

MAPPING EMIGRANT TRAILS MANUAL

PART A INVESTIGATIVE PROCEDURES & TRAIL CLASSIFICATIONS

**Prepared by the
Mapping and Marking Committee**

**Fifth Edition
(Revised and Expanded)
June 2014**

**Published by the
Oregon-California Trails Association
P.O. Box 1019
Independence, MO 64051-0519
816-252-2276
octa@indepmo.org
www.octa-trails.org**

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RESEARCH PRINCIPLES, METHODS, AND GUIDELINES

The purpose of OCTA's MET Manual Part A is to provide standardized investigative procedures and trail classification categories for mapping emigrant trails. Because the accuracy and reliability of this mapping program rests on the quality of research, it is important to emphasize the principles, methods, and guidelines used to locate and verify emigrant wagon trails. The following procedures focus on documentary research and investigative fieldwork. They are designed to impart order and discipline into the use of evidence in locating and verifying emigrant trail segments.

GENERAL PRINCIPLES GOVERNING TRAIL LOCATION AND VERIFICATION

At the most basic level, two general principles govern research for locating and verifying emigrant trail segments: Probability and Analogy.

1. Probability:

All too often the exact location of an emigrant trail segment cannot be verified with absolute certainty. In most situations, however, the trail researcher can strive for a higher degree of probability by utilizing all the available evidence and following accepted procedures. Verifying the extent to which a trail is an authentic emigrant trail may pose a problem. What appears as an emigrant trail may have originated as a later period freighting, mining, military, or stage road. In such cases, the researcher must determine the degree of probability that the trail in question did in fact originate as an emigrant trail. (See the discussion on the "Problem of Determining What Is an Emigrant Trail," page 12.)

2. Analogy:

The trail researcher can only measure the unknown by what is known through analogy. The location of a possible trail segment can be authenticated only by comparing and contrasting it with what is already known about other verified emigrant trails. These analogous relationships include all types of documentary and physical evidence. Thus, to authenticate newly-located trail segments, the trail researcher must apply the accumulated knowledge gained from previously verified trail segments to similar conditions found on the segments under investigation.

CARDINAL RULES OF TRAIL VERIFICATION

For the location of an emigrant trail segment to be considered as verified, it must conform to the following "Four Cardinal Rules." Where conditions exist that any of these four rules do not apply, the probability level is reduced accordingly. Essentially, these "Four Cardinal Rules" become a standard for assessing the degree of probability that the researcher/mapper has accurately located an emigrant trail segment.

1. Coherence Rule:

There must be a linear uniformity so that trail segments form a continuous sequence; i.e., the trail segment under investigation has to link together (*cohere*) with the trail segments that precede and follow it.

2. Corroborative Rule:

There must be confirming documentary evidence of the trail; i.e., the trail segment under investigation has to have valid written or cartographic evidence to support (*corroborate*) its authenticity. (See below the “Ranking the Reliability of Different Types of Evidence Used to Verify Trail Location.”)

3. Collateral Rule:

There must be accompanying physical and/or topographical evidence of a trail; i.e., the trail segment under investigation has to have some geomorphic or artifact evidence (*collateral*) to confirm it as an authentic emigrant trail. (See “Guidelines for Visually Locating Wagon Trails,” beginning on page 9.)

4. Correlation Rule:

There must be overall agreement among all types of evidence; i.e., the evidence resulting from the first three cardinal rules has to mutually support (*correlate*), and not contradict one another, in order to verify the location of a trail segment.

No set of standards, however well thought out, can cover all cases with equal uniformity. In most instances the “Four Cardinal Rules” will work well. Inevitably, however, situations will arise when the level of authenticity of a trail segment may be much higher than a strict application of the cardinal rules would warrant. In such cases, the researcher-mapper will have to rely on balanced judgment, acquired through experience, to arrive at a final determination. Ultimately, the trail mapper bears the responsibility of reaching a decision on where the trail is located; the rules alone cannot do that.

RANKING THE RELIABILITY OF DIFFERENT TYPES OF EVIDENCE USED TO VERIFY TRAIL LOCATIONS

In the best of situations, the trail researcher examines all the relevant written, cartographic, physical, and artifact evidence and finds them mutually supporting. But what does the researcher do when different kinds of evidence conflict? How does one determine the relative reliability of different types of evidence?

Though it may not apply in all situations, as a general rule ***the closer in time the evidence is in relation to the trail under investigation, the more reliable that evidence becomes.***

Experience has shown that caution must be exercised when using some of the following types of evidence and documentation. Even detailed diary accounts can be misleading or confusing, probably because the emigrant recorder was confused over where he or she was at the time. The

researcher must evaluate any suspect account by comparing it with other diary descriptions as well as topographic and cartographic information. Because recollections and reminiscences have been written long after the overland trek, when memories have faded, they often include unreliable or exaggerated descriptions. In rare cases, the emigrant author may have based his or her recollections on a diary kept while traveling overland. As a general rule, however, researchers should be wary of recollections and reminiscences.

When adequate diary/journal or physical/artifact evidence is lacking, the researcher must rely heavily on the next best source of evidence, usually later reports or maps, especially General Land Office (GLO) plats. In all cases, the researcher must utilize all types of available evidence and keep in mind that the closer the evidence is in time to the period of the trail's use, the more reliable it becomes.

The following ranking reflects the relative reliability of available evidence:

1. Written eyewitness descriptions that locate the trail with reasonable accuracy or exactness, such as detailed diaries, journals, letters, newspaper accounts, and reports of the Army Topographical Engineers describing emigrant trails. (For bibliographic information on identifying and locating these documents, see Appendix 1: Documentary Sources on Overland Trails.)
2. Written eyewitness descriptions that locate the trail in a general way or direction, such as less detailed diaries, journals, letters, emigrant guides or logs, and the more detailed recollections/ reminiscences.
3. Remaining physical, vegetation, or artifact evidence of wagon trails that correspond to either diary or plat evidence, such as traces, ruts, swales, wagon parts, and differential vegetation.
 - Archaeological reports and surveys either by universities, state, or federal agencies can assist in locating physical remains of emigrant trails.
 - Emigrant or wagon artifacts uncovered with metal detectors are very useful in verifying emigrant trail segments or sites, although skill is required in identifying the age and use of these artifacts. Also, to avoid violating federal laws on public lands, MET mappers must follow OCTA's policy regarding the use of metal detectors on historic trails and sites.
 - Remote-sensing technology that detects subsurface ground anomalies and uses computer-assisted image interpretation, show great potential for locating physical and artifact remains.
4. General Land Office (GLO) cadastral survey plats and survey notes.

