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LOCATIONS AND ROLES OF CRITICAL AMERICAN REVOLUTIONARY WAR
SUPPLY ROUTES

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Identifying Colonial Roads in Southern New Jersey: An application of field and archival methods to document the locations and roles of critical American Revolutionary War supply routes

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Abstract: This paper explores the use and preservation of historic roads in the State of New Jersey. The authors examine in detail the historical significance of a number of unpaved routes that continue to exist in Burlington County, New Jersey as well as discuss various methods that can be used to identify routes with historical significance. Field research was conducted to establish the current location of these historic routes, using GPS and GIS methods to estimate their likely date of construction. Further examination and mapping of these routes was undertaken, followed by documentation of the historical events linked to their use, thus establishing historical context. We have identified likely routes used as critical Revolutionary War supply routes, and describe a significant incident along one of these routes that partly contributed to Benedict Arnold's treason against the United States. The paper concludes with a discussion of appropriate actions that should be considered in the preservation of these routes and offers planners some options in terms of public policy.

1. Introduction

Roads are markers of history. They emerge in response to economic, social and travel needs at a particular point in time, negotiated against the constraints of a topography, technology and social structure of that time. They are also critical mechanisms to the development of economies, connecting and increasing the size, scale and scope of markets and shaping the evolution of production and consumption. Understanding where roads went and how they were used is thus critical to preserving the history of a given place.

In some cases, modern roads simply follow the folkways of a distant past. This is particularly true of routes following features of the natural environment, such as mountains, valleys, or watercourses that might still be the only feasible way of getting from points A to B. In other cases, the human-made origins and destinations may not have changed much, for example with old cities and towns that have longstanding existence and where connections between those places are continuously used (though, of course, with changes in intensity over time).

However, there are many routes where these natural and human-made features have changed so much that roads of long ago faded, then disappeared and were forgotten by society. Roads can be very transitory that way. From an historical point of view, this is a big loss of heritage and knowledge of the past. In these cases, recovering the routes and then surfacing its history is the first order of business.

This paper examines in detail the historical significance of a number of unpaved routes that continue to exist in Burlington County, New Jersey, parts of which have faded or been lost. The authors discuss various methods that can be used to clearly identify and map such routes and report on field research conducted to establish the current location of these historic roads and estimation of their likely date of construction. Further examination and mapping of these routes followed to document the historical events linked to their use, in particular establishing the role they played in local industries during the American Revolutionary War. The paper concludes with a discussion of the appropriate actions that should be considered in the identification, preservation and economic understanding of these routes, and others like them.

2. Early Roads in historical context

Roads have played a critical role throughout human economic history. Because of their importance, a number of routes with significant histories have been identified and preserved around the world. This is not just a matter of niche interest. Preservation of historic routes offers the opportunity for further examination of historical travel patterns, traditional road construction methods and establishment of the historic and economic importance and context of an area (Hubbard 2008). For example, the bulk of the historic structures have been destroyed in Lower Manhattan and thus only the old street grid provides some form of historical documentation of the Colonial development of New York City. Meanwhile, the Via Appia, begun in 312 BC, still provides a well preserved example of Roman road building, providing a physical knowledge-base of the specifics of the Roman Empire's well-established practice of using public works to provide for

political control, wide scale military access and significant trade activity. Sections of this road continue to exist and the longest section of straight road in Europe remains a 39 mile segment of the Via Appia. Interestingly, the road continues to be used for vehicular traffic, some still with their original paving, while the Italian government has restored a number of sections to their historic form (Berechman 2002).

Other routes have more localized importance as the sites of significant historical events. This local notoriety often provides special impetus to the preservation and recording of historic roads. The road between Boston and Concord, Massachusetts was utilized by both colonial and royal forces during the 1775 battle over its control. As such, a number of critical elements of the battle history are preserved along the roadway and significant portions of the original road bed are restored to period conditions to enhance the experience for visitors. The New England region of the US contains many other examples of such historic routes (DeLuca 2011).

In the cases mentioned thus far, historic roads remain in areas of longstanding economic and social activity. The challenge in these cases, often, is to keep that activity from encroaching on and erasing the historical record. Meanwhile there are portions of historic roads that fall off the active travel grid but remain preserved passively, as essentially excess capacity, because of significant alterations in the spatial pattern of human activity over time. The historic 6.5 mile gravel road section of the Albany Post Road, originally opened in 1699 and following existing Native American trails, was bypassed economically in the 1820's and has been maintained but never upgraded or redesigned to modern standards. This road is a designated historic landmark on the National Register of Historic Places. There has been considerable discussion as to the appropriate preservation methods for this route and whether it should be paved to facilitate greater use, though possibly degrading its historical characteristics (currently it remains as a gravel road) (Rhinevault and Rhinevault 2011).

Then there are the many routes that had only a limited period of significant use for narrow purposes, connected with an historical epoch but not an especially key event. The wagon routes that developed in the Western United States, such as the Oregon and Mormon Trails, supported very significant travel patterns for the period of American Western migration. These same routes still exist in certain locations, but the development of easier and parallel routes has in many cases left these earlier routes unused and often completely erased. Though oddly, especially in remote or low-density areas, the actual routes may be preserved by default, left untouched by economic development (though invisible to the awareness of anybody except the scholar or enthusiast).

