. This grove became the focal point of some of the bloodiest fighting of the battle during the morning and afternoon of July 1, 1863. Maj. Gen. Abner Doubleday explained the woodlot's importance in his official report:

> A small piece of woods cut [our] line of battle in about two equal parts. These woods possessed all the advantages of a redoubt, strengthening the center of our line, and enfilading the enemy's columns should they advance in the open spaces on either side.[37]

In this capacity Herbst's Woods provided Cover both to the Union troops defending it and to Confederate troops attacking through it. It also probably proved to be an Obstacle to these Confederates during their advance. R. K. Beechman, a member of the 2nd Wisconsin Infantry, was involved in two separate actions in Herbst's Woods on July 1. In the morning they counterattacked a Confederate brigade commanded by Brig. Gen. J.J. Archer's Brigade and in the afternoon they opposed the advance of Brig. Gen. J.J.

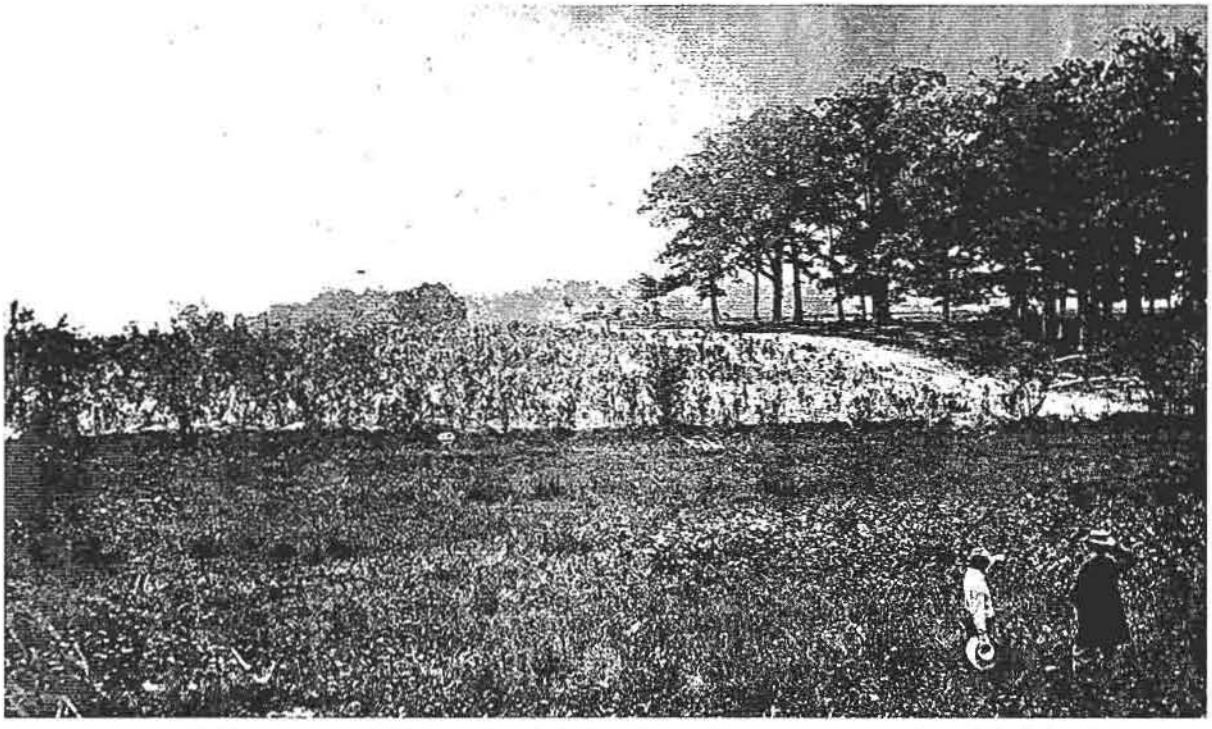


Figure 2-19 This 1863 photograph (Mathew Brady & Co.) shows the northeastern section of the John Herbst Woodlot (known more popularly as Reynold's Woods or McPherson's Woods). Even from a distance this view obviously reveals the orderly, managed appearance of the woodlot, being fairly open and free of underbrush. Close examination of photographs like this one can assist in determining a woodlot's historic limits, age distribution, density, height and species distribution. (GNMP #2B-2121)

Pettigrew's brigade. Beechman stated "The grove was our citadel, and it in itself furnished the means of strong defense. Every tree was a breastwork, every log a barricade, every bush a cover and concealment...."[38]

The woodlot also affected the Observation of the opposing forces during these actions. Col. Lucius Fairchild, commanding the 7th Wisconsin, described Herbst Woodlot as being "thinly studded with trees of a large growth." This gave the woodlot a comparatively open quality, the trees widely spaced and the ground free of underbrush, and allowed the units fighting there to fire from or into the woods.[39] The woodlot also briefly impacted long-range Observation, as it provided some Cover and Concealment for Union troops, both artillery and infantry, from the fire of Confederate batteries on Oak Hill to the north and Herr Ridge to the west. Upon driving out the Union defenders, the Confederates gained the Cover that Herbst Woodlot provided.[40]

Based on this analysis, Herbst Woodlot influenced the battle by providing Cover and Concealment, affecting Observation, and becoming an Obstacle to advancing troops. Therefore, the recommended treatment for the Herbst Woodlot might be the restoration of its ***historic limits***, since this characteristic is needed to understand how the woodlot provided Cover and Concealment and impacted long range Observation. Because Herbst Woodlot was the site of major fighting restoration of the ***age distribution*** and ***density*** might also be necessary as these characteristics influenced short range

Observation and determined the extent to which the woodlot became an Obstacle and provided Cover and Concealment. Because this woodlot did not significantly impact the long range Observation or fields of fire of any unit the restoration of its historic ***height*** would probably not be necessary. Since this woodlot influenced the battle, NPS would manage it for ***health*** to ensure its longevity.

Rose Woodlot was a deciduous woodlot, approximately 51 acres, that wrapped around the west, south and east boundaries of the Wheatfield, and most of the western slope of Houck's Ridge. This woodlot was the scene of considerable action on July 2 as elements of six Confederate brigades and eight Union brigades advanced and/or fought through it that day. Although largely free of undergrowth, numerous rocks and boulders, along with the trees themselves, became an Obstacle to all of the units that advanced through the woodlot. These features also gave some Cover and Concealment to some soldiers defending this area.[41]

The trees not only broke up units advancing in battle lines, but also proved to be an added hindrance to the attacking Confederates, when solid shot from Battery D, 1st New York Artillery, deliberately fired into the woodlot from the Wheatfield, began sending limbs crashing into their ranks. One Union officer described this fire as "very effective (as solid shot always is when troops are engaged in woods, the moral effect being at least equal to the physical)...."[42]

The woodlot provided Cover and Concealment for units on both sides. During one Confederate advance this woodlot provided shelter for the Southern soldiers, as Capt. Winslow, commanding Battery D, reported that "I was unable from my...position to observe the movements of the troops...." Col. De Trobriand, commanding a Union brigade defending the Wheatfield, later wrote, "The trees prevented us from seeing anything of the engagement (in Devil's Den)...." Once the lines became engaged both sides used the trees for Cover. Capt. G.W. Verrill, of the 17th Maine, remembered Southern troops "taking advantage of the trees...for shelter as they advanced." De Trobriand also recalled his men, "Like veterans...had sheltered themselves behind...trunks of trees...."[43]



Figure 2-20 Confederate dead near southwest edge of the Rose Woodlot (James Gibson, July 1863). This view, looking east, clearly reveals several important characteristics of Rose Woodlot that influenced the combat in this area. These include the historic limits, age distribution and density. It is obvious that this woodlot was well maintained being free of underbrush and fairly open, thus allowing fairly rapid movement through it, while also providing good Observation and fields of fire from or into it.
(GNMP #2B-2061)

The low ***density*** of the woodlot affected the combat that followed, for it gave troops on both sides the ability to see and fire into, or from, the woods. Though the trees limited their Observation somewhat, the open character of the woodlot, trees widely spaced and no undergrowth, allowed units to fire at 100 yards or more. An example of this was the effective fire of the 17th Maine into the left flank of the 3rd Arkansas as it advanced through Rose Woodlot.[44]

Eventually, these attacking Confederates captured the Rose Woodlot and thus obtained Cover during the combat that followed. Capt. Winslow reported their advance was "under cover" of the woods on the east, south and west sides of the Wheatfield. "Having no supports in rear," he continued, "and being exposed to a heavy fire of musketry in front and upon both flanks, I deemed it necessary to withdraw in order to save my guns...." When Union counterattacks soon after "approached the line of timber...they received a withering fire from the concealed enemy."[45]

Rose Woodlot also impacted the Observation between various points of high ground in that area and the line of sight, or fields of fire, of artillery batteries firing over the woodlot. The 2nd New Hampshire was positioned near the Peach Orchard on July 2 and just before that area came under Confederate infantry assault a member of the regiment recalled his view over the woodlot to Little Round Top:

> The fight for possession of Little Round Top, in full view of the Second, was at its height, the rocky pinnacle belching flames like a volcano, and the crash of musketry was heavy and continuous.[46]

At nearly the same time period Capt. Francis Moran of the 71st New York, positioned just north of the Peach Orchard, described his view over the Rose Woodlot to both Devil's Den and Little Round Top:

> Devil's Den...now faded from sight under a canopy of smoke, but the rattling volleys and ringing cheers of friends and foes told us through the fog that the hot struggle was still maintained by Sickles's stubborn but hard-pressed line... Round Top was now crowned with artillery; the Maltese Cross of the Fifth Corps and flags of the 91st Pa. rose out of the smoke of battle like a burning colosseum.[47]

Based on this analysis the Rose Woodlot affected the battle in several ways, by providing Cover and Concealment, becoming an Obstacle and by influencing both short and long range Observation. Therefore, the recommended treatment of the woods might include restoration of its ***historic limits***, since this characteristic is needed to understand how the woodlot provided Cover and Concealment and impacted long range Observation. Because Rose Woodlot was the site of major fighting restoration of the woodlot's ***age distribution*** and ***density*** might also be necessary since these characteristics influenced short range Observation and determined the extent to which the woodlot became an Obstacle and provided Cover and Concealment. This woodlot also had a significant impact on the long range Observation or fields of fire of many units and therefore the restoration of its historic ***height*** would need to be considered. Since this woodlot influenced the battle, NPS would manage it for ***health*** to ensure its longevity.

HEDGREROWS

Historic Use and Appearance

Though not abundant, hedgerows did exist on the 1863 Gettysburg landscape. Some of these were planted and maintained by farmers to serve as a cheap but durable "living fence."[48] Most hedgerows, however, were the result of the natural and unmanaged growth of vegetation along existing fence lines or areas of poor rocky soil or boulder outcroppings. The vegetation that made up the hedgerows was widely diverse and included various tree species, bushes, shrubs, briars and other undergrowth.

The ***historic limits*** (its length and width) and ***height*** of hedgerow was normally the result of its ***age distribution***. Older hedgerows were usually longer and higher. Because different types of vegetation grow at different rates, ***species distribution*** within a hedgerow can also affect its height. A hedgerow's ***density*** was influenced by many factors, including its ***age distribution***, ***species distribution***, along with the farmer's management, or lack thereof, of the vegetation. Denser hedgerows made better, tighter barriers. The ***health*** of the hedgerows on the battlefield varied, and was heavily dependent on the management practices of the individual farmers. The hedgerows that served as living barriers were usually carefully managed for longevity and thus had better health. Hedgerows that resulted from unmanaged naturally growing vegetation were usually not as healthy.

How Hedgerows Influenced the Battle

The impact these hedgerows had on the battle depended on the individual characteristics of the hedgerow and on the evolution of battle and battle movements. Hedgerows provided Cover and Concealment, affected Observation, and were Obstacles.

The ***historic limits*** of a particular hedgerow (i.e. length and width) determined how much Cover and Concealment could be gained by troops positioned along or behind it. This characteristic also determined how much area behind the hedgerow would be screened from enemy Observation.

Age distribution, species distribution and ***density*** were important when the hedgerow was an actual scene of combat. In these instances the above characteristics impacted the degree to which the hedgerow was an Obstacle to troops moving through it, how much Cover it provided to troops fighting in it and the Observation of units firing into or through it. Hedgerows having older vegetation, species of thick, heavy foliaged vegetation or possessing great density were more difficult to move through, provided better Cover and Concealment and also were more difficult to see and fire through or into than hedgerows containing younger vegetation that was thinly spaced.

During combat military units advanced in battle line (by rank) through some hedgerows. Almost invariably these occasions were during the heat of battle, when commanders were trying to get into position quickly. By its very nature, a hedgerow became an Obstacle to the rapid movement of troops. ***Age distribution, species distribution*** and ***density*** of the vegetation within a hedgerow created Obstacles to orderly movement. The higher the ***density*** of the vegetation the harder it was to keep the battle line in regulation alignment.

The ***density*** and ***species distribution*** of vegetation also determined to what extent the hedgerow impacted Observation or provided Cover and Concealment. The tighter the arrangement, larger the trees, and/or higher the percentage of evergreens/bushes present, the more limited the Observation became. The same would be true for the Cover and Concealment provided for these same troops.

Some hedgerows shaped the battle on an even greater scale, since they were not only the scenes of combat, but also heavily impacted Observation from various points within the Major Battle Action area. In such cases the historic ***height*** of a hedgerow affected line of sight, for Observation, including fields of fire, by determining how much area beyond the hedgerow would be Concealed. The higher the vegetation, the more area beyond that hedgerow would be screened or concealed.

General Treatment Principles

In general hedgerows fall into the same categories as woodlots, in that in some cases there are hedgerows that were present in 1863 but are now missing, hedgerows that have exceeded their 1863 limits, and modern hedgerows not present in 1863. The same principles and techniques noted under "Woodlots and Groves," above would be used to manage these features.

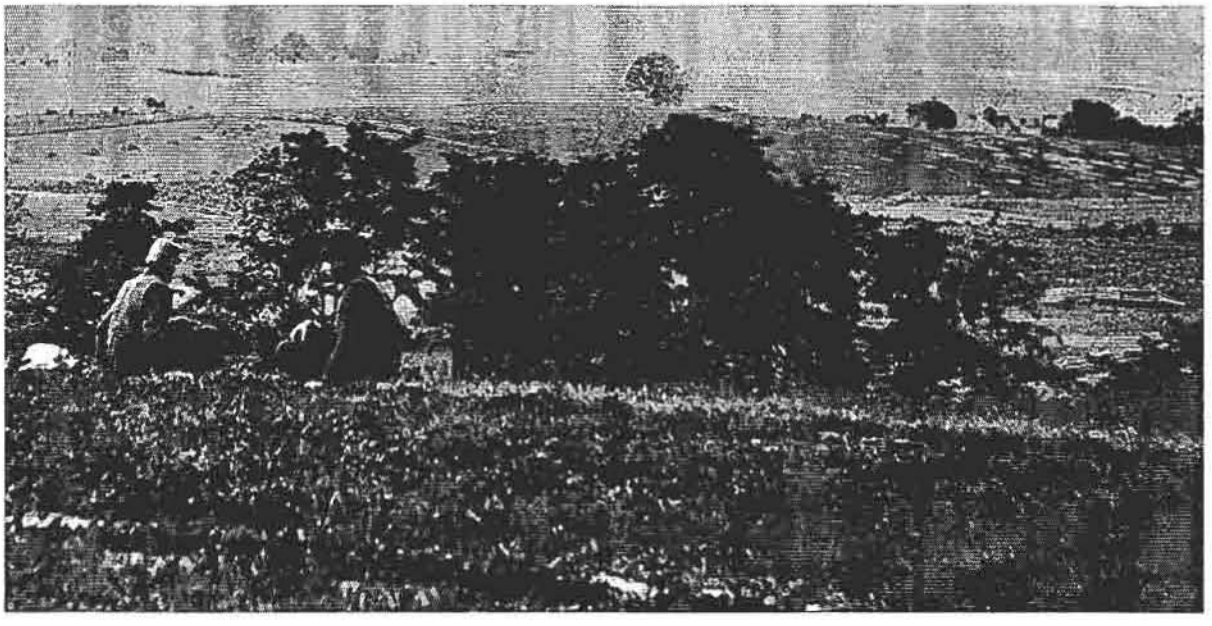


Figure 2-21 East Cemetery Hill, view northeast, 1863. Visible in the right portion of this photograph (just above the post and rail fence) is a hedgerow that grew along an existing fence line. This hedgerow appears as a thin line of vegetation consisting of small trees and brush. This fence was part of the boundary between the Henry Culp farm and a lot owned by Peter Raffensberger. While it is not always the case, hedgerows were more likely to be allowed to grow along property lines than within the historic limits of a farm. Even from the distant view of this photograph, some characteristics of this hedgerow (historic limits, height, density) can be determined (GNMP #2B-2025)

Example Illustrating Possible Treatment

Ziegler's Hedgerow was a "matted shrubby" covering a "stone wall" that stretched between Ziegler's Grove and the Taneytown Road. Throughout the morning and afternoon of July 2 Union troops belonging to Col. Samuel Carroll's brigade were positioned behind the hedgerow, using it for Cover and Concealment. Later that day these same troops crossed over the wall and hedgerow before making a counterattack against Confederate skirmishers along the Emmitsburg Road.

Based on this analysis the hedgerow influenced the battle by providing Union soldiers Cover and Concealment. It later became a minor Obstacle to these same troops by slowing their movement and

confusing their formation. Possible treatment of this feature would include reconstructing the original stone wall and then planting suitable vegetation that would rehabilitate the hedgerow's ***historic limits, density*** and ***height***. Restoration of the hedgerow's ***species distribution*** would not be necessary as no combat took place along or within close proximity of the feature.[49]

ORCHARDS AND NURSERIES

Historic Use and Appearance

Many orchards dotted the 1863 Gettysburg landscape. Because the area was primarily agricultural, mostly composed of subsistence farms, each farmstead typically had at least one orchard. Fruit harvested from orchards could be eaten fresh at harvest, or dried and canned for use in winter. Much of the apple crop was used to produce cider and other drinks. Both apple and peaches were commonly used as livestock feed. Surplus fruit could also be sold to create cash revenue. The fields where younger orchards were planted were also commonly used for crops, especially corn or small grain, or even pasture land for livestock.[50]

The ***historic limits*** of each orchard depended on many factors, including the size of each farm, how much land each farmer could or was able to devote to orchards, and the needs of each farm. The average orchard was between one to five acres. The ***species*** of fruit varied and included, among others, apple, peach, cherry, pear and plum, and many orchards contained more than one type. The ***internal arrangement*** of each orchard varied according to the type of fruit it contained and the method employed by the farmer. Some used a square pattern, using rows 15 to 40 feet apart depending on the fruit, planting the trees "at each crossing." Others used a quincunx pattern, "that is the trees in one row opposite to the intervals of the next" row. The distance between the rows was 15-20 feet for peach trees and 30-40 feet for apple trees.[51]

Because farmers needed to manage their orchards to be productive over the life their farm, the ***age*** and ***height*** of the trees within an orchard was usually consistent within each orchard. Farmers sometimes had an older orchard, nearing the end of its life cycle, with a young orchard near by. This would allow each farmer to slowly phase out older orchards as they became less productive. ***Height*** was also influenced by the management practices of the individual farmers, such as the pruning methods used by each. While some farmers pruned their fruit trees, the practice had not been fully accepted and most farmers did not. Thus, the ***height*** of the trees in an orchard was a direct result of its ***age***. Most farmers only pruned in "order to keep fruit out of reach of livestock pastured in the orchard." This led to a higher browse line on the trees, as one agricultural publication stated "the head of every apple tree should begin at least six feet from the ground; and those whose branches are sloping, eight feet." The ***health*** of each orchard was also of great importance for the same reason.[52]

How Orchards Influenced the Battle

How each orchard impacted the battle depended upon the characteristics listed above along with battle evolutions and movements that occurred near or within that orchard. Many of these orchards provided Cover and Concealment, impacted Observation and became Obstacles. Some orchards, even though their existence in 1863 is beyond doubt, played little or no role in the battle.

The ***historic limits, age*** and ***height*** of a particular orchard determined how much Cover and Concealment could be gained by troops occupying it or how much area behind the orchard would be screened from enemy Observation. This was especially true for older orchards, for these trees had

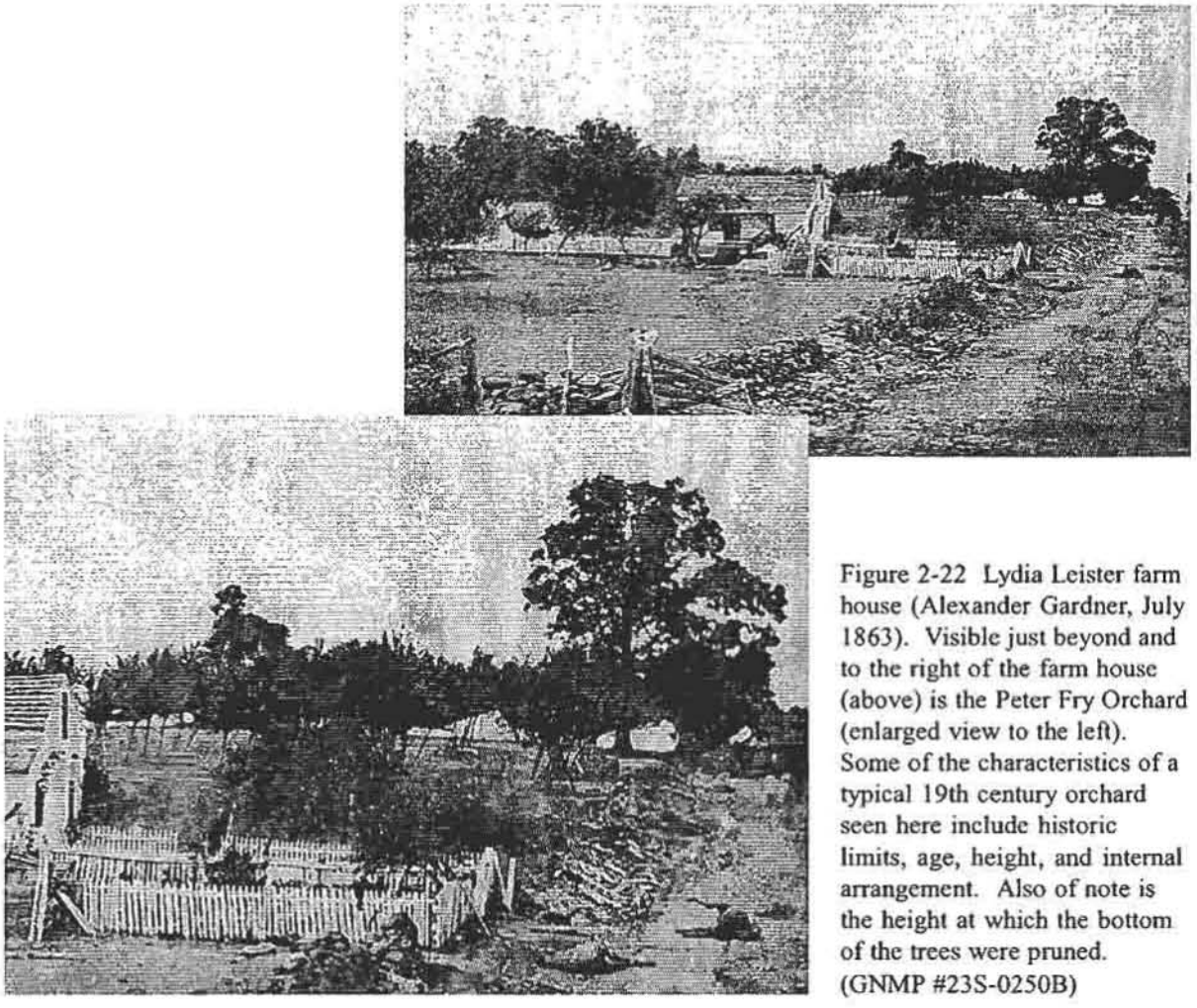


Figure 2-22 Lydia Leister farm house (Alexander Gardner, July 1863). Visible just beyond and to the right of the farm house (above) is the Peter Fry Orchard (enlarged view to the left). Some of the characteristics of a typical 19th century orchard seen here include historic limits, age, height, and internal arrangement. Also of note is the height at which the bottom of the trees were pruned. (GNMP #23S-0250B)

longer trunks and higher browse lines. These characteristic would give units, especially artillery batteries, occupying an older orchard good Cover and Concealment, while at the same time allowing them to fire by providing excellent Observation and fields of fire.[53] Orchards containing taller trees Concealed more area behind it from enemy Observation and fire.

In instances where major combat occurred near or within an orchard, its ***age*** and ***internal arrangement*** determined how and to what extent that orchard became an Obstacle to troops who moved through it while under fire. These factors also determined how much Cover a particular unit could receive from the orchard around it. Orchards that contained older trees with larger trunks and foliage canopies were more of an Obstacle to the orderly passage of troops, especially infantry moving in line of battle by rank, than younger, smaller trees. For these same reasons older orchards also provided more Cover and Concealment than younger orchards. These same principals would be true for orchards that possessed tighter or denser ***internal arrangements*** than orchards whose trees were widely spaced.

The ***species*** of an orchard had no impact upon the fighting, because most fruit trees have very similar characteristics (tree size, foliage cover, etc.). Therefore the ***species*** of fruit in an orchard had little or

no impact upon the fighting.

General Treatment Principles

In general, the type of fruit in an orchard was not significant, but its contribution to the spatial organization of a farm and thus to its use in battle was. Since the goal of the GMP is not to interpret 19th century farming, like woodlots, the specific species present in an orchard are generally not important. However, the historic limits and height of an orchard do affect its qualities as cover and concealment, obstacle, or avenue of approach. The exception to this understanding is named orchards that are now commemorative in nature, such as the Peach Orchard.

Orchards present in 1863 but now missing: Orchards will be planted using standard size apple or pear trees that will reach the general height common for orchard trees in the mid-19th century. Because of concerns regarding plum pox, stone fruit trees will not be used. NPS will use modern disease and pest resistant root stock, which will yield trees that remain healthy with less intensive maintenance. Trees of several different varieties may be planted, to avoid catastrophic loss to park orchards should a specific variety of tree develop disease in the future. Young trees will be pruned using 19th century pruning strategies, so that the resulting orchard has the general appearance, size and height of 19th century orchards. NPS will limit its use of pesticides and herbicides, and will not manage orchards for fruit production but for their general appearance on the landscape. Trees will be planted on 40-foot centers, unless there is a compelling interpretive reason to use a different internal arrangement.

Because orchard trees, like all living things, grow, mature and die, and because of the extremely high cost associated with doing so, NPS will not manage orchards to represent this feature at a specific age. Therefore, orchards that were quite young at the time of the battle (in general, less than four years old and under three feet in height), and that would be misleading to visitors were they to be represented as full grown orchards on the landscape, will not be restored. Orchards that contained trees large to have a crown and be visible from a distance but that had not reached maturity will be replanted with standard trees and will be allowed to reach maturity. However, orchards that were not mature may not have had as great an impact upon the battle as mature orchards did, and therefore may be considered low priority for treatment purposes. If and when replanted, the NPS may consider planting semi-dwarf trees, only if the immature height of the orchard affected fields of fire.

1863 Orchards currently represented on the landscape: These orchards will be maintained in their current condition until they become senescent and must be replaced. Then the general precepts for orchard planting noted above will be instituted.

An exception to this general rule is the Sherfy Peach Orchard. Visitors expect to see peaches here. The Sherfy Peach Orchard is ending its productive life. When it is time to replace it, then standard size peach trees grafted onto disease and insect resistant root stock will be selected. The trees will be planted on 20' centers. Trees of several different varieties may be planted, to avoid catastrophic loss to this park orchard should a specific variety or type of tree develop disease in the future. Young trees will be pruned so that the resulting orchard has the general appearance, size and height of 19th century orchards. NPS will limit its use of pesticides and herbicides, and will not manage orchards for fruit production but for their general appearance on the landscape.

Orchards present now but not present in 1863. In a few cases orchards, such as the one planted at the Biggs Farm, were not present in 1863. When time and budget permits, these non-historic features will be removed.

Examples Illustrating Possible Treatment

Three orchards illustrate how KOCOA can assist in determining the different methods and levels of treatment in the rehabilitation of the park's battle landscape. The **W. Bliss Orchard** was located between Seminary Ridge and Cemetery Ridge and just west of the William Bliss farmstead. This large orchard was composed of apple, peach and cherry trees. During the fighting on July 2 and 3 the orchard provided the only substantial Cover for both Union and Confederate skirmishers across the nearly 1,200 yards of relatively open ground between Cemetery Ridge and Seminary Ridge. It also proved to be a slight Obstacle to Confederate troops that passed through them during "Pickett's Charge."[54]

Treatment of this orchard might include restoration of its ***historic limits*** because for this characteristic determined the amount of Cover it provided and degree to which it was an Obstacle. The specific ***species*** of fruit present in 1863 would not be restored because the type of fruit grown in the orchards did not affect the battle. However, planting trees that replicate the historic ***height*** of the orchard would be important, since this impacted the level to which it provided Cover and Concealment and became an Obstacle. The NPS would also manage the orchard's ***health*** to ensure its longevity.

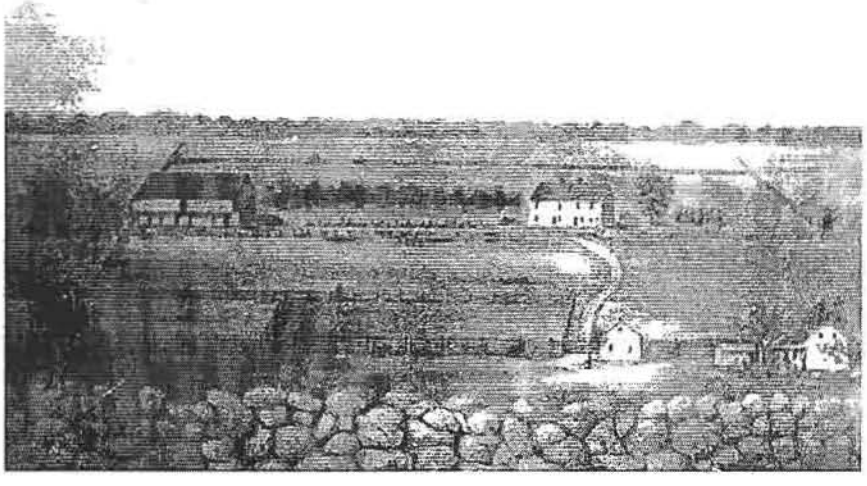


Figure 2-23 Painting of the William Bliss farmstead. Although no photographs of this farmstead are known to exist, this painting gives a basic idea of the appearance of the house and large stone bank barn and its general spatial organization. Quite prominent in this view is the extensive orchards located behind, and in between the house and barn. (GNMP #23S-002)

The **J. Sherfy Peach Orchard,** more popularly known as the **"Peach Orchard,"** was made famous by the fighting that swirled in and around it on July 2, 1863. Located east of the Emmitsburg Road and on both sides of the Wheatfield Road, this feature was actually composed of two orchards. Sherfy Orchard (South), located south of the Wheatfield Road, was approximately four acres in size, was composed of mature trees and was considered the famous "Peach Orchard." Because of its fame as a battlefield landmark, this orchard is also a commemorative site, and therefore has been replanted with peach trees several times since the battle. Sherfy Orchard (North), was located north of the Wheatfield Road, was approximately six acres in size and was made up of small, three-year old trees.

Sherfy Orchard (South) became a small Obstacle to both Union and Confederate troops that fought around this area. One Union battery commander remembered, "The orchard was so dense and thick...that one could not see all the guns at the same time unless possibly, he was in the center of the battery." On a positive note, the orchard also gave the troops positioned there some Cover. A soldier in the 2nd New Hampshire recalled, "...the regiment lay in this position, the men closely hugging the ground..... Since they lay the foliage of the peach orchard screened from their view everything in front...." Being made up of older trees, the browse line was higher, thus giving the Union batteries positioned there not only Cover, but also good Observation and fields of fire.[55]

Possible treatment of this orchard might include restoration of its ***historic limits*** because this characteristic influenced the amount of Cover it provided, Observation from or into it and the degree to which it became an Obstacle. Because of the feature's status as a commemorative site, its ***species*** (i.e., peach trees) should reflect the historic make-up of the orchard. The NPS would also manage the orchard's ***health*** to ensure its longevity.

Though the Sherfy Orchard (North) was mentioned by several of the participants who fought in and around it, this feature had no significant influence on the battle, apparently because the trees that made up the orchard were less than three years old and too small to become Obstacles or provide Cover or Concealment. Based on these facts this orchard would not be considered for rehabilitation, because a mature orchard in this location would be confusing to the public.[56]

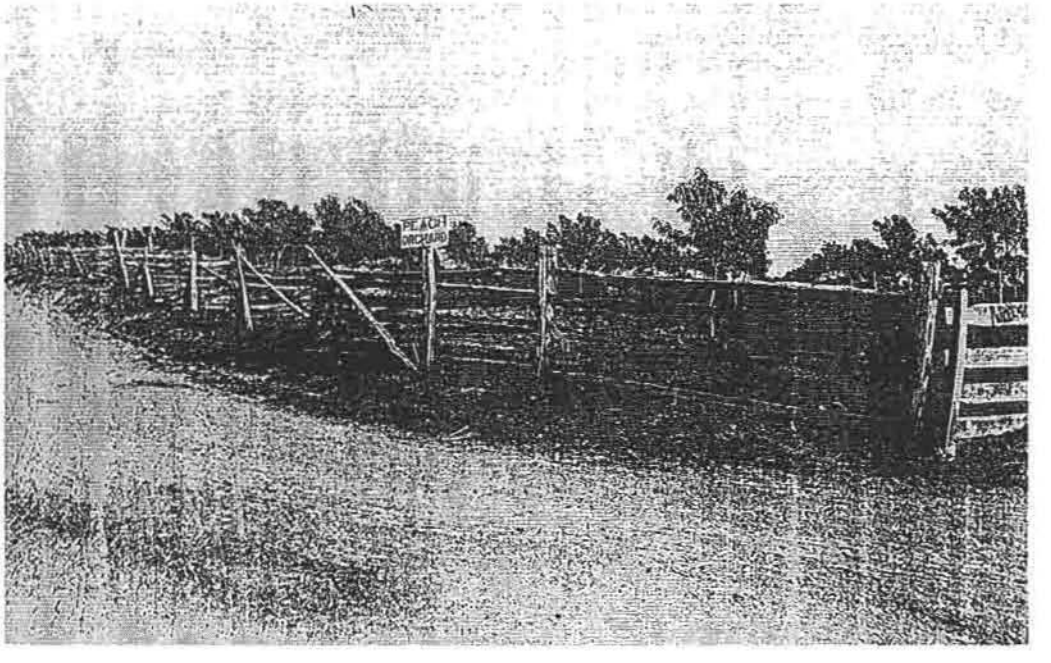


Figure 2-24 "The Peach Orchard, from the Emmitsburg Road," (William Tipton, ca. 1880). Sherfy Orchard (South) or The Peach Orchard as it appeared nearly 20 years after the battle. Although these trees are obviously not the ones present at the time of the battle, the orchard's historic limits, species distribution and internal arrangement are the same. (GNMP, Tipton #5093)

Straddling the central section of Seminary Ridge and south of the Fairfield Road was the David McMillan farm. Occupying the majority of his approximately 54-acre farm were extensive orchards, producing apple, peach, pear, plum and cherry trees. An approximately 12 acre nursery was also located near the farm house and buildings. The **McMillan Nursery** was one of the first such commercially-run orchard operations in Adams County. Since the McMillan nursery shared the same characteristics as orchards, (***historic limits, internal arrangement, age, height, species*** and ***health***) it impacted the battle in similar ways, by providing Cover and Concealment and impacting Observation.[57]

Possible treatment of this nursery could include restoration of its ***historic limits*** and ***height*** to reflect is influence in providing Cover and Concealment and impacting Observation. The NPS would manage the ***health*** of the nursery to ensure it longevity.[58]

INDIVIDUAL TREES

Historic Use and Appearance

Dotting the 1863 Gettysburg battlefield landscape were individual trees. These trees were separate from the woodlots, groves, woodlands, thickets, hedgerows, orchards, and nurseries on the battlefield. The location of individual trees was influenced by many factors. Many of these trees were located in dooryards, and therefore were small scale features of farm building complexes. Others were scattered throughout the fields, and were common in areas that were difficult to cultivate such as rock outcroppings, along fence lines and on boundary lines. In some cases, the size and species of an individual tree was important, when that was known, and the tree has become a commemorative feature.