For information on the use and reliability of GLO plats, see the discussion beginning on page 9.

5. Topographic features that confine wagon travel to a specific location can aid interpretation of sketchy diary accounts and GLO plats. However, emigrant trails often defy modern reasoning on the route these trails should have taken. Therefore, the trail researcher should be cautious on second guessing emigrant reasoning and practices. Keep in mind that the researcher/mapper is interpreting trail history not creating it.
6. Reports that describe the location of emigrant trails, such as federal, state, county, territorial, military, and railroad surveys undertaken in the 1850s and later. State and county highway/transportation department surveys at the beginning of the motor vehicle period, sometimes conducted along or across earlier emigrant trail routes, may prove useful.
 - Early property surveys buried in local county recorder records may show a trail as a property boundary.
7. Maps that show the location of either emigrant trails or possible emigrant trails.
 - The earliest mapping usually was the most general in that the maps covered large regions. Maps of this type include early surveys commissioned by state agencies and legislatures, maps of the Army Topographical Engineers, and maps of the Pacific Wagon Road Office of the Department of the Interior.
 - An exception is T. H. Jefferson's 1846 *Map of the Emigrant Road from Independence, Mo., to St. Francisco, California*, which has proved very useful in determining the early emigrant route to northern California.
 - Late 19th century maps that may reveal emigrant trails, such as early USGS topographic quadrangles and early county maps often located in county records or recorders offices.
8. Recent evidence and documentation (not necessarily in order of reliability).
 - Published trail descriptions and maps by historians and government agencies. Also trail studies/reports produced by consultants for government agency use.
 - Trail-location knowledge of trail buffs, local residents, ranchers, foresters, and government agency personnel.
 - Google Earth has proven to be a primary source for locating trail segments, especially those not readily visible on the ground.
 - Aerial photography.

USE OF EMIGRANT DIARIES/JOURNALS

The primary means of locating and verifying an emigrant trail segment or site is following a rigorous analytical and interpretive process. This process is most effective when there are enough available descriptions and observations left for us by emigrants in their diary or journal accounts. These emigrant accounts are the most reliable evidence we have available for determining trail locations and sites. They are the equivalent of an eyewitness account. However, the process of massaging the trail evidence imbedded in diary accounts is fraught with limitations. It's the **paradox** of the "observer effect" in which measurements of systems cannot be made without affecting the system being measured.

When using emigrant diary evidence, there is a three step process for arriving at a final determination of where a trail segment or site is located; paradoxically, each step increasingly strays from what the emigrant actually saw or witnessed. The **first step** is the diarist's personal description **recorded** in his or her diary. That's the first step away from the actual reality of what's being described. As we know, no two observers will ever describe the same location or event in the same words. Both apply their own personal perception of what they have seen or experienced. The **second step** is the modern researcher's use of these original accounts. The trail researcher gathers together as many emigrant accounts as possible for a particular location and then **analyzes** these descriptions, trying to extract useful trail information. This removes the researcher even further away from the very thing he or she is trying to determine, where a trail segment or site is located. Finally, in the **third step**, based on the previous analysis, the researcher **interprets** where the trail segment or site is located, carrying him or her even further astray from the very thing trying to be determined, hence the paradox.

This paradox is something trail researchers have to live with. We do our best to get back into the mindset of the emigrant, that eyewitness, to grasp what was seen and then recorded in diaries. To accomplish this, the best approach for the trail researcher is to rely as often as possible, assuming there are enough diary accounts available, on the "Composite Trail Description Method" and/or the "Multiple Hypotheses Method" (see the next two following sections). Also, the researcher must keep in mind the probability principle that postulates no emigrant trail segment can be known with absolute certainty, a result of the paradox of evidence described above. However, the researcher can strive for a higher degree of probability by utilizing the available evidence and following research procedures explained above. Finally, to locate and verify an emigrant trail segment or site, the final interpretation must conform to the "Four Cardinal Rules of Trail Verification."

USE OF THE COMPOSITE TRAIL DESCRIPTION METHOD

A very effective means of applying diaries/journals to locate and verify particularly vexing segments of emigrant trails (no more than a few miles in length) is using the **composite trail description method**. You begin by gathering together as many emigrant diary accounts as

possible that describe in any way the trail segment under study. Descriptions, for example, could include references to springs, a particular rock formation, creek crossings, a rocky part of the trail, sand hills, ridges, ravines, forks in the trail, and any distances or directions recorded. Look for similarities and discrepancies among the various accounts. Then arrange all of these descriptions—really clues—in some kind of sequential order that will reveal the course, direction, and location of the trail segment under study.

In effect, you will have created your own composite diary account. In this way, you can assemble a detailed description of the trail segment under investigation. Taking this composite trail description into the field will greatly facilitate your search for the trail by showing you where to look for trail traces. Also, if you are confronted by several apparent trail traces in the vicinity, this composite trail description should help in determining and verifying which of the traces are related to emigrant wagon use. (See Appendix 2: Composite Trail Description Method.)

USE OF THE MULTIPLE HYPOTHESES METHOD

Another method that can be applied to determine an unknown or unverified trail route is creating **multiple hypotheses** and then rigorously testing each one. Hypotheses are designed to be “destructively tested.” The biggest danger for the mapper analyst is to embrace a favored hypothesis rather than remain skeptical and rigorously test its validity. A hypothesis that remains durable under testing has a higher probability of being accurate. Look for a “fatal flaw” that would render a hypothesis highly unlikely to fit normal emigrant travel patterns. The testing process includes applying diary descriptions, General Land Office (GLO) plat information, and terrain surface characteristics in the field.

