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**WALKING THE LINE**  
GUIDANCE FOR IDENTIFICATION, EVALUATION, AND FIELD RECORDATION  
OF HISTORIC LINEAR SITES IN COLORADO

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## **Introduction**

Linear cultural resources (linears) are long, narrow structures whose primary functions are conveyance of people, energy, water, communications, or products across the landscape. They may be singular, unbranching lines or systems with many branches, and include such things as roads and trails, ditches and canals, pipelines, and transmission lines. Although roads and trails existed in prehistory, this paper concerns historic linears, or those linear structures that were built since the occupation of what is now the American West by the United States or Colonial Mexico. In Colorado, linears cause considerable confusion when it comes to recordation and interpretation. Linears are not archaeological sites in the traditional sense and are more akin to features that may be part of a larger archaeological or historic site, or are themselves built environment structures. Linears are technically structures under the National Register of Historic Places (NRHP) definitions, but we refer to them as sites for simplicity. They often constitute infrastructure of a community and are conveyance systems of water, power, or even people, and are most significant in how they relate to the communities or resources they connect, often more so than their physical manifestation. Linears can also be challenging in that they can be large sites that cover an enormous area, such as a railroad, and might cross several jurisdictions or municipalities. An added difficulty for compliance related work, linears almost always have some portions that fall outside of a project Area of Potential Effect (APE) or, at times, cross an APE multiple times, or may be the APE itself. As confusing as this may be, linears are not that mysterious and are subject to the same significance and integrity Criteria as other historic and archaeological sites. This is intended as a white paper to provide guidance to researchers and field staff as they identify and evaluate resources pursuant to projects requiring compliance with Section 106 of the National Historic Preservation Act. If the information in this document contradicts guidance information provided by entities such as the National Park Service (NPS), the Colorado State Historic Preservation Office (SHPO), or federal or state agencies who manage a linear resource, the agency guidance should take precedence. Additionally, there are programmatic and other agreement documents between the SHPO and federal and state agencies (i.e., Bureau of Land Management, U.S. Forest Service) or state (i.e., Colorado Department of Transportation [CDOT]) that may specify how and under what conditions linear resources are evaluated that should also take precedence over this document. Cultural resource projects conducted under Section 106 of the National Historic Preservation Act (NHPA) have a lead federal agency that makes determinations of eligibility using information gathered by in-house personnel or other cultural resource professionals. Finally, the authors recognize that the final determination of eligibility for any site or resource rests with the Keeper of the NRHP, and though their involvement is rarely required, defer to all determinations from that office. Finally, this guidance is meant to fully replace previous guidance from the Office of Archaeology and Historic Preservation.

## **The Situation in the Western United States**

An examination of the protocols for recordation of historical and archaeological sites for state and federal agencies in the western U.S. shows considerable appreciation for the importance of historical linear sites. Indeed, many historians and historical preservationists point to these features on the landscape—railroad lines connecting towns, irrigation ditches

snaking through agricultural fields, and barbed-wire fence lines that stretch across the prairies—as evidence of settlement patterns and Euro-American occupation of the American West. This leaves vast amounts of infrastructure for public land agencies to manage, and poses unique challenges for Cultural Resource Management (CRM) professionals. Federal land managing agencies, particularly multiple-use agencies, have long expressed frustrations with the significance ascribed to ubiquitous fences, ditches, and roads. The avoidance of contributing segments can create considerable challenges for federal undertakings, while doing little to increase public appreciation for or knowledge of our shared past. To date, most of the focus for linears has been on how to record these features, but little attention is given to what should be recorded and why. Only two states, Wyoming and Utah, have guidelines in place that identify site types that do not require recordation in a programmatic way (UPAC 2008; WYSHPO 2012). In addition, the State of Oregon has a guidance document discussing how linear resources should be identified and evaluated (ORSHPO 2013). Idaho recently implemented guidance on agricultural linear resources in ways that mirror the guidance presented here (IDSHPO 2017). In Colorado, the CDOT has a Programmatic Agreement that includes guidelines for the identification, documentation, and evaluation of Linear Resources (FHWA et al. 2014). Many states provide guidance in their survey or archaeology manuals, but most, like Colorado, have typically deferred to standard methods of identification and have left it to federal agencies, CRM companies, and scholars to apply the NPS significance and integrity standards.