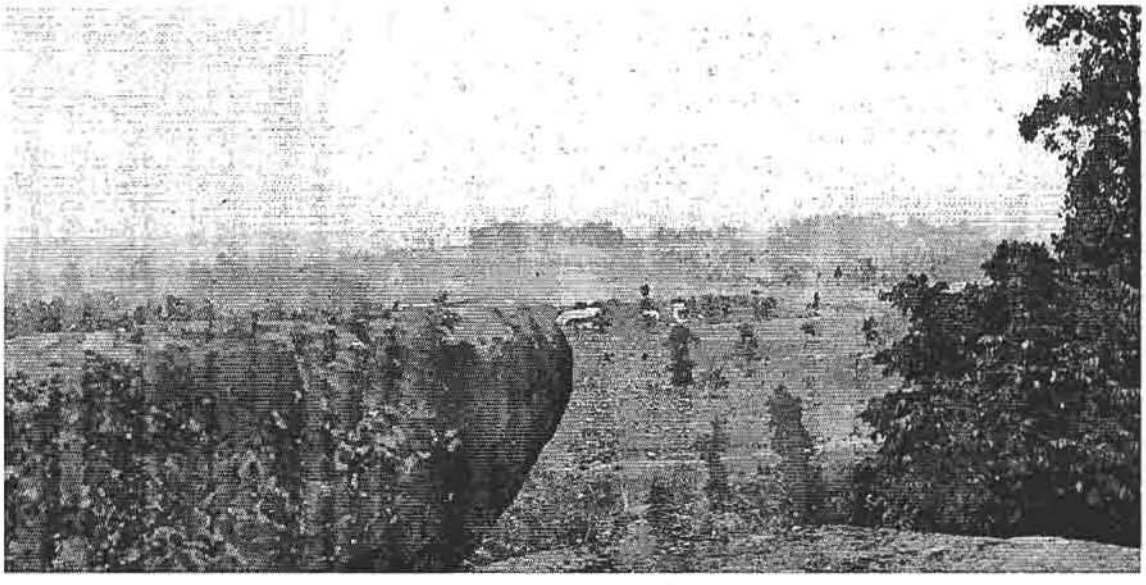


Figure 2-25 View north from Little Round Top (Mathew Brady & Co., July 1863). Clearly visible across Cemetery Ridge and other nearby fields are numerous individual trees. Some of these are associated with specific farm building complexes (such as the dooryard and barnyard trees around the George Weikert farmstead), but most are simply individual random trees scattered across the field. (GNMP #2B-2100)

How Individual Trees Influenced the Battle

The ***location*** and ***age*** of individual trees, along with the battle movements and action that occurred around them, determined the impact they had upon the battle. Some individual trees provided Cover and Concealment for both individual and small groups of soldiers, provided Observation to sharpshooters, served as easily identifiable landmarks, provided shade, or completed the spatial organization of the mid-19th century agricultural landscape. Photographs, official records, participant accounts, memoirs, etc., document the importance of these trees.

Other individual or small groups of trees were scattered across the field, mostly in locations that were difficult to cultivate. These random trees were standard features of 19th-century agriculture landscapes. These trees provided shade, were used for Cover by individual troops and sometimes served as landmarks. The size of an individual tree, determined its ability to provide Cover, its value as an Observation point and its ability to serve as a landmark. The species of a tree generally had no military impact on the battle.



Figure 2-26 Abraham Trostle farmstead (Alexander Gardner, July 1863). Note the numerous dooryard and barnyard trees associated with this farm building complex that were small scale features which helped complete its spatial organization. (GNMP #2B-2050)

General Treatment Principles

Surviving Witness Trees: Witness trees were present during the battle and survive today. Some witness trees were substantial in size during the battle, and affected the fighting as a landmark, Cover and Concealment, or Observation. Many of these trees have been identified and are considered as commemorative features. When witness trees were important to the battle, they will be protected and treated to ensure longevity. Treatment will depend upon a professional assessment of each tree. Typical treatments include trimming, removal of deadwood, provision of lightning protection, and other interventions intended to ensure the health of the tree. When a significant witness tree dies, a tree of the same species, and if possible, a descendant of the original tree will be planted in its place.

In other cases, trees may have been present at the time of the battle, but were not especially significant to it. Most of these trees were young trees, or woodland or woodlot trees that survive. Trees that were present at the time of the battle, but that were not especially important to it, will be protected. Even when these trees occur now in areas that did not include large trees at the time of the battle, such as Codori-Trostle thicket, they will be preserved.

The question of the age of a potential witness tree, and therefore determining its existence during the battle will occur often during treatements that involve the removal of non-historic vegetation. In such cases the cutting, or preservation of, these potential witness trees will be determined by three methods. They are, in descending priority:

1 *Photographic evidence*-if historic photographs (either 1863 or post-battle) reveal the non-existence of the tree in question, then it was obviously not a witness tree and can be removed.
2. *Estimating the tree's age by species* -if photographic evidence can not determine the existence of the tree in question, then an estimate of the tree's age can be determined using the standard formula of size (dbh) multiplied by tree species factor as established by the International Society of Arboriculture.
3. *Coring the tree* -if the above methods still leave in question the existence of a potential witness tree, then coring the tree (using accepted coring methods) will be completed in order to determine its age.

Only one method is necessary to make a determination, thus the last two methods will only be necessary if the first method is unsuccessful and so on. The area being rehabilitated and the possible interpretive use of such trees will also influence the final decision of removing or preserving a potential witness tree. As an example, if a potential witness tree can be used to represent a similar 1863 vegetation feature or to represent the existence of random trees, then the tree in question will be preserved for those uses. If a potential witness tree, however, hinders the rehabilitation of the KOCOA impact of a particular feature (such as Observation viewsheds), then the tree can and should be cut if its non-existence can be determined using the three methods listed above. Natural processes will determine the life of any potential witness tree that is preserved, and NPS will not provide additional interventions to protect its health and longevity.

Individual Trees that were present during the battle but that are now missing: When a tree that was significant to the battle, and that had achieved commemorative status, has died and is now missing, a tree of the same species will be planted in its place. Other trees that were significant to the battle, but that did not survive into the present and did not achieve commemorative status, will be replanted. In those cases, a larger tree having a height of at least six to eight feet and a dbh of at least two inches will be planted.

In other cases, random trees were found in pastures and fields. In many cases, there are still random trees found in these same pastures. They are not witness trees, and in many cases, have grown in a different location (for example, to the south of a group of boulders instead of to the north of the group of boulders). Since random trees were a part of the battle landscape, NPS will allow these trees to continue to grow, to represent those present at the time of the battle.

Examples Illustrating Possible Treatment

An example of a surviving witness tree is a swamp white oak located directly south of the Abraham Trostle farmstead complex and commonly referred today as the **Sickles Headquarters Tree.** Throughout much of the fighting on July 2, Maj. Gen. Daniel Sickles located his headquarters under this tree for several reasons. Its location was ideal (being behind the center of his recently advanced battle line) and was large enough to serve both as an easily visible landmark for his headquarters and a temporary aid station, while also providing abundant shade. Charles Reed, a soldier and artist, later described the tree's use by the general and his staff:

> at the foot of the hill on which we took position were Major Gen Sickles headquarters under a tree. we halted here a few minutes giveing me time to take a sketch of him. One of his Aids was already wounded by a piece of shell in the back and a surgeon was doing it up.[59]

The sketch Reed drew not only depicts the presence and size of the tree in 1863, but also shows Gen. Sickles and at least eight members of his staff located under it. Based on this analysis possible treatment of this tree would include maintaining and protecting it by rerouting the adjoining drainage to prevent additional erosion around the roots, protecting the roots from compaction from the horse trail, removing deadwood and installing a lighting arrestor.[60]

Three trees located northeast of the Abraham Trostle farmstead are examples of surviving 1863 trees that had no military impact on the battle or commemorative value. These were young trees in 1863, and no sources indicate that these trees had any impact on the battle. NPS will protect these trees through their natural life span.



Figure 2-27 "Major General Sickles headquarters as we passed him going into action on 2d of July at Gettysburg...I took the scetch on the spot." This drawing by Bugler Charles W. Reed of the 9th Massachusetts Battery, depicts the wartime appearance of the swamp white oak tree used by Maj. Gen. Daniel Sickles's and his headquarters staff on July 2, 1863. The Sickles's Headquarters Tree is a surviving witness tree located near the Abraham Trostle farmstead. (Charles W. Reed Collection, LC)

The **Doubleday Tree** serves as an example of an individual tree that was present during the battle and is now missing. During the evening of July 1 and morning of July 2 Maj. Gen. Abner Doubleday, commanding the First Corps of the Army of the Potomac placed his headquarters "under a large tree...in the corner of the field to left of the cemetery...." Verifying this tree's location and age is its presence in 1863 photographs. The tree's species is unknown.

Based on this analysis, this tree served to clearly mark First Corps headquarters and also probably provided shade to Doubleday and his staff. Possible treatment could include replanting a deciduous tree that would eventually reach the historic tree's size and foliage cover.[61]

SMALL SCALE FEATURES

These features add to the historic landscape and complete the spatial organization of a mid-19th century agricultural setting. These features "may be characteristic of a region and occur repeatedly throughout an area.... Collectively, they often form larger components, such as circulation networks or boundary demarcations."[62] On the Gettysburg battlefield this would include such features as fences and stone walls and gates. Collectively these features not only complete the cultural landscape, but also heavily influenced the battle.

FENCING

Historic Use and Appearance

According to one agricultural historian, "No aspect of farming has been the subject of more controversy, often acrimonious, than fences." This was because of the tremendous amount of labor involved in the "the construction and upkeep of fence lines" and their importance in defining the mid-19th century agricultural landscape.[63] Fences set property lines, confined livestock, protected crops and orchards and divided fields. The large number of fences present on the battlefield was also the result of the Fence Law of 1700, which declared that all crop fields be enclosed to keep out wandering livestock. This required that nearly every field, whether crop, pasture or meadow, be fenced. Consequently the landscape on which the battle was fought was crisscrossed with approximately 104 miles of fencing.[64]

The Fence Law of 1700 also stated that all fences should be "at least five feet high, of sufficient rail or logs, and close at the bottom." The fences of the 1863 Gettysburg landscape were almost universally made of wood or wood and stone and constructed using a variety of tried and traditional methods. Chestnut and locust were the preferred woods for their high durability.[65] The construction techniques for fences were determined by many factors, including the wealth of the individual farmer, the fence's location and purpose, the materials available, and the labor each farmer could invest in the construction and ongoing maintenance.

The farmers in the northern section of the park were generally wealthier, owned larger farms and could afford fences made entirely of wood: fences here were mostly mortised rail or board. Farmers on the southern and central sections of the park generally owned smaller farms on rougher and rockier ground. Thus their fences were made of wood and stone or entirely of stone. Stones were not only more available (as they were constantly turned up when the fields were cultivated) but also economical as well (requiring less maintenance).

Present on the 1863 Gettysburg landscape were eight types or ***styles*** of fences used by the farmers. Style is a complex characteristic that includes the materials used to construct it, its construction, strength, tightness, height and mass. The style of the fence was an important characteristic of the 1863 battlefield, because different styles presented different problems to the troops that faced them. Depending upon its style, a fence might be easier or more difficult to dismantle or might provide more or less cover, for example. The fence styles were:

Virginia worm: This was one of the most common types of fence, because it was cheap, "easy to erect and repair," and needed no special tools or machines. Its was made of wood, "usually of rails nine to twelve feet long...laid in a zigzag fashion, without stakes or posts to hold the ends in place." Normally, each panel consisted of nine rails, including the two cross braces. Thus a worm fence was seven rails high, giving it a height of approximately five feet.[66] Worm fences were relatively massive, requiring approximately 800 rails per acre. The disadvantage of a worm fence was that "it was readily overturned, occupied much space [six to eight feet], and harbored weeds and rodents."[67]

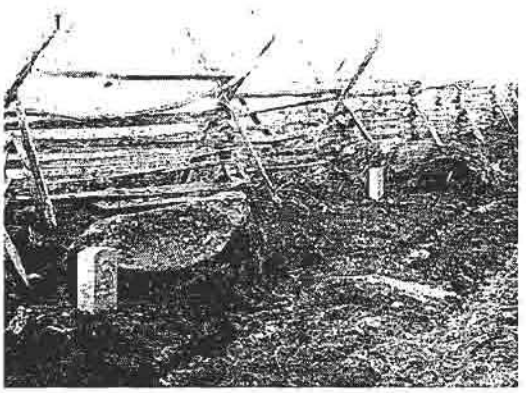
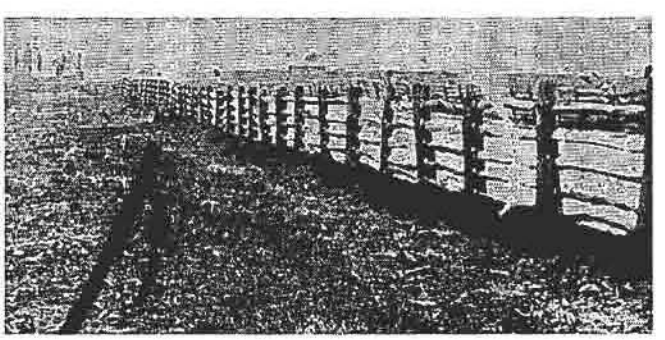


Figure 2-28 View westward along the Wheatfield Road (William Tipton, ca. 1879-1880). This photograph provides an excellent example of the construction techniques, material and appearance of a Virginia Worm Fence. (GNMP, Tipton #1879)

Post and Rail: Like the Virginia worm, this fence was made of wood. A post and rail fence required more labor to construct since it generally consisted of vertical posts (seven or eight feet in length) placed into the ground; then five rails (approximately eleven feet long) with their ends sharpened were placed horizontally into machine-chiseled holes in the post. Their height was about five feet high, and they "conserved timber, occupied a minimum amount of land and favored weed control." Because it required less wood to construct, a post and rail had a lower mass than a worm fence. The main disadvantage to post and rail fences was their high cost.[68]

Figure 2-29 The vast majority of post and rail fences on the 1863 Gettysburg landscape were, like the ones seen here along the Emmitsburg Road (William Tipton, ca. 1876-77), five rails high, although some only used four rails. Even more rare were the post and rail fences that were six rails high. (GNMP, Tipton #1876)

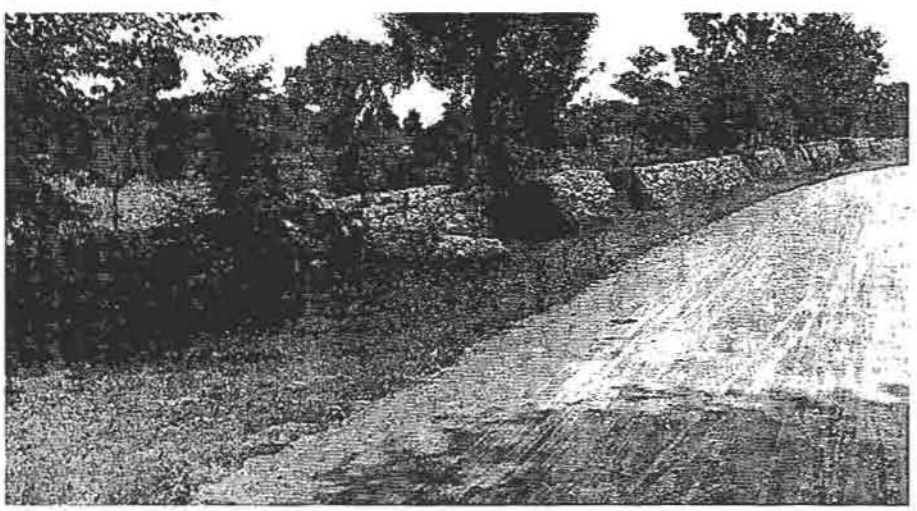


Stone Wall: Stone was used to construct this type of fence. It required a lot of time and labor to build, but stone gave these walls great mass and they proved to be most durable. Although writing about stone walls in northern Pennsylvania, one historian probably came close to describing similar stone walls on the Gettysburg battlefield: "These were laid up with arduous toil and great skill. One marvels at the prodigious amount of labor expended by our forefathers in erecting these enduring monuments to their devotion to the land. Often they were three feet thick and five feet high. Stone fences divided many farms into fields of three to ten acres."[69] The height of the walls on the battlefield varied greatly (depending on location, available materials, etc.) being between three and four and a half feet high. In most cases the wall was built to be stable and durable and many owners preferred these eternal walls as permanent farm boundary markers. This stability and durability was achieved by fitting the rocks tightly together, with the size of stones gradually diminishing as the wall grew in height. Thus a wall's foundation and lower sections were quite strong and gave the wall stability throughout. In many cases the wall was then topped with closely fitted capping stones, thus making it more weather proof and increasing its longevity.

Figure 2-30 This 1863 photograph (right) of the Lydia Leister farm house captures the height, mass and construction style of a typical stone wall that existed on the battlefield. (GNMP #23S-0252)



Figure 2-31(below) shows a stone wall along Sedgwick Avenue (Wm. Tipton, ca. 1900-10). Although this wall was rebuilt by the War Department using contemporary standards, this photograph does provide a good example of the construction techniques used in 1863. These include tightly fitted stones, a wide solid foundation using larger stones and the top finished with capping stones. (GNMP#21P-2176)



Stone and Rail: Stone and wood were the materials used in this type of fence. It usually consisted of a low stone wall, usually less than three feet high, supplemented by a three or four rail-high post and rail fence, thus giving it an approximate height of five feet. This style of fence required slightly less labor than a stone wall, but the stones gave it a greater mass than a post-and-rail fence. Most such fences were located south of town, where the clearing of agricultural fields provided the stone for these fences.

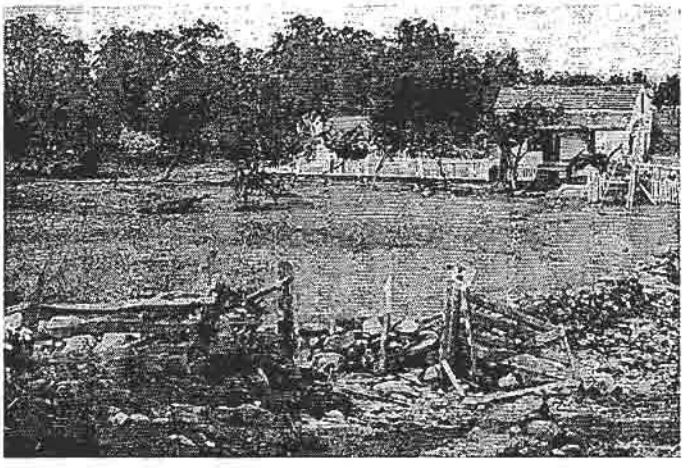


Figure 2-32 A panel of a Stone and Rail fence is visible in the lower left foreground of this photograph (Alexander Gardner, July 1863). This fence used three rails, although other Stone and Rail fences used four rails. The number of rails used depended on the amount of stones available which determined the height of the stone wall. (GNMP #23S-0252)

Stone and Rider: Like the stone and rail the materials for this fence were stone and wood. It usually consisted of a stone wall, usually less than three feet high, supplemented by a rider fence. "The rider fence panel consisted of two crossed stakes and two rails, the lower rail lying on the top of the stone wall and the upper rail in the cross of the stakes" giving it an approximate height of five feet. This type of fence is sometimes referred to as a "cow high-pig tight." These fences required slightly less labor than stone and rail fences, since the rails were easier to place.



Figure 2-33 Stone and Rider fence. Normally, the rails forming the cross-braces were the same length and material as the rails that were used as the riders. (GNMP #23S-0006)

Sawn Board: As the name implies, this type of fence was constructed using wooden boards that had been machine-sawed at local mills. These boards, seven to eight feet long, were then nailed into vertical posts. A completed fence panel usually consisted of four boards and had an approximate height of five feet. Though it possessed the same materials, and a similar height and mass of a post and rail fence, a sawn board fence was easier to dismantle (it was easier to knock the nailed boards from the vertical posts).

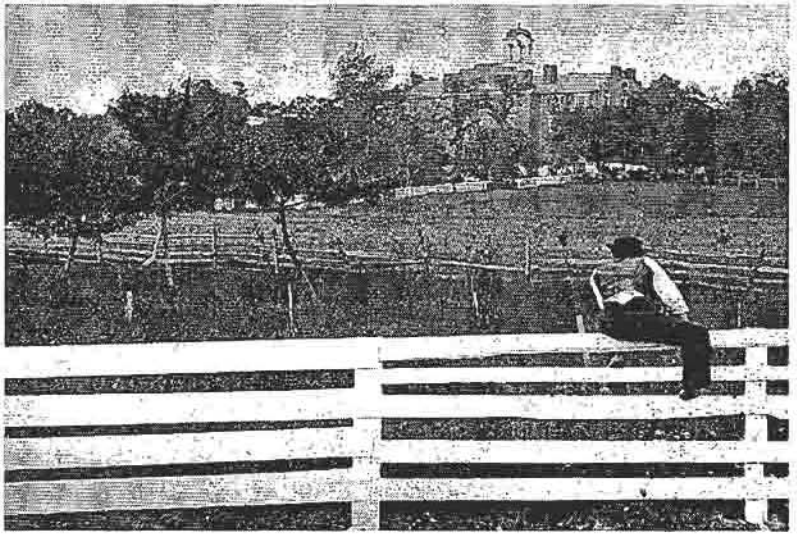


Figure 2-34 Lutheran Theological Seminary (Mathew Brady & Co., July 1863). The sawn board fence in the foreground provides an excellent example of the appearance and construction methods used in this type of fence. Note the uneven, random widths of the sawn boards and the different number of boards used for each panel (four boards on the left panel and five boards on the middle and right panels). (GNMP #23S-1046)

Plank or Slab Board: This type of fence was very similar to a post and rail. It consisted of the same materials (wood) and was constructed nearly the same way (five boards placed horizontally into vertical posts), thus giving it the same mass and height (about five feet). The main difference was that instead of using rails, sawn boards (slabs) of wood, with their ends sharpened, were placed into the chiseled holes in the posts.

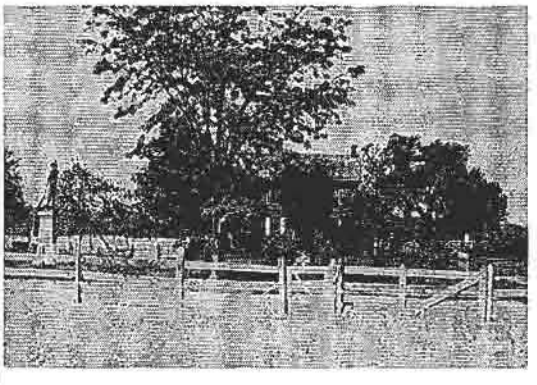
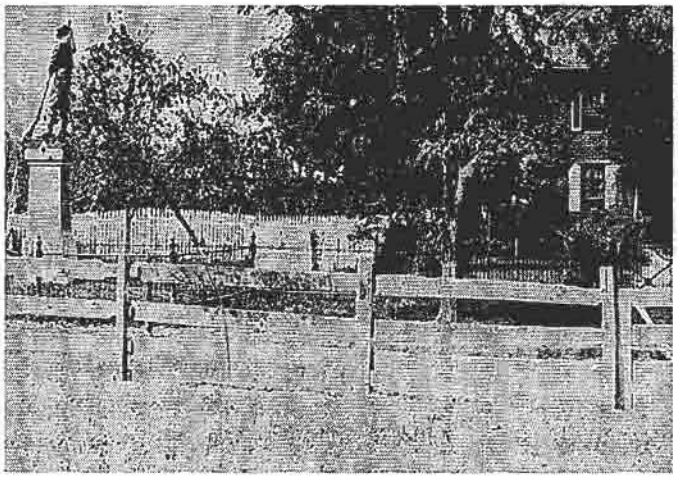


Figure 2-35 Joseph Sherfy farmhouse (William Tipton, ca. 1890). Note the appearance and construction methods (enlargement below) used in the plank or slab fence. The number of boards used (usually four or five) was determined by their widths (GNMP, Tipton #2499)



Stacked Rails: Also made of wood, this fence was essentially a cheap alternative to a post and rail fence. Its materials and design were similar to a post and rail, in that it had vertical posts and horizontal rails made of wood, thus giving it a similar height (about five feet) and mass. The main difference was in its construction, because the posts consisted of two sections of wood placed parallel to each other with the rails fitted into the space between. This avoided the extra cost and labor of chiseling holes into the posts. The rails could be held in place by two methods: either wood slats were nailed into the posts on which the rails rested or the rails were placed in alternating fashion at the connection of two panels. Additionally, cross braces were added at the posts, on which a rider rail was placed. Most of these fences were five or six rails high.

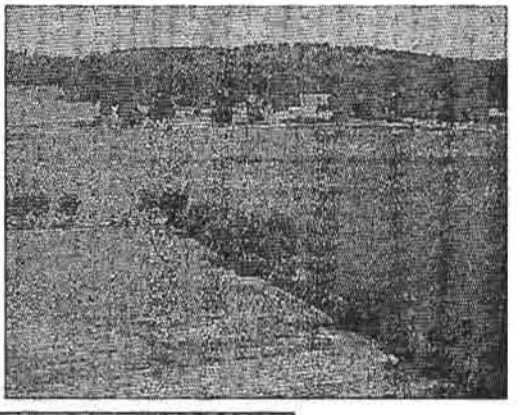
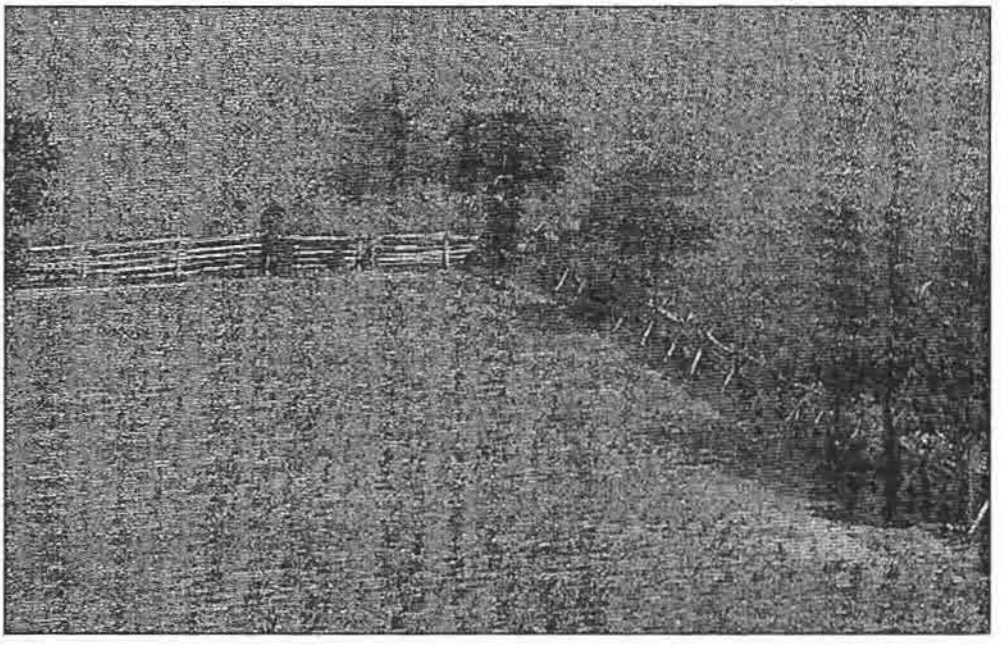


Figure 2-36 View southeast from the Longstreet Tower toward the George Rose farmstead and Little Round Top (William Tipton, c. 1900). An excellent example of a Stacked Rail Fence is visable in the foreground of this photograph (see enlargement below). Note the construction methods, include the alternating rails at the joints of the panels (as seen on the left) and the cross braces (as visible on the right). This fence is five rails high. (GNMP 2B-2185)



How Fences Influenced the Battle

No single man-made feature impacted the battle more than fencing. From a military perspective fences impacted the battle in several ways. By the very fact that most fences were erected of the strongest wood types and stone, to contain heavy livestock and hogs, they were sturdy and practically impenetrable to the moving armies. Special details, at considerable risk and effort, attempted to dismantle these heavy and stout fences when possible but most remained standing between the two battle lines. For Civil War infantry, moving and maneuvering in long linear lines of battle (normally

in two ranks), fences proved to be a major Obstacle that slowed movement (because they had to be dismantled or climbed) and disarranged a unit's formation. For skirmishers or infantry fighting defensively, fences also provided Cover and Concealment. Some were torn down to construct defensive works (breastworks or entrenchments). The location and specific characteristics of a fence determined its impact on the battle.

Virginia Worm: From a KOCOA perspective the worm fence proved to be an Obstacle, for its height (five feet) meant that troops attempting to pass over it either had to climb or dismantle it. Either method would disarrange the unit's battle line and slow their advance. The fence's crude construction, however, gave it a lower stability and therefore it could be taken down rather quickly. The mass of a worm fence made it good Cover for troops, both on the skirmish line and main line of battle. This was especially true for the bottom-stacked rails, whose tight arrangement offered better Cover. Along the main line of battle this type of fence, consisting of wooden materials and being easy to dismantle, was sometimes torn apart and the rails used to make temporary breastworks.[70]

Stone Wall: The materials and construction of stone walls made them excellent for Cover. Depending on their height, stones walls became great Obstacles to troops crossing over them and could also offer Concealment. Unlike all wooden fences (Virginia worm, post and rail, sawn board, plank or slab) the materials, mass and construction of stone walls made their removal nearly impossible, especially if the troops were under fire. Thus if troops wanted to pass beyond the wall their only choice was to climb over.[71]

Post and rail, sawn board, plank or slab board and stacked rails fences: These fences were all made with the same materials (wood), and used the same basic construction design (rails placed in or on vertical boards). This gave them a similar height (five feet) and mass. Therefore these fences were Obstacles to the same degree: they were better constructed than worm and more difficult to tear down. This meant that the only option for troops attempting to pass over one of these types of fence while under fire was to climb it, slowing their advance, exposing them to enemy fire and disarranging their battle lines. Sawn board and stacked rail fence were slightly easier to knock down and thus somewhat easier for troops to cross in battle. The tightness of the bottom rails on all of these fence types was comparable to that of a worm fence. This gave soldiers positioned along these fences Cover and encouraged them to remain and exchange fire with the enemy. When these fence types were dismantled to construct defense works they provided slightly less Cover and protection than that given by a worm fence, because of their lower mass.[72]

Stone and rail and stone and rider fences: These fences have similar characteristics and thus affected the battle in similar ways. Militarily, these fence types provided many benefits. Like stone walls, the materials and mass of a stone and rail or stone and rider fence gave troops positioned behind it good, durable Cover. Dismantling the rail or rider fence and placing the rails on top of the wall could improve these fences' usefulness as Cover. These fences were also Obstacles to troops crossing over them, with the height of the wall and rail or rider fence or stacked rails determining the extent to which the fence became an obstacle. Their sturdy construction meant that the only option for troops attempting to pass over a stone and rail or stone and rider fence while under fire was to climb it, thus slowing their advance and disarranging their battle lines.[73]

General Treatment Principles

The GMP estimated that park-wide, about 39.1 miles of 1863 fences have been lost to modern agriculture practices or other modern uses. In addition, many of the fences that do remain do not have the height, mass and tightness that characterized them in 1863. The GMP recommended that every fence present in 1863 within the Major Battle Action Area of the battlefield be represented, because no single man-made feature impacted the battle more than fencing.

In general, NPS will build fences that reflect the styles built at the time of the battle. NPS will use materials that are durable, such as woods that do not tend to rot quickly when placed in the soil. NPS will use machine-produced stock, since producing rails and posts using 1863 methods is not necessary for visitors to understand the battle action. However, since the height, mass, tightness and other aspects that characterized the style of a fence did impact the battle, the style will be reproduced.

Virginia worm: The common worm fence found today on the battlefield uses seven rails per panel; however, the common worm fence found on the battlefield in 1863 and for most of the 19th century used nine rails. The use of nine rails allowed farmers to achieve the five foot height mandatory for a good fence. NPS will build worm fences using nine rails. The cross braces should use the same type of non-tapered split rails as are used in the body of the fence, although the materials may vary as needed to assure a long-lasting fence. The length of the rails should generally fall between 9' and 10'. The cross bracing should in general not exceed the height of the fence by more than two feet. Cross bracing should be driven 12 to 18 inches into the ground, and the ends should not be cut off to achieve a uniform appearance. Cross braces in 1863 varied, and varied lengths can be used intermittently in the construction of replacement fences, as long as they do not exceed three feet in height beyond the top or rider rail. When needed, the angle of the sections to one another can exceed 90° in order to replicate historic conditions.

Post and Rail: The pattern used to build five-rail post and rail fences now used on the battlefield correctly reflects the historic style and should be continued.

Stone Wall: Stone walls have generally lost much of their Civil War era height. The War Department rebuilt many of these walls, since the inevitable wear and tear of many years use would tend to reduce the height and tightness of these walls. However, NPS has not restacked any of these walls in many decades. Stone walls should be restacked or rebuilt so that they reflect their 1863 height and construction, fitting the rocks tightly together with larger stones at the bottom. NPS will use field stone compatible to that found in 1863 stone walls. Where NPS can document that the walls were capped in 1863, this characteristic will be rehabilitated because it increases the life of the wall.

Stone and Rail: This style is a variation on the post and rail style, with thrown fieldstone taking the place of the lower rails. The higher the stack, the fewer the rails needed. Some of these walls are currently missing both the posts and rails, and many of the stones have been lost or displaced. The same materials used in post and rail fences should be used to reconstruct stone and rail fences, and when needed, the stones should be restacked to reflect the 1863 condition.

Stone and Rider: In this style of fence, the stone construction resembled more closely stone wall construction than thrown fieldstone construction. In some cases, the walls were shorter than standard stone walls, but in others they were the same height but also included riders. In general, the restacking or rebuilding of these walls will follow that of stone walls. Cross bracing will be made of the same

materials used for cross bracing for worm fencing, but the above ground height should not exceed about 7'. The riders, like those of Virginia Worm, will generally be nine to ten feet, with one rider below and one above the cross of the cross bracing. However, because these fences were so variable, when it can be well documented from 1863 photographs, the conditions present on the field will be duplicated.

Sawn Board: The pattern used to build sawn board fences now used on the battlefield correctly reflects the historic style and should be continued.

Plank or Slab Board: The pattern used to build plank or slab board fences now used on the battlefield correctly reflects the historic style and should be continued.

Stacked Rails: Similar to a post and rail, this fence consisted of two posts, six to eight feet in length, placed parallel to each other with the horizontal rails fitted into the space between. The rails, nine to ten feet in length, were held in place by two methods: either wood slats were nailed into the posts on which the rails rested or the rails were placed in alternating fashion at the connection of two panels. Additionally, six to eight feet long cross braces were added at the posts, on which a rider rail was placed. Most of these fences were five or six rails high, giving the total height of about five feet.