Armed with this type of evidence, head out into the field and try to put yourself into emigrant boots walking alongside a wagon to see whether or not a hypothetical trail route makes trail sense. For example, a route too sideling for wagons to traverse would be that fatal flaw negating a hypothesis. Any significant obstacle that would require time and energy to overcome—and is not accounted for in a diary description—might be a fatal flaw for a given hypothesis. For example, a challenging cliff barrier encountered on the ground would suggest that if emigrants had directly ascended the cliff the incident would have elicited diary comments. Absence of those comments would suggest that the travel route deviated in some fashion to avoid the obstacle. Likewise, the absence of an obstacle in the way of direct travel would negate a hypothesis that had emigrants taking a circuitous route.

USE OF GLO PLATS AND FIELD SURVEY NOTES

Among the most useful and readily available documentary resources for locating emigrant trails are the General Land Office cadastral survey notes and plats produced from the 1850s into the early 20th century. The purpose of these GLO field surveys was for subsequent land administration and disposal by the federal government. These original land surveys are available

in the western states on BLM websites or at BLM state offices (both the plats and surveyor notebooks). The availability and location of these plats and survey notes in the Midwest states varies considerably. When ordering or looking up GLO plats, know the Principle Meridian name under which the plats are referenced. (See a map of Principle Meridians and Base Lines and an explanation of the Public Land Survey System in Appendix 3.)

Surveyors were contracted to survey public lands in a grid system of townships (north-south) and ranges (east-west) of 36-square-mile blocks which were then further subdivided into 36 one-square-mile numbered sections. For this purpose, the surveyors established township and section corners (typically stones, wooden stakes, or blazed bearing trees). From these corners, surveyors were required to walk along section lines and only record in their survey books what landscape and cultural features they encountered along those section lines. Distances to features encountered were measured horizontally in surveyor chains laid down as they walked the section lines. (For survey measurements and the township/range grid system, see the Land Description Diagram in Appendix 3.)

Although most GLO plats were the result of conscientious surveys by competent surveyors, a few of the plats are not trustworthy. There are historical records of large-scale fraudulent surveys and smaller-scale, so called “hotel room surveys” where no actual field survey was ever conducted. The researcher must compare what is seen on these old plats with other sources. One way to verify a surveyor’s accuracy is to check the survey notes for resurveyed townships to see if the new surveyors found the section corner evidence as shown in the original notes. Because section corners may have changed with subsequent surveys, another possible validation method is to check a surveyor’s notes for natural features, such as rivers, creeks, or ravines. Using the surveyed measurements from these features to a surveyed trail shown on the plat may indicate the trail location on the section line.

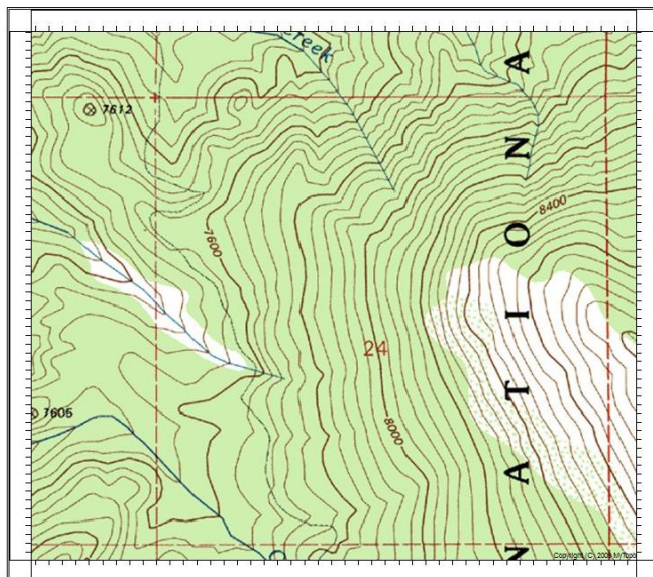
The accuracy of the surveyor’s trail identification also depended on his knowledge of emigrant routes. In some cases, surveyors labeled a wagon road as an “Old Emigrant Road,” “Old California Road,” or the specific name of a historic trail, which can be quite helpful. Other surveyors labeled them only as “Roads” or “Trails” which is less helpful. Consulting the surveyor notes can be very useful in revealing more trail information than appears on the plat. Keep in mind that the surveyor notes are the eyewitness accounts, with the plats themselves being interpretations of the survey notes by draftsmen, and may contain inaccuracies not present in the survey notes.

Even the most competent GLO surveyors recorded only features along section lines within a township. Thus field surveyors did not record features within the sections when surveying along section lines. When completed, a surveyor’s field notes typically were sent to a regional draftsman who then transposed the recorded features from the survey notes to the plat. However,

and this is most important for the trail researcher, in most cases the draftsman could only estimate where a road or trail was located between section lines. Therefore, unless the surveyor either followed a trail between section lines or could see it clearly (and provided that information in his survey notes), the trail route drawn between section lines may be inaccurate. This will not be a problem in areas where the trail is coursing through sections of flat terrain in a relatively straight line. But the possibility of inaccuracies should be considered when judging the reliability of a trail route appearing between section lines in mountainous and forested terrain. As a general rule, accuracy of GLO plats will exist only where the trail intersects a section line.

Usually, it behooves the researcher to pay particular attention to the township and range lines which were surveyed first (the section lines were filled in later). Surveyors tended to pay closer attention to feature details along these outside lines. Therefore, reading the surveyor notes for these township lines may reveal additional topographic information, like streams and ravines, in relation to the trail. Sometimes bearing and distance were provided to cultural features like cabins, mills, or trading posts that might be helpful in determining the location of those sites on a current topographic map.

In transposing trail/wagon road information from the old GLO plats to USGS 7.5 minute topographical maps, some modern section lines—due to more accurate surveying—may be rendered differently than those on the old plats (modern sections along township/range lines may be shorter or longer or configured differently). In such cases, the researcher will have to estimate where the trail is on the topographical map (in preparation for verification work in the field).