## **Basic Concepts in Linear Site Evaluation**

The NRHP Criteria are most often applied to sites exceeding 50 years in age<sup>1</sup> relative to applicable data categories or themes and take into consideration the historical integrity of the resource. Most frequently, linear sites that are recognized as significant<sup>2</sup>, NRHP-eligible properties are considered so under Criteria A and C. Occasionally, linear resources qualify under Criterion B. By nature, linear sites are not archaeological, so generally do not qualify under Criterion D, though associated sites or features may contain archaeological data of importance and would qualify individually under that Criterion.

### ***Themes and Period of Significance***

Integral to evaluating significance under the NRHP Criteria is assessing pertinent data categories for areas of significance (themes) appropriate to an individual site. To this end, applicable themes identified in the NRHP guidelines (National Register Bulletin 16A) may be applicable for a particular linear site type (NPS 1991). When determining what themes or

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<sup>1</sup> Contrary to common understanding, 50 years is a *guideline*, not a *rule*. Often, for long-term or phased projects, the SHPO will recommend a 45-year period to ensure important resources are not overlooked. For insight into the “50 Year Rule” please see Sprinkle (2007) and Stiles (2010). NRHP Criteria Consideration G enables properties less than 50 years of age to be considered significant. For example, Civilian Conservation Corps and Cold War Sites were considered to have gained historical significance prior to their attaining 50 years of age. Such significance is best demonstrated through development of thematic historic contexts.

<sup>2</sup> The National Park Service identifies four Criteria for significance, or why a property may be important to a period of history that we often short-hand as A. Events; B. People; C. Architecture and Engineering, and D. Archaeology. NPS provides detailed guidance in NPS Bulletin 15 *How to Apply National Register Criteria for Evaluation* (National Park Service 1997).

categories of significance under which a property may be eligible for the NRHP, researchers and CRM professionals should also utilize relevant historic contexts. A list of these resources is available at the end of each section of this paper. Please note that this list is not exhaustive. Critical to assigning and considering themes for significance evaluations is defining the *Period of Significance*<sup>3</sup> for a resource. The period of significance is the span of time when the property was associated with important events, activities, individuals, or use, or when it acquired its important physical characteristics. A property may have had more than one period of significance, depending upon its historic associations. Continued use of a resource does not necessarily justify a period of significance that corresponds to its full period of use. Rather, the period of significance should correspond to the period of time the resource made important contributions under a particular theme or area of significance. For both the identification of pertinent themes and assigning a period of significance, it is crucial that sufficient historical research has been conducted so that these tasks are soundly based. It is through such research that thematic contexts are developed to demonstrate resource significance and can account for sites which the period of significance is thought to extend to within the last 50 years and may be ascribed significance under NRHP Criterion Consideration G.

### ***Researching Significance***

Historical research should be commensurate with the scale, scope, and nature of the undertaking. Throughout this paper the authors reference historic contexts. While historic contexts are secondary resources, they are key resources for addressing the history of specific resource types and are often based on rigorous research of various types of primary resources. When historic contexts do not exist, or if a specific site is in need of archival research prior to field recordation, there are a number of sources that can be consulted. The Bureau of Land Management (BLM) retains a database of General Land Office records, otherwise referred to as GLOs. This database includes records on land patents, title deeds, survey plats, land status records, tract books, and other documentation pertaining to the history of land ownership and use for specific plots of land in the United States. It is searchable by document type, location, and even family or individual names. Similarly, the United States Geological Survey (USGS) provides access to historic maps, aerial imagery, and other datasets going back to 1884. These are especially useful for identifying sites, such as ditches and roads. For Colorado-specific resources, Denver Public Library (DPL) and History Colorado both have extensive on-line and physical archives that include maps and photographs. Similar archives can be found at local repositories across the state.

### **Resources for Primary Documents:**

Bureau of Land Management: General Land Office Records  
<https://gloreCORDS.blm.gov/default.aspx>

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<sup>3</sup> The NPS defines period of significance as "...the length of time when a property was associated with important events, activities, or persons, or attained the characteristics which qualify it for National Register listing." (National Register Bulletin 16A; National Park Service 1991:42).