Fences present in 1863 but now missing: As for all other major features, 1863 fences will be documented using at least two sources. When the style of fence is known, that style will be used to reconstruct the fence on the battlefield. In some cases, NPS may be able to confirm that a fence existed along a certain line, but the original sources may not designate the specific style of fence. When NPS can confirm that a fence existed, but its style is unconfirmed, NPS will use an economical, long lasting style of modern fence, such as a three-rail post and rail fences to indicate that a historic fence existed in this location.

Fences built in a modern style along an historic fenceline: When these fences are rebuilt, they will be rebuilt using the 1863 style of fence described above.

Interpretive Demonstrations: Across the battlefield many fences were fully or partially dismantled as a result of the battle. Most of the 1863 photographs showing dismantled fences were actually fences dismantled under fire. Photographs from the first day's field, for example, show that with post and

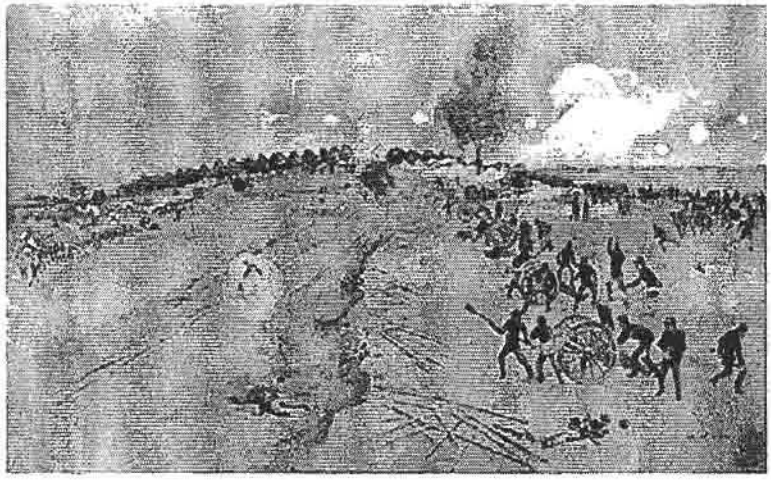


Figure 2-37 "Massachusetts Artillery at Gettysburg, July 2, 1863." Post-war painting by Charles W. Reed depicts Union artillery batteries in action along the Wheatfield Road near the Peach Orchard (visible on the rise of ground in the distance). This image clearly reveals the rails of the dismantled Virginia Worm fences that once lined the Wheatfield Road. These fences had been torn down earlier that day, prior to combat. (Regiments...of Massachusetts, An Historical Narrative..., Charles Hall, ed., [W.W. Porter, Boston, 1903]).

rail fences, the posts were generally left in place, while the rails were removed. In some instances only the middle and high rails were removed, while in other places all of the rails were taken out. For worm fences, photographs show that some sections were completely removed, while in others, rails were knocked down to lower the height of the fence.

In other battlefield areas, however, especially in the central and southern sections, entire fence lines were removed prior to combat in that area. As a limited interpretive demonstration, some of these fence lines will be constructed in such a way as to show that they were dismantled before combat began. The method selected to convey this interpretive demonstration is based on an 80 feet-20 feet pattern. Fence lines constructed in this manner will have 80 feet of fencing separated by gaps or openings 20 feet wide. This treatment will give these dismantled fence lines an orderly/uniform appearance while at the same time conveying their status before and during the battle.

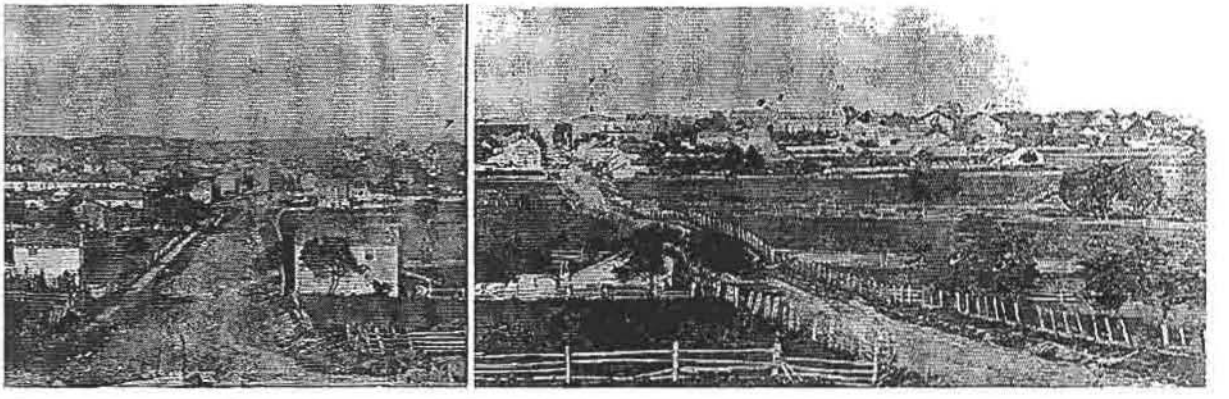


Figure 2-38A and 2-38B Gettysburg from Seminary Ridge (Isaac and Charles Tyson, August 1863). These two images, which show the appearance of the southwest section of the town approximately one month after the battle, were both taken from near the Lutheran Theological Seminary, but from slightly different locations. The impact of actually fighting on the fences is starkly evident. Seen here are various fence styles and their condition after being partially or completely dismantled during combat. In the right photograph these include a sawn board fence (the white posts with a few remaining boards along the road on the far right), a post and rail fence (the posts with chiseled holes, running along the left side of the same road), another nearly intact sawn board fence (the line of white posts in the immediate foreground at the bottom of the photograph) and the remains of either a post and rail or sawn board fence (the line of white posts in the middle distance above the white house). Visible in the left photograph is a dismantled post and rail, plank/ slab or sawn board fence (in the lower left foreground along the left side of the street) and a partially dismantled post and rail fence with two entire panels, including the posts, completely flattened (on the right side of the road below the white house with the small tree in front of it). The two panels of post and rail fence seen in the left photograph were probably knocked over for the passage of an artillery battery. (GNMP #8G-8001A and #8G-8001B)

Examples Illustrating Possible Treatment

Obstacles encountered by nearly all the Confederate units crossing the field during "Pickett's Charge" were the numerous Virginia worm, post and rail and plank or slab fences that impeded their advance. Not only did the height and stability of these fences slow troop movements, but their mass also provided Cover for Union defenders and skirmishers. Brig. Gen. Joseph Davis, who led a brigade in "Pickett's Charge," reported, "Our advance across the fields was interrupted by...fences...in crossing which the alignment became more or less deranged." Especially troublesome were the post and rail and plank fences lining the Emmitsburg Road. The stability and height of these fences greatly disarranged the Confederate ranks

passing through or over them. The wooden rails and posts of these fences gave the Confederates less substantial Cover, but also allowed them to dismantle the fences as an alternative to climbing over them. Col. Rawley W. Martin, 53rd Virginia Infantry, recalled these effects writing, "At the Emmettsburg road, where the parallel fences impeded the onward march, large numbers were shot down on account of the crowding at the openings where the fences had been thrown down, and on account of the halt in order to climb the fences."[74]

Based on this analysis, treatment would include restoration or rehabilitation of the various fence types (Virginia worm, post and rail or plank or slab) at their historic locations. These reconstructed fences will not only complete the historic scene, but also recreate the characteristics of the fence that had an impact on the fighting.

GATES AND GATEWAYS

Historic Use and Appearance

A gate is a physical barrier that closed an opening in a fence or wall. A gateway is a gap in a fence or wall. Gates and gateways provided ready-made access for farmers through fences and/or stone walls. Many of these openings were accessed from public roads or lanes while others were internal to a farm property. Their location, ***width*** and ***style*** was dependent upon the needs of the individual farmers and their farming operation.

There were two gate ***styles***: hinged and removable rails. Hinged gates were ideal for continual use, but more expensive and time consuming to build. Removable rails were two posts augured with two rows of holes to accommodate four or five rails.[75] When the farmer needed to pass through the fence or wall, the rails were removed to create an access. A gate that led to a pasture from a public road would probably be constructed using a more durable style than a gate that provided internal access within a farm.



Figure 2-39 A good example of the appearance and construction methods of a hinged gate is visible in this scene (Mathew Brady, July 1863). The gate, apparently broken off its hinges, is immediately to the right of the wagon shed. (GNMP #23S-0341)

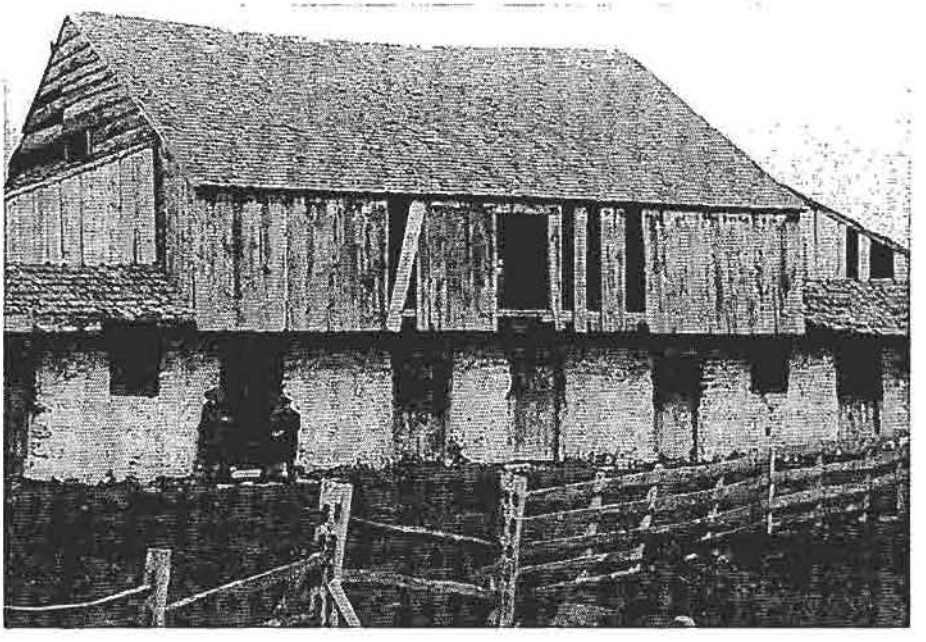


Figure 2-40 This photograph provides a clear example of a removable rails gate, visible in the middle foreground. The two posts, each containing a double row of five chiseled holes, mark the gate's location, even though only two of the five rails used are seen here. (GNMP #23S-0143)

How Gates and Gateways Influenced the Battle

The effect of these features upon the battle depended upon their ***width*** and ***style*** along with the battle movements and actions that occurred around them. Militarily, gates and gateways served as Avenues of Approach because their presence provided pre-existing access through a fence or stone wall. Some were Obstacles since they restricted the rapid movement of troops.

Gates affected the battle to a small degree as Obstacles, although after they were opened, this concern was abated and often an Avenue of Approach was created. Width was an important characteristic because it determined to what extent the gate or gateway or opening became an Obstacle or an Avenue of Approach. A narrow width restricted the passage of troops, thus slowing their rate of movement. Wide gateways allowed more troops to move through the opening at the same time, thus served as good Avenues of Approach.

General Treatment Principles

In general, when NPS can document the presence and style of an 1863 gate, it will be rehabilitated or rebuilt as a part of the treatment of the historic fence line. Whenever possible, the documented location of an 1863 gate or gateway will be used in preference to modern gate or gateway locations, and modern gates and their locations will be removed when historic gates or gateways are installed. If it is known that a gate existed in a certain location, but the style of the gate is unknown, a compatible modern wood gate will be installed. In the rare instance that the use of the field or pasture requires a non-historic gate, a modern metal gate shall be installed.

Example Illustrating Possible Treatment

A gateway that impacted the fighting on July 2, 1863 was located along the south side of Trostle Lane and nearly opposite the Abraham Trostle farm building complex. This gateway gave the Trostle

family direct access to a grass and grain field directly south of their farmstead and affected the fighting by serving as an Avenue of Approach and by becoming an Obstacle.

During the fighting on July 2, 1863, Union artillery, mostly from the Artillery Reserve, was ordered to reinforce the overextended Third Corps line positioned in the Peach Orchard and along the Emmitsburg Road. Many of the batteries used the Trostle-Weikert Lane to move from the army's rear to the front. Upon reaching the Trostle farmstead these batteries were assigned positions along the Wheatfield Road and in the Peach Orchard. The most direct route to their assigned positions was through this gate and then directly across the fields to the south and southwest. Because of the gateway's location it served as the most expedient Avenue of Approach for these batteries as they moved into position. A Massachusetts artilleryman recalled:

> Soon the order was "Forward," and we filed into a lane by Trostle's house, then turned to the left through a gateway. Before the left piece was through, the order rang out: "Forward into line, left oblique. Trot! and before the left piece was in the line, "Action front!"[76]

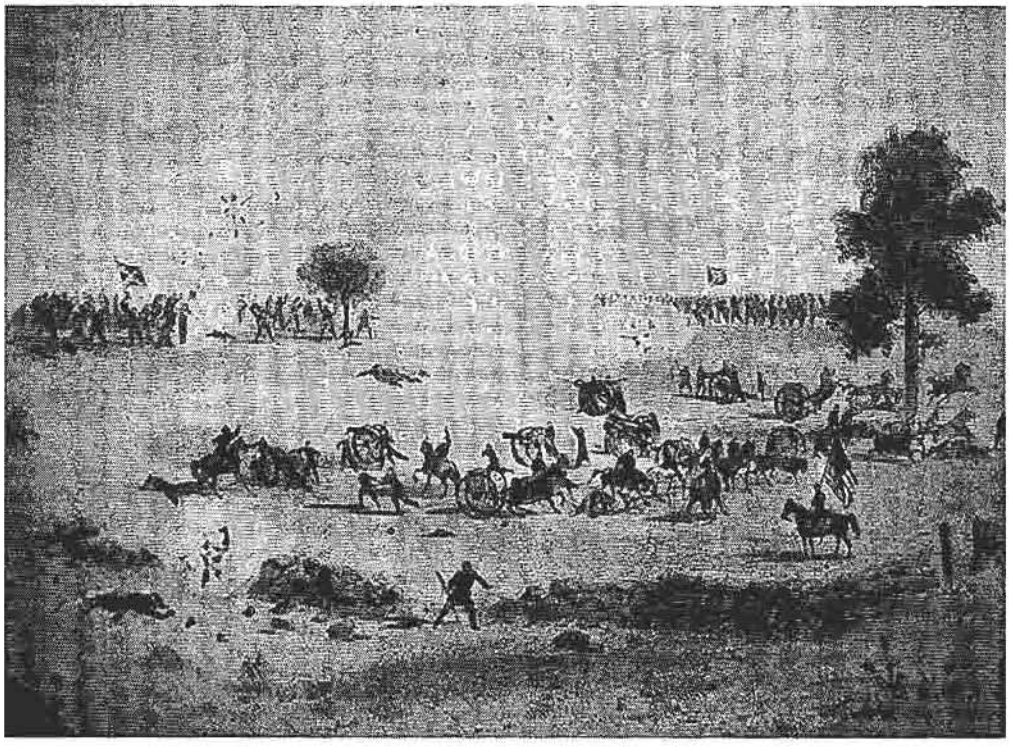


Figure 2-41 Detail from the Lithograph "Experiences of the 9th Mass. Battery at Gettysburg" by Charles W. Reed (1864). This scene depicts the final stand of the battery near the Trostle farm on July 2, 1863. The gateway that hindered the battery's escape is visible as the opening in the stone wall, flanked by wooden posts, on the far right side of the scene. (Charles W. Reed Collection, LC)

Later that same afternoon the Third Corps line at the Peach Orchard began to collapse, forcing these same batteries to fall back toward the Trostle farmstead. The last unit to retreat was the 9th Massachusetts Battery. Upon reaching "a position near which two stone walls met at an obtuse angle" at the Trostle farmstead, the battery was ordered to "hold [the] position as long as possible at all

hazards." During the battery's final desperate stand the gateway became both an Avenue of Approach and an Obstacle. Because the battery was literally trapped by the stone walls in their rear, the gateway was the only escape route available. However, the battery's commander, Capt. John Bigelow, described it as the "narrow gateway in the wall," and thus its small ***width*** was an Obstacle because it only allowed one limber and gun to pass through at a time. As the battery was finally overwhelmed and the gun crews attempted to escape through this narrow opening it was twice blocked by an overturned gun and limber. Thus the crew of another gun and limber, with its only escape route blocked, in desperation was "driven directly over the stone wall" in order to save themselves.[77]

Based on the above analysis this gate served as both an Avenue of Approach and became an Obstacle during the fighting. Possible treatment could include restoring the gateway in its historic ***location*** and ***width***, as a part of the restoration of the fences and walls that created the "obtuse angle" which trapped the battery.

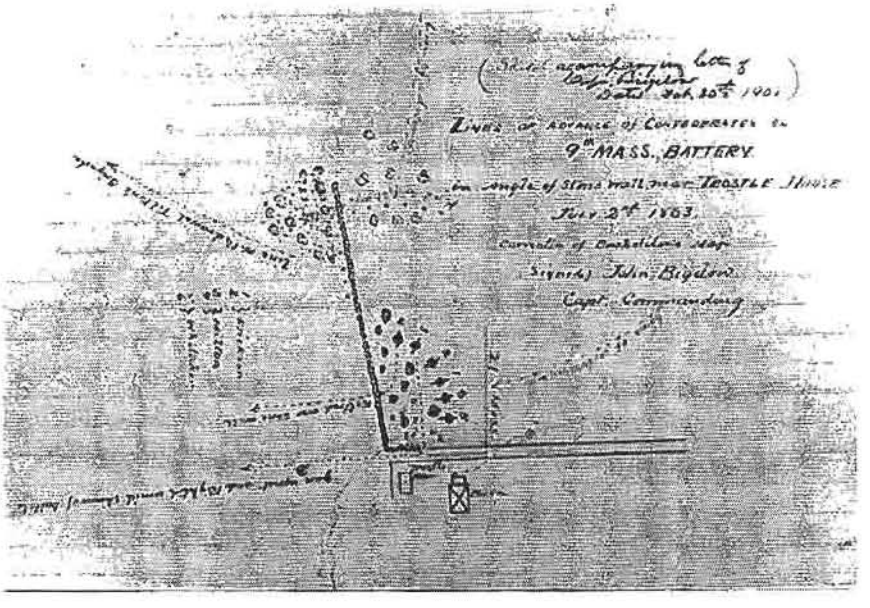


Figure 2-42 This map, drawn by John Bigelow in 1901, shows the position of his battery during its final stand near the Trostle farm. The narrow gateway is shown as the gap between the stonewall and fence (represented by the straight line) between the house and barn on the far side of the lane. Note that gun No. 3 was driven through the gateway, while gun No. 4 was forced to go over the stonewall ("Retreat over Stone Wall") to complete its escape. Bigelow's location where gun No. 3 overturned is in error. The gun actually upset at the gateway, thus blocking it, and not further down the lane as he depicts here ("Gun upset and Righted Amid a Shower of Bullets"). (Position of Troops, Vol. II, GNMP Archives)

CONSTRUCTED WATER FEATURES

A central part of all 19th century subsistence farms were constructed water features. These included wells, springs, ponds (including dams and temporary dams) and fords. Though natural water sources could be useful, constructed water features were absolutely essential in the everyday operation of a subsistence farm. These features provided a steady water supply to the farmer, his family and his

livestock and operated the machinery required by some local businesses such as grist mills and saw mills.[78]

WELLS

Historic Use and Appearance

These features were a fundamental necessity for a subsistence farm, since each needed a steady supply of water for the farmers and their livestock. Although springs (both natural and improved) could serve the same purpose, most farms had at least one well. Wells were more reliable (***duration***) than springs, whose output was heavily influenced by natural occurrences such as droughts. All of the wells present on the battle in 1863 were hand dug and lined with stone. For easy access the ***location*** of most of these was within the confines of dooryard or barnyard of each farmstead. These shallow wells provided enough water for a farmer and his livestock but did not have the flow to support the needs of the armies. Wells generally had two kinds of ***improvements***: some had a windlass and other had wooden pumps.

How Wells influenced the Battle

The presence of a well often determined the ***location*** of headquarters, hospitals and aid stations. Artillerymen carried buckets of water from wells to fill their sponge buckets and thus cool cannon barrels between rounds. Those wells that best served this capacity were ones that were located near battle lines. A well's ***improvements*** were important because they made the well easily visible. In addition, wells possessing a hand pump system were able to deliver a steady flow of water for longer periods compared to a well that used a bucket to draw water. Its ***duration*** also determined the well's usefulness; those that could provide sufficient water were the most ideal.

General Treatment Principals

Preservation or rehabilitation of the above grade improvements of 1863 wells can be used to represent the spatial organization of a mid-19th century farmstead cluster. In cases where the historic house of a farmstead cluster still exists, the above surface well improvements associated with that cluster should be preserved or rehabilitated in order to complete its spatial organization.

Examples Illustrating Possible Treatment

A well located within the dooryard of the Lydia Leister farmstead supplied water to Union officers and wounded during the battle. Gen. Meade located his headquarters at this farmstead from the early morning of July 2 through the afternoon of July 3. The well provided water to the commanding general, his staff and their mounts. Meade was forced to evacuate the farmstead during the great cannonade that preceded Pickett's Charge on July 3 and it thereafter served as a temporary hospital and ambulance collecting point for the Union medical corps. Undoubtedly, the well supplied water to treat the wounded gathered here.[79]

This well is visible in some of the earliest photographs, taken of this famous location during the summer and fall of 1863. The well was located within the confines of the Leister dooryard fencing, directly south of the front porch. The well's improvements consisted of a hand cranked rope and bucket delivery system. Because of this well's location and improvements it was more desirable than the spring located on the same property. The above ground improvements could be rehabilitated to mark this well's location and existence during the battle, when the property is treated.[80]



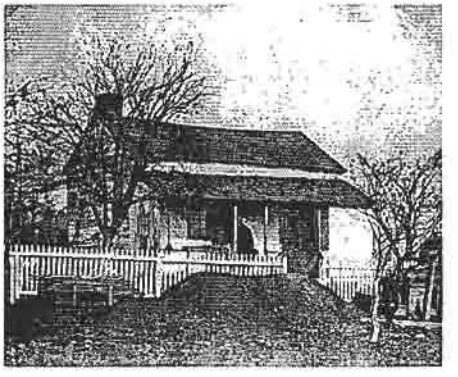


Figure 2-43 Lydia Leister farmhouse (Timothy O'Sullivan, November 1863). Visible in front of the porch (immediately to the left of the man, see enlarged view at left) is one type of well present on the 1863 Gettysburg landscape. The one seen here used a windlass to draw a water-bucket from the well. (GNMP #23S-0254)

IMPROVED SPRINGS

Historic Use and Appearance

Many springs existed on the battlefield in 1863; both their ***location*** and ***duration*** influenced the construction of the original settlement farmsteads. Those with a longer duration were the most ideal. Although many of these springs still existed in their natural state at the time of the battle, local farmers had improved some of them. ***Improvements*** included construction of stone, brick or timberwork at the spring's mouth to protect it from erosion, or the construction of a springhouse for preservation of food.[81]



Figure 2-44 Spangler's Spring, ca. 1880s-1890s. This famous landmark, seen here much as it appeared at the time of the battle, is an excellent example of the appearance of an improved spring. (GNMP #21P-1323)

How Springs Influenced the Battle

The presence of a spring, like a well, often determined the location of headquarters, hospitals and aid stations. Artillerymen used the water from springs to fill their sponge buckets and thus cool cannon barrels between rounds. Those springs that best served this capacity were ones that were located near battle lines. A spring's ***improvements*** were important because they made the spring easily visible. Its ***location*** and ***duration*** also determined the spring's usefulness; those that were close and could provide sufficient water were the most ideal. A springhouse signaled that fresh fruit and vegetables, in addition to water, might be available; these sites were sought after for use as hospitals.

General Treatment Principles

Treatment of these features includes preserving and maintaining existing springs, and rehabilitating their historic appearance and improvements. In some cases, changes in the surrounding area has increased water flow and is endangering the improvements, such as at the Culp Springhouse. Springs should be monitored to ensure that their historic flow is not exceeded and that damage is not occurring to improvements. When this occurs, the excess water should be rerouted to preserve the structure.

PONDS AND DAMS

Historic Use and Appearance

There were only two identified ponds on the battlefield in 1863: the McPherson pond, which still exists, and a large pond at the John Biesecker Farm, which was later removed by D. D. Eisenhower. Dams were constructed to provide water power for grist and saw mills in the area. Only two known dams existed on the Gettysburg battlefield. These were located on Rock Creek, approximately 650 yards north of the Baltimore Pike, and were a critical part of the McAllister Mill complex. In order to operate the mills the water flow had to be maintained at a certain level. The two dams accomplished this by backing up the water behind, or upstream, from the mills.

There is evidence that some type of temporary dams or impoundments were constructed in the 19th – century on Guinn Run and Blocher's Run. These were probably constructed respectively to assist the water flow to McAllister's Mill and to increase the water flow for several machinery shops. However, there is no evidence that temporary dams existed on the streams at the time of the battle.

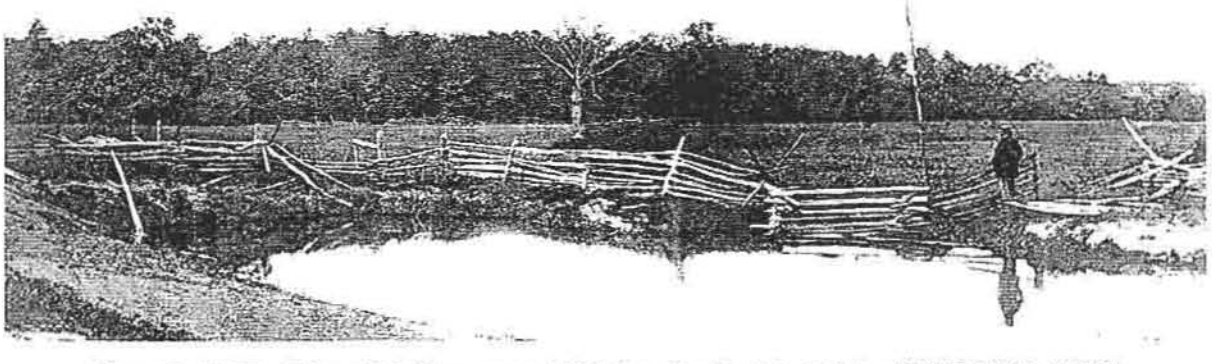


Figure 2-45 The Edward McPherson pond (Mathew Brady, July 1863). (GNMP #2B-2002)

How Ponds and Dams Influenced the Battle

The McPherson pond disrupted the battle line of Col. Roy Stone's Union brigade on July 1, 1863. The dams on Rock Creek created a "sheet of water that stretched upstream one-half to three-quarters of a mile from the breast of the dam." One Union officer reported the creek was "from 4 to 6 feet deep, with a muddy bottom, caused by the dam near the [Baltimore] turnpike." Col. Silas Colgrove, commanding a Union 12th Corps brigade, reported that the mill pond formed by this dam was "some 60 to 80 feet in width and from 6 to 8 feet deep" and thus disrupted his intended battle line.[82] These dams also had spillways, that allowed excess water to flow over them and a diversion that funneled the water unto the water wheel, which in turn powered the mill.[83]

General Treatment Principles

The McPherson pond remains and should be preserved. Reconstruction of the McAllister dams is not feasible under state law, but the remains of the dams and their spillways should be protected and preserved so that the location and role of the dams in the battle can be understood.

FORDS

Historic Use and Appearance

Theses features were located on streams and were shallow enough to allow passage through them, thus lessening the stream's effects as an Obstacle. Although by 1863 bridges had been constructed along the main turnpikes and state roads in Adams County, nearly all of the local and internal circulation features (county roads, lanes, field and wood access lanes) used fords to cross the numerous streams in the area.[84] A ford's ***approaches, depth, width*** and ***current*** determined its usefulness.

How Fords Influenced the Battle

Fords were Avenues of Approach for they determined where a circulation feature, and thus the troops moving along it, crossed a stream. A ford's ***approaches*** and ***width*** affected its value as an Avenue of Approach. Fords with ***approaches*** over smooth, level and hard-surfaced ground (or treated in some way to resist washing out) were ideal to promote the rapid movement of troops. ***Approaches*** over rough ground or up and down steep banks would obviously slow movement. An ***approach*** over soft ground would quickly turn into a quagmire with the heavy traffic associated with the passage of military units. A ford possessing great ***width*** was ideal, for it allowed more troops to cross the stream at the same time.



Figure 2-46 "The ford over Rock Creek at McAllister's Mill" (William Tipton, ca. 1900). This image reveals the appearance and most of the characteristics (approaches, depth and width) of a typical 19th-century ford in Adams County. (GNMP, Tipton #2329)

The ***depth*** and ***current*** of the water at a ford impacted the speed at which troops could cross a stream. The shallower the water was, the easier the passage across the stream became. As for ***current***, obviously, a stream with a low volume of water and slow current would be preferable to one with a high volume of water and swift current.

Possible Treatment

While some of these characteristics are influenced by a wide variety of factors and are beyond the control of NPS management (i.e., water volume and water speed under "Current"), any treatment plan for fords could include rehabilitation or preservation of those characteristics that influenced the battle, such as ***approaches*** and ***width***. The ***depth*** of a ford, for the most part, could not be controlled as its level constantly changes depending on rain fall, temperature and other natural factors. All surviving fords identified with use in the battle should be preserved.[85]

[1] Robert L. Bloom, A History of Adams County, Pennsylvania, 1700-1990 (Adams County Historical Society, Gettysburg, 1992), pp. 30-36, 118-128. These roads were, clockwise beginning in the north, the Carlisle Road, the Harrisburg Road, the York Pike, the Hanover Road, the Baltimore Pike, the Taneytown Road, the Emmitsburg Road, the Fairfield Road, the Chambersburg Pike, and the Mummasburg Road. Most roads were dirt, while pikes were macadamized, being made of hard surfaced rock and gravel. The major cities included: Harrisburg (36 miles), Baltimore (54 miles), Philadelphia (118 miles) and Washington, DC (80 miles).

[2] Stevenson Fletcher, Pennsylvania Agriculture and Country Life,1640-1840(Pennsylvania Historical and Museum Commission, Harrisburg, 1950), p. 257. The Chambersburg Pike and Baltimore Pike were macadamized roads. Fletcher described the method used to construct macadamized roads, writing, "Usually from nine to fifteen inches of crushed rock of graduated size was laid on a foundation of stones five to eight inches in diameter, with a surfacing of stone dust, gravel or course sand to serve as a binder."

[3] Fletcher, Pennsylvania Agriculture and Country Life,1640-1840, pp. 253-258.

[4] United States War Department, The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies. 70 volumes in 128 parts (Washington, D.C., U.S. Government Printing Office, 1880-1901), Vol. 27, pt. 1, pp. 246-247 (Maj. Gen. Abner Doubleday). (hereafter cited as OR. All citations are from vol. 27).

[5] Fletcher, Pennsylvania Agriculture and Country Life,1640-1840, p. 256.

[6] OR, pt. 1, p. 276 (Lt. Col. Rufus Dawes); pt. 2, pp. 504 (Maj. Gen. Edward Johnson), 649 (Brig. Gen. Joseph R. Davis).

[7] Final General Management Plan and Environmental Impact Statement, Vol. 1 (Gettysburg National Military Park, June 1999), pp. 94-95 (hereafter cited as GMP).

[88] Schematic Design Package, Horse Trails Improvements – Phase I, Rhodeside and Harwell Incorporated, Landscape Architecture.

[9] OR, pt. 1, pp. 565 (Col. John Austin), 881 (Lt. Col. Freeman McGilvery), 887 (Capt. Patrick Hart); Samuel Toombs, New Jersey Troops in the Gettysburg Campaign, from June 5 to July 31, 1863 (The Evening Mail Publishing House, Orange, 1888), p. 181; Levi Baker, History of the Ninth Massachusetts Battery (J. C. Clark Printing Co., South Framingham, Massachusetts, 1888), pp. 56, 57; George Kilmer, "Bigelow's Battery. The Ninth Massachusetts at the Gettysburg Peach Orchard," National Tribune, unknown date, copy in Robert Blake Collection, United States Army Military History Institute. Baker described the Wheatfield Road as "a road so little traveled as to be marked by fences more than anything else." (See, Baker, History of the Ninth Massachusetts Battery, p. 57). The exact route of the Trostle-Weikert-Swisher Lane ran roughly south/southeast from the Emmitsburg Road, past the Abraham Trostle farmstead and into the Codori-Trostle Woodlot where it connected with a woodlot access lane running north/south. At this point Trostle-Weikert-Swisher Lane, ran northward through the woodlot, then turned roughly eastward, snaking through the George Weikert farmstead,

then roughly northeast where it passed through the northern end of the Swisher-Patterson Woodlot before connecting with the Taneytown Road nearly opposite the M. Fry house. (See 1872 Warren Survey Map, sections D3 and D4). Although the western and eastern sections of the lane were improved, the access section that passed through Codori-Trostle Woodlot was not. One Union officer later referred to it as a "cart path." (See, Capt. Charles Phillips to J. B. Bachelder, n.d. in David and Audrey Ladd, eds., The Bachelder Papers, Gettysburg in Their Own Words, Vol. I, (Morningside Press, Dayton, Ohio, 1994), pp. 166-167).

[10] 1872 Warren Map, Sections C-4; OR, pt. 1, p. 290 (Brig. Gen. John Robinson), 287 (Col. Edward Fowler), 707 (Maj. Gen. Otis Howard), 730-731 (Maj. Gen. Carl Schurz), 735 (Lt. Col. Adolphus Dobke). A section of the western portion of this lane is plainly visible in a photograph taken in November 1863 and appears as a well defined dirt path (See, William Frassanito, Early Photography of Gettysburg, Thomas Publications, Gettysburg, 1995, p. 196).

[11] GMP, pg. 94-95.

[12] Schematic Design Package, Horse Trails Improvements – Phase I, Rhodeside and Harwell Incorporated, Landscape Architecture.

[13] 1872 Warren Map, Sections C-2, D-2 and D-3; OR, pt. 2, p. 359 (Lt. Gen. James Longstreet); Walter Harrison, Pickett's Men, A Fragment of History (D. Van Nostrand, New York, 1870), p. 90.

[14] The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes (U.S. Department of the Interior, National Park Service, Washington D.C., 1996) p. 15.

[15] Ibid., p. 28.

[16] A study of 49 fields located in the southern section of the battlefield found that the average was slightly less than 11 acres. As the average farm in this area was smaller than those found elsewhere (especially those located west and north of the town) the average size of all of the fields across the battlefield would probably be larger.

[17] GMP, pp. 112, 128.

[18] GMP, p. 87.

[19] GMP, pp. 278-279.

[20] J. Volnay Pierce to John Bachelder, November 1, 1882, in Ladd, eds., The Bachelder Papers, Vol. 2, p. 911; James Coey, "Magnificent Fight on the First Day at Gettysburg," National Tribune, unknown date, copy in GNMP Library.

[21] Charles Page, History of the Fourteenth Regiment, Connecticut Vol. Infantry (The Horton Printing Co., Meriden, Connecticut, 1906), pp. 142-143.

[22] GMP, pp. 129.

[23] GMP, pp. 85.

[24] GMP, pp. 129.