It is important to understand what the red section lines on a USGS topographic quadrangle indicate. A red + is a “found corner” which means that the map plot of the section corner is accurate within map standards. Absent a found corner, the section line is approximately where it is thought to be located. A solid red line indicates a surveyed line. A dashed red line indicates a non-surveyed line placed for reference purposes only. (See adjacent example of these section lines and corners on a topographical map section.)

In areas remote from railroad-building, mining activities, or settlements, GLO surveys often were not completed until the late 19th or early 20th centuries. By this time, unless an emigrant

trail had become a freight, stage, or ranch road, it may have fallen into such disuse that surveyors did not record its location. Thus, the more recent the GLO plat, the greater the chance emigrant trails will not have been recorded.

Nonetheless, GLO plats, despite their potential for inaccuracies and omissions, are among the most useful and available sources we have for determining emigrant trail routes. Certainly no mapping effort can be considered complete until this source has been utilized fully. As a general practice, consult and evaluate the relevant GLO plats and survey notes before beginning fieldwork. All gathered trail information should be transferred onto 7.5 minute topographic maps (manually or digitally) before going into the field and/or converted into GPS waypoints for “Go To” use in the field. (For these procedures see MET Manual C: Planning and Executing a Mapping Project.) GLO plats in conjunction with diary accounts will provide the best starting point for locating and verifying emigrant trails. (For examples of GLO plats, see Appendix 3.)

PROBLEM OF DETERMINING WHAT IS AN EMIGRANT TRAIL

For OCTA’s mapping program, as indicated previously, a central concern is determining the degree of probability that a trail segment under investigation originated as an emigrant trail and not as a later wagon road. Another way of looking at this problem is to ask, “How can MET help in distinguishing emigrant trails from later freighting, stage, military, or toll roads?” There are two sides to this problem: One deals with trail segments whose origins were emigrant but later were improved for other types of wagon use. The other deals with trail segments whose origins were later wagon roads not associated with overland emigrant travel.

Both of these later types of wagon roads mainly originated from west to east as civic promoters at the western destinations of overland emigrant travel sought to improve the original routes leading to their settlements or develop shorter or easier wagon routes to adjacent mining camps. As emigrants neared their long sought destinations, increasingly they were provided with these options on where and how to end their overland journey. For the mapper, this presents the problem of determining where emigrant trails end and later wagon roads begin.

This dual problem increases as the years move beyond the early 1850s, when new settlements proliferated in the west. They all demanded wagon road access of various kinds (for miners, merchants, settlers, freighters, stages, mail carriers). By the late 1850s and 1860s the migration pattern began to shift from predominately east-to-west travel to west-to-east travel to the new mining discoveries in Nevada, Idaho, Montana, southern California, and Arizona. Eastern Oregon experienced a similar pattern. It became a back-filling process as miners, merchants, gamblers, and hustlers dashed to these new mining settlements, sometimes using existing emigrant trails but often over new or adjacent wagon and toll roads.

There is an important distinction between the original emigrant trails and later wagon roads. Emigrant trails were a one-time, one-way transit that did not justify improvements beyond what

was necessary to gain passage. By contrast, the later wagon roads were related to continuous, back-and-forth use which justified costly improvements, such as shortened routes, side cuts, and better grades for stages and freight laden wagons.

A dramatic example was the silver and gold strike in western Nevada that created Virginia City in 1859. This transformed the emigrant trails over the Sierra Nevada into wagon road. The earlier Johnson Cutoff to Placerville and the Henness Pass Trail to Marysville were turned into freighting toll roads supplying Virginia City. In the Truckee Meadows area, adjacent to later Reno, there were numerous wagon roads leading to Virginia City that some trail historians mistakenly ascribed to early emigrant use. The strikes along the Reese River in central Nevada adjacent to the Central Overland Trail in the early 1860s prompted a realignment of a section of the earlier Carson Trail leading to Dayton/Virginia City.

Another example is the building of the Humboldt Wagon Road from Chico, in northern California, to the mining communities in southeastern Idaho in the mid-1860s. This wagon road used sections of the earlier Lassen Trail, Nobles Trail, and Applegate Trail, and thereby impacted these original emigrant trails. In eastern Oregon settlements sprung up in the 1860s, like Pendleton, LaGrande, and Baker City, which led to commercial activity along or near to the earlier Oregon Trail. On the Apache Pass Trail in New Mexico and Arizona—an emigrant cutoff opened in 1849—the Butterfield Stage Line, initiated in 1859, often ran over or alongside this earlier cutoff. The Pike’s Peak gold rush and establishment of Denver in 1859, in what will become the Colorado Territory in 1861, had a similar impact on the earlier Cherokee Trail and Platte River routes in this area.

Complicating the problem even more, as migration patterns shifted and later wagon roads proliferated, fewer and fewer travelers recorded their travel experiences in diaries or even recollections. By the 1860s, there is diminished diary evidence to work with. Often all that exists as documentary evidence are GLO plats, local newspaper reports of road building, and county and state road survey reports.

For the trail mapper, the challenge is determining what to authenticate/verify as an emigrant trail or trail segment. The MET Manual research procedures, guidelines, and trail classification categories can be applied equally well in authenticating post-emigrant era wagon roads. The devilish dilemma is determining what constitutes an emigrant trail (or segments of these trails), especially those that have been designated as a National Historic Trail under the National Trails System Act.

The purpose of discussing this verification problem is not to solve it, which can only be determined on a case by case basis, but to illuminate it so the mapper is alerted to what he or she

may confront in research and field investigations. For a discussion on how to classify these later wagon roads, see “Additional Guidelines and Qualifications for Classifying Trails,” page 22.

GUIDELINES FOR VISUALLY LOCATING WAGON TRAILS

The following guidelines focus on the most common surface characteristics and configurations, as well as other indicators, which can be used to locate and identify emigrant wagon trails in the field. (For descriptions and diagrams of trail terms used in the following guidelines, see Appendix 4: Trail Terminology.)