This last type of road - a route that had historical significance but which has now been passed by economically and spatially - is the one that offers special challenges to the historian. The route must first be discovered, then accurately uncovered, appropriately preserved, and its historic role must then be properly interpreted and understood. This paper now turns to a case study of three such roads, demonstrating how such a process unfolded for historic routes in colonial era New Jersey.

3. Identifying historically significant New Jersey Colonial Roads: a case study in Burlington County

The New Jersey Department of Transportation, in conjunction with the US Federal Highway Administration completed and published the New Jersey Historic Roadway Survey (NJHRS), which attempted to explore and document the existing historic roads that still exist, grouping them into four categories by era of construction. The first – the Early Roads Era (1621-1815) – is of interest here (NJHPO 2011).

Given the high levels of development and economic activity in New Jersey throughout American history, and especially the more modern era, it is not surprising that many of the earlier roads have had significant alteration to their alignments, travel lanes, paving and structures. As such, in many cases the NJHRS research team found it difficult to establish the true historic fabric of the region and be definitive as important routes and their associated activity had been obscured by extensive physical development. The NJHRS study focused heavily on secondary research and this certainly limited its ability to get accurate route locations.

The authors of this paper decided to examine, by county, the reported historic routes that were established in the NJHRS. We then conducted further archival research to examine reported historic routes based upon early map analysis as was used by the NJHRS. We ended up focusing in detail on Burlington County, which remains a fairly pristine area of New Jersey, consisting of large swathes of public land and undeveloped private tracts. Here a number of Early Roads Era routes appear to survive on public lands and also as established right of ways through private property. While actual roads, even unimproved, have often disappeared in parts, the physical environment is untouched enough to allow for field investigation that can be cross-checked and expanded with archival research.

Figure 1 below provides a map as established in the NJHRS of the Early Roads Era routes that still existed and could be documented in 2011 (Early Roads era routes in purple). Burlington County is reported to only have a few small segments of Early Roads Era roads; in particular, the Burlington-Perth Amboy - Shrewsbury Road and the Cape May - Burlington – Salem Road. These roads are both located in the very north and west of the county – with no Early Era roads indicated in the South and East of the county. We have indicated our general area of research in Figure 1 by a red oval that covers most of Eastern Burlington County. Our particular area of research are three roads that are located within the red box on Figure 1.

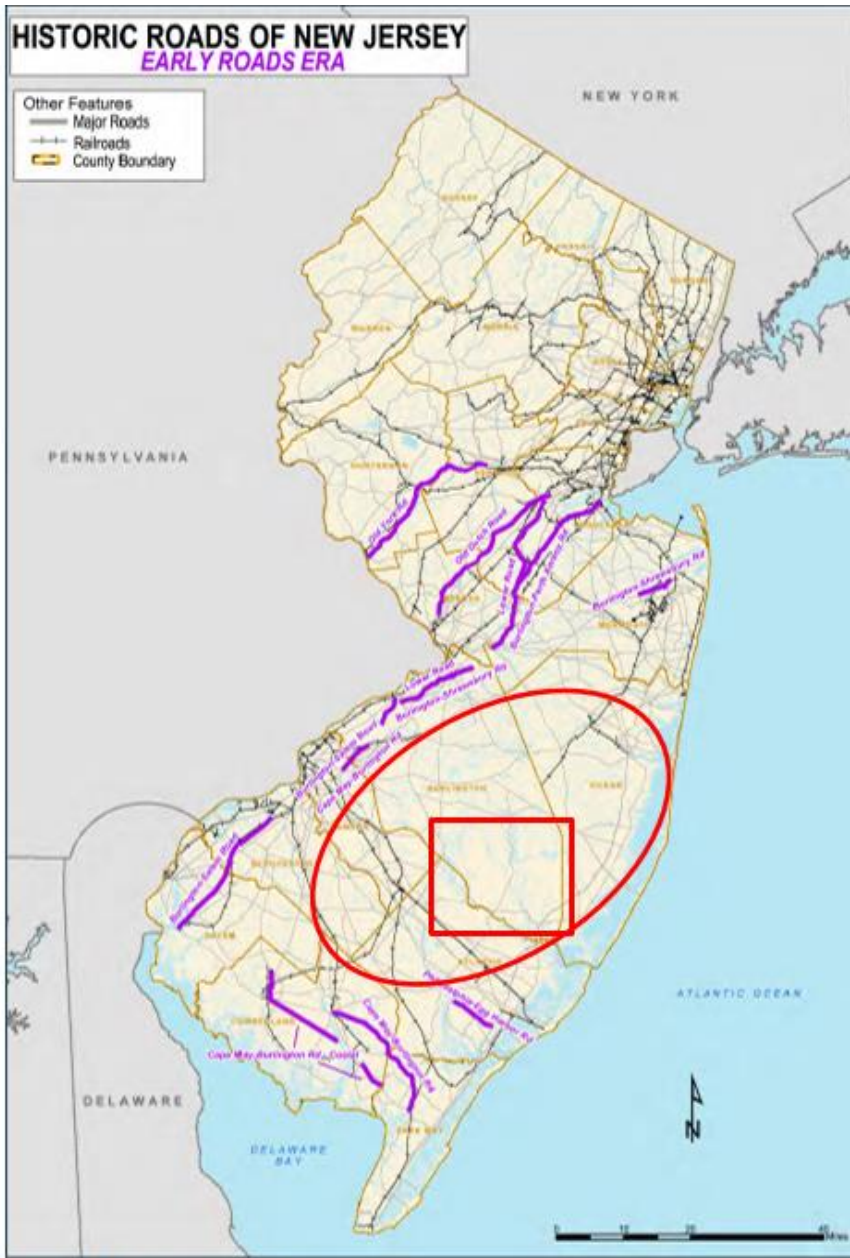


Figure 1: Early Roads Era Roads identified in NJHPO 2011 – p27. Authors' area of study circled in Red and Inset Location of Figure 2 Overlaid on area.