[25] "Classified Structure Field Inventory Reports" for the George Weikert house, barn, carriage house and summer kitchen, in "George Weikert Farm" folder, Buildings Files, Box 2 of 8, Drawers 1 &2, GNMP Archives.

[26] "National Register of Historic Places Nomination for Gettysburg National Military Park and Soldiers' National Cemetery, p. 21; Kathy Harrison, Memorandum "Comments on the Codori-Trostle Treatment Plan," August 16, 2001, GNMP's Historian's Office, p. 6. Examples of preserved farmstead clusters that have a significant amount of missing fencing are those of Henry Culp, Christian Benner, and Jacob Hummelbaugh. Examples of farmsteads that have been severely altered are those of Edward McPherson, Peter Rogers, John Wentz, William Bliss, John Forney, Philip Snyder, and Jacob Lott.

[27] Cecile Cavanaugh, "Identification, Restoration, and Maintenance of Historic Woodlots at Gettysburg National Military Park,, Technical Report NPS/MAR/NRTR-90/049," pp. iii, 3-4, 27-28.

[28] OR, pt. 1, pp. 478, 480 (Capt. John Hazard); Charles W. Reed, "Experiences of the Ninth Massachusetts Battery at Gettysburg," lithograph, John Bufford and Sons, Boston, 1864, S. K. Brown Military Collection, John Hay Library, Brown University, Providence, Rhode Island. Hazard describes the position and actions of Company I, 1st United States Artillery, commanded by Lt.

George Woodruff. This battery was positioned in Zeigler's Grove. Reed's lithograph depicts the appearance of Zeigler's Grove at the time of the battle.

[29] "Plan for Adding Woods to the General Management Plan Resource Area at Gettysburg National Military Park," (T. W. Bowersox, July 2002), pg 1-2; Gerald L. Storm, et al, Woodlots and Landscape Features at Gettysburg National Military Park (College of Agriculture, Penn State University, 2002), pp 28-29.

[30] Ibid, p. 2.

[31] Ibid, p. 2.

[32] "Plan for: Increasing the Sustainability of Woodlots in the General Management Plan Resource Area at Gettysburg National Military Park." (T. W. Bowersox, July 2002), p. 1.

[33] "Plan for: Increasing the Sustainability of Woodlots," pp. 2-3.

[34] Todd Bowersox, personal communication.

[35] Final Environmental Impact Statement, White-Tailed Deer Management Plan, GNMP, May 1995, pp. 135-136.

[36] Cavanaugh, "Identification, Restoration, and Maintenance of Historic Woodlots at Gettysburg National Military Park, Technical Report NPS/MAR/NRTR-90/049," p. 6; "National Register of Historic Places Nomination, Gettysburg National Military Park/Soldiers' National Cemetery," (GNMP, 2003), Section 7, p. 59. Patterson Woodlot also screened the Union Third Corps on July 3.

[37] Cavanaugh, "Identification, Restoration, and Maintenance of Historic Woodlots at Gettysburg National Military Park,, Technical Report NPS/MAR/NRTR-90/049," p. 6; OR, pt. 1, 244, 248 (Maj. Gen. Abner Doubleday), pt. 2, 649 (Brig. Gen. Joseph Davis); Gettysburg National Park Commission, Map of the Battlefield at Gettysburg, Gettysburg, Pennsylvania, 1901(hereafter cited as 1901 GNP Commission Map).

[38] OR, pt. 1, pp. 266 (Brig. Gen. James Wadsworth), 279, 280 (Col. William Robinson), 356 (Col. Charles Wainwright); R.K. Beechman, Gettysburg, The Pivotal Battle of the Civil War, (A.C. McClurg & Co., 1911), pp. 72-73.

[39] Incomplete draft report of Col. Lucius Fairchild, Fairchild Papers, State Historical Society of Wisconsin.

[40] OR, pt. 1, pp. 315 (Col. Chapman Biddle), 356 (Col. Charles Wainwright).

[41] "Identification, Restoration, and Maintenance of Historic Woodlots at Gettysburg National Military Park,, Technical Report NPS/MAR/NRTR-90/049," Historian's Files GNMP, p. 6; 1901 GNP Commission Map. The six Confederate brigades were commanded by Brig. Gen. J.B. Robertson, Brig. Gen. Henry Benning, Brig. Gen. George Anderson, Brig. Gen. J.B. Kershaw, Brig. Gen. Paul Semmes and Brig. Gen. William Wofford. The eight Union brigades were commanded by Brig. Gen. Hobart Ward, Col. Regis De Trobriand, Col. William Tilton, Col. Jacob Sweitzer, Col. Edward Cross, Brig. Gen. Samuel Zook, Col. Patrick Kelly and Col. John Brooke.

[42] Harry Pfanz, Gettysburg, The Second Day, (University of North Carolina Press, Chapel Hill, 1987), p. 250; OR, pt. 1, p. 583 (Capt. George Randolph).

[43] OR, pt. 1, p. 587 (Capt. George Winslow); Regis De Trobriand, Four Years with the Army of the Potomac, (Ticknor and Company, Boston, Massachusetts, 1889), pp. 496, 497; Verrill to Lt. Col. Charles Merrill, n.d., 1884, in Ladd, eds., Bachelder Papers, Vol. 2, p. 1013. Merrill commanded the 17th Maine, which belonged to De Trobriand's brigade.

[44] OR, pt. 1, pp. 522 (Lt. Col. Charles B. Merrill), pt. 2, 407 (Col. Van Manning); Maine Gettysburg Commission, Maine at Gettysburg: Report of the Maine Commission (Lakeside Press, Portland, Maine, 1898), p. 193.

[45] OR, pt. 1, p. 587 (Capt. George Winslow); John P. Nicholson, Pennsylvania at Gettysburg, (William Stanley Ray, State Printers, Harrisburg, Pennsylvania, 1914), Vol. II, p. 624.

[46] Martin Hayes, A History of the Second Regiment, New Hampshire Volunteer Infantry, (n.p., Lakeport, New Hampshire), p. 175.

[47] Francis Moran, "A Fire Zouave..." National Tribune, November 6, 1890.

[48] Fletcher, Pennsylvania Agriculture and Country Life, 1640-1840, pp. 86-87; Fletcher, Pennsylvania Agriculture and Country Life,1840-1940, p. 70.

[49] Thomas F. Galwey to John Bachelder, May 19, 1882, in Ladd, eds., The Bachelder Papers, vol. 2, p. 868.
[50] Fletcher, Pennsylvania Agriculture and Country Life, 1640-1840, pp. 205, 208, 209, 211, 213-14; GMP, Vol. 1, p. 142. Of the approximately 220 acres of orchards present on the battlefield in 1863, less than 20 acres currently exist.
[51] American Agriculturist, Vol. XXII-No. 4 (April 1863), p. 98, No. 5 (May 1863), p. 135, No. 6 (June 1863), pp. 178-79, bound originals, GNMP Archives.
[52] Fletcher, Pennsylvania Agriculture and Country Life, 1640-1840, p. 214; Fletcher, Pennsylvania Agriculture and Country Life, 1840-1940, p. 283.
[53] For an example of this impact see OR, pt. 1, pp. 900-901 (Capt. Nelson Ames) and Nelson Ames, History of Battery G, First Regiment New York Artillery, (Marshall Printing Co., Marshalltown, Iowa, 1900), p. 66.
[54] Elwood Christ, "Over a Wide, Hot,...Crimson Plain," The Struggle for the Bliss Farm at Gettysburg, (Butternut and Blue, Baltimore, Maryland, 1993), pp. 3-6, 15, 16, 22, 28, 37, 59, 60, 61, 66, 70, 72, 74, 77-79, 185; OR, pt. 2, p. 634 (Col. N. H. Harris); Advertisement for farm sale in Adams Sentinel, August 11, 1856, copy in Bliss Farm file, "Buildings Files," Box 2, GNMP Archives.
[55] Kathleen R. Georg, "The Sherfy Farm and the Battle of Gettysburg," January, 1977, unpublished study, GNMP Library, p. 6; Ames, History of Battery G, First Regiment New York Artillery, p. 66; Haynes, History of the Second Regiment, p. 171; OR, pt. 1, pp. 900-901.
[56] Francis Moran, "A Fire Zouave..." National Tribune, November 6, 1890.
[57] Margaret McMillan, "History of the McMillan House," unpublished paper, transcript in McMillan Farm file, GNMP Archives, pp. 1, 2 ; OR, pt. 2, pp. 665, 666 (Brig. Gen. James Lane). McMillan claimed the loss of 2000 fruit trees from his nursery (See, David McMillan Federal Damage Claim, No. 214/776, transcript copy in GNMP Historian's Office).
[58] GMP, p. 124.
[59] Eric Campbell, ed., "A Grand Terrible Dramma," From Gettysburg to Petersburg, The Civil War Letters of Charles Wellington Reed (Fordham University Press, New York, 2000), pp. 114, 116.
[60] GNMP and Olmsted Center for Landscape Preservation, Cultural Landscape Report, Emmitsburg Road Ridge, Vol. 2, pt. 2 (Gettysburg National Military Park, January 2002), p. 173.
[61] Lt. Jacob Slagle to Christie Slage, September 13, 1863, copy in 149thPennsylvania File, Vertical Files, GNMP Archives; Alexander Gardner photograph of Meade's Headquarters, stereo #259, July 6, 1863, Library of Congress; Mathew Brady photograph looking northward from Little Round Top, c. July 15, 1863 Library of Congress.
[62] "Guidelines for Evaluating and Documenting Rural Historic Landscapes," National Register Bulletin, 30 (U.S. Department of the Interior, National Park Service, Interagency Resources Division), p. 6.
[63] Fletcher, Pennsylvania Agriculture and Country Life,1640-1840, p. 69.
[64] GMP, Vol. 1, p. 142. The total mileage of fencing includes only the land within the boundaries of GNMP. The Fence Law of 1700 changed the basic philosophy for fencing and resulted in the great increase in the amount of fencing. Before 1700 farmers operated under common law, which simply accepted that fences were constructed for the sole purpose of confining livestock in order to prevent damage to crops (especially those of another farmer). The Fence Law of 1700 reversed this long standing ideal with a theory based on the reasoning that fences were constructed to keep free ranging livestock from damaging crops. Since there were many more crop fields than pastures, this law resulted in a great increase in the number and amount of fencing required by law. The 1700 law was repealed in 1889 (See, Fletcher, Pennsylvania Agriculture and County Life, 1840-1940, p. 69).
[65] Fence Law of 1700, as quoted in Fletcher, Pennsylvania Agriculture and County Life, 1640-1840, p. 85; Fletcher, Pennsylvania Agriculture and County Life, 1840-1940, p. 70. Cedar, locust and chestnut posts lasted about 40 years, oak posts about twelve years.
[66] Based on the earliest photographic evidence (1863-1880), GNMP Historian Kathy Harrison described the construction design of the Virginia Worm fence, writing, "Each overlapping section of rails was strengthened by two cross braces, made of the same material and length as the rails themselves. One rail rider angled atop the top rail at one end and rested atop the cross brace at the

other end. A second rail was then placed on top and anchored the angled rail. This arrangement of the two riders furthermore prevented cattle or horses from putting their heads between the stack and the top rider and dislodging the latter.... Each panel's construction materials consequently consisted of nine rails. The resulting fence was a high and tight fence, cheaply made by the local farmers without the expense of a fence mortising machine or the need to make unnecessary cuts or trims." (See, Harrison January 4, 2002 memo "Historic Appearance and Rehabilitated Construction of Worm Fences" GNMP). An example of a six-rail-high fence can be seen in the July 1863 Frederick Gutekunst photograph of the artillery lunettes on East Cemetery Hill (GNMP #2B-2031). In the central section of this photograph is a women, Mary Tepe, leaning against a six-rail fence post (See, William Frassanito, Early Photography at Gettysburg [Thomas Publications, 1995] p. 141, photographs 49 and 49, Detail).

[67] Fletcher, Pennsylvania Agriculture and Country Life, 1640-1840, pp. 85-86; Fletcher, Pennsylvania Agriculture and Country Life,1840-1940, p. 70.

[68] Fletcher, Pennsylvania Agriculture and Country Life, 1640-1840, p. 86; Fletcher, Pennsylvania Agriculture and Country Life,1840-1940, p. 70. Most post and rail fences were five rails high, though some used six rails.

[69] Fletcher, Pennsylvania Agriculture and Country Life,1840-1940, p. 70.

[70] Irvin Sale, "Pickett's Charge,"The Philadelphia Press, July 4, 1887, page 1, column 4; Gregory Coco, ed., From Ball's Bluff to Gettysburg and Beyond: The Civil War Letters of Private Roland E. Bowen, 15th Massachusetts Infantry, 1861-1864, (Thomas Publications, Gettysburg, PA, 1994), pp.198-99; Ralph Sturtevent, Pictorial History Thirteenth Regiment Vermont Volunteers (Regimental Association, Burlington, VT, 1910), p. 289.

[71] Isaac Hall, History of the Ninety-Seventh New York Volunteers, (L.C. Childs and Sons, New York, 1890), p. 136-137;; Grant, "The First Army Corps...at Gettysburg," The Gettysburg Papers, p. 50; OR, pt. 2, pp. 553 (Maj. Gen. Robert Rodes), p. 579 (Brig. Gen. Alfred Iverson); John Vautier, History of the 88th Pennsylvania Volunteers, (J.B. Lippencott Co., Philadelphia, Pennsylvania, 1894), p. 135.

[72] G. W. Finley account in "'Bloody Angle' The Story of Cemetery Ridge from the Blue and Gray," Buffalo Evening News, May 29, 1894, copy in GNMP "Gettysburg Newspaper Clippings," Vol. 4, pp. 41-44; Coco, ed., From Ball's Bluff to Gettysburg and Beyond, pp. 198-99; Col. Shepard's account as quoted in James I. Metts, "Longstreet's Charge at Gettysburg, Pa., Pickett's, Pettigrew's and Trimble's Divisions, Historical Essay," (unknown publisher, unknown date), p. 4, copy in GNMP Vertical Files, V4-11hi "Longstreet's Assault Folder #1; Catlett Conway, "The Battle of Gettysburg," Atlanta Journal, December 7, 1901, copy in GNMP Vertical Files, V7-VA7.

[73] Frederick Tilberg, "A Study of the Location and Type of Fences, and of Woodland and Orchards in the Area of Cemetery Ridge," (unpublished report, 1944), p. 15, GNMP Archives; Capt. Henry L. Abbott to Charles C. Paine, July 28, 1863, Boston Public Library, copy in GNMP Library files. Abbott was in the 20th Massachusetts Infantry.

[74] OR, pt. 2, pp. 386 (Maj. Charles Peyton), 618 (Brig. Gen. Cadmus Wilcox), 623 (Brig. Gen. Ambrose Wright), 628 (Col. Walker), 651 (Brig. Gen. Joseph Davis); Col. Rawley Martin's account in "The Battle of Gettysburg and the Charge of Pickett's Division" Southern Historical Society Papers, Vol. 32 (1904), p. 188.

[75] Examples of the different gate styles can be found in historic photographs. A hinged gate is visible in a Mathew Brady photograph of the Edward McPherson farm. The gate is located just to the right of the wagon shed (See, Frassanito, Early Photography, p. 56, photograph 16a, detail). An example of a removable rails gate can be seen in a Frederick Gutekunst photograph looking west along the Chambersburg Pike. The double augured post is located on the right (north) side of the road, three rail panels to the left of the man in the white linen duster (See, Frassanito, Early Photography, p. 82, photograph 23a, variant, detail).

[76] Baker, History of the Ninth Massachusetts Battery, p. 57.

[77] OR, pt. 1, pp. 882 (Lt. Col. Freeman McGilvery), 886 (Lt. Richard Milton); Baker, History of the Ninth, p. 214; John Bigelow, The Peach Orchard (Kimball-Storer Co., Minneapolis, 1910), pp. 18, 57; John Bigelow

to John Bachelder, n.d., in David and Audrey Ladd, The Bachelder Papers, Gettysburg in Their Own Words (Morningside Press, Dayton, Ohio, 1994), Vol. I, p. 173.

[78] Fletcher, Pennsylvania Agriculture and Country Life, 1640-1840, pp. 323-28.

[79] Frank A. Haskell, The Battle of Gettysburg (Commandery of the State of Massachusetts, Military Order of the Loyal Legion, The Mudge Press, Boston, 1908), pp. 15-16, 34, 36, 46, 52; Greg Coco, A Vast Sea of Misery, pp. 62-63.

[80] Historic Photographs #23S-0252 and 23S-0254, Archives, GNMP.

[81] Fletcher, Pennsylvania Agriculture and Country Life,1640-1840, p. 371.

[82] Gettysburg Compiler, 1906, "Gettysburg Newspaper Clippings, Vol. 5, p. 30, as quoted in, Frederick Tilberg, "Historical Importance of Rock Creek," NPS report, September 1939, Waterways of Adams County folder, "Reports 1934-1946," GNMP Archives; OR, pt. 1, pp. 778 (Brig. Gen. Thomas Ruger), 812 (Col. Silas Colgrove).

[83] 1872 Warren Survey Map, section D4.

[84] Bloom, A History of Adams County, Pennsylvania, 1700-1990, pp. 119-120.

[85] Possible examples of fords might be at McAllister Mill Road through Rock Creek, the Wheatfield Road through Plum Run, Trostle-Weikert-Swisher Lane through Plum Run, although outside of the park, Willoughby Run Road to Pitzer Lane through Willoughby Run.

Chapter 3
NATURAL FEATURES

The 1863 Gettysburg landscape was a matrix of agricultural, cultural and natural features. Many natural features were crucial to the outcome of the battle. These included woodlands and thickets, streams, wetlands and natural springs, all of which shaped the planning of the battle and influenced the fighting that followed in a variety of ways.

NATURAL VEGETATION FEATURES

In addition to vegetation planted and maintained by farmers, there were also woodlands, thickets and other natural vegetation found on the battlefield. These woodlands and thickets played an important role in the battle.

WOODLANDS

Historic Use and Appearance

While productive fields, orchards, pastures and woodlots dominated the 1863 Gettysburg landscape, there were areas of woodlands and thickets that were covered by a thick growth of bushes, scrub growth, brushwood and trees. These areas of naturally occurring vegetation normally existed in bottomlands and along streams. Since these areas could not be farmed, or even used as pastures, the vegetation was allowed to grow unmanaged; thus these features usually were composed of undesirable fast growing wetland trees, scrubs, bushes and other types of undergrowth. These elements gave woodlands and thickets a cluttered and dense character, a marked difference in appearance from the woodlots and groves that consisted of slow-growing uplands trees carefully managed by farmers and town residents.

The ***historic limits*** of a woodland depended on the amount of land upon which the farmer would allow vegetation to grow unmanaged. Because this vegetation was not cultivated for use or profit, the ***species distribution*** (the type of trees it contained), ***age distribution***, ***density*** and ***health*** of a woodland a product of natural succession and became important characteristics that contributed to its historic appearance. This lack of management gave woodlands a high ***density***; they were filled with under-brush, scrubs, briars and deadwood, and in many cases produced trees that were unhealthy. These practices could also affect the ***height*** of a woodland, since it allowed healthier trees to reach a mature height, something that rarely occurred in a managed woodlot.

How Woodlands Influenced the Battle

The impact a woodland had on the battle depended on how the characteristics described above affected the evolution of battle and battle movements. Woodlands could be used for Cover and Concealment

during the battle, could become Obstacles to the rapid movement of troops and could hinder Observation of units attempting to fire through or beyond them. A few woodlands played a greater role in the battle, especially when they were sites of actual combat. In these cases woodlands shaped the battle on an even greater scale, since they were not only the scenes of combat but also heavily impacted Observation from various points within the major battle action area.

The ***historic limits*** of a particular woodland determined how much Cover and Concealment could be gained by troops occupying it. The ***historic limits*** of a woodland also determined how much area behind it was screened from enemy Observation.

The ***species distribution*** of a woodland would probably not heavily impact the battle because nearly all species of deciduous trees are similar in nature (i.e., foliage, browse lines, height, trunk diameter, etc.). Thus any species of deciduous tree present would represent the historic appearance of, and the military influence, each woodland during the battle.

However, ***age distribution*** and ***density*** of a woodland affected not only the quality of Cover and Concealment it provided, but also to what level the woodland became an Obstacle and affected Observation. For Observation, density impacted not only long range views, but also the ability to see and fire within a woodland.

During combat military units advanced in battle line (by rank) through some woodlands. Almost invariably these occasions were during the heat of battle, when commanders were trying to get into position quickly. By its very nature, a woodland was not an ideal place for such quick movements because the ***age distribution*** and ***density*** of the trees created Obstacles to orderly movement. The higher the concentration of trees, particularly of the large, mature trees, along with the thick undergrowth present within woodlands, the harder it was to keep the battle line in regulation alignment.

Age distribution and ***density*** of a woodland might also affect Observation and Cover and Concealment. The tighter the arrangement, the larger the trees and/or the thicker the undergrowth, the more limited the Observation for troops in the woodland became. On the other hand, these characteristics would provide more Cover for these same troops.

The ***height*** of the trees within a woodland affected line of sight for Observation, including fields of fire, by determining how much area beyond the woods would be concealed. The higher the trees, the more area beyond that woodland would be screened or concealed from enemy Observation and fire. This factor became important when observers were located at the higher elevations, such as Little Round Top, looking down, or vice-versa.

Although farmers did not maintain the ***health*** of their woodlands, the longevity and continued health of these features is an important treatment goal for NPS. Since the historic appearance and certain characteristics of these woodlands affected the battle, NPS must maintain these features in perpetuity. Therefore the ***health*** of these woodlands is critical for their continued existence.

General Treatment Principles

The 1999 approved General Management Plan directs NPS to maintain in perpetuity the patterns of open vs. closed land present in 1863. Therefore, the general treatment principles established for woodlands are intended to establish and keep these features within their historic boundaries, retrieve

historic height where KOCOA Observation has been comprimised and to ensure their health and sustainability over time.

Woodlands Present in 1863 but now missing: Historic sources, such as maps, surveys, photographs and written reports from combatants and residents will be used to establish the historic boundaries of woodlands. Where woodland areas were present in 1863, but have now disappeared, new woodlands will be established.

Early successional, native species currently growing in the park or region will be planted. Likely species include black cherry, staghorn sumac, sycamore, and yellow poplar. These species will grow rapidly and thus will create the appearance of woodlands within the shortest possible time. Trees will be planted with a density of 680 bare-root seedlings per acre at an average spacing of eight and a half feet by eight and a half feet. After five years, this should produce a woodland of about 400 trees per acre with an average height of ten feet. Within eight to ten years these woodlots will be managed as per the recommendations for long term care. This may include supplemental plantings, health cuts and other management practices.[1]

In some areas that are now heavily used by visitors, another planting strategy is needed. These areas will be planted with containerized sapling-sized trees that are four feet to eight feet in height. These areas will be planted at a density of 400 trees per acre in an irregular design. This will help ensure that these woodlands will survive heavy visitor use.[2] In areas where natural succession towards forest cover is now occurring, this growth will be augmented by the addition of 100 bare root seedlings per acre to enhance the natural regeneration process. [3]

Woodlands that exceed their historic boundaries: Where the 1863 boundaries of a historic woodland area have been exceeded, all non-historic shrubs and trees will be removed. NPS will treat these areas to ensure that invasive exotic plants are controlled, both prior to the removal and afterwards. NPS will prepare sedimentation and erosion control plans to ensure that erosion is controlled appropriately when non-historic vegetation is removed.

In the case when control of the height of a woodland is crucial to interpretation, removal of taller trees will be completed. Witness trees will be protected, even if their height now exceeds that at the time of the battle. Other trees that block critical observation, important views or fields of fire will be cut using chain saws or other manual methods and felled directionally during the height of the winter to avoid damage to other trees. Trees that are cut will be limbed and left in the woodlands, to provide habitat for woodland species. Generally in woodland areas limbs will be cut and left as habitat until they degrade naturally.

Within 35 feet of streams that now have non-historic woody vegetation, woody vegetation will be maintained. Woody vegetation will be maintained at a height (generally less than ten feet) that will not interrupt key lines of sight and observation that was important at the time of the battle. This action was proposed by the 1999 GMP to ensure that NPS meets it obligations under the Chesapeake Bay Compact.

Ensuring the health and sustainability of woodlands: The park's GMP requires that areas that were wooded in 1863 remain wooded in perpetuity. Therefore, it is essential that woodlands be maintained in a healthy condition, and contain trees of various ages and species to ensure their continuity over time. In general, woodlots will be managed so that their age and species distribution contributes to a

healthy, sustainable woodland.
In 1990, Fairweather and Cavanaugh recommended a structure—that is, the number of trees in each age class, or the age distribution—that would ensure that these woodlands can be maintained in a healthy condition over time. Both the White-tailed Deer Management Plan/EIS (1995) and the GMP/EIS (1999) adopted these standards as necessary to restore, maintain and sustain the park's historic woodlots.[4]

When necessary, NPS will intervene to establish and maintain healthy trees in the uneven aged structure recommended for the park's woodlands. Woodlands will be managed to sustain:

- Native herbaceous, shrub and tree species that are ecologically adapted to the environmental conditions in each woodland.
- Trees with trunks that have the strength potential to support a well-balanced crown.
- Trees with a balanced crown structure that is centered above the trunk.
- Witness trees.
- Density and age structure recommended by Fairweather and Cavanaugh.

To ensure the health and sustainability of historic woodlands, each woodland area will be inventoried to determine the current density by species, diameter and physical sustainability. An initial sustainability plan to reduce the numbers of non-sustainable plants will be tailored for each woodlot. Stems that are not physically sustainable, i.e., that do not meet the conditions noted above, will be removed as needed to reach the desired stocking and age distribution levels. Woodlots will be monitored to ensure that these interventions are resulting in a stand structure that is close to that recommended for the park. To the greatest extent possible, invasive exotic vegetation will be controlled or eliminated in historic woodlands.[5]

As noted above, witness trees will be protected and preserved. Trees that are not healthy will be cut using chain saws or other manual methods and felled directionally during the height of the winter to avoid damage to other trees. Trees that are cut will be limbed and left in the woodlands, to provide habitat for woodland species. Generally in woodland areas limbs and smaller unhealthy trees will be cut and left as habitat until they degrade naturally.

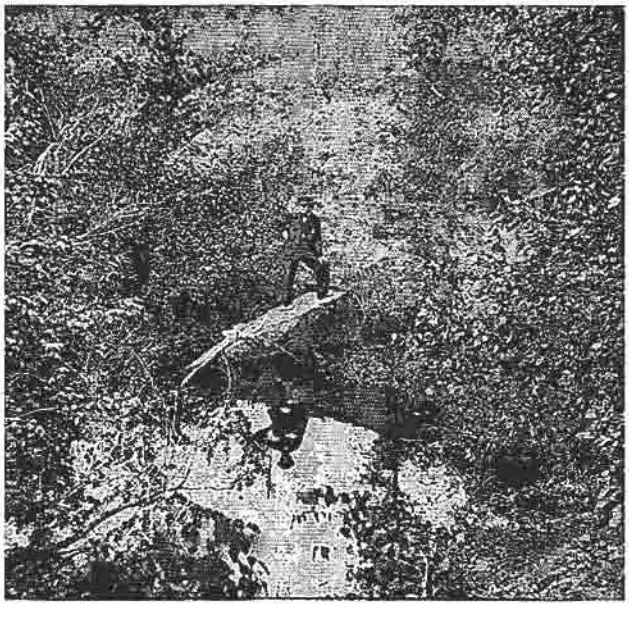


Figure 3-1 "On Willoughby's Run...Position of the Iron Brigade" (William Tipton, c. 1865). It was through this woodland vegetation, along the banks of Willoughby Run, that Confederate units advanced during their attacks on the morning of July 1, 1863. Dense underbrush like this obviously became an obstacle to Civil War infantry moving in linear formations (GNMP, Tipton #1794).

Examples Illustrating Possible Treatment

A example of a woodland influencing the battle are the woods bordering Willoughby's Run west of, and connected to, Herbst's Woodlot. On July 1, 1863 Confederate brigades had to pass through the latter woodland in order to attack the Union line on McPherson's Ridge. This woodland, described by one Confederate as "thick underbrush and briars skirting the banks" of Willoughby Run, became an Obstacle to their advance. Another Confederate officer reported the "undergrowth" of the woodland was...[a] disadvantage to our line" during their attack. Faced with a Union counterattack, these same Southern soldiers were forced to withdraw, at which point, "owing to the obstructions in our rear [the woodland and Willoughby Run]...some 75 of our brigade were unable to make their escape" and were captured. Later that afternoon Union artillery positioned on Seminary Ridge opened fire upon Confederate troops advancing from Herr's Ridge.[6]

Based on this analysis this woodland influenced the battle as an Obstacle and also impacted the Observation of both the units occupying it or firing over it. Therefore, recommended treatment might be the restoration of its ***size***, ***historic limits***, ***height*** and ***density***, because these characteristics determined the extent to which the woods were an Obstacle and influenced Observation. Because the ***species distribution*** and ***age distribution*** of this woodland had no influence on the battle restoration of these characteristics would not be restored to their 1863 condition, but would be managed for health and sustainability.



Figure 3-2 Willoughby Run, view north (William Tipton, ca. 1900) Though taken nearly 40 years after the battle, the woodland vegetation along the banks of Willoughby Run had changed little. Because it was unmanaged, the woodland vegetation on the left (west) bank consisted of wide variety of trees (of various species and ages) and a dense understory of brush, briars and dead wood. By comparison, the carefully managed Herbst Woodlot (visible on the right bank) presents a clearer, more open appearance. (GNMP, Tipton #1796)

THICKETS

Historic Use and Appearance

Thickets were usually located in areas where woodlots had been recently harvested and were naturally regenerating or where rock outcroppings or other natural features encouraged shrubby growth. While thickets share many of the same characteristics as woodlands, the main difference between the features is their ***height***. Because thickets consisted of younger vegetation, they were not as tall as woodlands or woodlots.

How Thickets Influenced the Battle

Because thickets have many of the same characteristics as woodlands, from a KOCOA standpoint, they influenced the battle in much the same way, by providing Cover and Concealment, becoming Obstacles and affecting Observation. The biggest military difference between woodlands and thickets is the latter's lower height. By their nature thickets were usually less than ten feet in height. This low height improved the line of sight, or Observation of units firing over them. This factor is especially important when considering the observation that could be obtained from higher elevations on the battlefield, such as Cemetery Ridge, when looking towards lower elevations, or vice-versa. (e.g., the height of the Codori-Trostle thicket determined the observation and fields of fire of the Union artillery positioned along Cemetery Ridge and how much area beyond the thicket the Union gunners could fire upon). Characteristics that could be considered under any treatment are the same as woodlands i.e., ***historic limits***, ***species distribution***, ***age distribution***, ***density***, ***height*** and ***health***.

General Treatment Principles

The 1999 approved General Management Plan directs NPS to maintain in perpetuity the patterns of open vs. closed land present in 1863. Therefore, the general treatment principles established for thickets is intended to establish and keep these features within their historic boundaries, their historic height limitations, and to ensure their health and sustainability over time.

Thickets Present in 1863 but now missing: Historic sources, such as maps, surveys, photographs and written reports from combatants and residents will be used to establish the historic boundaries and height of thickets. Where thickets were present in 1863, but have now disappeared, new thickets will be established.

Shrubs will be selected based upon the environmental conditions present in the thicket location. Native shrubs found within the park or the region that self-seed and that will attain a mature height not to exceed ten to fifteen feet will be chosen. A variety of species to ensure diversity will be selected. Areas where thickets are to be reestablished will be treated to control invasive exotics before and after a thicket is replanted to ensure that the selected species are able to become established. Bareroot shrubs grown in open field conditions will be planted in mixed plots according to a planting plan developed by a qualified forester. The thicket will be monitored, and trees that exceed a height of ten to fifteen feet will be periodically removed as warranted to maintain historic viewsheds.

Thickets that exceed their historic boundaries: Where the 1863 boundaries of a historic thicket area have been exceeded, all non-historic shrubs and trees will be removed. NPS will treat these areas to ensure that invasive exotic plants are controlled, both prior to the removal and afterwards. NPS will prepare sedimentation and erosion control plans to ensure that erosion is controlled appropriately when non-historic vegetation is removed. The thicket will be monitored, and trees that exceed a height of ten to fifteen feet will be periodically removed as warranted to maintain historic viewsheds.

Thickets that have become woodlands: In order to reestablish the historic character of the thicket to restore significant observation and fields of fire, an initial cut of 50% to 60% of the overstory trees within the historic battle-era thicket boundaries will be completed. Potential witness trees, trees with high visual or wildlife value, and trees likely to die within the next five to ten years will be retained. Felled trees not needed for wildlife habitat should be removed if their removal does not alter wetland soils. Tree stumps will be treated to prevent resprouting.

Shrubs will be selected based upon the environmental conditions present in the thicket location. Native shrubs found within the park or the region that self-seed and that will attain a mature height of no more

than ten feet will be chosen. A variety of species to ensure diversity will be selected. Areas where thickets are to be reestablished will be treated to control invasive exotics before and after a thicket is replanted to ensure that the selected species are able to become established. Bareroot shrubs grown in sheltered conditions will be planted in mixed plots according to a planting plan developed by a qualified forester.

After the shrubs have become established, the balance of the overstory will be reduced. Witness trees and trees with high visual or wildlife value will be preserved and protected. Less than 10% of mature trees should be retained for these purposes. Other remaining trees will be directionally felled to avoid the shrub plots and removed. Within wetland areas, trees will be directionally felled to avoid shrub plots. The branches of these trees will be removed and left, and the felled trunks will be left as wildlife habitat. The thicket will be monitored, and vegetation that exceeds a height of ten to fifteen feet will be periodically removed.

Example Illustrating Possible Treatment

The **Codori-Trostle Thicket** is located in the low ground between Cemetery Ridge and the Emmitsburg Road. This swale is created by Plum Run, a small, sluggish stream that meanders southward through the battlefield. Plum Run Swale, described as "a narrow valley, through which ran a rocky ravine or stream, fringed with small trees and undergrowth of bushes," became an Obstacle for troops moving through it. Three Confederate brigades advanced across this rough ground on July 2, along with several Union regiments during counterattacks. The area was covered with "thick bushes and in some places were old stumps and large or rough boulders." All of these obstructions tended to break up and confuse formations and slow down movement. One Confederate recalled the confusion amongst the three brigades that reached the thicket on July 2:

> By the time the small brushy drain at the foot of the enemy's position was reached, the brigades of Barksdale, Wilcox...and Perry were in marked confusion, mixed up indiscriminately, officers apart from their men, men apart from their officers, but all pushing forward notwithstanding.[7]

Two Confederate brigades also advanced into this area on July 3, where the thicket was not only an Obstacle, but also gave these troops some Cover. Col. David Lang, commanding a Florida brigade described these impacts in his official report:

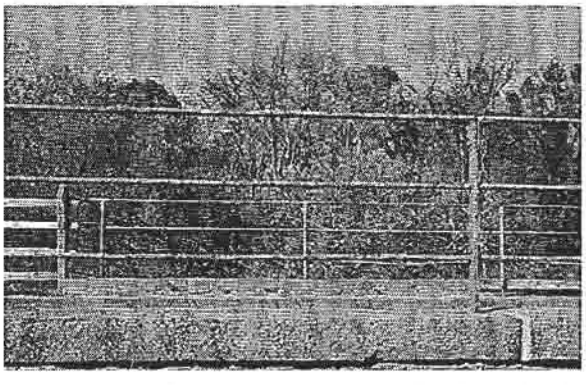
> ...I moved forward...under a heavy fire from artillery...until coming to the skirt of woods at the foot of the heights. Just before entering the woods, a heavy body of infantry advanced upon my left flank. ...the men were by this time so badly scattered in the bushes and among the rocks that it was impossible to make any movement to meet or check the enemy's advance. To remain in this position, unsupported...was certain annihilation. To advance was only to hasten that result, and, therefore, I ordered a retreat.... Owing to the noise and scattered condition of the men, it was impossible to have the order to retreat properly extended, and I am afraid that many men, while firing from behind rocks and trees, did not hear the order, and remained there until captured.[8]

Numerous Union batteries on both Cemetery Ridge and the Trostle-Neinstedt Ridge were able to fire directly over the Codori-Trostle Thicket on both July 2 and 3, causing great damage to the attacking

Confederate brigades located beyond. Lt. Col. Freeman McGilvery, commanding most of these cannon, described the excellent fields of fire, or Observation, his gunners had over the thicket against the Confederates during Pickett's Charge on July 3:

> At about 3 p. m....appeared three extended lines of battle...advancing upon our center. These three lines of battle presented an oblique front to the guns under my command, and by training the whole line of guns obliquely to the right, we had a raking fire through all three of these lines. The execution of the fire must have been terrible, as it was over a level plain, and the effect was plain to be seen. In a few minutes, instead of a well-ordered line of battle, there were broken and confused masses, and fugitives fleeing in every direction.[9]

Based on this analysis, therefore, the Codori-Trostle Thicket influenced the battle several ways. It provided Cover and Concealment to troops occupying it, became an Obstacle for troops moving through it, and its low height provided excellent Observation for units looking and firing over it. Therefore, recommended treatment of this thicket might be the restoration of its ***historic limits***, ***density*** and ***height*** because these characteristics determined how much Cover and Concealment it provided, the level of an Obstacle it became, and influenced the Observation of units firing from, into or over the thicket. Because the ***species distribution***, ***age distribution*** of the thickets did not influence the battle, decisions concerning these characteristics would be made by NPS to ensure its significant characteristics and longevity. Since the historic appearance and certain characteristics of these thickets affected the battle, NPS must maintain these features in perpetuity. Therefore the ***health*** of these woodlands is critical for their continued existence.