High Relief Terrain:

- In hilly or mountainous terrain, emigrant wagons generally followed ridges rather than ravines or canyons. However, in arid regions, like the southwest, having hilly and/or rocky terrain, trails frequently followed the easier route of dry, sand-filled washes
- When encountering hills on steep ascents/descents, wagons normally traveled directly up or down to avoid sideling on steep slopes. Trails traversing along the sides of slopes usually will not be emigrant wagon trails but later improved wagon roads. Exceptions might be where there was either no alternative to a steep slope or the slope angle was not steep enough to make wagons unstable.
- When traveling up or down hills, wagons often left swales and ruts that eventually caught runoff and took on the appearance of natural drainage features, thereby making it difficult to distinguish between a naturally occurring drainage and one that resulted from wagon use. Generally, wagons ascended and descended on the spine of a ridge rather than up or down adjacent ravines or canyons. Therefore, an unnatural drainage on the spine of a hill may indicate a one-time wagon trail.

Rocky Terrain:

- When possible, wagon-bound emigrants avoided rocky terrain. Do not expect to find wagon traces in rocky areas unless no alternative route was possible. If no alternative existed to these rocky areas, rocks were moved to both sides of the trail for ease of passage.
- In rocky areas, often emigrants cleared larger rocks out of the trail and placed them along the sides of the trail to make wagon passage easier. A line of rocks, often partially embedded in the soil, may mark the edge of trails. By way of contrast, rocks may have been placed in trail depressions to facilitate wagon travel in wet or boggy sections.
- In rocky terrain, wagon trains tended not to spread out because it was difficult to move rocks out of the way to create a parallel trail. However, this does not preclude finding short parallel trail segments in rocky areas.

Low Relief Terrain and Alkali Flats:

- In low lying flat areas with adjacent hills, trail segments often skirt along the base or toe of hill slopes to avoid places where water collects or sage brush grows thick.
- Wagon trails that cross gullies often appear as more than one rut or swale, either on the ascending or descending side or both. This indicates that over time and use a crossing became eroded and another adjacent swale replaced it.
- In areas where there are scattering of dark volcanic boulders, as on alkali flats, some of them may have been turned over and are white on the underside. This could indicate that wagon wheels have turned them over along a trail route.
- Wagon wheels rolling over alkali flats often left distinctive single or multiple tracks. Continuous tracks, streaked or lined with alkali from evaporation, may give the appearance of alkali “tire tracks.”

Soil Influences:

- Wagons commonly spread out to avoid alkali dust and deep, loose sandy soils. This traffic pattern created very wide depressions or swales. Also, as trail deterioration occurred due to use and weather, emigrants established parallel trails to avoid badly rutted and eroded segments.
- Wagons drawn by draft animals on dirt trails tended to create swales and ruts rather than parallel wheel tracks separated by a center mound which are typical of two-track roads left by motor vehicles. Exceptions are where wagon wheels have worn deep two-track grooves into hard surfaces, such as sandstone and limestone.
- In hard packed, gravel soil, wagon traffic may have left a distinctive “gravel road” appearance that has withstood remarkably well the impact of erosion and weathering. In places, often over long stretches, these gravelly “roads” remain the most authentic appearing, unaltered trails still existing. They are most prevalent in open, sagebrush and desert areas.
- On more arid, hard-packed soils (especially where the trail has long been in disuse), the wagon trail will often appear in erratic, scarring patterns that at first glance will not seem like a trail. If possible, the mapper should look for scarring from an elevated position or on aerial photos, where the continuity of scarring will be more apparent.
- In some types of soil, the passage of wagons compressed the earth so that it is less subject to erosion than adjacent areas. In such cases, the trail appears smooth and slightly elevated above the looser material along the side. In other places, where the soil was easily broken up by the passage of animals and wagons, prevailing winds may drift soil into the trailside vegetation and form a berm on the prevailing downwind side of the trail.

Vegetation Influences:

- Old wagon traces will often display different vegetation growth than adjacent areas. This can be evident in grass, brush, or forested areas. On the edges of trails, where softer soil has built up, more vigorous growth can occur, leaving a distinctive vegetative border. On trails with hard, compacted soil, little or only stunted growth will occur. And in some cases, where a swale has acted as a rain collector, a line of trees or high shrubs may have grown up over the years. Also, concentrated organic matter from draft animal manure could lead to more robust vegetation. These vegetation variations often are more apparent when viewed from higher ground or on aerial photos.
- Remains of wagon swales can be observed crossing cultivated agricultural fields, particularly during certain seasons. They may be even more visible on aerial photos.
- Agriculture crops, in certain seasons, will show a wagon trace by slightly different coloration and/or height of the plant. An example is wheat fields just beginning to head in the spring months.
- Evidence of a wagon trail can be a cattle path. Cattle tend to take the paths of least resistance which often are old wagon traces. So what appears to be only a cattle path may be the vestige of an old wagon trail.
- Recent fires are often overlooked aids in locating trails. The intense heat of brush and forest fires will clear the ground cover to bare soil and possibly reveal wagon traces or artifacts that had been obscured by vegetation. After brush or forest fires have burned over a trail area, it is good practice to check the area for possible evidence of trails.

Trail Artifacts:

- Wherever wagon passage was difficult—such as either steep descents and ascents or over hot sandy deserts—wagon parts, pottery fragments, and barrel hoops are commonly scattered about. They are the remains of wagon breakdowns or abandoned provisions. For the benefit of future research and verification, and in compliance with State and Federal law, all wagon and emigrant artifacts should be left exactly where they are situated. If on public land, particularly significant artifacts should be reported to the managing agency for evaluation and possible curation.
- Occasionally, rock piles may be found near a trail. These may mark grave sites, particularly if they appear in an oval or rectangular arrangement with an east-west orientation. Small rock cairns a foot or so high also have been found along verified trail routes. Whether these were made by emigrants, surveyors, road builders, or later trail followers is not known.