Figure 2: Inset Map 1 – Showing Routes of Tuckerton Stage Road (Blue), Washington – Quaker Bridge Road (Purple) and Middle Road from Atsion to The Forks (Red).

A key task then was to determine some promising candidate historical routes that could be studied and mapped. Based upon discussions with local historians and consultation with various historical documents, three key early routes were identified in South East Burlington County, as shown in Figure 2. These include (a) Middle Road, (b) Washington – Quaker Bridge Road and (c) the Tuckerton Stage Route. Examination of colonial era maps indicated that a number of early roads continue to exist in the eastern portion of Burlington County and further it appears that their current physical condition is quite similar to their condition when initially constructed.

Identification of historic roads requires both secondary research (thorough searching and analysis of archival information to understand where origins, destinations and physical interconnections were) and primary research (fieldwork and ‘ground truth’ investigation). In some cases, where some sort of road still exists and use has been steady, secondary research may be sufficient. But often, direct primary investigation of route location is called for. Even where there is still a road, such digging (sometimes literally) is often needed to surface deviations between the past and present pathway. Global Positioning Systems (GPS), Geographic Information Systems (GIS), physical

sensing and big data methods are all being used to aid in more accurately identifying and documenting historic roads (Chudy et. al 2014, Gaughwin and Forghani 2000). Such accuracy is critical in the next step, which is preservation. With a route confidently located, various means can be employed to mark and make it functional to the desired and appropriate level, whether that be an active roadway, a footpath, or simply a marked out area (Bennis and Davison 2005, Grazuleviciute and Matijosaitiene 2010).

The three roads identified for detailed analysis in this study were located using comparisons to historic maps supplemented by direct field mapping of routes using GPS and GIS methods. The authors were able to establish the length of time an existing route was there based upon the earliest map that included that route as well as conducting a literature review of existing sources to establish likely routes for historic roads. As a secondary source of location, the authors compared historic maps with the United States Geological Survey (USGS) Topographical 7.5 Minute, 1:24,000 scale quadrangle maps both in paper and georeferenced forms that were produced in paper form from 1947 to 1992. This allowed us to establish the likely routes of these roads in the period in which the USGS conducted detailed mapping of the region (see Figure 3 top panel). Finally, the authors utilized primary resources located in the county archives that document the legal locations of roads as established at their time of formal creation and recognition (known in the world of surveying and land use as road returns).

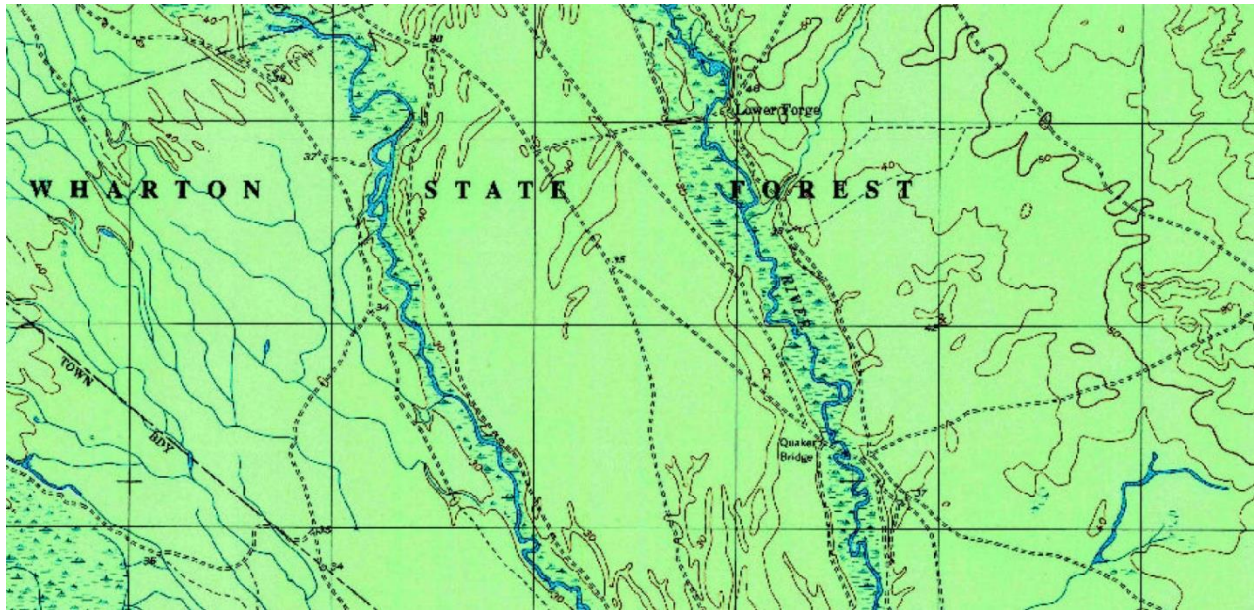


Figure:3 USGS Topographical Quadrangle Map Example – Atsion, NJ Quad Detail (top) compared with 1860 New Jersey Topographic Map by H.G. Bond, Publisher (bottom)