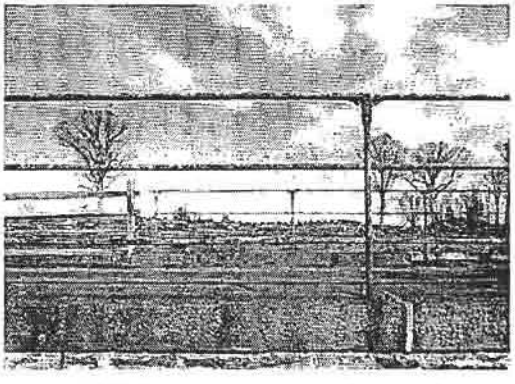


Figure 3-3A and 3-3B Codori-Trostle Thicket (NPS, 2001) The Codori-Thicket serves as a good example of one that has become a woodland. Being located on poor, rocky soil this vegetation over time envolved into a woodland (as seen in the left photograph). In 2001, NPS removed approximately 60% of the overstory trees (some of the remaining 40% are visible in the right photograph) and then planted shrubs to recreate the appearance of the historic thicket. Potential witness trees, trees with high visual or wildlife value, and trees likely to die within five to ten years were retained. Once the thicket vegetation is established, the remainder of the overstory trees will be felled.

NATURAL WATER FEATURES

Although not abundant, natural water sources, such as streams, wetlands and springs existed on the battlefield landscape. These features influenced the settlement patterns, pre-battle history of the area, and the battle itself in several ways.

STREAMS

Historic Use and Appearance

Several streams crossed the 1863 Gettysburg landscape and influenced the location of individual farmsteads and the practices of mid-19th century subsistence farming.[10] Streams were a source of water for both farmers and their livestock, marked property lines and provided power to grist and saw mills. These uses in turn influenced the location of some of individual farms and businesses, since each needed a steady source of water.

These streams generally flow south and are the principal means by which water is drained from the highlands through the shale lowland and eventually into the Potomac River and the Chesapeake Bay.[11] These drainage patterns therefore determine the main characteristics of these streams -- ***depth, width*** and ***course***. Most of the streams are shallow, narrow and meandering. A few, such as Rock Creek and Marsh Creek, are fairly wide and can be quite deep and swift, especially following periods of heavy rain fall.

How Streams Influenced the Battle

For this military analysis a stream is delineated as the body of water itself (stopping at the water's edge) and not other features associated with it, such as stream banks, swales, ravines, etc. The impact of a stream on the battle depended on how the characteristics described above affected the evolution of the battle and battle movements. Some streams became Key Terrain, for they provided a natural barrier on which to anchor an army's vulnerable flank. Most were Obstacles during the fighting, especially for troops attempting to cross them in line of battle or retreating across them while under fire.

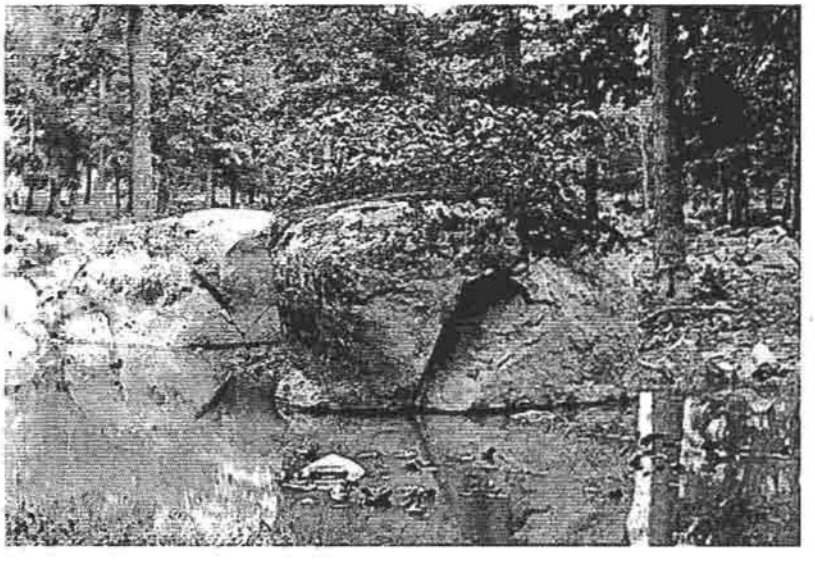


Figure 3-4 Rock Creek at the base of Culp's Hill. Due to its width and depth, Rock Creek was one of the most substantial water features on the battlefield. (GNMP #21P-1331)

The ***depth*** and ***width*** of a stream are the most important characteristics, because they determined the extent to which a stream became an Obstacle. The wider and deeper a stream, the more difficult it was to cross. This was especially true for troops who were moving in line of battle, for a wide and/or deep stream would inevitably slow them down and disarrange their battle lines. Depending on its location (see "Course" below) a deep and wide stream could also be Key Terrain. A stream that was deep and/ or wide could give strength to an army's flank, the most vulnerable part of its battle line, by slowing and disrupting attacking enemy formations. Depth and width could also create a stream with steep or

deep banks (See "Topography" below for military analysis).

A stream's ***course*** defined its historic route through a particular area. This characteristic is important because it determined where the stream was located and therefore if it could be Key Terrain. If an army was placed so that its flank(s) rested at a deep and/or wide stream, this would greatly strengthen its position. Conversely, if the enemy was able to control the stream, that flank instantly became more vulnerable and subject to being turned by a flanking maneuver. In such a situation the stream would be Key Terrain for whichever army controlled it.

General Treatment Principles
Over the last 140 years, the course of battlefield streams has changed. Such change is a naturally occurring process, and is an expected part of the natural evolution of battlefield parks.

However, NPS will not undertake activities that would change the ***depth***, ***width*** or ***course*** of any stream found within Gettysburg National Military Park. In general, this includes damming of streams or activities that significantly change the annual streamflow, significantly increase erosion and soil loss, significantly increase stream temperature or levels of turbidity, or that will significantly change the character of the stream banks. Where such activities have occurred within the park, they will be reversed.

Examples Illustrating Possible Treatment
Rose Run is a small tributary of Plum Run that begins near the Emmitsburg Road and runs generally southeastward, passing through Rose Woods at the western base of Houck's Ridge. During the fighting on July 2 the creek became an Obstacle to Confederate soldiers who passed through this area during their assault against the Wheatfield. The run formed a small, somewhat marshy ravine between the "Stony Hill" and Rose Farm Ridge. This "morass" slowed down both Confederate and Union troops moving across the run. A Georgia soldier recalled:

> A heavy line of infantry was....ranged along the further edge of a bog...about twenty or thirty yards wide.... Had that plaguey bog been somewhere else, the line on the other side could not have held its ground....the color-bearer of our regiment attempted to cross but he mired down.... I saw several others killed in the bog.[12]

Based on this analysis this small stream was an Obstacle during the battle. In the 1980s, Rose Run west of Emmitsburg Road was placed underground by NPS to expand a field for agriculture. Extensive tile drains were placed along Rose Run both east and west of Emmitsburg Road, changing the wetlands character of the stream. Therefore, possible treatment could include daylighting the stream corridor, restoration of its historic limits and of its wetland character, and restoration of the historic hydrological regime.

Rock Creek is a medium sized stream that runs southward through the battlefield, passing east of Barlow Knoll, the town, and along the eastern base of Culp's Hill. The creek was a substantial one, being fairly wide and up to six feet deep, and at places was lined with steep banks. During the fighting on July 2 and 3, 1863 Rock Creek was Key Terrain, because it served as an anchor to the right flank of the Army of the Potomac, protecting it from Confederate flanking movements. During the first day of the battle (July 1, 1863), north of town, the creek became an Obstacle to the Confederates who had to

pass through it during their assaults against the right end of the Union line located on Barlow's Knoll. On the second and third day of the battle (July 2 and 3, 1863) the creek was also an Obstacle to any Confederates attacking the Union right on Culp's Hill. Every Southern soldier who assaulted the hill first had to wade Rock Creek, which was "nearly waist deep," and thus causing "much confusion" within their ranks. This high water was not only due to the McAllister Mill dams, but also the frequent and steady rains that fell during the two weeks preceding the battle.[13]

Based on this analysis Rock Creek influenced the battle both by becoming Key Terrain for the Army of the Potomac and by becoming an Obstacle to attacking Confederate units. Therefore, recommended treatment of this stream might be the maintenance of its ***depth***, ***width*** and ***course***, since these characteristics determined how it became Key Terrain and an Obstacle, and to what extent. NPS would oppose activities—such as channelization, extensive use of rip rap, and other similar measures—that would change the depth, width and course of Rock Creek.

Guinn Run is a small stream corridor located between the Taneytown Road and Baltimore Pike, that flows generally south and east before emptying into Rock Creek at the McAllister Mill site. Although this stream corridor falls outside of the major battle action area, it was used by Union troops placed in reserve and by three temporary Union hospitals for water. (In addition to its battle significance, it flows through Guinn Woods, an old mature woodlot that is biologically diverse). The stream was dammed in three places to create rides and artificial scenery for a small amusement park built on the site in the 1940s and 1950s. Because it was used by combatants and now contributes to the habitat and biological diversity of the park, the recommended treatment for Guinn Run will be to remove the modern dams and restore the natural function and structure of the stream.[14]

WETLANDS

Historic Use and Appearance

There were a number of wetlands in the 1863 Gettysburg landscape. Because the diabase rock of the Gettysburg sill lies close to the surface, many water sources, especially streams and springs, create wetland areas along their course.[15] These marshy areas, being unsuitable for farming, were mostly used as pasture land. Those areas that were especially wet or inaccessible were sometimes allowed to return to their natural state and thus were the in the early stages of becoming thickets or woodlands. The ***historic limits*** of a wetland were determined by the drainage pattern of its water source, the geological formations over which it was located and the amount of rainfall. A wetland's ***duration*** was also important, since some existed throughout the year, while others were seasonal in nature and their presence was determined by rainfall, temperature, and other natural factors

How Wetlands Influenced the Battle

The impact of a wetland upon the battle depended on how the characteristics described above affected the evolution of the battle and battle movements. The wetlands that existed at the time of the battle became Obstacles, to the orderly movement of troops, forcing men to pass through them or to bypass them.

The ***historic limits*** of a wetland determined to what extent it became an Obstacle. The larger or wider a wetland the more difficult it was to traverse or bypass. The ***duration*** of seasonal wetlands could also influence the extent of a wetland.

General Treatment Principles

Gettysburg National Military Park has lost many of the wetland areas present at the time of the battle to agricultural modernization and other regional and local changes in the urban environment. Whenever possible, in order to restore the 1863 landscape and to improve habitat for the park's plants and animals, wetlands that were historically present will be rehabilitated and restored.

The park will not allow any new tile drains within its historic areas. Whenever possible, NPS will remove existing tile drains and restore 1863 topography. In planning for wetlands restoration, NPS will try to restore the natural function and structure of the wetland, and re-establish the hydrological regime. Wetlands will be designed to be self-sustaining and low maintenance, and will not require artificial water supplies or extensive vegetation management. Whenever possible, passive restoration—such as the elimination of tile drains or the restoration of historic topography or the original hydrological regime—will be used in preference to active site restoration. When active restoration is necessary to restore a wetland, only native species will be used. Wetlands restoration projects will be monitored and strategies will be adjusted as necessary so that sustainable, low maintenance and productive wetlands are reestablished within the park.

Examples Illustrating Possible Treatment

Passing through the area popularly known as the "Valley of Death," the low ground situated between the Round Tops and Houck's Ridge, is a small sluggish stream called Plum Run. The **Plum Run Wetlands** are extremely marshy areas at the valley's northern and central sections created by this stream. This wetland became a substantial obstacle for Union troops counterattacking through this area on July 2. Col. Thomas Egan, commanding the 40th New York, reported, "I...ordered my men to charge...they pushed forward at a double-quick, crossing a marsh up to their knees in mud and water." Maj. Arthur Lee, 2nd U.S. Regulars, described this area as "a marsh about 50 yards wide, ankle-deep and miry...."[16]

Based on this analysis the Plum Run Wetlands influenced the battle as an Obstacle. Therefore, recommended treatment of these wetlands would be continued preservation and maintenance of its ***historic limits***.

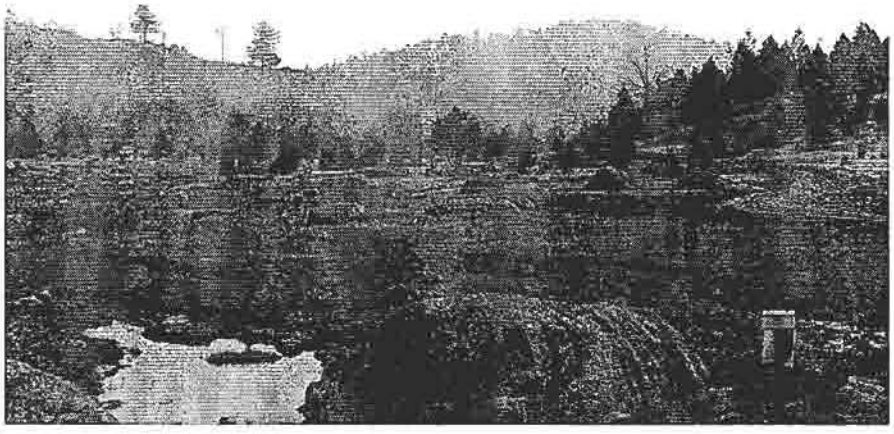


Figure 3-5 "Valley of Death-Between the two Round tops" (ca. 1870s-1880s). This view of the northern end of the Valley of Death clearly showsa portion of the wetland areas that existed at the time of the battle. (GNMP #2B-2080)

NATURAL SPRINGS

Historic Use and Appearance

Many springs existed across the battlefield in 1863. These features were a major influence on the location of the original settlement farmsteads, since each needed a steady supply of water for the farmers and their livestock, thus many were located near a spring. Springs possessing good ***duration*** and ***location*** (near fertile cropland and easily accessible to nearby roads) were ideal.[17]

How Springs Influenced the Battle

Springs are not KOCOA features, yet were extremely important as a source of water for the armies, for during the battle there were not only 170,000 soldiers but also thousands of animals, all requiring water. Water was not only necessary for the health of these men and animals, especially the thousands of wounded soldiers located in the temporary hospitals, but was also required by artillery batteries as part of their loading procedure in order to extinguish lingering sparks and to cool the barrel between rounds.

General Treatment Principles

Many springs still exist, though some have been altered from their historic appearance (due to natural causes, the installation of field drain tiles, agricultural farming practices, etc.). Other springs have dried up or otherwise ceased to exist since the battle period. Possible treatment of these features includes preserving and maintaining existing springs and rehabilitating their historic appearance. Where springs have been lost to agricultural practices, tile drains, or topographical changes, they will be restored using the same principles and practices that will be used to restore wetlands..[18]

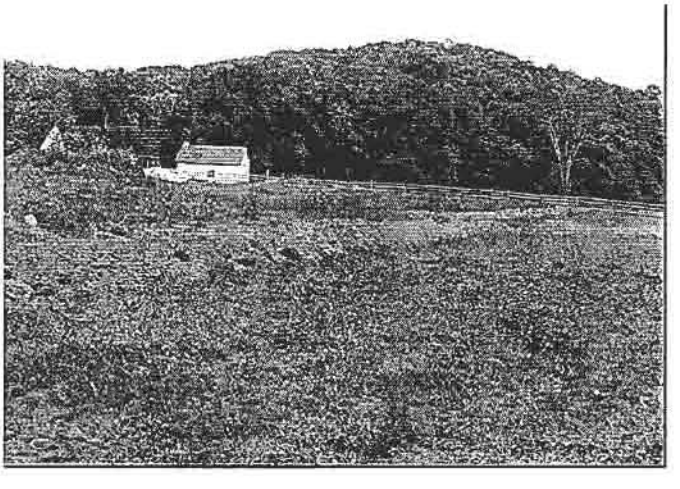




Figure 3-6 and Figure 3-7 These two photographs document the 1977 installation of tile field drains on the John Slyder farm which resulted in the destruction of the historic natural spring. (GNMP #23S-SL-110 and 23S-SL-115).

Examples Illustrating Possible Treatment

Approximately 400 yards southwest of Devil's Den was the farmstead of John Slyder. A major water source for Slyder and his family was a spring located directly east of the house. The small stream created by this spring then flowed less than a 100 yards to the southeast where it emptied into Plum

Run. In the days following the battle the farmstead was used as a temporary hospital and the spring supplied the water necessary to treat the wounded.[19]

In the late 1970s this spring was destroyed by the installation of tile drains for agricultural purposes. Possible treatment would include removal of the tile drains and restoration of the spring using the principles and practices listed above.

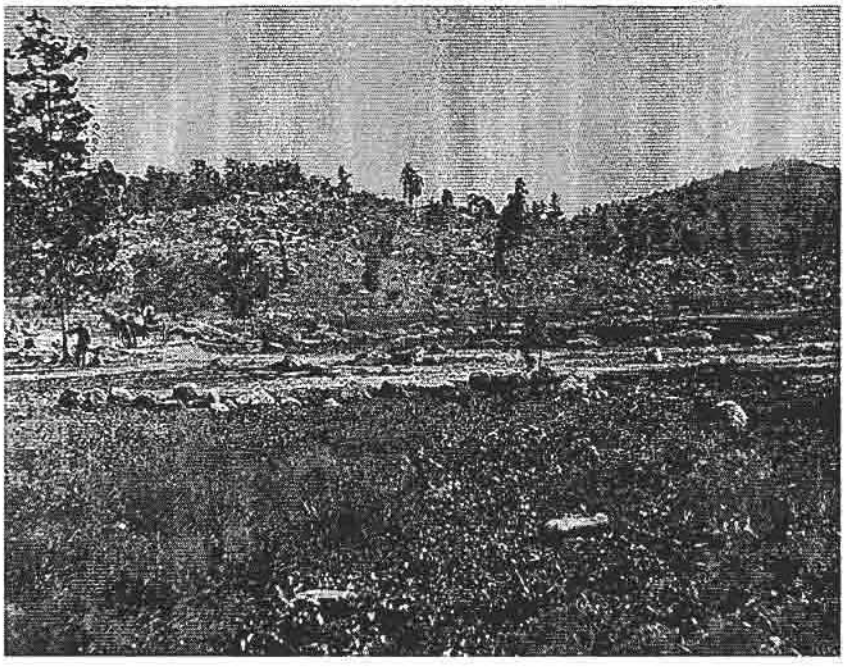


Figure 3-8 Little Round Top, view toward southeast from near the Wheatfield Road (Mathew Brady, July 1863). (GNMP #2B-2087)

TOPOGRAPHY

The most important natural feature to influence the battle was the topography of the 1863 landscape. The creation of this topography was heavily dependent upon the various geological features present in the battlefield landscape, including sills, formations, dikes and outcrops. These features, along with differential weathering, erosion, etc., created the important natural terrain landmarks that heavily shaped the battle. One of the most important geological features is the Gettysburg sill, "the largest concordant body in the area." Consisting primarily of diabase bedrock, this formation crosses the area south of the town from northeast to southwest. This sill, along with weathering and erosion, is responsible for the rocky nature of the terrain and the formation of important battlefield features (e.g., Little Round Top, Devil's Den, Cemetery Ridge, Cemetery Hill, Culp's Hill, etc.)[20] The arrangement of these hills, ridges, swales and other topographical features, and their relationship to each other, shaped the pre-battle settlement and development of the Gettysburg area, thus influencing the location of the man-made cultural features on the landscape. All of this in turn influenced the strategy and tactics used by the opposing armies on, around and across the 1863 Gettysburg landscape.

HILLS AND RIDGES

Historic Use and Appearance

All of the geological and weathering factors described above determined the characteristics of each hill

and ridge, including its ***historic limits***, ***height***, ***grade*** and the presence of ***boulder outcroppings***. Soils on the hills and ridges across the battlefield is generally rocky, thin and otherwise unsuitable for farming. Thus many of the hills on the battlefield were partially or completely covered by woodlots (See "Woodlots" above).

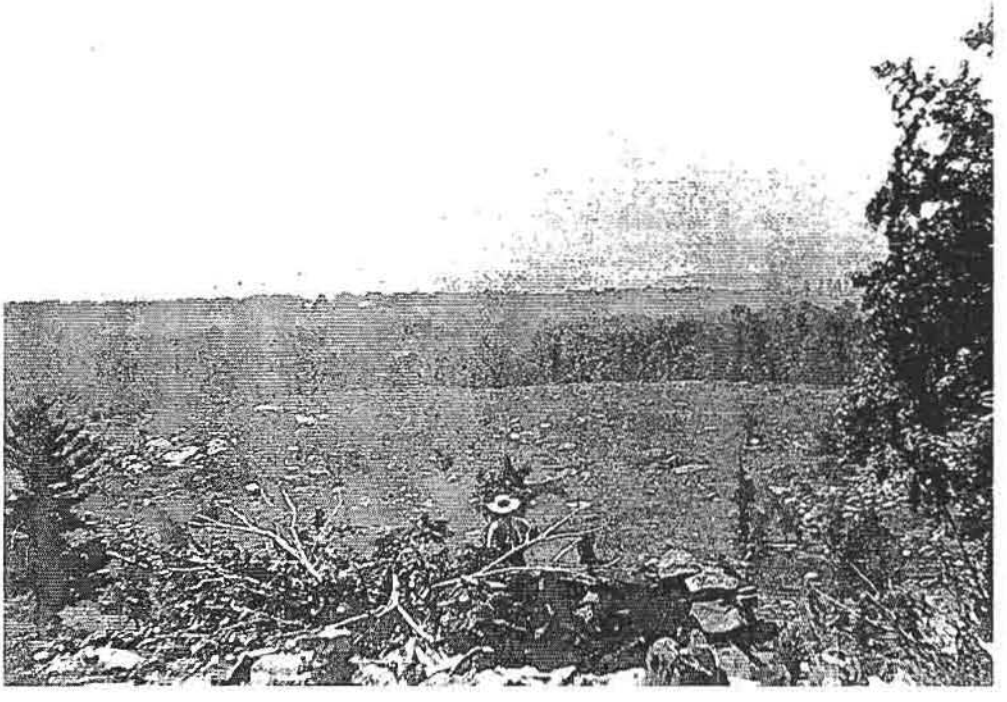


Figure 3-9 View toward the west/southwest from Little Round Top (Mathew Brady, July 1863). The excellent observation available from the crest of this hill is obvious in this photograph. Many important features that impacted the battle are clearly visible, including Plum Run Gorge or "Valley of Death," (in the lower foreground), Houck's Ridge, Rose Woodlot (the large woodlot in the middle distance) and Warfield Ridge (marked by the tree line in the distance). The open fields seen here had to be crossed by the advancing Confederates on July 2 and were all within range of the Union artillery on Little Round, Houck's Ridge and near the Peach Orchard. (GNMP#2B-2090)

How Hills and Ridges Influenced the Battle

The impact a hill or ridge had on the battle depended on how the characteristics described above affected the evolution of the battle and battle movements. Hills and ridges heavily influenced the fighting by serving as Key Terrain, becoming Obstacles, providing Cover and Concealment, and providing Observation and fields of fire.

The ***historic limits*** of a hill or ridge, along with its ***height*** and ***grade*** determined its value as Key Terrain. Whenever possible Civil War armies placed their battle lines on hills and ridges. Larger, taller and steeper hills or ridges greatly strengthened an army's position, by making the position easier to defend and by becoming an Obstacle for troops attempting to assault uphill. This was especially true for hills and ridges that could serve as an anchor for an army's vulnerable flank or provide great strength to a particular section of an army's battle line. These same characteristics also determined how much of an Obstacle the hill would pose to troops attempting to advance over it.

The ***historic limits*** of a hill or ridge, along with its ***height*** determined how much Cover and Concealment it provided to the army's rear and its value as an Observation point and artillery platform. The higher a hill was the better Observation and fields of fire it provided to the troops positioned upon it.

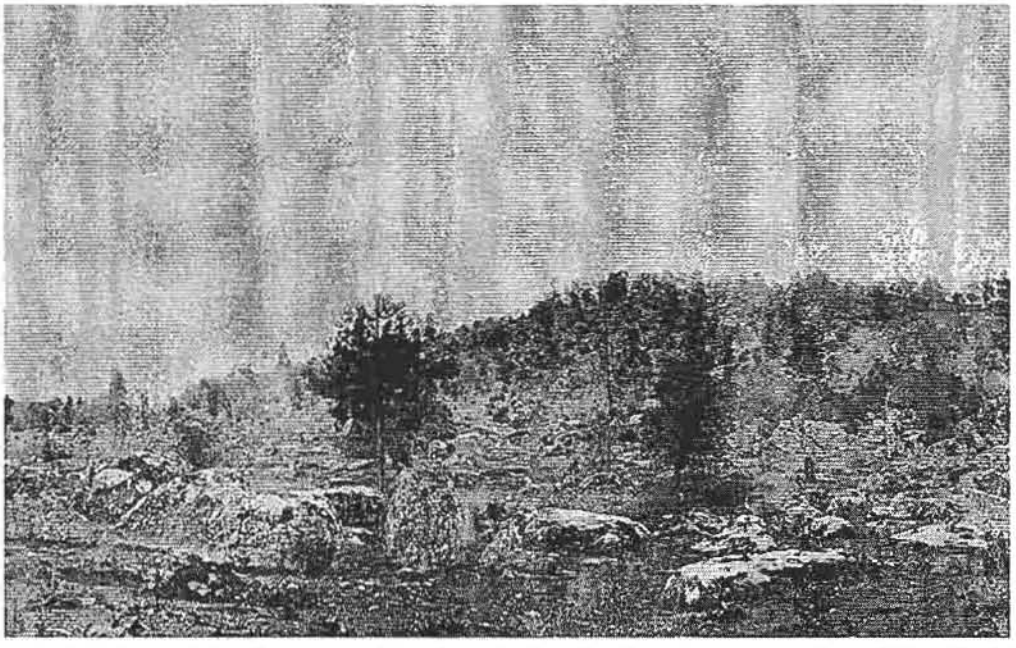


Figure 3-10 Little Round Top from Plum Run Gorge below Devil's Den, view northeast (Timothy O'Sullivan, July 1863). Numerous boulder outcroppings made the ground near the Round Tops and Devil's Den some of the roughest terrain on the battlefield. (GNMP #2B-2085)

Boulder outcroppings located on a hill or ridge could affect the battle in two ways. They became an Obstacle to the orderly and rapid movement of troops in all three branches of the armies (infantry, artillery and cavalry). This was especially true of infantry units, who were moving in line of battle. At times these boulders also provided Cover and Concealment for troops. Although larger boulders were obviously greater obstructions or afforded better cover, even smaller stones and outcroppings could and did heavily influence the battle.

General Treatment Principles

Over the last 140 years, hills and ridges have changed. In some cases, they have changed as a result of a natural process, such as a flood or natural wind or soil erosion. Such change is a naturally occurring process, and is an expected part of the natural evolution of battlefield parks. In other cases, change has occurred as a result of NPS or private owner activities, such as road building, agricultural clearing, bulldozing of boulders in farm fields or other activities.

NPS will not undertake activities that would change the ***historic limits, height or grade*** of any hill or ridge found within Gettysburg National Military Park. NPS will not remove ***boulder outcroppings*** or other natural features that contribute to the setting of hills or ridges. In general, this includes activities that significantly change the topography of hills and ridges, such as building of new roads, leveling of ridgetop areas for farm fields, or actions that will artificially increase soil erosion. Where such activities have occurred within the park, they will be reversed.

Examples Illustrating Possible Treatment

One of the most dominant topographical features on the battlefield was **Little Round Top**, for it became Key Terrain for the Army of the Potomac, and at the same time provided excellent Observation and artillery positions along with Cover and Concealment for Northern units. The hill also became a major Obstacle to the attacking Southern troops during the fighting on July 2.

Rising nearly 160 feet above the surrounding terrain, Little Round Top became one of the most important features for the Union army during the last two days of the battle. On July 2 this "high, rocky, and broken peak formed the natural termination" of its "fishhook" battle line. The hill not only provided a strong anchor for the left flank of the Union line but also protected the Taneytown Road to the east, behind the Union line. Possible disaster faced the Union army if the hill fell to the assaulting Confederate troops on July 2.[21]

Making Little Round Top even more valuable to the Union army was the Observation it provided. The western face of the hill had been cleared of woods before the battle and the view to the southwest, west and north was therefore nearly unobstructed. Maj. Gen. George Sykes, whose Fifth Corps was charged with defending this vital terrain on July 2, reported, "A rocky ridge, commanding almost an entire view of the plateau held by our army, was on our extreme left." The Union Signal Corps promptly placed a station upon the hill "and from this point the greater part of the enemy's forces could be seen and their movements reported." The Observation the hill afforded also made the hill an ideal artillery platform. This artillery was extremely effective during the fighting on both July 2 and 3. During "Pickett's Charge" on July 3 the Union cannon on Little Round Top had an unobstructed view of the Confederate advance, allowing them to deliver a devastating flanking fire upon the assaulting columns. A Confederate officer in Pickett's Division recalled this fire:

> ...the...[Union battery]... posted on the mountain, about 1 mile to our right,...enfiladed nearly our entire line with fearful effect, sometimes as many as 10 men being killed and wounded by the bursting of a single shell.[22]

Once Little Round Top was occupied by Northern units it became a formidable Obstacle to the assaulting Confederates. Numerous Confederate reports mentioned the hill's height, along with the broken, rocky and rough nature of the ground as a hindrance to their attacks. Gen. Longstreet called Little Round Top "a commanding hill, which is so precipitous and rough as to render it difficult of ascent." Other comments from Southern officers described the hill as a "mountain...which we found to be the strongest natural position I ever saw," or "almost impregnable." The extreme roughness of the ground added to the Confederates' difficulties. Lt. Col. K. Bryan, commanding the 5th Texas, went so far as to state:

> Our failure was owing to the rocky nature of the ground over which we had to pass, the huge rocks forming defiles through which not more than 3 or 4 men could pass abreast, thus breaking up our alignment and rendering its reformation impossible.[23]

Once the opposing lines were locked into combat, these same rocks and boulders provided some Cover and Concealment for the men on both sides. A Texas soldier remembered:

> The sides of the mountain were heavily timbered and covered with great boulders... which afforded great protection to the men. Every tree, rock and stump that gave any protection from the rain of minie-balls, that was poured down upon us, from the crest above, were soon appropriated.[24]

Based on this analysis Little Round Top influenced the battle by becoming Key Terrain, providing excellent Observation, giving the Union army Cover and Concealment and by being an Obstacle to the Confederate attacks. Therefore, possible treatment of this hill would include preserving and maintaining its principal characteristics (***historic limits, height***) and historic appearance. This would include maintaining an historic open vista along the hill's western slope, managing visitor traffic to control erosion, preserving the historic ***grade,*** and preserving and maintaining the historic ***boulder outcroppings***.

One of the most important pieces of terrain for the Army of the Potomac was **Cemetery Ridge**. This "gentle elevation" begins just southwest of Cemetery Hill and runs southward approximately one and one half miles (2500 yards) to Little Round Top. Though not an imposing terrain feature, Cemetery Ridge was "well-defined," being "smooth and open," with its eastern slope being steeper (nearly 60 feet higher than the Taneytown Road), while the western slope is more gradual (less than 30 feet to the Emmitsburg Road). The ridge was Key Terrain for it determined the placement of a major section of the Army of the Potomac's line of battle, gave the Union army excellent Observation and provided Cover and Concealment to troops placed on its eastern slope. The ridge was also a slight Obstacle to assaulting Confederate units.[25]

One of the ridge's greatest attributes was the excellent field of fire it provided the Union artillery and infantry facing westward toward Seminary Ridge. Brig. Gen. Alexander Hays, commanding the 3rd Division, Second Corps, was placed on the northern end of the ridge and reported:

> On July 2 the division...was assigned a position on a ridge...facing westward. ...an open space of half a mile in our front afforded the artillery posted on the...flanks a fair field for effective fire.[26]

Though "in some places the surface [of the ridge] is but slightly elevated" numerous batteries were positioned along its length "wherever the slightest eminence could be obtained." A Massachusetts soldier described the expansive view from the crest of Cemetery Ridge:

> ...here the ground in front was nearly level to the Emmitsburg road after which there was a slight rise, then it slope gradually for nearly a mile...to the right could be seen Gettysburg—perhaps a mile distant to the left could be seen the round top [Little and Big Round Top].[27]

This unobstructed field of fire gave the Union defenders a great advantage against Confederate assaults upon the ridge on both July 2 and 3. Maj. Edmund Rice, 19th Massachusetts Infantry, positioned near the center of the Union line, later described the beginning of "Pickett's Charge," writing, "from the configuration of the ground, I had an excellent view of the advancing lines, and could see the entire formation of the attacking column."[28]

Another benefit of Cemetery Ridge was the Cover and Concealment it gave the Union army. Gen. Henry Hunt reported the crest of the ridge concealed "everything immediately behind it from the observation of the enemy." Brig. Gen. Alexander Webb, commanding a Second Corps brigade, reported that "three regiments of the brigade [were placed] under cover of the hill [ridge]." Lastly, the ridge became a slight obstacle to the Southern troops who stormed its western slope. Brig. Gen. Ambrose Wright, in describing his Georgia brigade's July 2 attack, called the ridge an "abrupt slope."[29]

Based on this analysis Cemetery Ridge influenced the battle by becoming Key Terrain, providing excellent Observation, giving the Union army Cover and Concealment and by being an Obstacle to the Confederate attacks. Therefore, possible treatment of this hill would include preserving and maintaining its principal characteristics (***historic limits, height***) and historic appearance. This would include maintaining the historic open vista, managing visitor traffic to control erosion, preserving the historic ***grade,*** and preserving and maintaining the remaining historic ***boulder outcroppings***.