- Where wagons traversed rocky areas, the iron wheels and hubs may have left rust marks (external iron oxidation) where they rubbed over rocks or against large boulders and bedrock. Due to the abrasive character of minerals harder than iron (quartz and to a lesser extent orthoclase or plagioclase), many rocks/boulders, especially those that are quartz rich (like granite & rhyolite), will exhibit external rust oxidation from wagon wheel scraping. Often heavily rubbed areas will be much smoother than the surrounding boulder surfaces. On harder rocks, the evidence may be in the form of lighter colored areas, where wagon wheels chipped off small fragments or scraped away the patina surfaces. Along well-traveled sections, wagon wheels may have left striations, even well-developed grooves, on boulders and bedrock, sandstone and limestone.
- Rust marks left on rocks—especially in larger patches—can be excellent wagon trail markers. However, small, isolated rust specks could be the result of horse/mule shoes, or even construction equipment, dating from a later period. In forested areas, where logging has occurred, exercise caution in evaluating rust rock evidence. Early logging equipment used iron wheels and steel tracks which left external rust marks on rocks.
- Emigrants liked to put their names on suitable rocks either by carving or with axle grease. The most common rocks used for emigrant graffiti are sandstone cliffs, granite outcrops, or very large boulders that have flat surfaces. The names that have resisted weathering and erosion best will be found most often in recessed, sheltered sections of cliffs and outcrops. Emigrant graffiti will evidence typical mid-19th century lettering. Often names were carved in block letters with decorative wedges at the ends or bases of each letter. Sometimes names, dates and places of origins were in cursive script. Also, whether carved or in axle grease, some letters or numbers may be reversed (as mirror images), such as N and 4:

Other indicators either helpful or misleading in locating emigrant wagon trails:

- One of the most difficult types of topographic evidence to assess is deeply eroded features that originally may have been wagon trails on sagebrush plains. Today they might be dismissed as natural drainage features. But are they? How do you tell the difference? It is not uncommon for a wagon rut or swale, especially in loose soil, to catch rain runoff and over time become part of a well-developed drainage pattern. The only way to evaluate this kind of topographical evidence is to walk the full length of the drainage feature and see if it eventually coherently links together with the trail segments that enter and leave the drainage pattern.
- Another way to determine if a deeply-eroded feature is a onetime trail is to observe its linear pattern. Often the deeply-eroded feature will abruptly turn at a sharp angle in a different direction and leave the trail that connects with it in a non-eroded condition once again. For the erosion feature to be the remains of a onetime wagon trail, there must be

linear uniformity between the non-eroded trail segment that precedes and follows the erosion channel.

- Swales and ruts with soil berms on each side are suspect as emigrant wagon trails. Modern mechanized equipment may have been used to dig drainage ditches that over time and disuse have taken on the appearance of old wagon trails. The possibility exists, however, that wind could have piled loose soil on the edge of authentic wagon swales so that they appear as man-made berms. One way of testing a suspect berm is to walk along it to see where it ends up.
- Over time, underground cables and pipe lines can give the appearance of wagon trail scarring or shallow swales. In some cases, they will be laid either parallel to or in the trail. Usually, underground cables and pipe lines will have labeled post/metal stakes placed at intervals for identification.
- Sometimes trail segments are used as access roads for power lines which can make identification difficult. Conversely, power line access roads may share the characteristics of wagon trails in that they are not constructed roads. In old fire areas, control lines scraped by hand crews or tractors often may have the appearance of an old trail feature. Look for the presence of water bars to control erosion for clues to the origin of these trail-like features.
- In forested areas, loggers often used emigrant wagon traces for skidding logs, a process which resulted in these traces now appearing as swales. When skidding logs, logging arches and other wheeled equipment traveled up and down ravines and gullies and left swales or ruts that would not be emigrant in origin.
- In forested areas, blazes or scars on trees may or may not indicate a nearby wagon trail. Some government road surveyors did use blazes. In a few cases, emigrant diary accounts indicate that emigrants opening new trails did blaze trees to show the way through a forest. Also, there are verified cases where blazes were made by emigrants to mark a nearby grave. Usually a name is carved on the blaze although only a few letters will remain visible due to subsequent scar tissue covering much of the original lettering.
- Keep in mind that in a 150 year period, any blaze would have had to be rather large to be visible today. Tree scar tissue would likely have covered much of the original blaze. Moreover, an emigrant blazing a trail would have selected mature trees that 150 years later may have been logged or died. Also, at a later time, someone interested in identifying the trail route may have blazed trees next to the trail. Then, too, in mining areas prospectors used blazes to mark mining claim boundaries. Land surveyors often blazed trees to mark property lines.

Therefore, to rely on tree blazes as evidence for a trail, core samples (taken with an increment borer) should be taken and the growth rings counted to see if the time interval

between the blaze and the present equates to the age of the opening of an emigrant trail or a trail site. (Permission to take core samples must be obtained from either the landowner, if private land, or the managing government agency, if public land.)

- Where emigrants took their wagons twisting and turning through dense forests, wagon wheel hubs rubbing against trees may have left scars at hub heights (anywhere from 1½ to 2½ feet from the ground). Here, too, a core sampling is needed to verify the age of the scar before concluding it was caused by wagons.
- At the top of steep slopes, emigrants commonly snubbed ropes and chains around tree trunks to lower down and pull up wagons. It is possible that evidence of this practice remains on old trees in the form of scars left by ropes and chains. However, apparent scarring on old trees could be due to other uses that post-date the emigrant period. Again, core sampling is needed to verify the age of the scarring.

Concluding observations on guidelines:

These guidelines for determining trail remnants and segments cannot cover all situations. Even our most experienced trail trackers have encountered puzzling anomalies leading to unanswerable questions. Why has the trail vanished in some undisturbed places while in other undisturbed places—often very near, in similar terrain, and with identical soil conditions—the trail remains in pristine condition? Quite often there is no obvious explanation why no visible trace remains when it can be established convincingly that the trail passed that way. Why do some remaining ruts, swales, and depressions appear so differently? Why are some swales twenty feet wide and several feet deep while on a segment perhaps a half mile back, in similar terrain, the trail is no wider than one wagon and consists of a shallow depression? There is much to learn about the conditions that have led to the survival of some trail traces and the disappearance of others.