Denver Public Library: Western History Collection <https://digital.denverlibrary.org/>

History Colorado: Stephen H. Hart Research Center <https://www.historycolorado.org/research-center>

United States Geological Survey Historic Map Collection [https://www.usgs.gov/core-science-systems/ngp/topo-maps/historical-topographic-map-collection?qt-science\\_support\\_page\\_related\\_con=0#qt-science\\_support\\_page\\_related\\_con](https://www.usgs.gov/core-science-systems/ngp/topo-maps/historical-topographic-map-collection?qt-science_support_page_related_con=0#qt-science_support_page_related_con)

United States Geologic Survey Earth Explorer <https://earthexplorer.usgs.gov/>

### ***Aspects of Integrity***

When a linear site is found to have significance under the NRHP Criteria, the integrity of the property requires evaluation. Insignificant sites do not require integrity to be evaluated. The qualities of integrity<sup>4</sup> are spelled out under the NRHP guidelines. Historic integrity may have a strong influence on determining if a historic resource has sufficient integrity to convey its significance. Those elements of a linear site that do not retain sufficient integrity to convey its significance are considered non-contributing elements. Integrity, under the NRHP guidelines, considers qualities of location, design, setting, materials, workmanship, feeling, and association.

#### *Location, Setting, and Feeling*

Some of the qualities to be considered reflect the landscape setting, whereas others bear directly upon the physical characteristics of the resource. In the case of many linear resources, such as roads and canals, **location** is not at issue, because they are part of the landscape and are immovable. Some linear resources may have suffered from degradation or modification sufficient that their location may have become obscured or no longer recognizable, which would be a clear detriment to historic integrity. Other landscape qualities include setting and feeling. Assessing integrity of these landscape qualities is necessarily a subjective process. The **setting** is the physical environment of the resource. Ideally, the setting should be the same as when the resource was in use during its period of significance, but the degree to which this is important should be considered against the themes under which the site is considered important. For instance, if a resource is considered important because of an aspect of its engineering, then its surroundings would be less important than if it were considered important for landscape architecture. Natural changes to the environment should also be taken into consideration, as should human-made changes. If a resource is considered significant for its role in industry, then perhaps the industrialization of its surroundings should not be considered a detriment to its integrity, but rather, should be considered a reflection of the success of the resource. **Feeling** is an intangible characteristic that alone is insufficient for significance to be ascribed (National Register Bulletin 15; National Park Service 1997:45), but

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<sup>4</sup> NPS Bulletin 15 discusses the seven aspects of integrity—Location, Design, Setting, Materials, Workmanship, Feeling, Association—as well as how to apply the aspects in relation to the four significance Criteria (National Park Service 1997:44-49).

should be considered in conjunction with the setting, design, materials, and workmanship in assessing the scene relative to its period of significance and theme. Alterations dating after the period of significance should be carefully considered as to their degree of impact on the feeling of the resource.

#### *Design, Materials, Workmanship, and Association*

Design, materials, workmanship, and association are less subjective qualities. Most linear resources were generally not constructed with harmonious blending with the environment in mind. Rather, they were put in place on the most expedient course from one place to another, given the technology available. Consequently, considerations of **design** as a process of conscious placement of a linear resource should be made, but may not be of particular importance in assessing historic integrity. Still, it should be recognized that the environment usually influences the placement of a linear, and topography impacts the nature of a linear in terms of the level of technology brought to bear in its construction and innovations incorporated into its design for its successful implementation. As a result, a linear may be a good example of typical technology in use at the time of its construction or innovations that made its installation possible.

Assessment of **materials** relative to a linear resource will likely be restricted to determining if the materials now visible are the same materials that were used in the original construction. Materials incompatible with the period of significance will be an indication of subsequent modification and loss of historic integrity. However, integrity of materials should not be an overarching consideration for assessing the significance of a linear. The most important aspect should be whether a linear continues to function as it was originally designed or retains sufficient evidence of its functional design. For linears utilizing human-made materials, the most modern materials were typically used in a linear's construction. As time passed, wear and tear often required replacement of site elements. Typically, replacement was also with the most modern and functional materials. Consequently, original materials may be a rarity on certain site types with the design and function retained. For example, rails and ties are routinely replaced on railroads; canals and ditches are routinely cleaned out and headgates and other regulating elements replaced; and transmission line poles and hardware are replaced. So long as the system continues to function as historically engineered and designed, the significance of a linear site usually also continues.