SWALES AND RAVINES

Historic Use and Appearance

There are numerous swales and ravines, formed by streams or natural drainage areas, scattered across the Gettysburg battlefield. The drainage area that formed each determined its ***historic limits***. While many swales and ravines contained ideal soil for farming, others consisted of poorer soils or were otherwise unproductive. Factors that contributed to this futile condition included the swale or ravine's unusual ***depth***, steep ***grade*** or the geological formations beneath the surface. These factors, alone or in combination, sometimes resulted in the existence of wetlands at the bottom of these features (See "Wetlands" above). Still other swales or ravines were unproductive because of the numerous ***boulder outcroppings*** they contained.

How Swales and Ravines Influenced the Battle

The level at which swales and ravines impacted the battle depended on how the characteristics described above affected the evolution of the battle and battle movements. Many swales and ravines became Obstacles to troops attempting to move through them. Swales and ravines also provided Cover and Concealment for troops moving through them or occupying them.

The ***historic limits*** affected the extent to which the swale or ravine became an Obstacle or provided Cover and Concealment. Larger and wider swales or ravines posed more of an Obstacle to advancing troops who moved through them or bypassed them. Conversely, larger swales and ravines allowed larger bodies of troops to occupy them and thus receive the benefit of the Cover and Concealment they provided.

The ***depth*** of a swale or ravine determined the amount of Cover and Concealment it gave to troops occupying it. Conversely, the deeper a swale or ravine was, the more of an Obstacle it became for troops passing through it.

Grade heavily influenced the extent to which a swale or ravine was an Obstacle. The steeper the slope, the more of an Obstacle it became for troops to move through it, both up and down slope.

Some swales and ravines contained ***boulder outcroppings*** that affected the battle in two ways. They became an Obstacle to the orderly and rapid movement of troops in all three branches of the armies (infantry, artillery and cavalry). This was especially true of infantry units, who were moving in line of battle. At times these boulders also provided Cover and Concealment for troops. Although larger boulders were obviously greater obstructions or afforded better cover, even smaller stones and outcroppings could and did heavily influence the battle.

General Treatment Principles

Over the last 140 years, swales and ravines have changed. In some cases, they have changed as a result of a natural process, such as a flood or natural wind or soil erosion. Such change is a naturally occurring process, and is an expected part of the natural evolution of battlefield parks. In other cases, change has occurred as a result of NPS or private owner activities, such as contour farming or other agricultural activities.

NPS will not undertake activities that would change the ***historic limits, depth or grade*** of any swale or ravine found within Gettysburg National Military Park. NPS will not remove ***boulder outcroppings*** or other natural features that contribute to the setting of swales or ravines. In general, this includes activities that significantly change the topography of historic swales and ravines, such as

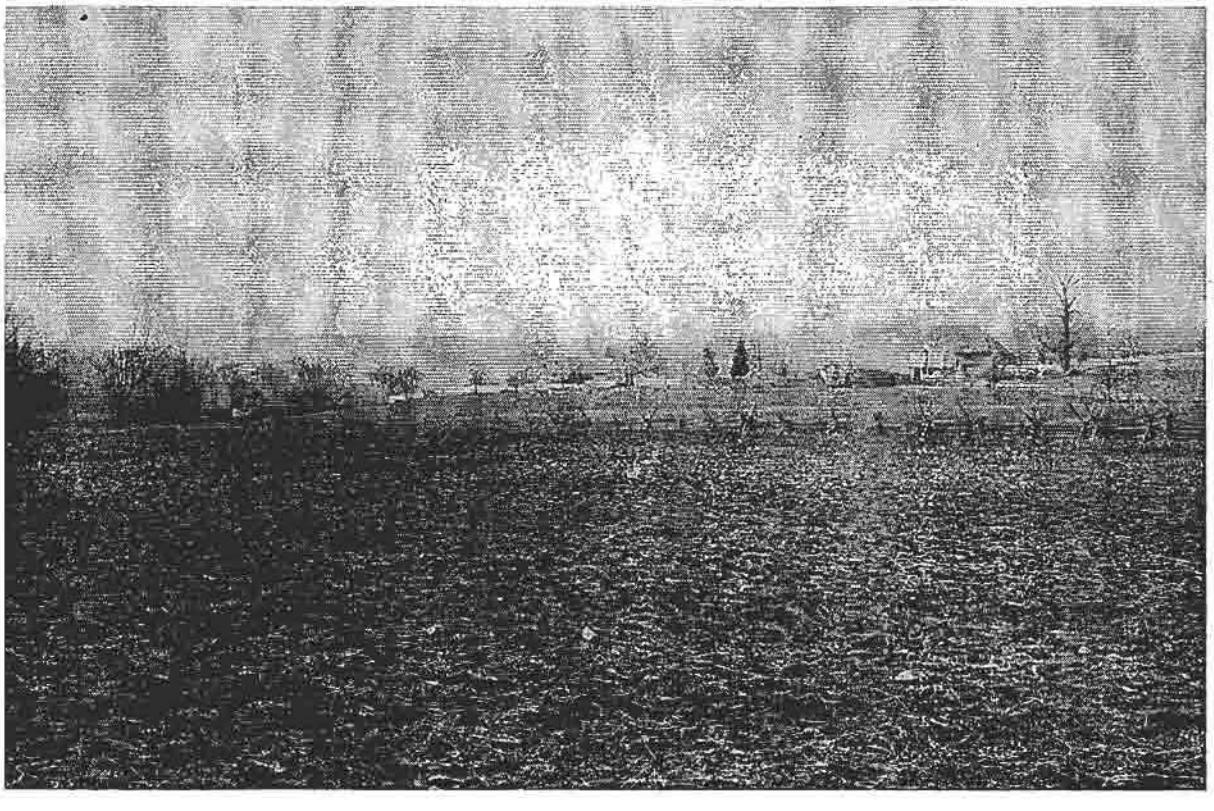


Figure 3-11 The George Rose farmstead from the Wheatfield Road, view southeast (ca. 1890). Rose Run Swale is located in the middle foreground, between the Virginia worm fencing and the farmstead proper (note the fence line disappears from view as it runs from right to left across the photograph). On July 2, 1863 Confederate troops of Brig. Gen. J. B. Kershaw's brigade, crossing the field from right to left, gained cover as they moved into the depression created by the run. (GNMP # OS-2752)

development of contour farming, use of historic swales and ravines to remove water from new roads or construction or similar activities. Where such activities have occurred within the park, they will be reversed.

New swales have been developed throughout the park as a result of the addition of tile drains and the development of modern contour farming. In other cases, new swales have been added to drain roads and avenues. Where these artificial modern swales would be confusing to the public, and where interpretation of battle action would be enhanced by their removal, modern swales will be eliminated.

Example Illustrating Possible Treatment
Rose Run, a small tributary of Plum Run that begins near the Emmitsburg Road and runs generally southeastward, created a small swale or ravine north of the George Rose farmstead. The Rose Run Swale benefited some of the attacking Confederates on July 2 by providing Cover during their advance. This was especially true for the left wing of Brig. Gen. Joseph B. Kershaw's Brigade that used the ravine to gain Cover from Union batteries on the Peach Orchard Knoll. A Union artillery officer recalled, "Part of (Kershaw's Brigade) moved...toward us until concealed in a little hollow running parallel to our front."[30]

Based on this analysis this swale influenced the battle by providing Cover and Concealment to Confederate units during their assaults. Therefore, possible treatment of this feature would include preserving and maintaining its principal characteristics (***historic limits, depth, grade***) and historic appearance, including the remaining ***boulder outcroppings*** present within the ravine.

PLAINS

Historic Use and Appearance
The Gettysburg landscape consists mostly of gently rolling terrain, interspersed with higher ridges and hills. Despite the predominant undulating nature of the terrain, there were a few plains, areas of relatively flat, open land, present on the landscape. Typically these plains consisted of good soil and therefore were used primarily for crop land. Several factors made these areas ideal for raising crops, including their large ***historic limits,*** their ***grade,*** the lack of intervening tall or woody ***vegetation*** and the absence of ***boulder outcroppings***. The open character of a plain, however, usually resulted in the construction of numerous fence lines to separate the various crop fields present on the plain.

How Plains Influenced the Battle
The existence of plains, and their impact upon the battle depended upon the characteristics described above and on the evolution of the battle and battle movements. Consisting of relatively flat ground that was free of natural obstructions, plains were especially ideal as Avenues of Approach and provided excellent Observation and fields of fire from, into or over them.

The ***historic limits*** of a plain determined its usefulness as an Avenue of Approach, because the larger and wider a plain was, the more troops could pass through it at the same time. Larger plains were also more attractive as an Avenue of Approach for they contained fewer obstacles and therefore allowed for the rapid movement of troops. The ***historic limits*** of a plain could also influence the Observation and fields of fire of other adjacent terrain features, such as hills and ridges, into and over it. The larger the plain, the longer a unit would be under the field of fire of opposing artillery and infantry while attempting to cross it. Since plains in general were relatively flat, their easy ***grade*** also made them relatively

attractive as Avenues of Approach.

The lack of ***intervening vegetation*** was one of the primary reasons plains were good Avenues of Approach and provided great Observation. This characteristic gave plains an open character, that allowed units to move and maneuver without natural hindrances, while at the same time keeping the enemy in sight and also providing them clear fields of fire from the plain. Conversely, any unit moving over or across a plain had less cover and thus was subject to more accurate enemy fire during their approach.

Plains usually lacked ***boulder outcroppings***. This characteristic, much like the lack of vegetation, made plains attractive as Avenues of Approach, since these outcroppings usually presented a obstacle to the orderly and rapid movement of troops. This was especially true of infantry units, who were moving in line of battle.

General Treatment Principles

In many locations throughout the park, the original topography and elevation of plains has changed. Almost all of this change is the result of activities undertaken to modernize agriculture within the park.

In the future, NPS will not undertake activities that would change the ***historic limits*** or ***grade*** of plains found within Gettysburg National Military Park. In general, this includes activities that significantly change the topography of plains, such as contour farming, regrading for drainage, or other similar activities. Where such activities have occurred within the park, and the changes detract from the public's ability to understand the historic events that occurred in that location, they will be reversed.

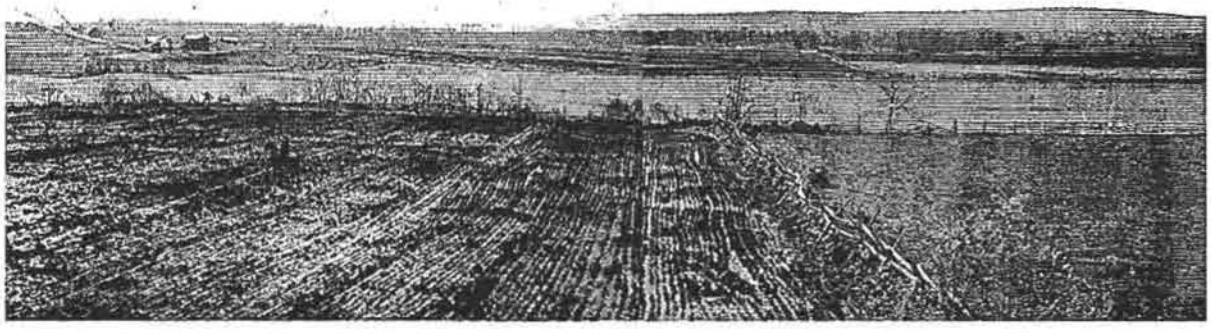


Figure 3-12 The field of Pickett's Charge, view westward from Cemetery Ridge (William Tipton, 1881). This broad plain was seen by the Confederate high command as an ideal Avenue of Approach, for it allowed rapid movement across it and thus was used during two Confederate attacks (July 2 and July 3) against the Union line on Cemetery Ridge. The field's lack of Cover, however, gave the Union defenders excellent Observation and fields of fire over and into it. That, along with the numerous farmsteads and fence lines which helped break up the Southern formations, resulted in the repulse of both assaults. (GNMP, Tipton #2650 and Tipton #2651)

Example Illustrating Possible Treatment

Between Cemetery Ridge and Seminary Ridge is a broad open plain. Although made famous by the grand Confederate assault across it on July 3, 1863 this field was also an Avenue of Approach for several Confederate brigades during the fighting on July 2, 1863. The field's extensive size and limited

cover eliminated any chance for the Confederates to surprise the Union defenders, thus giving them ample opportunity to break up the Confederate attacking formations. Making any advance across the field especially difficult was that the area was subject to both a frontal and flanking fire from Union batteries positioned on Cemetery Hill, Cemetery Ridge and Little Round Top. The field contained numerous fences and three farmsteads (William Bliss, P. Rogers and Nicholas Codori), all of which slowed down and confused the Southern ranks. The only Cover available to the Confederates were numerous swales and small ridges in the field that temporarily put the Southern soldiers in defilade during their advance.

One of the Confederate brigades to attack on July 2nd was commanded by Brig. Gen. Ambrose Wright, who reported, "In this advance, I was compelled to pass for more than a mile across an open plain, intersected by numerous post and rail fences, and swept by the enemy's artillery...." In describing the planning for Pickett's Charge on July 3, Lt. Gen. James Longstreet expressed a concern over the width of the field writing, "The distance to be passed over under the fire of the enemy's batteries, and in plain view, seemed too great to insure great results...."[31]

Based on the above analysis this plain influenced the battle by providing Confederate units an ideal Avenue of Approach during their assaults against the Union battle line, for it lacked steep elevations, intervening vegetation and boulder outcroppings, all of which allowed for a rapid advance across it. The plain's lack of vegetation also provided excellent Observation for both Confederate units, especially artillery batteries, placed on Seminary Ridge and Union artillery and infantry on Cemetery Ridge. The plain's drawbacks included the lack of Cover and Concealment available to the Confederate units during their assaults and the large number of fence lines present, which slowed their advance.

However, ithin the last 30 years part of this plain, located east of the Virginia Memorial, was radically altered by regrading to produce a deep, artificial swale. It did not work as its builders hoped, and has gradually deepened through erosion to bedrock in some locations. Therefore, possible treatment of this feature would include preserving and maintaining its principal characteristics where they remain and restoring the 1863 topography to eliminate the artificial swale not present in 1863.

STREAM BANKS

Historic Use and Appearance

Several streams that passed through the battlefield cut gouges at various locations, thus creating steep banks at the stream's edge. These banks had some influence on the location of crossing points for everything from roads, pikes and lanes to cattle crossings on individual farms. Characteristics of stream banks that determined a crossing point included its ***length, depth*** and ***grade***. Obviously a stream bank that consisted of a long length, great depth or steep grade (either singlely or in combination) was to be avoided in favor of one that was level with the streambed and consisted of an easy grade.

How Stream Banks Influenced the Battle

The impact a steam bank had on the battle depended upon the variability in the characteristics described above and the evolution of the battle and battle movements. Some stream banks provided Cover and Concealment, become Obstacles to troops attempting to pass through them or impacted Observation from them.

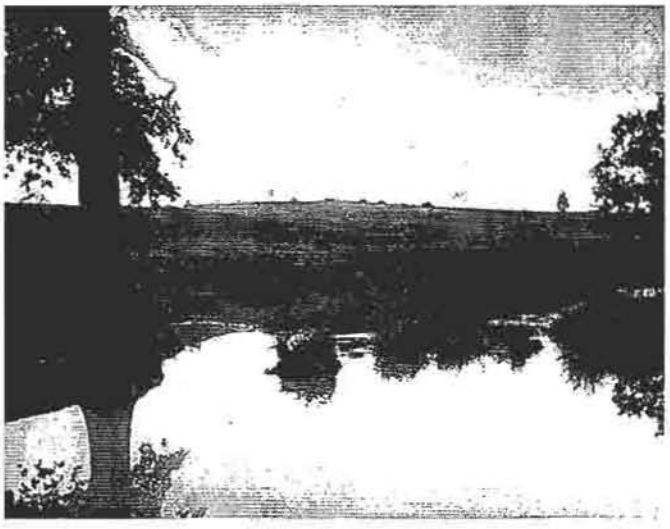


Figure 3-13 "Barlow's Knoll—from Rock Creek," (William Tipton, ca. 1897). Visible here is one of the locations along Rock Creek where the shallow stream banks allowed the passage of Confederate troops during their attacks against the Union line at Barlow's Knoll on July 1, 1863. Along other sections of Rock Creek the streams banks were so steep that movement across the stream was extremely difficult. (GNMP, Tipton #4317)

A stream bank's ***length*** determined to what level it become an Obstacle to troops crossing it and also how much Cover and Concealment it provided to troops occupying it. Longer stretches of steep banks posed more of an Obstacle as they affected a great number of advancing troops, especially infantry moving in line of battle. Conversely, longer sections of stream banks allowed for larger bodies of troops to occupy them and thus receive the benefit of the Cover and Concealment they provided.

The ***depth*** of a stream bank also determined how much of an Obstacle it became and the level of Cover and Concealment they gave troops occupying the stream bed. The deeper the stream banks were the more of an Obstacle they became for troops passing through the stream. The ***depth*** of a stream bank also impacted the Cover and Concealment they provided. Shallow stream banks provided less cover than deeper ones. Conversely, if a stream bank was too deep, it impacted the Observation of troops occupying it for they could not see over the bank or out of the stream bed.

Grade heavily influenced the extent to which a stream bank became an Obstacle. The steeper the slope, either up or down, the more difficult the stream became for troops to move through.

General Treatment Principles

Over the last 140 years, the banks of battlefield streams has changed. Some of this change is a naturally occurring process, and is an expected part of the natural evolution of battlefield parks. However, other changes to stream banks have occurred because of use by cattle, erosion caused by agricultural practices and other human-caused events.

NPS will not undertake activities that would change the ***historic depth***, ***length*** or ***grade*** of any stream bank found within Gettysburg National Military Park. In general, this includes allowing cattle unfettered access to stream banks, allowing farmers to place new crossings along stream banks, and other agricultural or maintenance activities that change the depth or grade of a stream bank. Where such activities have occurred within the park, they will be reversed.

Examples Illustrating Possible Treatment

Rock Creek, as it passes east of Barlow Knoll northeast of Gettysburg, contains several sections were the banks are rather steep. These steep stream banks became an Obstacle to Confederates attacking

across the creek on July 1, 1863. As his brigade moved against the Union right that afternoon, Brig. Gen. John B. Gordon reported "crossing a creek whose banks were so abrupt as to prevent a passage excepting at certain points."[32]

Based on this analysis this stream bank influenced the battle by becoming an Obstacle to Confederate units during their attacks against the Union line on Barlow's Knoll. Therefore, possible treatment of this feature would include preserving and maintaining its principal characteristics, including ***length, depth, grade*** as these factors determined the level the bank became an Obstacle to these Southern soldiers.

Rose Run, as it passes near the southwest corner of the Wheatfield, contains a section were its banks are somewhat sunken. During the fighting near the Wheatfield on July 2, 1863 these sunken banks provided some Cover for the attacking Confederates. One Georgia officer remembered, "A little brook made a natural ditch some two or three feet deep, and...with its grassy banks made a fine natural rifle pit."[33]

Based on this analysis this stream bank influenced the battle by providing Cover and Concealment to Confederate units during their assaults against the Wheatfield. Therefore, possible treatment of this feature would include preserving and maintaining its principal characteristics, including ***length, depth, grade*** since these factors determined the amount of Cover the bank provided.

[1] "Plan for Adding Woods to the General Management Plan Resource Area at Gettysburg National Military Park," (T. W. Bowersox, July 2002), pp. 1-2; Gerald L. Storm, et al, Woodlots and Landscape Features at Gettysburg National Military Park (College of Agriculture, Penn State University, 2002), pp. 28-29.

[2] "Plan for Adding Woods," p. 2.

[3] "Plan for Adding Woods," p. 2.

[4] "Plan for: Increasing the Sustainability of Woodlots in the General Management Plan Resource Area at Gettysburg National Military Park." (T. W. Bowersox, July 2002), p. 1.

[5] "Plan for: Increasing the Sustainability of Woodlots," pp. 2-3.

[6] United States War Department, The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies, 70 vols. in 128 parts (Washington, D.C.: Government Printing Office, 1880-1901), series I, Vol. 27, pt. 2, pp. 643 (Maj. J. Jones), 646 (Lt. Col. S. G. Shepard), (hereafter cited as OR. All subsequent notes are from series I, Vol. 27).

[7] OR, pt. 1, p. 425 (Capt. Henry Coates), 472 (Lt. Col. James Bull), pt. 2, pp. 618 (Brig. Gen. Cadmus Wilcox), 631, 632 (Col. David Lang); Letter from Capt. Charles Richardson to John Bachelder, May 8, 1868, BP; Judge George Clark, "Wilcox's Brigade at Gettysburg," Confederate Veteran, Vol. XVII, January, 1909, No. 1, p. 229. The three Confederate brigades that reached the swale on July 2 were commanded by Brig. Gen. William Barksdale, Brig. Gen. Cadamus Wilcox and Col. David Lang (Perry's Brigade). The Union regiments were those of Col. George L. Willard's Brigade and the 1st Minnesota Infantry. Both Willard and Barksdale were killed during this action. On July 3, Wilcox's and Lang's brigades advanced into the swale a second time.

[8] OR, pt. 2, p. 632 (Col. David Lang).

[9] OR, pt. 1, p. 884 (Lt Col. Freeman McGilvery). The first force mentioned by McGilvery were the brigades of Brig. Gen. Cadamus Wilcox and Col. David Lang.

[10] See, Figure 30 "Wetlands, Streams and Floodplains," Final General Management Plan and Environmental Impact Statement, Vol. 1 (Gettysburg National Military Park, June 1999), pp. 214-215.

[11] GMP, Vol. 1, p. 177.

[12] OR, pt. 1, p. 403 (Col. William Baily), pt. 2, p. 401 (Maj. H.D. McDaniel); Diary of 1st Lt. J.C. Reid, 8th

Georgia Regiment, Alabama Department of Achieves and History.

[13] 1901 Gettysburg National Park Commission, Map of the Battlefield at Gettysburg (Gettysburg, Pennsylvania, 1901, (hereafter cited as 1901 GNP Map); OR, pt. 1, pp. 759, 760 (Maj. Gen. Henry Slocum), pt. 2, p. 492 (Brig. Gen. John B. Gordon); Lee, "Reminiscences," p. 56; William Thomas Diary, transcription in GNMP Library; Frederick Tilberg, "Descriptive Account of Rock Creek," NPS Report, September 1939, Waterways in Adams County folder, "Reports 1939-1946," GNMP Archives; Kathleen Georg Harrison, "A Day Book of the Gettysburg Campaign, June 3-August 1, 1863, unpublished study, GNMP Historian's Office, entries from June 17-June 30, 1863; Thomas L. Elmore, "A Meteorological and Astronomical Chronology of the Gettysburg Campaign," The Gettysburg Magazine, Issue 13, July 1995 (Morningside Press, Dayton, Ohio), pp. 8-10. The depth of Rock Creek between Hanover Road and the Baltimore Road varied between 1-5 feet (at low water). In the two weeks preceding the battle, there was some level of precipitation (heavy storms, rain or drizzle) ten days, including the last six days of June (June 25-June 30).

[14] 1872 Corrected Warren Map; Gregory Coco, A Vast Sea of Misery, A History and Guide to the Union and Confederate Field Hospitals at Gettysburg, July 1-November 20, 1863 (Thomas Publications, Gettysburg, Pennsylvania, 1988), pp. 61-62, 62-63, 74-75. The three Union hospitals were those located at the farmsteads of Catherine Guinn, Lydia Leister and Nathaniel Lightner.

[15] Andrew Brown, Geology and the Gettysburg Campaign (Commonwealth of Pennsylvania, Department of Environmental Resources Management, 1983), pp. 1, 13.

[16] OR, pt. 1, p. 526 (Col. Thomas Egan), 646 (Maj. Arthur Lee).

[17] Stevenson Fletcher, Pennsylvania Agriculture and Country Life,1640-1840 (Pennsylvania Historical and Museum Commission, Harrisburg, 1950), p. 371. Fletcher states that "By far the most important considerations in locating the...home were quality of soil, transportation facilities and access to a spring or other water supply."

[18] A small number of springs were reputed to have medicinal value. The most famous of these was the Gettysburg Katalysine Springs. This spring is located west of the town on the Emanuel Harmon farm, in the small valley formed by Herr Ridge and McPherson Ridge. Though the supposed recuperative powers of the water were discovered before the Civil War, the spring's fame and popularity were, in a large part, due to the battle. Post-war sources indicate the springs might have been used by the Confederate army during the battle, or by wounded soldiers "to slake their thirst and bathe their wounds." Claims of water's healing power were wide-spread and included, but were not limited to, problems of the bladder, distorted limbs, enlarged joints, skin diseases, dyspepsia, liver and kidney problems, neuralgia, anemia, nervous disorders, rheumatism, urinary disorders, gout, typhoid fever, piles and mental depression. From a military perspective the spring had the same general characteristics and uses as general springs. After the war this site was developed into a resort by the Gettysburg Springs and Hotel Company and was commonly referred to as the Springs Hotel. It is today the site of the Gettysburg Country Club golf course. (See, Kathy Georg Harrison, "The Significance of the Harmon Farm and the Springs Hotel Woods," unpublished NPS study, 1991, GNMP Historian's Office, pp. 27-42 and Whitney Brothers, The Gettysburg Katalysine Water [Gettysburg Spring Company, 1872], copy in John Nicholson Scrap Book, Gettysburg National Park Commission, GNMP Archives, pp. 3, 4, 6-8, 13-19, 38).

[19] Coco, A Vast Sea of Misery, p. 70.

[20] Andrew Brown, Geology and the Gettysburg Campaign (Bureau of Topographic and Geologic Survey, 1962), pp. 1, 9-14; William R. Shirk, A Guide to the Geology of Southcentral Pennsylvania (Robson and Kaye, Inc., Chambersburg, Pennsylvania, 1980), pp. 64-66, 74-75.

[21] 1901 GNP Commission Map; OR, pt. 1, p. 232 (Brig. Gen. Henry Hunt), 368 (Maj. Gen. Winfield Hancock), 617 (Col. James Rice).

[22] OR, pt. 1, pp. 202 (Capt. Lemuel Norton), 592 (Maj. Gen. George Sykes), 659 (Capt. August Martin), pt. 2, p. 386 (Maj. Charles Peyton).

[23] OR, pt. 2, pp. 358 (Lt. Gen. James Longstreet), 399-400 (Capt. George Hillyer), 412 (Lt. Col. Bryan), 415 (Brig. Gen. Henry Benning).

[24] Val C. Giles, 4th Texas, as quoted in, J.B. Polley, Hood's Texas Brigade, Its Marches, Its Battles, Its Achievements, (Reprint, Morningside Bookshop, Dayton, Ohio, 1976), p. 173.

[25] OR, pt. 1, pp. 116 (Maj. Gen. George Meade), 232 (Brig. Gen. Henry Hunt); Hunt, "The Second Day of Gettysburg," Battles and Leaders of the Civil War, Vol. III, (The Century Company, New York, 1884-1887), p. 295; 1901 GNP Commission Map.

[26] OR, pt. 1, p. 453 (Brig. Gen. Alexander Hays).

[27] Greg Coco, From Ball's Bluff to Gettysburg...and Beyond, (Thomas Publications, Gettysburg, Pennsylvania, 1994), p. 197. Roland Bowen was a member of the 15th Massachusetts Regiment.

[28] Edmund Rice, "Repelling Lee's Last Blow at Gettysburg," Battles and Leaders, Vol. III, pp. 387-388.

[29] OR, pt. 1, pp. 232 (Brig. Gen. Henry Hunt), 427 (Brig. Gen. Alexander Webb), pt. 2, p. 623 (Brig. Gen. Ambrose Wright).

[30] Charles Phillips to John Bachelder, n.d., in David and Audrey Ladd, The Bachelder Papers, Gettysburg in Their Own Words (Morningsdie Press, Dayton, Ohio, 1995), vol. 3, p. 1632.

[31] OR, pt. 2, pp. 359 (Lt. Gen. James Longstreet), 623 (Brig. Gen. Ambrose Wright).

[32] OR, 2, p. 492 (Brig. Gen. John Gordon).

[33] George Hillyer, "Battle of Gettysburg," Address Before the Walton County Georgia Confederate Veterans, August 2nd, 1904, Walton Tribune.

Chapter 4
DEFENSE WORKS

Although military leadership was still debating the value of defense works in 1863, units in both armies did construct such works at Gettysburg. These improvements were constructed from a variety of materials that were readily available, including, rocks and stones, fence rails, trees and earth. The works considered under this category were built independent of, and in addition to, the agricultural stone walls and fences that already existed on the field (See "Fences" above for analysis of those features).[1] Compared to the elaborate entrenchments constructed by Civil War armies later in the war (1864-1865), the defensive works on the Gettysburg battlefield were modest, yet were still substantial enough to provide protection and influence the fighting. Defense works are defined by two categories; stone walls and earthen.

STONE WALLS BUILT DURING THE BATTLE

How Stone Wall Defenses Influenced the Battle

Because much of the battlefield was rocky in nature, particularly south of town, stones were readily available for use in the building of defense works. The majority of these stone walls were constructed in the vicinity of Little Round Top, Big Round Top and Devil's Den. Most of these walls were constructed during lulls in the fighting, since soldiers stacked them to either strengthen a defensive line or to consolidate a position that had been gained through offensive action. Many of these defensive stone works were impressive, both in ***height*** (approximately two to three feet) and ***mass,*** although not constructed for permanence.

Much like stone walls built by farmers, these stone defense works provided good durable Cover and Concealment and proved to be Obstacles during the battle.[2] The higher the wall the better Cover it offered, while increasing its ability to Conceal troops behind it. These walls also became obstacles to troop movement.

General Treatment Principles

Defensive stone works were built in many places around the battlefield. Some of these stone walls have been protected and maintained, and where they remain, they will continue to be preserved. When necessary to maintain these walls, they may be restacked or sections may be reconstructed.

Sadly, as late as the 1980s, NPS robbed many of these defense works (and in some cases, stone walls built by farmers) to find the stones needed for construction of Virginia worm fences, building foundations, and other building purposes. This has had the effect of reducing the height and jeopardizing the stability of these walls.

In other cases, stone walls that were protected and maintained through the War Department era have now been scattered or removed. When these defense works can be properly documented, they should be reconstructed.

This treatment could include gathering the scattered stones and restacking, repairing, or if needed, rebuilding these defensive structures. Routine maintenance will be required to ensure that these structures persist.

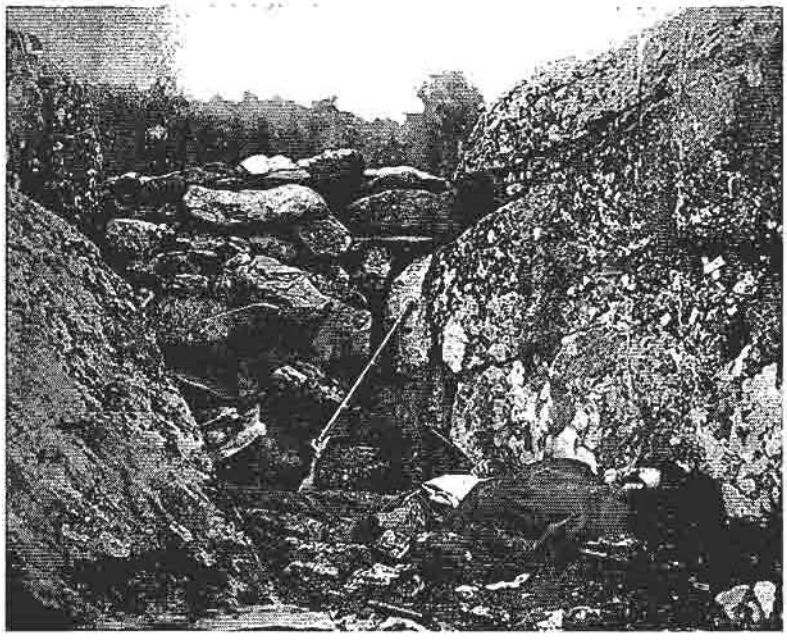


Figure 4-1 This famous photograph of the dead Confederate "sharpshooter" in Devil's Den (Timothy O'Sullivan, July 1863) provides an excellent example of the incorporation of existing boulders in the construction of stone wall defenses. (GNMP #2B-2067)



Figure 4-2 Stone wall defense works, northwest slope of Little Round Top, view north (Mathew Brady, July 1863). The man posing behind the wall makes its height and mass clearly evident. (GNMP #2B-2097)



Figure 4-3 4th Ohio Monument, Emmitsburg Road, (c. 1887). This photograph, looking east/northeast towards Ziegler's Grove, clearly shows a stone wall extending north-south along Cementery Ridge (seen in the backgroud on both sides of the monument). This wall represented defensive works constructed during the battle and was maintained by the War Department through the 1890s. For some unexplained reason it was torn down around the turn of the century. (GNMP, Tipton #6017)

Example Illustrating Possible Treatment

Extensive defensive stone works were built at ***Little Round Top*** during the battle (July 2-3, 1863) by Union troops defending the left flank of the army against Confederate attacks. These stone walls were photographed after the battle and were among the first battle-related features to be preserved. The War Department carefully maintained these walls through the early 1930s. However, these walls are inherently unstable and require routine maintenance to preserve their structural integrity. Increasing pedestrian traffic has contributed to undermining them. NPS has not maintained these walls, and many of the stones have now been scattered. In a few cases, all evidence of the battle-built stone wall are gone. NPS should treat these walls by obtaining replacement stone that is similar in color and size to the missing stones, and restoring their original height and historic appearance.

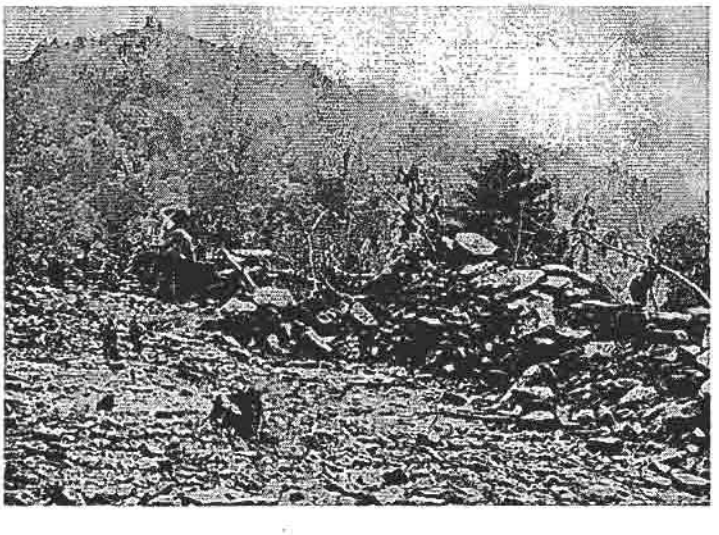


Figure 4-4 Stone wall defense works, crest of Little Round Top, view south toward Big Round Top (Mathew Brady, July 1863). These stone walls were constructed by Union soldiers on the evening of July 2, 1863. (GNMP #2B-2114)

EARTHEN WORKS AND LUNETTES

How Earthen Defense Works Influenced the Battle

Across the battlefield both armies constructed earthen works and lunettes for protection. Unlike defense works made exclusively from stone, earthen works were made from a variety of ***materials***, including rails, timber, rocks, dirt, personal equipment, etc. Methods of construction varied. Some were simply made by stacking material to create a barrier, while others were more elaborate, and included the digging of trenches or, placement of head logs. The ***height*** and ***mass*** of each work was dependent upon a variety of factors, including the work's location, the availability of materials and entrenching tools, and the direction given by officers. Since the amount of time available to most troops was limited, many of these earthen works were only one to three feet in height. Other works were more elaborate, such as those constructed by the Union Twelfth Corps on Culp's Hill, and resembled log cribs filled with stone and earth. Some were as high as five feet.[3]

Much like stone walls, earthen defense works provided good Cover and Concealment and proved to be Obstacles during the battle. The impact of these defense works depended upon the characteristics described above and the battle movements and actions that occurred in front of each earthen work.