Most trail segments that remain visible today have been impacted by man and nature during the post-emigrant period. Subsequent human impact on earlier emigrant trails may have taken the form of stage, freighting, or ranch use and even road building. Nature may have eroded a trail segment into an eroded trough, deep swale, or gully. In some sandy areas, wind may have blown away loose soil and sand, thereby leaving huge, deep, wide swales now covered with grass. Where the original emigrant trail has not had some kind of subsequent use or impact, it may have all but vanished—gradually fading into the surrounding terrain. Often, only vestiges of emigrant trails remain, barely kept visible by cattle and humans walking on them. Therefore, the vanishing character of emigrant trails makes it imperative that we locate, verify, and map them before they become indistinguishable from the surrounding landscape.

CONCLUSION TO RESEARCH PRINCIPLES, METHODS, AND GUIDELINES

The contributors to the MET Manual are convinced that careful adherence to the research and investigative procedures in this manual will lead to increased accuracy in locating and verifying emigrant trails. Also, gathering as much information as possible before going into the field—especially from diaries, GLO survey field notes and plats, and aerial photos—will make the mapping task much more effective. However, all experienced trail mappers have learned that the more research and field work they undertake the more questions they raise. One should avoid jumping to quick conclusions. When in doubt, contact other MET mappers; engage them in a dialogue or better yet, get them into the field with you. They may have alternative solutions and insights. Involving other trail experts is always helpful in resolving conflicting evidence or seemingly unanswerable questions. No single person is capable of furnishing all the right answers. The more questions and alternatives raised and reviewed, the closer the results become an accurate representation of the past.

Most importantly, the mapper should conduct field investigation and authentication with an open mind. The easy things are readily resolved; the difficult problems will require additional research and field work. The mapper should avoid going into the field with preconceptions that lead to “make things fit,” especially when they don’t seem to square with the evidence. The MET program is open-ended. It is designed to allow for doubts and to provide for corrections and additions as new materials and evidence come to light. It isn’t a matter of being “right.” It is more a matter of putting forth what research has indicated has the highest degree of probability. All mapping endeavors should be considered as the opening of an on-going dialogue. That’s the historical process at work.

EMIGRANT TRAIL CLASSIFICATION CATEGORIES

The first five emigrant trail classification categories which follow are designed to assess the condition of trail segments at the time of mapping and establish a basis for protecting and preserving those trails on public and private lands. A sixth classification category has been added for altered or destroyed trail segments that have been reconstructed on their original location. These six categories are OCTA's standard classifications for all emigrant trail segments. (For descriptions and diagrams of trail terms used in the Classification Categories and elsewhere, see Appendix 4: Trail Terminology. For plotting these trail categories on USGS 7.5 min. quadrangle paper maps, see Appendix 5: Plotting on USGS Topographic Maps.)

CLASSIFICATION CATEGORIES

Class 1: Unaltered Trail

Description: The trail segment retains the essence of its original character and shows no evidence of having been substantially altered by motor vehicles or by modern road improvements. There is visible evidence of the original trail in the form of depressions, ruts, swales, tracks, scarring, vegetative differences, rock alignments along the trailside, and eroded trail features.

Class 2: Used Trail

Description: The trail retains the essence of its original character but shows past or present use by motor vehicles, typically as a two-track road overlaying the original wagon trail. There is little or no evidence of having been altered permanently by modern road improvements, such as widening, blading, grading, crowning, or graveling. In forested areas the trail may have been used for logging but still retains elements of its original character.

Class 3: Verified Trail

Description: The trail route is accurately located and verified from written, cartographic, artifact, geomorphic, and/or wagon wheel impact evidence (as rust, grooved, or polished rocks). But due to subsequent weathering, vegetative succession, rodent surface digging, or logging, trail traces will not be visible on the surface. What does remain is a verified trail corridor that has not been directly altered by modern intrusion or development. Typically this includes trails that once passed through forests and meadows, across excessively hard surfaces or bedrock (such as on ridges), over alkali flats and sandy or gravelly soils, through ravines or washes, and other surfaces not conducive to trail preservation.

Class 4: Altered Trail

Description: The trail location is verified but elements of its original condition have been permanently altered, primarily by road construction, such as widening, blading, grading, crowning, graveling, or paving. In some cases, the original trail has been permanently altered by underground cables and pipelines. In other cases, trail segments, whose locations are verified, may have been destroyed by natural events or modern developments, leaving no evidence of its original appearance.

Class 5: Approximate Trail

Description: The trail is either so obliterated or unverifiable that its location is known only approximately. In many cases, trail segments have been destroyed entirely by development, such as highways, structures, agriculture, utility corridors or inundated beneath reservoirs. In other cases, natural causes have removed any remains of a trail. In both cases, there is not enough documentary or geomorphic evidence to locate the trail accurately. Thus, only the approximate route is known.

Class 6: Reconstructed Trail

Description: A segment of Class 1, 2 or 3 trail no longer exists in its previous form due to alteration or destruction. Subsequently, this trail segment was replicated by design and construction in its previous verified location to appear as the trail class it was before the alteration or destruction occurred.

Additional Guidelines and Qualifications for Classifying Trails

- Many emigrant trail segments still retaining evidence of wagon use—in the form of depressions, swales, ruts, scarring, or tracks—probably have undergone later 19th century use as freighting, mining, stage, or ranching roads. Therefore, visible trail remains may not be the result exclusively of emigrant wagon use. Also, because these wagon trails have had little or no use in the 20th century, their appearance has often changed due to erosion or natural restoration, and they no longer look as they did in the 19th century. Nonetheless, these trail segments still retain the essence of their original character and qualify as **Class 1**.
- When an emigrant trail segment has been deeply eroded, and its original visual character changed, it is still worthy of being protected and preserved as a **Class 1** trail. Almost all Class 1 “unaltered trail” segments have been eroded to some degree over time. To assess a trail segment for classification purposes, based on the degree of erosion, would not be

practicable. If a Class 1 trail segment is deeply eroded, a note explaining this condition should be made in the map margin or digital notes.