Evidence of **workmanship** may be variable for linear resources. For example, early roads may show no evidence of workmanship at all, as they became established simply through use. Other roads may show considerable workmanship in basic construction or by the presence of functional elements that are decorative as well. Again, themes and period of significance should be taken into consideration in determining how important workmanship is to the historic integrity of a linear resource.

**Association** connects the property to the activity that makes the site significant. Physical characteristics must remain that relate to that activity. In the case of linear sites, the physical remains that make it recognizable provide the association.

## Identification and Evaluation

A paradox of linear sites in Colorado is that they are not archaeological resources, yet most linear sites are identified, recorded, and evaluated by archaeologists. Approaching linear sites in the same way a lithic scatter or can dump is approached – starting with field survey and recordation then performing historic research to finalize site forms and survey reports – may be costing cultural resource managers both time and money, while not providing any additional “preservation payoff.” Completing historical research prior to visiting the field, including a literature review or a site file search, checking historic maps and property descriptions, and consulting with knowledgeable local subject-matter experts should help with field work design.

The Secretary of the Interior requires that a “reasonable and good faith effort” for the identification of historic resources be undertaken within an APE. Identification specifically refers to identifying historic properties that may be affected by a federal undertaking, the effort of which should be reasonable to the scope and scale of the undertaking, to the degree necessary for planning and to make decision regarding effects, and may be limited to archival documentation or exhaustive survey (Advisory Council on Historic Preservation). Although it is directly related, evaluation differs from identification efforts in important ways. Identified historic properties are evaluated to determine their significance and, therefore, potential eligibility to the NRHP (typically referred to as determinations of eligibility) and are evaluated to determine the effects of the federal undertaking on the property, or to what degree the project will alter the integrity of a historic property (or determinations of effects). As discussed below, linear sites or features are rarely eligible under Criterion D, for the potential to yield information important to prehistory or history.<sup>5</sup> In most cases, it is reasonable to assume that a significance evaluation for a linear resource could be determined solely from historical documentation and, if the site is determined not significant and, therefore, not eligible for inclusion on the National Register, the resource would not have to be recorded in the field. If a site is determined *significant*, then it should be recorded in the field to evaluate *integrity*. As with all other site types, identification and evaluation efforts should always take into account Tribal perspectives and local stakeholder/consulting parties who may have unique knowledge about how a linear resource may be important to local history.

In order to facilitate the development of historic contexts for roads and trails, canals and ditches, water pipelines, and utility lines—those sites that we are advocating for more deliberate approaches to identification and evaluation—we present thematic associations that

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<sup>5</sup> Although in Colorado linear sites are typically identified as historical archaeology and more often than not recorded and evaluated by archaeologists, linear sites are not archaeological sites in a traditional sense. They are built environment structures, like a bridge or a neon sign. For any site to be significant under Criterion D, there must be accompanying research questions that further investigation could answer. It is not simply an archaeological assemblage condition assessment.



are important to consider for developing historic contexts by which significance can be ascribed. As with all historical sites, a lack of understanding of a site's history or context should not be used as grounds for ascribing insignificance. Instead, it should be the impetus for examining the site closer and conducting historical research about it. *At all times, CRM professionals must provide robust reasoning and arguments grounded in significance and integrity Criteria to validate excluding the recordation of potentially historic resources within an APE as well as recommendations of eligibility.* In every case, it is incumbent upon the CRM professional to determine whether a linear resource may be a contributing element to a larger district or landscape. To be contributing, the resource does not have to be independently eligible. In addition, a potential district or landscape boundary may extend beyond a project's APE and should still be taken into consideration. And finally, many linear resources, such as roads, ditches, domestic water pipelines, some oil and gas pipelines, and electrical lines, are dendritic in nature in that they can split into a multitude of lesser distribution routes to the point of serving a single individual or location in redundant fashion. At some point, the redundancy of the linear resource is reduced to infrastructure background, where the individual linear branch can no longer be considered significant, supporting, or contributing.

## **Linear Site Types**

### ***Fences***

Fences can be an especially problematic linear site type and are typically included as an element of a more complex site or feature of a district, such as a ranch or farmstead. Isolated sections of fence or fences too far removed to be associated with a larger site should be excluded from the requirement of recordation. Exceptions may be possible if a fence has particularly remarkable construction attributes or can be shown to be important as an individual entity by its historic context.