Figure 4-5 Union defense works on Culp's Hill (Mathew Brady, July 1863). These defense works were constructed by the Union 12th Corps on the morning of July 2, 1863. Earth works defenses varied greatly in design and construction as soldiers used whatever materials and tools that were readily available. This section of works consists mostly of rocks and logs. Other Union defense works on Culp's Hill were made by felling trees and then digging a small trench along the inside, the dirt being thrown toward the front. Some even had head logs placed several inches above the main work, thus providing its defenders almost complete protection. (GNMP #2B-2115)



Figure 4-6 Union artillery lunettes on East Cemetery Hill, view north (Frederick Gutekunst, July 1863). These lunettes were constructed on the night of July 1, 1863 and protected the guns belonging to Lt. James Stewart's Battery B, 4th U. S. Artillery. Note the use of rails from a dismantled fence on the inside of the lunettes. (GNMP #2B-2031)

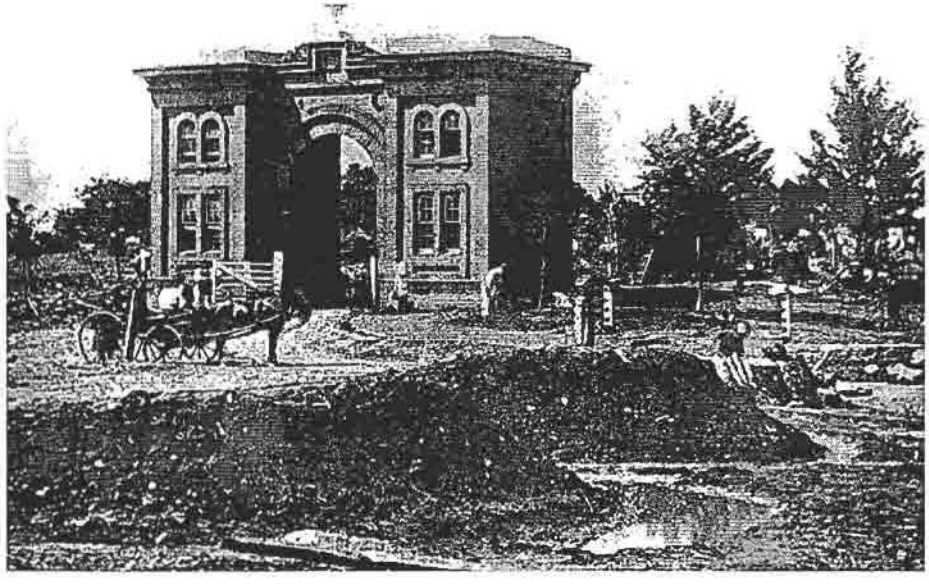


Figure 4-7 Evergreen Cemetery Gatehouse (Timothy O'Sullivan, July 1863). The artillery lunettes in foreground are the same as those shown in the previous photograph as seen from the front. (GNMP #2B-2027)

General Treatment Principles

The Gettysburg Battlefield Memorial Association rebuilt many of these earthen defense works as commemorative features, and these were preserved and maintained by the War Department. The treatment of rebuilt commemorative works will be discussed in the Commemorative Treatment Philosophy.

However, some of the battlefield's earthen works were not rebuilt and remain as 1863 features. Appropriate preservation and maintenance of these features is crucial in order to perpetuate the only existing intact battle-era earthworks remaining on the field.

Earthen works built in the open but now wooded: These earthworks were built specifically to provide Cover for troops. In these cases the absence of vegetation provided a excellent field of fire in front of the work. The woods that have now overgrown these works obscure the field of fire. Although woods provide marginally better protection from erosion than good grassland, in these cases, the trees should be removed to reestablish the field of fire available to the soldiers manning the works. Stumps will not be ground, but will be allowed to decay naturally. Native species of grass will be established and maintained. The earthworks should be mowed using hand mowers (riding mowers and weed whackers can cause damage to these structures) every two to three years to prevent woody and exotic vegetation growth. Grass should be cut so that at least eight inches of grass remains after cutting to protect and provide possible bird nesting sites. Earthen works should be monitored annually, to ensure that grass is well established and that erosion is not occurring.

Earthen works built in the woods and still wooded: These specific earthworks provided Cover for troops under fire and were used purely for defensive purposes. As these works were constructed in wooded areas, they will remain wooded. However, in order to protect these structures from windthrow and other depredations caused from the loss of mature trees, all vegetation will be removed from the works on a regular basis. In general, the same methods used to remove individual trees in woodlots will be used to remove trees on earthen works. Trees will be cut using chain saws or other manual methods and felled directionally during the height of the winter to avoid damage to other trees.



Figure 4-8 "Earthworks from Steven's Knoll to Culp's Hill (William Tipton, ca. 1888-1889). This view shows some of the earthworks on McKnight's Hill (Steven's Knoll) and Culp's Hill that had recently been reconstructed by the Gettysburg Battlefield Memorial Association. (GNMP, Tipton #1846)

Trees that are cut will be removed off from the earthen work, limbed and left in the woodlands. Stumps will not be ground, but will be allowed to decay naturally. Earthen works should be monitored annually, to ensure that trees and other woody vegetation are located and removed. When necessary, grass or other woodland forbs will be established to ensure that erosion is not occurring.

Earthen Works rebuilt during the Commemorative Era: In general, earthen works rebuilt during the commemorative era should be treated in the same way as remaining 1863 earthworks. In some cases, reconstruction of damaged portions of commemorative works may be recommended; this issue will be discussed in the Commemorative Treatment Philosophy.

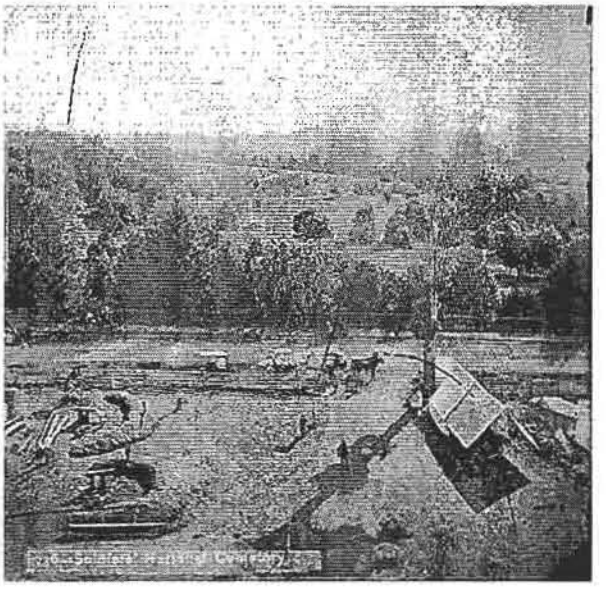


Figure 4-9 "Soldiers' National Cemetery" (William Tipton, 1878). The foreground of this image provides a clear example of the appearance of the reconstructed commemorative lunettes on East Cemetery Hill. These had been rebuilt by the Gettysburg Battlefield Memorial Association in 1873. These lunettes represent the same defense works of Lt. Stewart's Battery B, 4th U. S. Artillery seen in Figures 4-6 and 4-7 (GNMP, Tipton #1838A)



Figure 4-10 "Wadsworth's Field works—Culp's Hill," (William Tipton, c. 1898). The height and mass of these commemorative earthworks is easily discernable because the couple under the umbrella providesa scale for comparison. These works had been recently reconstructed by the Gettysburg Battlefield Memorial Association. (GNMP, Tipton #4300)

Example Illustrating Possible Treatment

A linear example of earthen works constructed in an open area that is now wooded are those located along Seminary Ridge north of the McMillian Woods. These works were built by troops of Hill's Confederate Corps in anticipation of a Union counterattack after Pickett's Charge. The War Department preserved them, but volunteer trees now have invaded the line of these works. These volunteer trees have now grown to a size where they may endanger the preservation of these 1863 works. The trees should be removed to protect the remains of these earthworks. NPS will also change its mowing regime to protect these works, and ensure that they are maintained in native grass cover.

[1] Frederick Tilberg, "Report on Field Defenses on the Battlefield of Gettysburg," NPS report, April 2, 1943, Reports 1934-1946, GNMP Archives.

[2] Tilberg, "Report on Field Defenses on the Battlefield of Gettysburg," pp. 20-22.

[3] Tilberg, "Report on Field Defenses on the Battlefield of Gettysburg," pp. 6-20, 22-23.

Chapter 5
INDUSTRIAL SITES

Because the battlefield was primarily an agricultural area in 1863, there were few recorded industrial sites. These included the McAllister grist and saw mills, the Blocher cooper, wheelwright and blacksmith shops, and the Warfield blacksmith shops. These sites are, in the main, archeological sites today. They were used logistically by both armies but did not play a role in combat. Like other archeological sites on the battlefield, these sites should be assessed and protected.

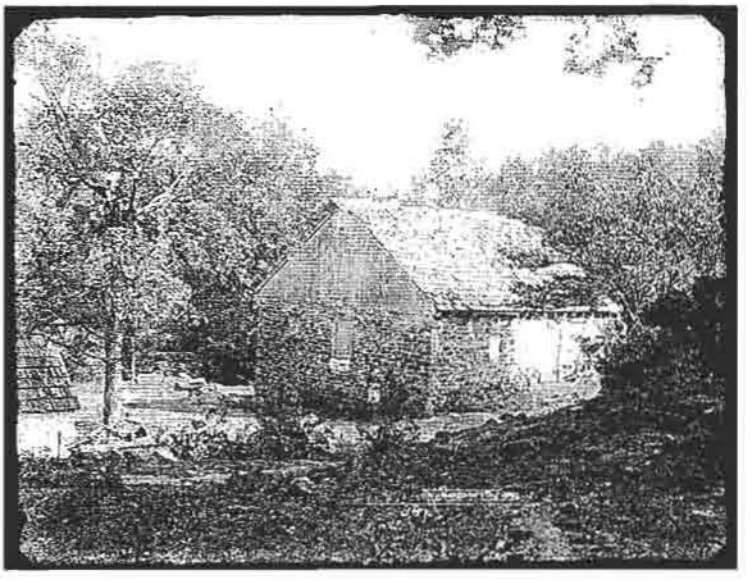


Figure 5-1 "McAllister's Old Grist Mill—Rock Creek," (William Tipton, ca. 1880s-1890s). (GNMP Tipton #2300)

In addition to these businesses, there were also quarries (belonging to Lightner, Power, Menchy and McPherson) and several brickyards and tileyards. These were used for building materials, headstones and other industrial uses and had some impact on battle action.

QUARRIES

Historic use and Appearance

The quarries on the battlefield were generally used for two differing purposes. The commercial quarries were used to extract a variety of stone including granite and shale for building purposes or clay for the manufacture of brick and tile. Because the work was done almost entirely by manual or

animal labor, these quarries were limited in ***historic limits*** and ***depth***.

How Quarries Influenced the Battle
The impact quarries had on the battle depended upon their characteristics and the evolution of the battle and battle movements. Quarries were Obstacles to units, disrupting their formations while moving by or around them. They also offered clear Observation and fields of fire for units firing over them. Units occupying a quarry could also gain Cover and Concealment.

General Treatment Philosophy
Where quarries that were used in the 1863 battle remain, they will be preserved. However, most of these quarries have been used as dump sites in the past. These dumpsites should be cleaned and the refuse removed. When an open quarry site is acquired, it should be evaluated and if it contains refuse, it should be cleaned prior to acquisition. In some cases, grass cover may need to be established to prevent additional erosion.

Example Illustrating Possible Treatment
A small quarry that existed on the Edward McPherson farm impacted the battle during the fighting on the morning of July 1, 1863. Located along the northwest tip of Herbst's Woodlot and just east of Willoughby Run, this quarry gave Cover and became an Obstacle. During the fighting in Herbst's Woodlot Union regiments of the "Iron Brigade" counterattacked the Confederates in Brig. Gen. J. J. Archer's Brigade, forcing them to retreat. Maj. John Mansfield, 2nd Wisconsin, reported "the line of the enemy in our immediate front yielded, a portion seeking cover in a deep excavation...from which they attempted to reform their broken lines." This quarry provided some temporary Cover for the Confederates. However the quarry's 15' to 20' depth and steep grade turned it into an Obstacle, in which many Confederates were soon trapped and forced to surrender.[1] This historic quarry should be preserved, and the refuse and trash that has been placed in it since the battle should be removed.

BRICKYARDS AND TILE YARDS

Historic Use and Appearance
Several brickyards and tile yards were present on the 1863 battlefield landscape. These were small industries that produced goods for local use. Each of these sites contained a variety of buildings and other structures and small scale features (kilns, temporary ovens, clay pits, enclosing fencing, etc.) that were associated with the production process. The majority of these structures were clustered together to complete the individual industrial site. A number of factors, such as ***spatial organization*** and the amount of ***small scale features*** present determined the ***historic limits*** of each complex.

How Brickyard and Tile yards Influenced the Battle
How these sites influenced the battle depended upon the characteristics listed above and on the evolution of the battle and battle movements. These features became Ostacles for troops attemtpting to move through or around them and provided Cover and Concealment for troops occupying them.[2]

The ***historic limits*** and ***spatial organization*** were the most important characteristic of these features for they determined how and to what degree the buildings and structures of each site impacted the battle as Obstacle, providing Cover and Concealment, or providing Observation. The larger the ***historic limits*** of a brick or tile yard were, the more of an Obstacle it became to movement, especially to infantry moving in line of battle. With ***spatial organization***, the number of buildings, their size or

mass and how they were arranged on the site impacted their use as Cover and Concealment. Obviously, the more buildings within a complex the greater the Cover and Concealment it provided and the more difficult an Obstacle it became. The arrangement of the buildings (compact/tight vs. loose/open) also impacted the degree to which a brick or tile yard was an Obstacle or provided Cover and Concealment. Tighter or compact clusters covered less area and therefore posed lesss of an Obstacle to military units as they could more easily bypass the yard. Conversely, densely arranged complexs provided better Cover and Concealment for those units who occupied or were positioned behind the complex.

The ***small scale features*** included structures associated with a brick or tile yard, and its enclosing fences. The number of ***small scale features*** included within a yard directly impacted the amount of Cover and Concealment it provided and the degree to which it became an Obstacle. The clay pits associated with tile yards provided excellent Cover for troops occupying them.

Example Illustrating Possible Treatment

The **John Kuhn brickyard** was located along the southern end of town and at the northern end of Brickyard Lane. Because this brick yard is currently outside park boundaries the analysis that follows serves as an example of how such a feature might be treated if it is found to be situated within the park.

This site influenced the battle on July 2 and 3, 1863. Confederate skirmishers belonging to Brig. Gen. Harry Hay's Brigade took advantage of the brick kilns by using them for Cover. Col. Andrew Harris, commanding the 75th Ohio, reported, "the enemy attacked my skirmishers, firing from behind the fences and a brick kiln on the right."[3] All the structures associated with this site no longer exist.

Based on this analysis possible treatment of this feature might include a representation of the brickyard's historic limis, using small scale features, such as enclosing fencing and/or creating foundation outlines for the brick kilns.

OTHER INDUSTRIAL SITES

Historic Use and Appearance

Other businesses that can be classified as industrial sites were present on the 1863 battlefield landscape. These included coopers, wheelwrights, carriage and wagon shops and blacksmith shops. Nearly all of these were small industries that produced goods for local use. Each of these sites contained a variety of buildings, other structures and small scale features that were associated with their particular needs.

How These Industrial Sites Influenced the Battle

While these sites did not impact the battle in a military sense, they were used by each army for logistical and supply purposes. Nearly all of these small sites suffered losses as both armies took useful items through purchase or impressment. The David Blocher cooper, wheelwright and blacksmith shop complex serves as a good example of such a site impacted by the battle.[4]

General Treatment Philosophy

Primarily, these sites should be preserved and protected. If opportunity offers, these sites can be marked and used as an interpretive tool to convey the story of the impact that a large military campaign has upon a local community, including those civilians whose property was not directly affected by battle action.

[1] Kathleen R. Georg, "Edward McPherson Farm: Historical Study," (unpublished study, 1977) GNMP Library, pp. 7-8; United States War Department, The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies, 70 vols. in 128 parts, (Washington, D.C., Government Printing Office, 1880-1901), series I, Vol. 27, part 1, p. 274 (Maj. John Mansfield). This quarry was probably opened c. 1820 to obtain the stones for the construction of the McPherson barn.

[2] A possible example of a clay pit associated with a brickyard or tile yard that impacted the battle was located near the base of East Cemetery Hill. This pit is visible in an 1863 photograph taken from the crest of the hill looking north/northeast (see, William Frassanito, Gettysburg, A Journey in Time [Charles Scribner's Sons, New York, 1975], pp. 102-103). This pit was probably used by Edward Menchy in his pottery business and might have been used by Union skirmishers for Cover from July 1-4 and could have been an Obstacle to the Confederates of Brig. Gen. Harry Hays' brigade during their attack on the hill the evening of July 2, 1863.

[3] United States War Department, The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies, 70 vols. in 128 parts (Washington, D.C.: Government Printing Office, 1880-1901), series I, Vol. 27, pt. 1, p. 716 (Col. Andrew Harris).

[4] Robert Bloom, A History of Adams County, Pennsylvania, 1700-1990 (Adams County Historical Society, Gettysburg, Pennsylvania, 1992), pp. 99-101.

GLOSSARY

Listed below is the terminology, along with all the natural and cultural features, and feature characteristics discussed and analyzed in the Treatment Philosophy Plan. Features appear, both in heading form and within the text of each subject, with the first letter of each word capitalized (e.g. Ponds, Dams and Temporary Dams). Characteristics are italicized, both in heading form and within the text of each subject (e.g. *age distribution*), except when they appear within the text of their own definition.

age is a characteristic of Individual Trees and Orchards and Nurseries. Although most vegetation features are made up of vegetation from a wide variety of ages, Orchards and Nurseries consist of trees with nearly identical ages. For individual trees and fruit trees, age influences their height, size of the trunks and the amount of foliage.

age distribution is a characteristic of five vegetation features (Woodlands, Thickets, Woodlots, Groves and Hedgerows) and describes the variation in the age of the individual plants that make up that feature. Most vegetation features, both Natural and Managed, consisted of vegetation with a wide range of ages. For trees, age distribution can also impact the *density* a vegetation features possesses.

Agricultural Fields are features that in part make up the Agriculture Landscape. Nearly all of the fields that made up the Gettysburg battlefield were used for agricultural purposes such as crops, pasture or meadow. The majority of these fields were fairly small (less than 15 acres). This was the result of a combination of several factors. Most of the farms were worked by their owners or by their tenants as subsistence farms. Thus most of the farms themselves were small in size, as most farmers lacked the funds to buy additional land. This in turned forced farmers to divide their land into small fields for the diversified use required of a subsistence farm (e.g., pasture for farm animals, oats for animal feed, crops for food or sale, woodlots, etc.). The labor intensive techniques used in subsistence farming also limited the amount of land that could be farmed by a farmer and his family. The quality of the soil also could restrict the size of the fields, as many farms contained limited areas that could be cultivated. All of these factors determined not only the *external limits* of each field, but also the type of crops that could be grown in each. Thus the *height of crops* and *density of crops* were other characteristics of farm fields.

Agricultural Landscapes is one of the six main classifications used in the Treatment Philosophy Plan to organize the features that comprised the Gettysburg landscape. The 1863 Gettysburg battlefield was almost entirely agricultural, being made up of subsistence farms. This landscape consisted of a variety of features, such as Agricultural Fields, Managed Vegetation, Farm Building Complexes, Internal Circulation, Constructed Water Features and Small Scale Features. The *Spatial Organization* of this landscape was a patchwork appearance of open areas interspersed with the natural and cultural features listed above. The vast majority of the troop movement and combat took place on and across the agricultural setting of these privately owned farms that the dominated the landscape. This agricultural setting gave the battlefield a mostly open appearance that affected the battle in a number of ways.

alignment is a characteristic of all Circulation features (Roads and Railroads, Local Road Network, Internal Circulation, including Field Access and Woodlot Access Lanes). Alignment is simply the ground plan or route of a road or lane through an area. Alignment can impact the *grade* of these same circulation features.

approaches is a characteristic of Fords. It describes the ground which must be crossed to enter and exit the ford.

Avenues of Approach is the fifth of the five K.O.C.O.A. categories and includes the operational and tactical movement of troops over natural and cultural features. On an operational level major roads dictated the rapid movement of large bodies of soldiers to and sometimes around a battlefield. Logistically road networks were of extreme importance to Civil War armies, who relied upon roads for rapid troop movements and logistical support. On a tactical level (normally defined as once an engagement begins) avenues of approach included smaller roads or farm lanes that allow maneuvering of troops in preparation for offensive action or for defensive reaction. Tactical avenues of approach can also include or be influenced by Natural Features, such as Topography (e.g. Hills, Ridges, Plains, etc.) or vegetation (e.g., Woodlots, Woodlands, etc.). As commanders planned and executed military maneuvers (assaults and/or the placement and maneuvering of troops for defensive purposes) some features, such as Plains, were ideal for the effective and efficient movement of troops and therefore were excellent Avenues of Approach. Conversely, other features (i.e., dense woodlands, large Farm Building Complexes, large Hills, etc.) hindered the movement of troops and thus influenced the routes units took while maneuvering into or across a battlefield.

Barnyards are part of Farm Building Complexes. These are structures of complexes associated more closely with the barn and the actual agricultural operations of the farmstead (barn, barnyard fencing, wagon sheds, corn cribs, pig pens, chicken coops, blacksmith shops, bee skaps, privies, etc.). Normally these structures are located within the enclosed areas of the farmstead complex, usually near the barn, and beyond the dooryard(s). The barnyard fencing that enclosed each farm complex and connected the various outbuildings together with the house, marked the *historic limits* of the complex.

Barnyard Fencing enclosed the structures associated with a Barnyard. The fencing style adopted was practical and inexpensive, and therefore had a nonuniform appearance. The various styles used included post and rail, post and board, stone and rail, sawn board or a wide variety of combinations.

Brickyards and Tileyards are components of Industrial Landscapes in the Treatment Philosophy Plan. Several brickyards and tileyards were present on the 1863 battlefield landscape. These were small industries that produced goods for local use. Each of these sites contained a variety of buildings and other structures and *small scale features* (kilns, temporary ovens, clay pits, enclosing fencing, etc.) that were associated with the production process. The majority of these structures were clustered together to complete the individual industrial site. A number of factors, such as *spatial organization* and the amount of *small scale features* present determined the *historic limits* of each farm complex.

boulder outcroppings are a characteristic of nearly all Topography features (Hills and Ridges, Swales and Ravines, and Plains) This describes the numerous rock formations protruding from the soil across large sections of the Gettysburg landscape. The abundance of these formations is the result of geological features, especially the Gettysburg sill. Consisting primarily of diabase bedrock, this formation crosses the area south of the town from northeast to southwest. This sill, along with weathering and erosion, is responsible for the rocky nature of the terrain.
buildings and structures is a characteristic of Farm Building Complexes. This includes all the structures of a farm complex, including *barnyard* and *dooryard* structures.

Circulation is one of the six main classifications used in the Treatment Philosophy Plan to organize the features that comprised the Gettysburg battlefield landscape. These features were of extreme

importance, both in the pre-battle history and development of Gettysburg and in terms of understanding and shaping the battle. Circulation can be classified into three levels; Roads and Railroads, Local Road Network and Internal Circulation. These features were critical in getting the opposing armies to Gettysburg and also played a significant role during the battle on a tactical level by expediting the movement of troops across and around the battlefield.

Constructed Water Features were part of the Agricultural Landscapes classification and were a central part of all 19th-century subsistence farms. These included Wells, Improved Springs, Ponds, Dams and Temporary dams and Fords. Though natural water sources could be useful, constructed water features were absolutely essential in the everyday operation of a subsistence farm. These features provided a steady water supply to the farmer, his family and his livestock and operated the machinery required by some local businesses such as grist mills and saw mills.[1]

course is a characteristic of Streams and defines its historic route through a particular area.

Cover and Concealment is the third of the five K.O.C.O.A. categories. "Cover is protection from enemy fire. Concealment is protection from enemy observation."[2] Based on this definition cover normally is provided by a small scale features (e.g., Stone Walls, Fences, Defense Works) and concealment is provided by large scale features (such as the reverse slope of Hills and Ridges). Once a unit is detected (seen) by the enemy, it can only gain cover from a feature, since that unit is no longer concealed. Concealment gained by larger-scale features provide areas where troops can move, muster and rest without detection. It also includes areas where supplies, ammunition and support elements of the army may be placed or stored without fear of direct or indirect fire. On both a small and large scale, cover and concealment is also important in the selection of both defensive positions (for protection from Observation and indirect fire) and for offensive Avenues of Approach (for protection from observation and direct fire).

cluster arrangement is a characteristic of Farm Building Complexes. This describes the *spatial organization* of the *dooryard* and *barnyard structures*. This characteristic, along with *small scale features*, determines the complex's *historic limits*.

current is a characteristic of Fords and describes the speed and/or volume water flowing through a Stream at the crossing site.

Decisive Terrain is a sub-category of Key Terrain, in that it is a feature (e.g., Hill, Ridge, Woodot, Stream) that *must* be held in order to achieve victory.

Defense Works are one of the six main classifications used in the Treatment Philosophy Plan to organize the features that comprised the Gettysburg battlefield landscape. Both armies constructed works of limited size throughout the battle. These improvements were constructed from a variety of *materials* that were readily available, including but not limited to, rocks and stones, fence rails, trees and earth. The works considered under this category were built independent of, and in addition to, the agricultural Stone Walls and Fences that already existed on the field. Compared to the elaborate entrenchments constructed by Civil War armies later in the war (1864-1865), the defensive works on the Gettysburg battlefield were modest, yet were still substantial enough to provide protection and influence the fighting. These works are defined by two categories; Stone walls and Earthen Works.[3]

density is a characteristic of many features, both natural and cultural, and delineates a wide variety of aspects of those features and their impact upon the fighting. In Managed Vegetation Features (Woodlots, Groves and Hedgerows) this characteristic describes the relative concentration of vegetation. It includes not only the number of vegetation features and their proximity to each other, but is also influenced by the *age distribution* (diameter mix) and the *species distribution* within the feature. For Natural Vegetation Features (Woodlands and Thickets) density is defined not only by the number and proximity of the various plants, but also includes underbrush, scrubs, briars, deadwood and similar vegetation that was present within the feature. Like Managed Vegetation Features density in natural vegetation areas is also influenced by *age distribution* and *species distribution*. In Agricultural Fields density is defined by the crops planted in each field. Some crops, such as hay, wheat and corn, are more dense than others, like clover.

depth is a characteristic of both Natural and Constructed Water Features, some Topographical Features and some Industrial Sites. In water features (Streams, Ponds, Dams, Temporary Dams and Fords) this characteristic describes the depth of the water itself. This, of course, was heavily influenced by rainfall, temperature and other natural factors. With Dams and Temporary Dams, depth was also influenced by of the dam's construction, especially the spillway that allowed excess water to flow over it, along with the size of the water source the dam was located on. Depth was also a characteristic of Topographical Features (Swales, Ravines and Stream Banks) and Industrial Sites (Quarries) and is defined by the vertical distance from the lip of the feature to its lowest point.

Dooryards are part of Farm Building Complexes. These are structures most closely associated with, and in the immediate vicinity of, the main farm house (e.g., picket fencing, wells, pumps, dog houses, bake ovens, springhouses, summer kitchens, privies, woodsheds, smoke houses, gardens). Normally these structures are located within the confines of the enclosed yards that are accessible from the house's doorway(s).

Dooryard Fencing encloses the structures associated with a farmstead's Dooryard. Although some farmsteads contained ornamental picket fencing, most dooryard fencing was of a much more practical and inexpensive style. Split palings were the most common method used and therefore nearly all of the dooryard fencing located upon the battlefield had a nonuniform appearence.

duration is a quality of both Natural and Constructed Water Features (Wetlands, Natural Springs, Wells and Improved Springs). With Wetlands, duration defined the feature as seasonal or temporary. While some wetlands were permanent, existing throughout the year, others were only seasonal in nature. Duration determined the length of their presence and was determined by rainfall, temperature, other natural factors. In Natural Springs, Wells and Improved Springs duration defined both the amount of water (flow rate) the feature could provide and also how long the feature provided water before running dry.

Earthen Works are a type of Defense Work constructed by the soldiers during the battle. Across the battlefield both armies constructed earthen works for protection. Unlike Defense Works made exclusively from stone, earthen works were made from various *materials*, including rails, timber, rocks, dirt, personal equipment, etc. Methods of construction also varied. Some were simply made by stacking material to create a barrier, while others were more elaborate, including the digging of trenches, placement of head logs and the addition of abatis in front of the works. Lunettes constructed by artillery crews to protect their guns, would also be included in this feature. The *height* and *density* of

each work was dependent upon a wide variety of factors, including the work's location, the availability of materials and entrenching tools, the troops constructing the work, and the amount of time available to construct them. As most troops had a limited amount of time, many of these earthen works lacked *density* and *height* (1-3 feet).[4]

Farm Building Complexes are a component of Agricultural Landscapes. Scattered across the landscape are numerous buildings and structures associated with individual farmsteads, the majority of which were clustered together to complete individual farmsteads typical of a 19th-century agriculture landscape. These farmstead building complexes included a variety of structures, such as the main farm house, barn, wagon shed, corn cribs, pig pens, chicken coops, sheep shelters, smokehouses, blacksmith shops, springhouses, summer kitchens, wood sheds, privies, dooryard fencing, barnyard fencing and others. A number of factors (the size of the farm, wealth of the farmer, location of the farm complex, etc.), along with a characteristics specific to each farm, including *spatial organization* and the amount of *small scale features* present determined the *historic limits* of each farm complex.

Field Access Lanes are part of Internal Circulation and consisted of simple farm lanes that normally traced their alignment along a fence line, and provided access to a particular field, pasture or even residence. These lanes were used so infrequently that they are not even recognized as such and do not always appear on any official maps of the battlefield. These were generally single track dirt paths that received little or no regular maintenance.

Fencing is a Small Scale Feature of Agricultural Landscapes. Fences were tremendously important in defining the setting of a mid-19th century agricultural landscape and in the life of a farmer. Fences set property lines, confined livestock, protected crops and orchards and divided fields. The large number of fences present on the battlefield was also the result of the Fence Law of 1700, which declared that all crop fields be enclosed to keep out wandering livestock. This required that nearly every field, whether crop, pasture or meadow, be fenced. Consequently the landscape on which the battle was fought was crisscrossed by miles of fencing. This is especially noteworthy for fences were extremely costly and time consuming to construct and maintain. The style of fences constructed was determined by many factors, including the wealth, or lack thereof, of the individual farmer, the fence's location and purpose, the materials available, and the effort or *workmanship* each farmer invested into its construction. Present on the 1863 Gettysburg landscape were at least eight types or ***styles*** of fences. A fence's height and mass was determined by its style, for each required different construction methods and/or materials. These ***styles*** included Virginia Worm, Post and Rail, Stone Wall, Stone and Rail, Stone and Rider, Sawn board, Plank or Slab board and Stacked Rails.[5]

Fords were usually Constructed Water Features, that were located on Streams and were shallow enough to allow passage across them, thus lessening the streams effects as an Obstacle. By 1863 bridges had been constructed along the main turnpikes and state roads in Adams County, but nearly all of the other Circulation (Roads, Local Road Network, Internal Circulation) features used fords to cross the numerous Streams in the area. A ford's *approaches, depth, width* and *current* determined its usefulness.[6]

Gates were a Small Scale Feature component of Agricultural Landscapes. Gates provided the only ready-made access for farmers through fences and/or stonewalls. Many of these gates were accessed from public roads or lanes while others were used internally within a farmer's property. Their location was dependent upon the needs of the individual farmers and their farming operation. A gate's *width* and *style* was determined by the needs of the farmer. A Gate is a physical barrier, of different *styles*

(see below) that closed an opening in a fence or wall. A Gateway is simply a gap in a fence or wall. Essentially, there were two gate *styles*; Hinged and Removable Rails. From an agricultural perspective, the Hinged Gate is ideal for continual use, but more expensive and time consuming to build. With a Removable Rails gate, when the farmer needed to pass through the fence or wall, the rails were simply removed to create an access. A gate that led to a pasture from a public road would probably be constructed using a more durable ***style*** than a gate that served the internal access within a farm.

Gateway is a type of Gate and is considered a Small Scale Feature. A gateway is simply a pre-existing gap in a fence or wall created by farmers.

grade is a characteristic of Topographical Features and Circulation Features. With Hills, Ridges, Swales, Ravines and Stream Banks this characteristic defines the degree of slope (steep or gradual) in the vertical rise or fall along the sides of the feature. With Circulation Features (Roads and Railroads, Local Road Network, and Internal Circulation) grade defines the degree of slope (steep or gradual) in the vertical rise or fall along the *alignment* of the feature.

Groves were Managed Vegetation Features. Scattered throughout the battlefield were groups of trees similar to Woodlots, but smaller in size. Groves had the same characteristics as Woodlots (*historic limits*, *species distribution*, *age distribution*, *density*, *height* and *health*). The only difference between the two features was in their appearance. Because some groves were used by civilians as gathering spots, such as picnic areas, their appearance was more clean, orderly and open, almost park-like, than that of Woodlands or Woodlots.

health is a characteristic of both Natural and Managed Vegetation Features (Woodlands, Thickets, Woodlots, Woodlots, Groves, Hedgerows, Orchards and Nurseries) and describes the overall physical condition (insect infestation, diseases, regeneration, etc.) of the vegetation that made up the feature. This characteristic could influence the *height* of certain vegetation within the feature along with its longevity.

Hedgerows were Managed Vegetation Features. Though not abundant, hedgerows did exist on the 1863 Gettysburg landscape. Some of these were planted and maintained by farmers to serve as a cheap but durable "living fence." Most hedgerows, however, were the result of the natural and unmanaged growth of vegetation along existing fence lines or areas of poor rocky soil or *boulder outcroppings*. The vegetation that made up the hedgerows was widely diverse and included various tree species, bushes, shrubs, briars and other undergrowth. The *historic limits* and *height* of hedgerow were normally the result of its *age distribution*. Older hedgerows were usually longer and higher. Because different types of vegetation grow at different rates, *species distribution* within a hedgerow could also affect its *height*. A hedgerow's *density* was influenced by many factors, including its *age distribution*, *species distribution*, along with the farmer's management, or lack thereof, of the vegetation. Denser hedgerows made better, tighter barriers. The *health* of the hedgerows on the battlefield varied, and was heavily dependent on the management practices of the individual farmers. The hedgerows that served as living barriers were usually carefully managed for longevity and thus had better *health*. Hedgerows that resulted from unmanaged naturally growing vegetation were usually not as healthy.[7]

height is a characteristic of many features, both natural and cultural, and delineates a wide variety of aspects of those features and their impact upon the fighting. Height can also be influenced by the *age distribution* and *species distribution* of the vegetation in each feature. For Woodlands this characteris-

tic is defined by the overall height of the vegetation within it. Thickets usually have less height, for they are essentially the early stages of Woodlands, and therefore the vegetation is younger. The height of Managed Vegetation Features (Woodlots, Groves, Hedgerows) is also usually shorter than Woodlands, as the managed practices used by the farmers resulted in trees being felled for use before they reached their mature height. In Orchards and Nurseries height is determined not only by the type of trees within each feature but also by the management practices, especially pruning, used by each farmer. The height of Agricultural Fields is determined by the typesof crops planted in each field. For Hills and Ridges height is defined by the highest point of each feature. With Stone Defense Works and Earthen Defense Works height is defined by the amount of materials and labor employed in the construction of each feature.