These locations were then compared with GPS tracks the authors collected in the field using Garmin GPS units and driving in off-road vehicles, motorcycles and/or walking on foot, as needed, following methods for data collection practices suggested by the New Jersey Department of Environmental Protection (NJDEP 2013). These tracks were mapped using ESRI Corporation's ArcMap software and compared with existing official GIS data sources.

The early maps in many case indicated the historical locations of early roads, but as reported in the NJHRS, the mapped locations of routes on early maps may have varied from their actual positions. By comparing and analyzing maps from various eras, we could establish with some level of clarity the likely routes of early roads. Some of these routes also have established road easements which aided in this determination. Further - and fortunately - parts of these routes retain in many cases historic route names that help establish their location and use. Finally, a number of prominent and documented features with long historical provenance (towns, bridges and crossroads) help us georeference our historical maps to current geography.

A section of the 1860 Map of New Jersey published by H.G. Bond (Figure 3, bottom panel) clearly indicates the location of the Quaker Bridge, with a well-established construction date in the early 1770's. The map provides clear indication of the routes of Stokes Road, Quaker Bridge Road and Middle Road. The former two routes are also indicated on maps from 1834 by Finley and 1845 by Hammond. Middle Road was reported by other sources as being in use for military, commercial and smuggling purposes in the 1760's to 1780's. All three of these routes are omitted from the NJHRS and yet all three appear to have very long histories of use. We can also see the route of the Tuckerton Stage Road.

Knowledge of the technology of the time was also useful in fixing historic road paths more tightly. The NJHRS report noted that "few streams were bridged in the seventeenth and eighteenth centuries. When bridges of short spans were constructed, using stone or wood, longer spans were rarely attempted. If a waterway could not be forded as was too wide to be easily spanned, colonials had to resort to ferries" (NJHPO 2011 p 22). Thus, early roads in this region would likely follow routes that allowed the user to avoid any major stream fords. Quaker Bridge is a notable exception – which was so notable as a bridged route to be well-known, well documented and extensively discussed in period documents. Quaker Bridge which was first constructed by the Quaker community in the 1770's to allow travel between the Quaker Meetings in Burlington and Tuckerton without the need for fording the Batsto River. Middle Road provides a major bridge-free route from the Forks to inland points and is one of the best routes south from the ferries at Philadelphia and Camden (the major urban centers in the 1770's). The authors have traversed this route and it remains open and passable for the full distance from Atsion to The Forks.

One further element that can document the historic location and date of development of a given road would be a recorded public record of a road easement called a Road Return that would generally be found filed with the county clerk. In New Jersey, a number of historic records still exist from the Colonial and early United States periods. The authors have researched the county records for Burlington County and we have

found a number of period documents that establish the date and routes of given public rights of way – and we have located a number of these records. As an example of the high level of historic content contained in public road returns we include the 1798 Road Return for Quaker Bridge road appears as Figure 4. This return, filed on April 7, 1798 memorializes the road that stretched from the Burlington County border at the boundary known as the Keith Line to the iron works located at Atsion. This road may well have been in use prior to the date of this road return and the road return itself references “old road”. In many cases roads were established with general rights of way and there may or may not be a known recorded record of the route as originally surveyed. In many cases, road returns may have been lost in fires, floods or other catastrophic events that destroyed public records. In those cases, the courts in the United States have tended to follow English Common Law that assumes the public dedication was made at some point in time – in spite of a lost road return.

Return of a Road from
 Kethis line to Abison, } Whereas we the Subscribers surveyors of the High-
 ways for the County of Burlington being duly
 qualified according to law, agreeably to an appoint-
 ment of the Court of Common Pleas in and for the County of
 said in the Sum of February last past for the purpose of laying
 out a public road from the province line, commonly called
 Kethis line in the road leading from Suckerton to Manahan
 kin, thence the most eligible, as is particularly named in the
 warrant to us directed, and agreeably to said Appointment
 have met and viewed the ground, heard the Allegations of
 the parties for and against the propriety and impropriety
 of said road, and taking the same into consideration do lay
 out a public four road, as follows: By Beginning
 at a stake in said Kethis line in said road leading as aforesaid
 from thence South thirty seven degrees West One
 hundred and seventy eight Chain to a stake on the
 southerly side of the ^{old} road opposite Joseph Ridgeway's
 gate, thence South eighty one degree west twenty four Chain
 and seventy links to a Stake on the Eastward of Shon's Mill
 & Down thence Crossing over the same South fifty one degrees ^{West}
 eleven Chain and eighty five links thence North eighty ^{degrees}
 thence North ^{thirty} Chain and ^{thirty} links, thence North twenty one
 degrees west four hundred Chain to a Stake on the East land
 near base near thence North twenty two degrees West

Figure:4 Road Return for Quaker Bridge Road from the Burlington County, New Jersey Road Returns – Book B – Burlington County Clerk’s Office – Recorded April 7, 1798.