### ***Roads and Trails***

Roads and trails, including railroads, may be important for a variety of reasons. In addition to being potentially significant as individual entities, roads and trails form linkages with other sites. An understanding of these linkages may be important in interpreting those sites. The significance of roads and trails may come from a variety of data categories for areas of significance (themes) that are considered important to history under the NRHP guidelines (National Register Bulletin 16A) (National Park Service 1991). The primary theme associated with roads and trails is Transportation, which refers simply to the process and technology of conveying passengers or materials. Ascribing significance under the Transportation theme alone will be difficult; significance will generally be better determined when associations with secondary themes are considered. Such secondary themes include:

- **Commerce** – A road or trail may have importance to commerce if it was constructed specifically to allow a commodity to be brought to market or if it enabled the successful exploitation and development of a commodity (Criterion A). For instance, a road to a mining operation may have resulted in that mine being able to transport its ore

economically, allowing the mine to expand and succeed where it otherwise would not have been profitable.

- **Communications** – A road or trail may have importance to communication if it was constructed specifically for that purpose, such as a postal road (Criterion A).
- **Community Planning and Development** – A road may have importance to community planning and development if it can be demonstrated to have been a major constituent in the design of a community or if the success and growth of a community was the direct result of the road (Criterion A).
- **Engineering** – A road may have engineering importance if it is a good example of a method or type of construction (Criterion C). Frequently, this is best ascribed to physical elements of workmanship, such as masonry retaining walls. Associated features, such as bridges, culverts, and tunnels, may also have engineering importance if they are good examples of a particular method or type of construction or if they are associated with a noteworthy engineer or designer.
- **Exploration/Settlement** – A road or trail may have exploration or settlement importance if it can be demonstrated to have been a route used for the investigation of a previously unknown region or served in the establishment and earliest development of new settlements (Criterion A).
- **Industry** – A road or trail may have importance to industry if it can be demonstrated to have furthered the development of goods and services (Criterion A).
- **Landscape Architecture** – A road or its constituent elements may be considered to have importance to landscape architecture if they have design elements that further our enjoyment or appreciation of the land (Criterion C). For instance, a road or trail may have been created by design, workmanship, or materials to blend with its natural surroundings in such a way that we find it aesthetically pleasing or enhancing.
- **Politics/Government** – A road may have importance to politics or government if it was the result or a good example of a particular political event, series of events, or governmental policy or philosophy (Criterion A).
- **Recreation**- some roads and even trail systems date to the beginnings of the public lands system and America's love affair with state and national parks, among other public lands. These trail systems are important to understanding the development of recreation in Colorado (Criterion A).

### ***Guidance for Field Recordation***

It is expected that most of the historically important roads or trails can be identified through the examination of early maps, including those prepared by the General Land Office (GLO). GLO survey maps have limitations because their primary intent was to depict township and sections lines. Topographical and built elements, such as roads and trails, are most accurate at the section lines and their positions between the section lines cannot be counted on for accuracy. Many early roads or trails were situated in restricted topographic settings, such as narrow canyons, which have served as favored travel routes to the present day. As a result, it can be expected that the early manifestations of roads or trails in restricted topographic settings have been obliterated by subsequent roads and highways. Most modern roads tend to utilize straighter alignments, so remnants of earlier roads may still exist along the margins of modern roads. Often, old roads circumnavigated topographic difficulties by meandering around obstacles, or by deviating along contours into side drainages to enable crossings to occur without substantial loss or gain in elevation. Not all roads and trails appearing on early maps, including GLO maps, have historical significance. Some were used for local resource extraction of little or no historical importance. Others served as initial travel routes to developing communities or major resource extraction locales, such as mining districts. If a road or trail is labeled as connecting one place with another, it is more likely to have been historically important. Early maps offer only snapshots in time of regional road development. Trails could be treated as their own special category as there are trails of heightened national significance, such as the Santa Fe or Overland trails. Despite the level of importance, segments of these resources may not appear on historic maps or GLOs. Such resources may require additional levels of documentation and recordation. A blanket approach to recording a road, trail, or any other linear site that appears on a GLO map or other historical map, simply because of age, should be discouraged and a more nuanced approach used that relies first on potential significance based on the historic context of an area or region.