- Modern visual intrusions, such as freeways, power lines, or buildings situated near trails, normally do not affect trail classification. Only the condition of the trail itself, or the trail corridor in the case of “verified trails,” determines a trail’s classification. The classification categories describe the trail segment’s surface, not its surrounding landscape.
- Often a Class 1 “unaltered trail” will intermittently fade into and out of a Class 3 “verified trail.” In these cases, a **Class 1** designation would be appropriate for the length of the intermittent trail segment. Conversely, a Class 3 “verified trail” may intermittently fade into and out of a Class 1 “unaltered trail.” In these cases and if the segment is short, a **Class 1** designation would be appropriate for the length of the intermittent trail segment based upon the principle of coherence.
- Occasionally, a two-track road will have been abandoned for decades and reverted in appearance to a Class 1 “unaltered trail” and will be designated as such. However, if it is known that the trail was once used as a road for motor vehicles, this should be noted in the map margin or digital notes as an abandoned road now appearing as an “unaltered trail.”
- In other cases, a two-track road may have been lightly bladed at one time, therefore technically making it a Class 4 “altered trail,” but subsequent weathering and natural recovery have restored its appearance and profile to a Class 2 “used trail.” Therefore, as long as there is no apparent permanent alteration, the trail can qualify as **Class 2**. Also, water bars and barrier berms may have been placed across Class 2 “used trails.” Nonetheless, these short, impacted segments are recoverable and should not change the trail classification from a **Class 2**. In both cases, a note explaining the condition can be made in the map margin or digital notes.
- In the case of Class 3 “verified trails,” logging, forest fires, or tree mortality may have temporarily impacted the trail corridor, but over time new growth has or will have restored the natural setting of the trail corridor. Therefore, as long as the trail route is accurately known, these recoverable settings qualify as **Class 3**.
- A Class 3 “verified trail” segment, by definition, does not show visible surface characteristics of wagon travel (other than rock alteration or artifact evidence); however, this does not imply such a trail segment is any less worthy of protection and preservation than a Class 1 or Class 2 trail segment.
- A Class 4 “altered trail” segment no longer possesses elements of its original character, which have been permanently destroyed; however, there may arise a situation wherein it

is desirable to retain a protective corridor along the “altered trail” as a way of retaining the trail integrity of adjacent or connected Class 1, 2 or 3 segments.

- In most cases, **Class 5** trails have been so obliterated by development that exact trail locations are impossible to determine. However, there will be situations where additional research and field verification may reveal the exact location of a trail segment which presently is known only approximately. Thus, where trail location has not been determined due to insufficient research data and field verification work, a trail corridor should be protected from disturbance until it has been confirmed that physical or other evidence of a trail segment no longer exists.
- Related to the problems of classifying trail segments is the challenge discussed previously of determining if a trail segment under investigation was originally an emigrant trail or a later wagon road (refer to the “Problem of Determining What Is an Emigrant Trail,” page 9). How is a one-time emigrant trail, later overlain by a stage, freighting, military, or early county wagon road, to be classified? In one sense, the original emigrant trail is altered permanently, thereby becoming a Class 4 “altered trail.” In another sense, what is being located and verified is an historic wagon road overlaying an earlier emigrant trail segment and thereby becoming a Class 1 “unaltered trail.” Because the trail segment under investigation is in a Class 1 “unaltered” condition and should be preserved, it should be classified as **Class 1** with a margin note or digital note explaining the complexity of the situation.
- The Class 6 Reconstructed Trail was added to conform to the sixth NHT Condition Category (see the brief discussion in the next section). The intent of this **Class 6** trail is not to disparage its reconstructed form. It is rebuilt to simulate the trail’s original character at its original location, as a Class 1, 2, or 3 trail. Therefore, a **Class 6** trail segment should be treated as it was before alteration or destruction. The trail segment location is documented by previous mapping, surveys, archeological studies, aerial photography, or other historic documentation undertaken prior to the alteration or destruction of the segment. Indicate in the map margin or digital notes which form the **Class 6** trail reconstruction took (Class 1, 2 or 3 trail) and when this restoration occurred.

No trail classification scheme can cover all situations with equal uniformity. In most situations, the six classification categories will apply rather well. Nonetheless, we mappers must keep in mind that the natural world, and that includes any emigrant trail segment, is on an ever changing continuum which we try to artificially categorize for purposes of protection and preservation. Inevitably there will be situations where more than one trail category might apply. In such cases, where there is no clear determination, the trail classifier will have to make a subjective decision based on thorough observation and assessment. When in doubt, always go for a higher level of preservation (a lower classification number).

NATIONAL HISTORIC TRAIL CONDITION CATEGORIES

Federal Trail Data Standards (FTDS), developed by the National Park Service, include National Historic Trail (NHT) Condition Categories which have been authorized for government interagency use. These NHT Condition Categories parallel OCTA's Emigrant Trail Classification Categories. In fact, they were "inspired" by OCTA's Classification Categories which were used "as a starting point" for developing the NHT Condition Categories. While the wording and category names differ, the overall definitions are similar in intent.

Where OCTA's Classification Categories, originally the first five, are designed specifically for emigrant trails, the NHT Condition Categories are designed "to be more broadly applicable" to all types of National Historic Trails. The FTDS added a sixth category for "Historic Reconstruction" which OCTA followed by adding a similar Class 6: "Reconstructed Trail."

Like the OCTA trail classification categories, the NHT Condition Categories describe the trail route's surface, not the landscape in which the NHT segment lies presently. Only the presence (or absence) of visible trail remnants, archaeological evidence, and/or knowledge of the trail's location affect categorization.

For comparison with OCTA's six trail classification categories, see Appendix 6: National Historic Trail Condition Category Definitions.