4. Establishing historical significance

Identifying historic routes is only the first step in preparing documentation as to the value of a given route and location. The next is establishing historical significance. The US National Register of Historic Places has four criteria establishing that properties have historic value if they:

A ...are associated with events that have made a significant contribution to the broad patterns of our history

B...are associated with the lives of persons significant in our past

C...embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction

D...that have yielded, or may be likely to yield, information important in prehistory or history

(NJHPO 2011, p6)

The NJHRS, for the Early Roads Era Route (ca. 1621 – ca. 1815), adds that a roadway exhibiting one or more of the characteristics below “might be considered a roadway of statewide significance”:

- 1) Demonstrated Regional or interregional importance
- 2) Mandated by the colonial government
- 3) Built primarily for military purposes
- 4) Linked major population centers either within or just outside the state’s borders, including colonial capitals. (NJHPO, p 26)

The archival work done for this paper indicates that the roads studied here meet criteria A, B & C and characteristics 1, 2, 3 and 4. We'll focus on Middle Road to demonstrate this.

Middle Road was part of a network of sand roads that were utilized for trade and movement of military material during the American Revolutionary War in Southern New Jersey. With the loss of the major trade ports of New York City and Philadelphia in 1777, the American Army was in critical need of supplies. The Continental Congress recognized the key value of smaller ports – some used by smugglers – as key points of entry for military supplies – and on June 24, 1776 authorized the procurement and staffing of “Row Gallies” to protect Little Egg Harbor. Little Egg Harbor provided a key point to bring cargo either to be smuggled or in fact captured from British owners by American privateers (government sanctioned pirates).

The two main port areas of interest in Little Egg Harbor were Chestnut Neck and The Forks. These formed the core of the South Jersey smuggling ports. Their location of these activity centers are clearly indicated on the 1770 map shown as Figure 5 (this map was drawn rotated 90 degrees clockwise – with North indicated to the right – the map is shown with North at top) as well as certain roads that served these areas – including Middle Road which is indicated as a route to Camden, NJ (indicated as Cooper Ferry).

Given that the cargo in question was offloaded from ships – the location of the port facilities utilized could vary based upon the water depth in the river and the size of the ship in question. The Forks of the Mullica River represented the furthest inland point that was commonly reachable by larger vessels for the purpose of moving cargo. Further west and north of that point was not navigable and thus the points of The Forks and Batsto Landing represented the best place to land cargo that was heading to Philadelphia and the surrounding areas such as Valley Forge. Further, this same route was of value in providing access for the shipment of munitions (in particular cannon balls) from two key iron forges at Batsto and Atsion.



Figure 5: Map of South Jersey - The Forks and the Associated Sand Roads – A Key Revolutionary Supply System (Map of the coast of New Jersey from Barnegat Inlet to Cape May.. Scale ca. 1:32,000. Manuscript, pen-and-ink. Oriented with north to the top. LC Maps of North America, 1750-1789, 1264 A)

These roads were of crucial significance during the Revolutionary War. The American Army was in critical need of supplies, suffering from financial frailty of the new American Government, compounded by British Army and Navy control and blockade of key ports. However, local colonial traders had a long tradition of skirting British rules by smuggling goods, landing them in remote locations outside of the supervision of the British authorities.

One key port for smuggling was Little Egg Harbor and the Mullica River in Burlington County. With the outbreak of the War, the American government authorized the use of privateers – state sanctioned pirates – as a key method to provide harassment of British trade and obtain needed goods. The privateers were motivated by opportunity and profit, as goods captured were typically auctioned off, with some military supplies requisitioned for Army use. The American government had military warehouses established at key smuggling points to receive munitions and military cargo, such as on Rabbit Island at the Forks (Shomette 2017).

The routes that were used most likely represented the most direct and safe routes for transport, with the major routes identified by local experts as still existing as the Tuckerton Road and the Quaker Bridge Road. In addition, the Middle Road also provided the direct ford-free route to the ferries at Camden, New Jersey and then on to Philadelphia.

The Revolutionary War also stimulated increased activity at the local iron furnaces and pressure to provide more refined products to serve in the war effort. The iron furnaces and forges were of such importance to the war effort that workers were exempted from military service. The commonly reported major trade routes for these activities included the Atsion Road and the Tuckerton Stage Route. These routes exist today in Wharton State Forest and in adjoining lands in Burlington County. The most direct route that avoids any major bridge crossing was the route of Mullica River Road or Middle Road and the western segment of the Quaker Bridge Road. These were identified by local experts as still existing and passable for use today (Pierce 1957).

Scholars note that the forges and furnaces of the area were critical producers of the raw and finished materials for producing munitions (such as shot and muskets) and other supplies for the Continental Army. The roads of the Pine Barrens were utilized to move these goods to Philadelphia (Shomette 2017, Soodalter 2017).