The development of towns and cities resulted in commensurate development of streets and roads reflecting urban growth and expansion. Similarly, farms, ranches, and other resource-use developments surrounding urban centers resulted in a growth in roads that connected them to urban centers. Major roads that were important to the economic development of a region may be worthy of recordation, as indicated in the Colorado State Roads and Highways Multiple Property Submission (MPS) for farm to market roads with important engineering characteristics (Autabee and Dobson-Brown 2003). Although a large number of these infrastructure roads are presently old enough to be recorded and evaluated under the NRHP Criteria and an abundance more will become 50 or more years old as time goes on, they are commonplace and of such uniformity that they do not offer any significant physical characteristics or important data. Consequently, documenting them as sites cannot be expected to enhance our understanding or appreciation of history and, thus, should be programmatically excluded from the necessity for recordation or further consideration as cultural resources. Of course, there may always be an exception to such a general conclusion of insignificance, and, if such an exception is found, recording is not precluded or discouraged. It should be noted that all 151 of the state highways in Colorado have already been evaluated for

significance (Autobee and Dobson-Brown 2003) and that CDOT desires those encountering state highways in Colorado use their historical background and significance statements for those properties.

### **Historic Contexts**

Alford, Paul

2010 *A Historical Context of Recreational Developments on the Arapaho and Roosevelt National Forests*. Prepared by the Arapaho and Roosevelt National Forest, Boulder, Colorado. On file at the Office of Archaeology and Historic Preservation, History Colorado, Denver.

2009 *Historic Context of Brainard Lake and the Civilian Conservation Corps*. Prepared by the Arapaho and Roosevelt National Forest, Boulder, Colorado. On file at the Office of Archaeology and Historic Preservation, History Colorado, Denver.

Autobee, Robert, and Deborah Dobson Brown

2003 *Colorado State Roads and Highways*. National Register of Historic Places Multiple Property Submission. Office of Archaeology and Historic Preservation, Colorado Historical Society, Denver.

Colorado Department of Highways

1982 *Colorado Bridge Building since 1945*. Prepared by the Colorado Department of Highways. On file at the Office of Archaeology and Historic Preservation, History Colorado, Denver.

Bureau of Land Management

ND National Scenic and Historic Trails Strategy and Work Plan. Produced by the U.S. Department of the Interior, Washington D.C.

Dobson-Brown, Deborah, and Robert Autobee

2002 *Highways to the Sky: A Context and History of Colorado's Highway System*. Prepared by Associated Cultural Resource Experts for the Colorado Department of Transportation. On file at the State Historical Fund, History Colorado, Denver.

Fraser, Clayton

2000 *Highway Bridges in Colorado: Multiple Property Documentation Form*. Prepared by Fraser Design for the Colorado Department of Transportation. On file at the Office of Archaeology and Historic Preservation, History Colorado, Denver.

Mead & Hunt and Dill Historians

2016 *Colorado State Historic Highways Inventory: National Register of Historic Places Significance Evaluations*. Prepared for the Colorado Department of

Transportation. On file at the Office of Archaeology and Historic Preservation, History Colorado, Denver.

McClelland, Linda Flint

1995 *The Historic Landscape Design of the National Park Service 1916 to 1942: Multiple Property Documentation Form*. On file at the Office of Archaeology and Historic Preservation, History Colorado, Denver.

Mehls, Steven

2017 *An Historic Context for the Victory Highway/U.S. Highway 40 in Northwestern Colorado*. Prepared by Espinoza Cultural Services for United States Forest Service. On file at the Office of Archaeology and Historic Preservation, History Colorado, Denver.

Parsons Brinckerhoff and Engineering and Industrial Heritage

2005 *A Context for Common Historic Bridge Types*. Prepared for the National Cooperative Highway Research Program, the Transportation Research Council, and National Research Council.

Pettem, Silvia

1999 *The Automobile Era in Boulder*. Boulder Planning Department, Boulder, Colorado.

1996 *Tracking Down Boulder: Colorado's Railroads and Roads of the Mountains and Plains*. Boulder Planning Department, Boulder, Colorado.

Twitty, Eric

1990 *Denver Mountain Parks: Multiple Property Documentation Form*. On file at the Office of Archaeology and Historic Preservation, History Colorado, Denver.