Hills and Ridges are features under the Topography classification of the Treatment Philosophy Plan. Hills are "well defined naturally elevated area[s] of land smaller than a mountain." Ridges are "long, narrow land elevation[s]."[8] The geological and weathering factors described in Topography determined the characteristics of each hill and ridge, including its *historic limits*, *height*, *grade* and the presence of *boulder outcroppings*. Soils on the hills and ridges across the battlefield is generally rocky, thin and otherwise unsuitable for farming. Thus many of the hills on the battlefield were partially or completely covered by Woodlots.

Hinged Gates were constructed in a variety of designs and methods. Nearly all were made of wood with iron hinges. An ideal gate was "one which will be sufficiently strong to stand constant and rough usage, and yet not so heavy as to sag." Although more expensive and time consuming to build, the advantage of a hinged gate, compared to removable rails, is the convenience of closing it once the fence or wall is passed.[9]

historic limits is a characteristic of many features, both natural and cultural, and delineates a wide variety of aspects of those features and their impact upon the fighting. With Natural and Managed Vegetation Features (Woodlands, Thickets, Woodlots and Groves, Hedgerows, Orchards and Nurseries) this characteristic is defined by the historic boundary or perimeter of a particular feature. External limits in Topographical Features varied according to the type of features. With elevations (Hills and Ridges) external limits defines the horizontal foot print of the feature upon the ground. With Swales and Ravines external limits are determined by the drainage area by which each feature was formed. The external limits of Plains is determined by the size of the relatively level area present, along with the presence (or lack thereof) of *intervening vegetation*. The external limits of Agricultural Fields and Farm Building Complexes is usually determined or defined by its enclosing Fencing and Barnyard fencing respectively. The external limits of Water Features is determined by a variety of factors specific to each feature. With Wetlands external limits is determined by the drainage pattern of its water source, the geological formations over which it was located, the amount of rain fall and other natural factors. The external limits of Industrial Sites (Brick yards, Tile yards and Quarries) is dependent upon the number of *small scale features* associated with each site along with its enclosing fencing.

improvements are a characteristic of Wells and Improved Springs. With Wells improvements consist of any man-made object or structure used to increase the flow of water, ease its accessibility or ensure its longevity. These may include, among other things, the well's depth, structures built to protect the well, and water retrieval systems, such as rope and bucket or a pump. These made the wells easily visible and identifiable at a distance and increased the rate of water delivery. Wells possessing a pump system (usually hand-cranked) were able to deliver a steady flow of water for longer periods compared

to a well that used a bucket to draw water. With Improved Springs this characteristic included, among others, the construction of spring houses, brickwork at the spring's mouth for durability, improving the drainage around a spring to increase flow or to ease accessibility and the addition of a water retrieval system (such as a rope and bucket). These improvements allowed the spring to provide a steady supply of water even under excessive and prolonged use and made the spring easily visible and identifiable as a spring even from a distance.

Improved Springs were Constructed Water Features that existed across the battlefield in 1863 and had heavily influenced the location of the original settlement farmsteads (as each was normally located near a spring). Although many of these springs still existed in their natural state at the time of the battle, most had been improved by the local farmers. Improved springs had the same characteristics as natural springs, those being good *duration* and *location* (near fertile cropland and easily accessible to nearby roads) along with *improvements* made by the individual farmers.[10]

Individual Trees were Managed Vegetation Features. Dotting the 1863 Gettysburg battlefield landscape were individual trees that were separate from the Woodlots and Groves, Woodlands, Thickets, Hedgerows, Orchards, and Nurseries on the battlefield. The *location* of individual trees was influenced by many factors. Many of these trees were located in Dooryards, and therefore small scale features of Farm Building Complexes. Others were scattered throughout the fields, but especially in areas that were difficult to cultivate such as rock outcroppings, along fence lines and on boundary lines. Thus, throughout the battlefield were random trees. The other characteristic of individual trees was *age*, which in part determined the tree's size and foliage cover.

Industrial Landscapes are one of the six main classifications used in the Treatment Philosophy Plan to organize the features that comprised the Gettysburg battlefield landscape. Because Adams County was almost exclusively an agricultural area in 1863, there were only a few businesses that could be considered industrial. These included carriage manufacturers, grist and saw mills, blacksmith shops, Brick Yards and Tile Yards and Quarries. Since all the businesses except Quarries, Brick Yards and Tile Yards were located in the town itself, or outside of the modern park boundaries they had no influence on the battle.[11]

internal arrangement is a characteristic of Orchards and Nurseries and basically describes the pattern used in planting the trees. Some farms used a square pattern, laying out cross-hatching rows, 15 to 40 feet apart depending on the fruit, and planting the trees at the intersections of the rows. The quincunx pattern was also used and consisted of planting trees in one row opposite to the intervals of the next row. The distance between the rows was usually 15-20 feet for peach trees and 30-40 feet for apple trees.[12]

Internal Circulation features make up the third tier of the Circulation infrastructure. Basically these were lanes that provided access within a farmstead or between different farmsteads on an intermittent basis. These lanes can be defined as either Field Access Lanes or Woodlot Access Lanes. A Field Access Lane was a simple farm lane that normally traced their alignment along a fence line, and provided access to a particular field, pasture or even residence. A Woodlot Access Lane was a track that gave farmers access to, or passage through a Woodlot or Woodland. These lanes were used so infrequently that they are not even recognized as such and do not always appear on any official maps of the battlefield. These were generally single track dirt paths that received little or no regular maintenance. Therefore, the majority of these lanes were inferior, compared to the roads and lanes of the

area's primary and local road network, in nearly all characteristics, including *alignment, width, grade* and *materials.*

Key Terrain is the first of the five K.O.C.O.A categories. It is "any locality or area that affords a marked advantage to whichever combatant seizes, retains, or controls it."[13] During the Civil War this usually included high ground (e.g., Ridges, Hills) on which an army's main battle line could be established. Ideally such high ground provided good Observation (thus controlling the surrounding terrain by providing clear fields of fire), proved an Obstacle to enemy troops and provided Cover and Concealment to the army's reserve troops and rear areas. Key terrain could also include dense Woodlots, rivers, etc. that were commonly used in the Civil War to anchor the flanks of a battle line. This was especially important as its flanks were the most vulnerable part of any army's battle line.

K.O.C.O.A. is the instructional method used by modern military armies to analyze topography and its impact on a potential battlefield in an organized and systematic fashion. K.O.C.O.A. is an acronym that represents, Key Terrain, Obstacles, Cover and Concealment, Observation and Avenues of Approach. While this system did not exist in its current form in the mid-19th century, the basic concept had been taught at West Point before that time and was in use during the Civil War. The various K.O.C.O.A. elements are not exclusive of each other, but can be used to analyze a particular battlefield feature in several different ways. The difference in the modern military's use of KOCOA analysis and in the NPS use of this same system is the perspective, or hindsight, involved. While the military uses K.O.C.O.A. to analyze a landscape for its *potential* impact upon an engagement, the NPS analyzed the Gettysburg NMP landscape features for their *actual* impact upon the Battle of Gettysburg (i.e. how *can* a feature influence a battle vs. how *did* a particular feature influence the battle).

lack of intervening vegetation is a characteristic of Plains and describes the absence of any tall or woody vegetation features that possess the *height* or *density* to hinder lines-of-sight (fields of fire) or movement into, over or across the plain.

length is a characteristic of Stream Banks and describes the distance along the *course* of a Stream in which the banks are significantly steep enough to hinder movement.

Local Road Network is the secondary tier of the Circulation classification in the Treatment Philosophy Plan. These consisted mostly of dirt lanes and served to either provide farmers access to the main roads from their residences and fields or to connect two primary roads. Therefore, the majority of these lanes were inferior, compared to Roads and Railroads, in nearly all characteristics, including *alignment, width, grade* and *materials.*

location is a characteristic of a number of features, both natural and cultural, and defines the sites of those features and their impact upon the fighting. These include Natural Springs, Wells and Improved Springs where location was important to both the local populace and the military. For farmers the ideal location for these water sources was near fertile cropland and easily accessible to nearby roads. For the opposing armies during the battle the location of a Spring was good if it was in close proximity to their front line troops and the staging or reserve areas to the rear, especially to hospital sites. The location of Individual Trees could be important for some trees served as landmarks, provided shade and were used by sharpshooters as Cover.

Managed Vegetation Features are part of Agricultural Landscapes. These included, among others, Woodlots and Groves, Hedgerows, Orchards and Nurseries, and Individual Trees. A central part of a 19th-century farm were areas of managed vegetation, because many were essential in providing such things as material, food, cash reserves and other uses and items necessary in the every day operation of a subsistence farm. Because of their usefulness, most of these vegetation features were actively managed by farmers, or existed as a result of management practices, unlike Natural Vegetation Features, such as Woodlands and Thickets.
mass is a characteristic of Stone and Earthen Defense Works and defines density or the amount of material (wood, stones, earth, etc.) used to construct it. The more material such a feature contains, the denser it becomes.

materials is a characteristic of many man-made features. The materials used and their durability depended upon the feature being constructed and its intended use. For Roads and Railroads, Local Road Network and Internal Circulation this included everything from dirt and wood to stone, gravel and iron rails. The material used to construct Earthen Defense Works consisted of not only with dirt, but sometimes included wooden rails, timber, rocks, and soldiers' personal equipment. The materials used in the construction of any feature could also influence its *height* and *mass*.

Natural Features are one of the six main classifications used in the Treatment Philosophy Plan to organize the features that comprised the Gettysburg battlefield landscape. Although the 1863 Gettysburg landscape was almost entirely agricultural, there were many natural features that dotted the fields which shaped the planning of the battle and influenced the fighting that followed in a variety of ways. These included Woodlands and Thickets, Streams, Wetlands and Natural Springs.

Natural Springs are part of Natural Water Features in the Treatment Philosophy Plan. These features were a major influence on the location of the original settlement farmsteads, since each needed a steady supply of water for the farmers and their livestock, thus many were located near a spring. Springs possessing good *duration* and *location* were the most ideal. An historian of Pennsylvania agriculture stated that "By far the most important considerations in locating the...home were quality of soil, transportation facilities and access to a spring or other water supply."[14]

Natural Water Features are a sub-classification of Natural Features in the Treatment Philosophy Plan. These are water features that were, for the most part, not actively managed or controlled by man. These include the Streams, Wetlands and Natural Springs that existed on the battlefield landscape. These features influenced the settlement patterns, pre-battle history of the area, and the battle itself in several ways.

Observation is the fourth of the five K.O.C.O.A. categories. It is defined by what can be seen from a given feature. These can be either Natural Features (such as high ground) or cultural features (such as the cupola at the Lutheran Theological Seminary). During the Civil War observation applied to two basic elements: signal stations and fields of fire. The placement of signal stations was important for allowing maximum observation of the enemy's movements while also providing rapid communications within the army. Fields of fire applies to both views at long range (i.e., artillery fire) and short range (i.e., infantry fire). This was especially important for Civil War artillery, which was restricted to direct line-of-sight fire. Observation can also apply at shorter ranges, such as infantry fire, when units are located or firing into vegetation features (e.g., Woodlots, Thickets) or when Topographical Features (i.e., Hills, Ridges, *boulder outcroppings*, etc.) can fully or partially conceal units.

Obstacles is the second of the five K.O.C.O.A. categories. They are "any natural or manmade [feature] that prevents, delays, or diverts the movement of military forces."[15] Such features can serve either to assist the defenders and/or impede the attackers. Natural obstacles can be high ground, bodies of water (such as rivers, streams or creeks), rough ground, ravines and forest land among others. Man-made features can include fences, farmsteads and stonewalls along with breastworks or entrenchments built during a battle. Obstacles, whether pre-existing or built during the battle, can define Avenues of Approach, strengthen Key Terrain and provide Cover. For this study, a feature is considered to be an obstacle if it hinders timely and orderly movement under battle circumstances.

Orchards and Nurseries were Managed Vegetation Features that dotted the 1863 Gettysburg landscape. Because the area was primarily agricultural, being mostly composed of subsistence farms, each farmstead had at least one orchard. These orchards not only provided fresh food when harvested, but also in the winter since as the fruit could be dried or canned. Much of the apple crop was used to produce cider and other drinks. Both apple and peaches were commonly used as livestock feed. Surplus fruit could also be sold to create cash revenue. The fields where younger orchards were planted were also commonly used for crops, planted between the rows of trees, especially corn or small grain, or even pasture land for livestock. The *historic limits* of each orchard depended on many factors, including the size of each farm, how much land each farmer could or was able to devote to orchards, and the needs of each farm. The average orchard was between one to five acres. The *species distribution* of the orchards in 1863 varied and included, among others, apple, peach, cherry, pear and plum. The *internal arrangement* of each orchard varied according to the type of fruit it contained and the method employed by the farmer. Because farmers needed to manage their orchards for most productive use over the life their farm, the *age* and *height* of the trees within an orchard was usually consistent within each orchard, but mixed between the different orchards. This would allow each farmer to slowly phase out older orchards with orchards containing younger trees near by on each farm. *Height* was also influenced by the management practices of the individual farmers, specifically the pruning methods used by each. While some farmers pruned their fruit trees, the practice had not been fully accepted and most farmers did not. Thus, the *height* of the trees in an orchard was a direct result of its *age distribution*. The *health* of each orchard was also of great importance for production and longevity.[16]

Plains are features under the Topography classification of the Treatment Philosophy Plan. Despite the predominant undulating nature of the Gettysburg landscape, there are a few plains, or areas of relatively flat, open land, present on the landscape. Typically these plains consisted of good soil and therefore were used primarily for crop land. Several factors made these areas ideal for raising crops, including their large *historic limits, lack of intervening vegetation* and the absence of *boulder outcroppings*. The open character of a plain, however, usually resulted in the construction of numerous fence lines to separate the various crop fields present on the plain.

Plank or Slab board is a *style* of Fence consisted of five wooden planks, sawn at local mills, placed horizontally into vertical posts. Thus it had the same *mass* and *height* (about five feet) of a Post and Rail fence. The main difference was that instead of using rails, sawn boards (slabs) of wood, with their ends sharpened, were placed into the chiseled holes in the posts.

Ponds and Dams These Constructed Water Features were created for agricultural use or to provide water power to operate local businesses, such as grist mills and saw mills. Although there were few Ponds in existence on the 1863 Gettysburg landscape, they served several useful purposes including providing water for the livestock and possibly crop irrigation during times of dry weather. Some ponds

required the construction of embankments or small dams to retain the water. The main purpose of Dams in a 19th-century agricultural landscape was to supply and control the flow of water for grist and saw mills. These permanent structures included spillways and diversions to control the flow of water. The dams, along with the water source they were constructed on, determined the *external limits* and *depth* of the water upstream from the impoundment.

Post and Rail was a *style* of wooden Fence. It required great effort to construct as it consisted of vertical posts (seven or eight feet in length) placed into ground, with five rails (approximately eleven feet long) with their ends sharpened, placed horizontally into machine-chiseled holes in the post. Their height was about five feet, five or six rails high, "conserved timber, occupied a minimum amount of land and favored weed control." Because it required less wood to construct a post and rail had a lower mass than a worm fence. The main disadvantage to post and rail fences were their high cost.[17]

Quarries are components of Industrial Landscapes in the Treatment Philosophy Plan. Several small quarries were in active operation in Adams County in 1863. These sites extracted a variety of stone including granite, limestone and stone for gravel. This material was used in the construction of local farm and town houses, cemetery head stones and gravel for road building. Because the work was done almost entirely by manual or animal labor, the *historic limits* and *depth* for most of these quarries was rather small.[18]

Removable rails gate is a *style* of Gate that consisted of two posts augured with double rows of holes to accommodate four or five rails. When the farmer needed to pass through the fence or wall, the rails were simply removed to create an access.

Roads and Railroads make up the first level of the Circulation classification in the Treatment Philosophy Plan. While many of these roads were simply wide dirt paths, others had been improved. The quality of the road depended upon its initial construction and continued maintenance. Three of the roads radiating from Gettysburg were macadamized pikes, being made of "crushed rock of graduated size...laid on a foundation of stones," which made them nearly weather proof. Another type of road was the turnpike or toll road. While most turnpikes were macadamized, including the three that passed through Gettysburg, not all of them were. Even still turnpikes were usually of good quality for they "were privately financed, constructed, operated and maintained" to meet standards set by state regulations. The quality of a road was determined by its construction, which included not only good *materials* and *workmanship*, but also by its *alignment*, *width* and *grade*. Turnpikes were usually of better quality than the average road because they were usually laid down using a well planned *alignment*, making them more stable and easier to maintain, were sufficiently wide, contained fills and cuts to lessen sharp *grades*, were constructed with excellent *workmanship* using durable *materials*, such as stone.[19]

Small Scale Features are one component of Agricultural Landscapes. These features add to the historic landscape and complete the *Spatial organization* of a mid-19th century agricultural setting. These features "may be characteristic of a region and occur repeatedly throughout an area.... Collectively, they often form larger components, such as circulation networks or boundary demarcations." On the Gettysburg battlefield this would include such features as Fences and Stone Walls and Gates. Collectively these features not only complete the cultural landscape, but also heavily influenced the battle.[20]

small scale features are characteristics of Farm Building Complexes, Brick yards and Tile yards. The small scale features of a Farm Building Complex include structures associated with both Dooryards and Barnyards. Dooryards are structures most closely associated with, and in the immediate vicinity of, the main farm house (picket fencing, wells, pumps, dog houses, bake ovens, springhouses, summer kitchens, privies, woodsheds, smoke houses, gardens, etc.). Normally these structures are located within the confines of the enclosed yards that are accessible from the house's doorway(s). Barnyards are structures of a complex more closely associated with the barn and the actual agricultural operations of the farmstead (barn, barnyard fencing, wagon sheds, corn cribs, pig pens, chicken coops, sheep sheds, blacksmith shops, bee skaps, privies, etc.). Normally these structures are located within the enclosed areas of the farmstead cluster, usually near the barn, and beyond the dooryard(s). The barnyard fencing that enclosed each farm complex and connecting the various outbuildings together with the house, marked the *historic limits* of the complex. Small scale features of Brick yards and Tile yards include such structures as kilns, temporary ovens, clay pits and enclosing fencing.

Spatial Organization is "the three-dimensional organization and patterns of spaces in a landscape... created by...cultural and natural features.... The organization of such features defines and creates spaces in the landscape and often is closely related to land use. Both the functional and visual relationship between spaces is integral to the historic character of a property." For the 1863 Gettysburg landscape this includes the size, configuration, proportion and relationship of the various features including Natural Features, Topography, Circulation, Agricultural Fields, Managed Vegetation, Farm Building Complexes, Internal Circulation, Constructed Water Features, and Small Scale Features. These component landscape features define the overall pattern of the cultural and agricultural landscape. The arrangement of the various elements listed above and their relationship with each other created the Agricultural Landscape upon which the Battle of Gettysburg was fought[21]

spatial organization involves the specifics of Farm Building Complexes and Brick and Tile Yards and is unlike Spatial Organization (listed above) for larger landscape units. On this sub-level spatial organization is defined by the number of buildings, their size or mass and how they are arranged (compact/tight vs. loose/open) within a complex or site.

species distribution was the type of vegetation present (tree species, evergreen/bushes or mixed), in their historic proportion, that make up a particular vegetation feature (Woodlands, Thickets, Woodlots and Groves and Hedgerows). For Orchards and Nurseries species distribution simply defines the type of fruit trees that made up the orchard.

Stacked Rails was a *style* of Fence that was essentially a cheap alternative to a Post and Rail fence. Made of wood, its design was similar to a Post and Rail, in that it had vertical posts and horizontal rails, thus giving it a similar height (about five feet) and mass. The main difference was its construction, for the posts consisted of two sections of wood placed parallel to each other with the rails fitted into the space between. This avoided the extra cost and labor of chiseling holes into the posts. The rails could be held in place by two methods; either wood slats were nailed into the posts on which the rails rested or the rails were placed in alternating fashion at the connection of two panels. Most of these fences were five or six rails high, with a rider, achieving a height of about five feet.

Streams are Natural Water Features in the Treatment Philosophy Plan. Several streams crossed the 1863 Gettysburg landscape and influenced the location of individual farmsteads and the practices of mid-19th century subsistence farming. Streams were a source of water for both farmers and their livestock, marked property lines and provided power to grist and saw mills. These uses in turn

influenced the location of some of individual farms and businesses, since each needed a steady source of water. These streams generally flow south and are the principal means by which water is drained from the highlands through the shale lowland and eventually into the Potomac River and the Chesapeake Bay. These drainage patterns, therefore determine a stream's, *depth, width* and *course*. Most of the streams were shallow, narrow and meandering. A few, such as Rock Creek and Marsh Creek, are fairly wide and can be quite deep and swift, especially following periods of heavy rainfall.

Stream Banks are features under the Topography classification of the Treatment Philosophy Plan. Several streams that passed through the battlefield cut gouges at various locations, thus creating steep banks at the stream's edge. These banks had some influence on the location of crossing points for everything from roads, pikes and lanes to cattle crossings on individual farms. Characteristics of a stream bank that determined its crossing point included its *length, depth* and *grade*. Obviously, stream banks that consisted of one or more of these characteristics was to be avoided in favor of one that was level with the stream bed and consisted of an easy grade.

Stone and Rider was a *style* of Fence made with stone and wood. It usually consisted of a stone wall, usually less than three feet high, supplemented by a rider fence. "The rider fence panel consisted of two crossed stakes and two rails, the lower rail lying on the top of the stone wall and the upper rail in the cross of the stakes" giving it an approximate *height* of five feet. Consisting of the same materials as a stone and rail, they had the same mass, though the stone and rider required slightly less effort as the rails were easier to place.

Stone Wall is a *style* of Fence under Agriculture Landscapes. Obviously made from stone, these walls required an excessive amounts of time and effort to build, but gave stone walls great mass and proved to be the most durable type of fence. The height of the walls on the battlefield varied greater (depending on location, available materials, etc.) being between three and four and a half feet high. In most cases the wall was built with the principals of stability and durability being of the highest standard and thus many owners preferred these eternal walls as permanent farm boundary markers. This was accomplished by fitting the rocks tightly together, with the size of stones gradually diminishing as the wall grew in height. Thus wall's foundation and lower sections had great mass and gave the wall stability throughout. In many cases the wall was then topped with closely fitted capping stones, thus making it somewhat weather proof which gave it durability.

Stone Walls—Defense Works constructed by the soldiers during the battle. Because much of the battlefield was rocky in nature, particularly south of town, stones were readily available for use in the building of defense works. The majority of these walls, built entirely of stone were constructed in the vicinity of Little Round Top, Big Round Top and Devil's Den. Most of these walls were constructed during lulls in the fighting, especially at night, as soldiers stacked them to either strengthen a defensive line or to consolidate a position that had been gained through offensive action. Though they lacked the stability that a farmer's stone wall possessed (for the soldiers simply lacked the time), many of these defensive stone works were impressive, both in *height* (approximately 2-3 feet) and *mass*.

style is a characteristic of Fences and Gates. There were eight major styles of fences; Virginia Worm, Post and Rail, Stone Wall, Stone and Rail, Stone and Rider, Sawn Board, Plank or Slab Board and Stack Rails. With fences style emcompassed many factors, including materials, construction methods, strength, tightness, height and mass. There were two styles of gates; Hinged, and Removable Rails.

Swales and Ravines are features under the Topography classification of the Treatment Philosophy Plan. There are numerous swales and ravines, formed by Streams or natural drainage areas, scattered across the Gettysburg battlefield. Their *historic limits* are determined by the drainage area by which it was formed. While many swales and ravines contained ideal soil for farming, others, consisted of poorer soils or were otherwise unproductive. Factors that contributed to this futile condition included the swale or ravine's unusual *depth*, steep *grade* or the geological formations beneath the surface. These factors, alone or in combination, sometimes resulted in the existence of Wetlands at the bottom of these features. Still other swales or ravines were unproductive because of the numerous *boulder outcroppings* they contained.

Sawn board this *style* of Fence was constructed using wooden boards that had been machined sawed at local mills. These boards, seven to eight feet long, were then nailed into vertical posts. A completed fence panel usually consisted of four boards and had an approximate height of five feet. Though it possessed a similar height and mass of a Post and Rail fence, the sawn board did not have the stability for it was much easier to knock the nailed boards from the vertical posts.

Thickets are Natural Features that were usually located in areas where Woodlots had been recently harvested and were naturally regenerating or where rock outcroppings or other natural features encouraged shrubby growth. While thickets share many of the same characteristics as Woodlands (*historic limits species distribution, age distribution, density* and *health)*, the main difference is their *height.* Because thickets consisted of younger vegetation, they were not as tall as Woodlands or Woodlots.

Topography is one of the six main classifications used in the Treatment Philosophy Plan to organize the features that comprised the Gettysburg battlefield landscape. The most important natural feature to influence the battle was the topography of the 1863 landscape. This included Hills and Ridges, Swales and Ravines, Plains and Stream Banks. The creation of this topography was heavily dependent upon the various geological features present in the battlefield landscape, including sills, formations, dikes and outcrops, along with differential weathering and erosion. One of the most important geological features is the Gettysburg sill, "the largest concordant body in the area." Consisting primarily of diabase bedrock, this formation crosses the area south of the town from northeast to southwest. This sill, along with weathering and erosion, is responsible for the rocky nature of the terrain and the formation of important battlefield features (e.g., Little Round Top, Devil's Den, Cemetery Ridge, Cemetery Hill, Culp's Hill) The arrangement of these topographical features, and their relationship to each other, shaped the pre-battle settlement and development of the Gettysburg area, thus influencing the location of the cultural features on the landscape. All of this in turn influenced the strategy and tactics used by the opposing armies on, around and across the 1863 Gettysburg landscape.[22]

Virginia worm was one of the most common *style* of Fence, for it was cheap, easy to build and repair and no special tools or machines were needed. Its materials were wood, "usually of rails ten to twelve feet long...laid in a zigzag fashion, without stakes or posts to hold the ends in place." Normally, each panel consisted of nine rails, including the two cross braces. Thus a worm fence was seven rails high, giving it a height of approximately five feet. The mass of a worm fence was high, requiring approximately 800 rails per acre. The disadvantages of the Worm fence was that "it was readily overturned, occupied much space [six to eight feet], and harbored weeds and rodents."[23]

Wells as Constructed Water Features were a fundamental necessity for the existence of a subsistence farm, since each needed a steady supply of water for the farmers and their livestock. Though Natural

and Improved Springs could serve the same purpose, most farms had at least one well. Wells were more reliable than Springs, whose output was heavily influenced by natural occurrences, such as droughts. Those possessing good *duration* and *location* were the most ideal. Wells, especially those that were deep, proved more dependable over longer periods of time. Other characteristics that affected a wells usefulness were its *improvements.*

Wetlands are a Natural Water Feature in the Treatment Philosophy Plan. There were a number of wetlands in the 1863 Gettysburg landscape. This is due mostly to the diabase rock of the Gettysburg sill lying close to the surface; thus many water sources, especially Streams and Natural or Improved Springs, created wetland areas along their course. These marshy areas, being unsuitable for farming, were mostly used as pasture land. Those areas that were especially wet or inaccessible were sometimes allowed to return to their natural state and thus were the in the early stages of becoming Woodlands or Thickets. The *historic limits* of a wetland were determined by the drainage pattern of its water source, the geological formations over which it was location and the amount of rainfall. A wetland's *duration* was also an important characteristic, since some existed throughout the year, while others were seasonal in nature and their presence was determined by rainfall, temperature, other natural factors.[24]

width is a characteristic of both natural and cultural features. For Streams the width is defined as the distance across, measured from the water's edge. This distance can greatly vary at different points along the *course* of a stream. The width of Roads and Railroads, Local Road Network and Internal Circulation features is determined by many factors, including its intended use, original construction, *alignment, materials* and *workmanship*. Normally, Roads and Railroads were wider than those making up the Local Road Network and Internal Circulation routes. The width of a Ford is determined by length of the stream's shallow area that creates the Ford. The width of a Gate depends upon many factors, including its *style* location and materials.

Witness Tree are those trees that were present during the battle and survive today. Some witness trees were substantial in size during the battle, and affected it as a landmark, Cover and Concealment, or Observation. Many of these trees have been identified and are considered as commemorative features. In other cases, trees may have been present at the time of the battle, but were not especially significant to it. Most of these trees were young trees, or woodland or woodlot trees that survive.

Woodlands were Natural Features and included areas covered by a thick growth of bushes, scrub growth, brushwood and trees, normally existing in bottom lands and along streams. Since this type of land could not be farmed, or even used as pastures, the vegetation was allowed to grow unmanaged, thus these features usually were composed of undesirable fast growing wetland trees, scrubs, bushes and other types of undergrowth. These elements gave woodlands and thickets a cluttered and dense character, a marked difference in appearance from the Woodlots and Groves, that consisted of slow-growing uplands trees carefully managed by farmers. The *historic limits* of a woodland would depend on the amount of land the farmer would allow vegetation to grow unmanaged. Because this vegetation was not cultivated for use or profit, the *species distribution*, *age distribution*, *density* and *health* of a woodland was a product of natural succession and became important characteristics that contributed to its historic appearance. This lack of management gave woodlands a high *density*; they were filled with underbrush, scrubs, briars and deadwood, and in many cases produced trees that were unhealthy. These practices could also affect the *height* of a woodland, as it allowed healthier trees to reach a mature height, something that rarely occurred in a managed woodlot.

Woodlots These Managed Vegetation Features were a critical part of a subsistence farm and necessary to provide material for a variety of needs, including fencing, firewood, housing and general carpentry over the life of a farm. Woodlots and groves were also cut and sold to raise revenue. The money raised through the sale of wood often paid for taxes and other expenses, and provided a cash reserve in case of hard times. Although most woodlots were parts of farms, town residents also owned some of the woodlots found on the battlefield. In most cases, a woodlot was located on the poorest land on a farm (rocky, thin or steep soils, etc.), thus its *historic limits* would depend on the amount of such land available to the farmer. Woodlots usually consisted of slow-growing upland trees, but because they had to furnish materials for a wide variety of uses (e.g., hard wood for fuel, light smooth wood for lumber and construction, durable wood for fence posts and rails, small trees for farm tools and implements) farmers actively managed the *species distribution* and *age distribution* within the lot. The *health* of a woodlot was also an important characteristic managed by farmers, for the trees harvested met their need for materials over the life of a farm. These management practices made woodlots more open in nature to allow for the passage of wagons and teams. In addition, woodlots were cleared of underbrush, shrubs, deadwood, and trees that were not healthy or that were undesirable. This led to an appearance that was more orderly than would be found in naturally occurring Woodlands. These management practices also affected the *height* of the trees for in younger woodlots, and in woodlots that were heavily managed, a tree might never reach the full height common for its species, and the overall *height* of the woodlot might be less than found in naturally occurring Woodlands.[25]

Woodlot Access Lanes were tracks that gave farmers access to, or passage through a Woodlot or Woodland. These lanes were used so infrequently that they are not even recognized as such and do not always appear on any official maps of the battlefield. These were generally single track dirt paths that received little or no regular maintenance.

[1] Stevenson Fletcher, Pennsylvania Agriculture and Country Life, 1640-1840 (Pennsylvania Historical and Museum Commission, Commonwealth of Pennsylvania, Harrisburg, 1971), pp. 323-28.

[2]"Appendix A, Engineer Estimate," (website <www.wood.army.mil>), p. 4.

[3] Frederick Tilberg, "Report on Field Defenses on the Battlefield of Gettysburg," NPS report, April 2, 1943, Reports 1934-1946, GNMP Archives.

[4]Tilberg, "Report on Field Defenses on the Battlefield of Gettysburg," pp. 6-20, 22-23.

[5] The Fence Law of 1700 changed the basic philosophy on fencing and resulted in the great increase in the amount of fencing. Before 1700 farmers operated under common law, which simply accepted that fences were constructed for the sole purpose of confining livestock in order to prevent damage to crops (especially those of another farmer). The Fence Law of 1700 reversed this long standing ideal with a theory based on the reasoning that fences were constructed to keep free ranging livestock from damaging crops. As there were many more crop fields than pastures, this law resulted in a great increase in the number and amount of fencing required by law. The 1700 law was repealed in 1889 (See, Fletcher, Pennsylvania Agriculture and County Life, 1840-1940, p. 69).

[6] Robert Bloom, A History of Adams County, Pennsylvania, 1700-1990 (Adams County Historical Society, Gettysburg, Pennsylvania, 1992), pp. 119-120).

[7] Fletcher, Pennsylvania Agriculture and Country Life,1640-1840 p. 86-87.

[8] William Morris, ed., The American Heritage Dictionary of the English Language (Houghton Mifflin Co., Boston, 1976, pp. 623, 1117.
[9] The American Agriculturist, Vol. XXII, No. 2 (February 1863), p. 45.
[10] Fletcher, Pennsylvania Agriculture and Country Life,1640-1840, p. 371.
[11] Bloom, A History of Adams County, Pennsylvania, 1700-1990, pp. 99-106.
[12] American Agriculturist, Vol. XXII-No. 4 (April 1863), p. 98, No. 5 (May 1863), p. 135, No. 6 (June 1863), pp. 178-79.
[13] "Appendix A, Engineer Estimate," p. 7.
[14] Fletcher, Pennsylvania Agriculture and Country Life,1640-1840, p. 371.
[15] John M. Collins, Military Geography for Professionals and the Public (Brassey's, Washington, D.C., unknown date), p. 401.
[16] Fletcher, Pennsylvania Agriculture and Country Life, 1640-1840; pp. 205, 208, 209, 211, 213-14; Fletcher, Pennsylvania Agriculture and Country Life, 1840-1940, p. 283 and American Agriculturist, Vol. XXII-No. 4 (April 1863), p. 98, No. 5 (May 1863), p. 135, No. 6 (June 1863), pp. 178-79.
[17] Fletcher, Pennsylvania Agriculture and Country Life, 1640-1840, p. 86; Fletcher, Pennsylvania Agriculture and Country Life,1840-1940, p. 70.
[18] Bloom, A History of Adams County, p. 247.
[19] Fletcher, Pennsylvania Agriculture and Country Life,1640-1840, pp. 253-258.
[20] Charles A. Birnbaum, ed., Guidelines for Evaluating and Documenting Rural Historic Landscapes (U.S. Department of the Interior, National Park Service, et al., Washington, D.C., 1996), p. 6.
[21] Birnbaum, ed., Guidelines for the Treatment of Cultural Landscapes, pp. 15, 28.
[22] Andrew Brown, Geology and the Gettysburg Campaign (Bureau to Topographic and Geologic Survey, 1962), pp. 1, 9-14; William R. Shirk, A Guide to the Geology of Southcentral Pennsylvania (Robson and Kaye, Inc., Chambersburg, Pennsylvania, 1980), pp. 64-66, 74-75.
[23] Kathy Harrison January 4, 2002 memo "Historic Appearance and Rehabilitated Construction of Worm Fences" GNMP; Fletcher, Pennsylvania Agriculture and Country Life,1640-1840, pp. 85-86; Fletcher, Pennsylvania Agriculture and Country Life,1840-1940, p. 70.
[24] Brown, Geology and the Gettysburg Campaign, pp. 1, 13.
[25] Cavanaugh, "Identification, Restoration, and Maintenance of Historic Woodlots at Gettysburg National Military Park,, Technical Report NPS/MAR/NRTR-90/049," pp. iii, 3-4, 27-28.