These roads were auxiliaries to various important events. The privateer activity so incensed the British command that a punitive raid was ordered in September 1778. The raid, which arrived on October 5th 1778 to Little Egg Harbor, was able to damage the area of Chestnut Neck, but was unable to reach a further 10 miles upriver to The Forks. Chestnut Neck is well known today for the actual battle that occurred in this area that involved a significant force from Royal Navy under Captain Henry Collins and British Regular Army soldiers and New Jersey Loyalist troops under Captain Patrick Ferguson who were opposed by Count Pulaski of the American Army. The Forks remained largely untouched by this and other engagements and thus became forgotten by history. In fact, the Forks remained the major trading area for the next 3 years of the war with “fully 56% of all sales undertaken in the Little Egg Harbor region...held at the Forks” (Shomette 2017, p 133).

Given all of the activity from the Revolutionary War period, we feel confident that our evaluation of the routes in question would meet the standard of historical significance as Early Roads Era routes and thus should be identified as historic and managed appropriately.

5. Identifying other Burlington County roads of potential historic significance

In our field validation of the USGS Topo maps, we found a high degree of correlation of our GPS tracks and the indicated sand roads (Unimproved Roads in USGS parlance). It appears that a good number of sand roads located in Burlington County have very long histories and a number of these routes are associated with very historic events and historical figures. Figure 5 (top) was produced using the digital USGS Topo maps and the field collected GPS tracks produced by the author's team. They validate that the routes appear to be stable in terms of location and route as compared to the 1947-1993 USGS Topo data. Given the dense forest surrounding these routes, it is likely that road users would remain on the established tracks, and thus by use preserve the route for future evaluation (Figure 6, bottom, is a photograph of what the roads there typically look like now).

Validation of the routes via GPS helps resolve any discrepancies between the historic maps, modern maps and the actual current physical location of the transportation assets. Our results in this case indicate a strong degree of correlation between the reported physical locations of the routes on the USGS Topo quads and the field collected GPS routes. A number of routes found in the field do not exist on the USGS maps, however, and that may well reflect new cut roads in the region as opposed to errors in the USGS mapping process. (As an interesting side note, we found considerable variation in some cases between our reported GPS field data and the modern GIS road shapefiles that appear to have been created using computer drawing in NJDOT or other agency offices, as opposed to being based on field collection of data).

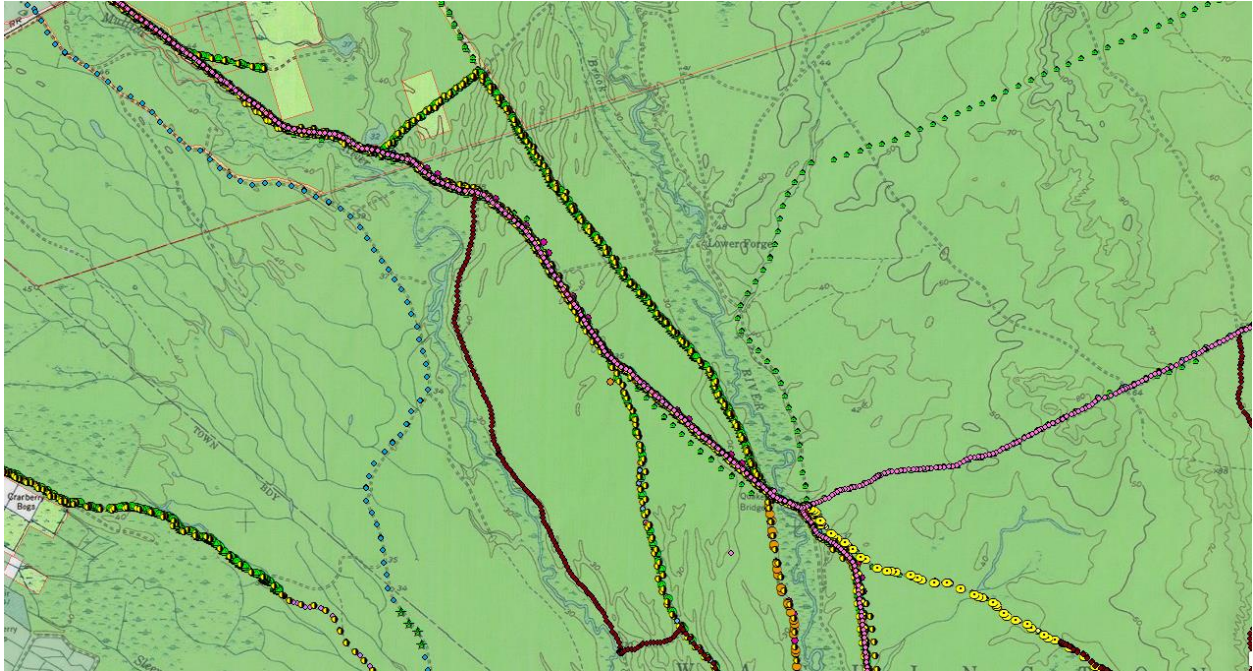


Figure 6: (top) Authors' Field Collected GPS Tracks overlaid on USGS Topo – Atsion, NJ Area; (bottom) Typical Sand Road (2016) – The Forks Road – Wharton State Forest. (Author photos)

6. Benedict Arnold and the Incident at the Forks in Burlington, New Jersey – one part of his path to treason

In the course of our research into the smuggling and privateer activity at the Forks of the Mullica River, we ran into one of the most controversial characters in United States history – Benedict Arnold. To say that we were astounded is a dramatic understatement as little of this history is documented on the sites or roads of this region.

Every school child in America learns of Arnold's treason and the attempt to turn over the plan for the fortifications at West Point in 1778 as well as his flight to the British. Yet few understand how this acknowledged hero of the Battles of Quebec, Ticonderoga and Saratoga early in the Revolutionary War could decide to turn against the United States at a critical point in the war and attempt to profit from betraying the cause. (Biographical information here and below taken from Wilson 2001).

Arnold had already had some unfortunate turns and brushes with Continental Army discipline, even offering to resign at one point, an offer that was refused. He nonetheless fought valiantly in various engagements and was wounded in the right leg at the Battle of Saratoga in the autumn of 1777. Coming to Valley Forge after that battle, General George Washington, seeing his physical condition, decided that Arnold could not have a field command until his leg was healed and sent him to be the military commander of Philadelphia, which had just been liberated from British control. While stationed in Philadelphia, Arnold became romantically involved with a noted lady of stature (Peggy Shippen) whom he later married in April 1779. This apparently increased his desire for income and he returned to commercial activity, including apparently becoming the majority owner of a cargo ship, the *Charming Nancy*.

Arnold used his considerable influence to attempt to protect the cargo of this ship, including writing a letter of protection from Valley Forge on June 4, 1778 for the *Charming Nancy* to dissuade any American Privateers from taking the ship. This attempt was in vain and the ship was captured by the American privateering vessel *Santippe* around June 18, 1778 and taken to Egg Harbor where an attempt was made to declare the ship a war prize and subject to auctioning of the cargo. The other members of the owners group fought in Admiralty court to retain ownership, but the ship sat in Egg Harbor for a considerable period of time. It appears that it was moved up river to the Forks by October 1778 – as Arnold indicated in his October 11, 1778 letter to George Washington.

Arnold was informed of the legal case and also of a recent raid by the British on Egg Harbor on October 7, 1778. Arnold apparently decided to order wagons that were tasked to serve the Continental Army to the Forks to attempt in an attempt to retrieve this cargo. The task was successful and the cargo was sold in Philadelphia, netting Arnold a significant sum of £7,500 that he collected in November 1778. All of this activity is well documented in direct testimony as recorded in the transcript of his general court martial that was held off and on in New Jersey from June to December 1779.

The court-martial documents, published by Congress in 1780, provide us with a wonderful insight into Arnold's thoughts as well as his activity during this period. The transcript provides direct testimony that documents the activities at the Forks and Egg Harbor and the direct actions and orders of General Arnold during this period. Most insightful is the direct testimony of some of the wagon masters and also the reproduction of the direct orders that were made to subordinates. In particular, the deposition of wagon master Jeffe Jordan provides some context for the events that followed (Proceedings 1779):

“Colonel Mitchell told them that they might go to Eggharbour, and to go to General Arnold and receive orders from him; that he went accordingly to General Arnold, and soon after received the orders from his aid de camp in writing, signed David S. Franks, aid de camp; that in obedience to those orders, he proceeded with the brigade of wagons empty to the forks of Eggharbour; that until they arrived within about twenty or twenty five miles of the forks, the deponent was confident they were employed in public service of the continent, and expected they were to take in a loading of public stores,...” (Proceedings 1779, p 39, regarding the events of the 16th of October, 1778)

The transcript provides a copy of the direct order to Wagon master Jordan which is cited on page 37 of the court martial:

“You will proceed immediately with your teams to Egg-harbour or the Forks, take the orders and directions of Captain Moore, whom you will obey in every particular. By order of General Arnold, David S. Franks, Aid de Camp. To Jeffe Jordan, waggon master, Copy. T. Matlack, Secretary.” (Proceedings 1779)

The orders to Wagon Master Jordan appear very clear and further review of the transcript provides even greater detail as to the intent of General Arnold's order to direct wagons to retrieve his cargo. Captain William Moore is identified as the master of the ship Charming Nancy in the copy of a pass given to Captian Robert Shewell on June 4, 1778 by General Benedict Arnold as reported in the court martial transcript (Proceedings 1779, p 14). Further, this same pass identifies the cargo of the Charming Nancy that is being loaded prior to departure from Philadelphia. These goods were recovered by the wagon train to the Forks and were subsequently disposed of by merchant Stephen Collins of Philadelphia. Further testimony at the court martial indicated that Benedict Arnold was the recipient of the bulk of the proceeds from the sale of these goods, netting him 60% of the £13,400 that the cargo realized at sale.

Here we have a clear chain of evidence that links Benedict Arnold directly to the events at the Forks and the successful recovery of the cargo from the Charming Nancy by the misappropriation of government wagons and the personal benefit to Benedict Arnold of the sale of these goods. This set of acts and the subsequent court martial that resulted served to harden Arnold against the new American government and help set in motion his treason at West Point. This context obviously further solidifies the historical significance of these particular roads.

7. Conclusions and implications for historical research and preservation

A large number of unpaved sand roads exist in Burlington County, New Jersey and remain in a similar condition to when they were constructed in the 18th to 20th century. These roads are located in a largely undeveloped region of New Jersey on state forest lands and surrounding agricultural and residential land. Our research work has focused on three roads in Wharton State Forest, the largest single tract of unimproved land in New Jersey (125,000 acres) in Burlington County. Inside the boundary of the State Forest, over 500 miles of roads, trails and fire cuts exist. They range in width from single track motorcycle trails and foot paths to minimally constructed sand roads to formal gravel roads and paved sections.

The routes continue to exist for various reasons, including public access, historic agricultural activity and hunting. Users include hikers, mountain biking, horse riders, kayak and canoe transport and licensed motor vehicle users (cars, trucks & motorcycles). Thus, the existing roads provide visitors with a number of recreational opportunities and access to a broad range of areas in the forest. This paper has focused on methods for identifying the historic roads amongst these and the value of conducting thorough fieldwork using GPS and GIS methods to assist in this task. There is the need for a further discussion as to how best can we preserve these historical assets once they are identified.

Proper preservation and marking of historic roads is of key importance and a clear and actionable preservation plan should be developed. In the case of the sand roads, another matter to consider is what is the object or structure to be preserved. Much like Route 66 – stretching from St. Louis, Missouri to Los Angeles, California in the United States or the Oregon Trail – the key asset to be preserved is the physical network of roads that link various historical locations. Thus, our plan of preservation must encompass both the physical preservation of the routes as well as appropriate interpretive information as to the historic sites related to the regional transportation network.

The goals and practices of historic preservation for a given site – and particularly in terms of the historic preservation of networks can be in conflict with other regional plans – such as economic development or recreational uses, even in relatively undeveloped areas such as the Wharton Forest. Recently, there has been considerable discussion regarding public access onto the Wharton Forest roads and issues related to their use and the activity of motorized vehicles on existing sand roads and trails. One might assume that this use would undermine preservation. Yet the use of these trails by modern vehicles may serve to preserve the route and manage overgrowth of the routes. A sensible management plan may include regular use of the routes to continue to maintain the open rights of way for the route, in conjunction with heritage safeguards.

Documented loss of some significant routes due to a lack of use has indeed occurred in the area. A significant portion of the Tuckerton Stage Route has been lost as the removal of a key bridge and development of a paved alternative resulted in the re-routing of traffic onto a parallel route. Thus, with limited travel and activity, the surrounding forest reseeded the route and over time, the route effectively was extinguished. In particular, the section from Beaver Run to Bodine Field is reported as unpassable as of the 1960's and today is largely lost due to a lack of use.

In this case, however, it may be that historic preservation and sensible use of these facilities may fruitfully coexist. In fact, regular use requires management and periodic maintenance, which may, properly done, actually help preserve a route under the right conditions. This is particularly important for areas of high use and at intersections. These intersections naturally are subject to turning and direction changes that create additional stresses on the road surface and may disrupt the road fabric. Thus, the ongoing operations of historic roads that are unpaved merits serious consideration both from a preservation of the route and balancing that with excessive wear and tear. These impacts are most pronounced at areas that concentrate activity, such as at river crossings and at geographic choke points. The often stated desire to eliminate motorized vehicle road use in public parks, for the purposes of returning a given area to a natural state, in some cases may be in direct conflict to the historic preservation of these routes, as a lack of use could lead to loss of the historic route due to overgrowth. Further, to maintain a route without use would require periodic trail cutting, a significant effort and expense for forest management. Of course use can be harmful to preservation as well. But it should not be assumed to be automatically so.

There are a number of useful technological solutions that can be applied to protect and provide additional surface and subsurface strength to historic roads with minimal impact to the look and functionality of historic roads. In particular, at high use areas, the deployment of proper subsurface preparation and the use of geotextiles and soil stabilization can create very durable road surfaces with significantly better load capacity, while maintaining a surface appearance that is very consistent with the historic nature of the road. For example affordable geogrids can be placed using standard equipment to create a reinforced road that has significantly better wear and strength as compared to unreinforced soils. These technologies should allow the continued use of historic roads while preserving their essential characteristics and routing. Further, these techniques can be applied as needed, with appropriate surface treatment maintaining the historic appearance of a given route (DeGeyter and Ho 2017).

Finally, one significant consideration for planners is the aspect of considering the economic value of a historic road structure. The historic sand road network in South New Jersey continues to support a broad range of recreational activity that produces significant economic activity for the region. Unpaved road users make significant investments in vehicles and equipment. Further, their visits to the forest produce significant revenue for local merchants including food establishments, fuel stations and even towing companies. Properly preserving historic facilities can enhance all these modern-day benefits.

Sensible management and strategic investment in historic roads in many cases, such as this one, may consist of a mix of use and conservation, preserving the historic routes through continued use as appropriate while limiting any changes or damage caused by use. And such a mixed approach might be able to tap into funding sources that are not directly devoted to historical preservation and investigation. In the case considered here, funding for investments could likely be supported via the Recreational Trails Program of the US Federal Highway Administration, which provides funds for

recreational trails through the use of fuel taxes that are collected on recreational and off-road vehicle use. Other opportunities might be available elsewhere.

In general historical roads and routes are an essential part of the record and understanding of economic history and their preservation and documentation is critical for the historian, economic and otherwise. This paper has described and discussed a case study of colonial roads in New Jersey that provides some ideas, methods and insights for doing just this.

8. References

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