### ***Canals and Ditches***

Like roads and trails, canals and ditches may be important for a variety of reasons. In addition to being significant as individual entities, canals and ditches form linkages with other sites. An understanding of these linkages may be important in interpreting those sites. For instance, rural homesteads depended on irrigation water; without it, farming would not have been possible. Conversely, the temporal patterning of initial settlement in an area served by a canal might help us understand the canal's sphere of influence and clarify its construction and expansion history. The primary themes associated with canals and ditches are Agriculture, Community Planning and Development, and Conservation. Each of these basic themes can be ascribed on the basis of the primary function of a canal or ditch. Most of the canals and ditches were constructed strictly for agricultural irrigation. However, not all water conveyed in ditches and canals is diverted onto agricultural land. Water at the end of a canal or ditch is frequently drained off into an otherwise natural drainage that enters a stream or reenters another canal or ditch downstream, sometimes with a formal outlet. Often, canals and ditches are equipped

with outlet gates at key points along their lengths to expel excess water that may have been collected from side drainages at times of high runoff from storms or from field runoff in order to prevent overtopping its banks. These irrigation-return or excess-water-removal channels are usually not of formal construction beyond their outlet. They would fall under the Agriculture theme as a ditch or canal component, but their absence of formal construction beyond their outlet would preclude the necessity for their recordation in most instances. In urban settings, canals and ditches were sometimes constructed to convey wastewater or sewage away from a city; these fall into the Community Planning and Development theme, as they are part of the infrastructure included in city planning and development. In some places, canals and ditches were constructed to drain marshy areas for agriculture, health, or residential development; drainage canals and ditches fall within the Conservation theme, as would canals and ditches used to improve wildlife habitat or grow food for wildlife. Ascribing significance under one of these themes alone is possible, but significance can often be better ascribed when associations with secondary themes are considered. Such secondary themes include:

- **Engineering** – A canal or ditch may have engineering importance if it is a good example of a method or type of construction or if it had an innovative design to overcome some obstacle (Criterion C). Frequently, engineering is best ascribed to physical elements of workmanship, such as masonry retaining walls. Associated features, such as bridges, culverts, and tunnels, may also have engineering importance if they are good examples of a particular method or type of construction (Criterion C) or if they are associated with a noteworthy engineer or designer (Criterion B).
- **Industry** – A canal or ditch may have importance to commerce if its use enabled agricultural products to be produced on a commercial scale or if it conveyed water to an industrial facility that relied upon the water for its success, thereby furthering the development of goods and services (Criterion A).
- **Landscape Architecture** – A canal or ditch, or their constituent elements, may be considered to have importance to landscape architecture if they have design elements that further our enjoyment or appreciation of the land (Criterion C). For instance, a flume may have been created by design, workmanship, or materials to blend with its natural surroundings in such a way that we find it aesthetically pleasing or enhancing.
- **Politics/Government** – A canal or ditch may have importance to politics or government if it was the result or a good example of a particular political event, series of events, or governmental policy or philosophy (Criterion A).
- **Social History** – A canal or ditch may have importance to social history if it was constructed to promote the welfare of society (Criterion A). For instance, a project undertaken to stabilize the lives of individuals and families thrown into turmoil by economic distress, such as the Depression, or by environmental degradation by providing a reliable source of water for agriculture and making additional lands available for sustainable farming may be attributable to the theme.

### ***Guidance for Field Recordation***

It is expected that major historic canals and ditches can be identified through the examination of literature and historic maps. State agencies responsible for managing irrigation resources have historical information and detailed maps showing not only major irrigation features, but divisions of water from them often including field ditches, irrigation returns, and drains. In most cases, larger ditches and canals appear on current USGS quadrangles. In many parts of the west, agricultural expansion was the result of extending irrigation systems into previously unirrigated lands. The primary ditches and canals of the larger irrigation systems oftentimes feed numerous laterals and secondary ditches that were further divided into smaller and smaller ditches that cover the agricultural landscape. Excess or wastewater from irrigated lands is often channeled back into drainages by small ditches, making it once again available for use downstream. The small divisions of water beyond a primary ditch or canal and small return ditches are so ubiquitous across the agricultural landscape as to be rather meaningless background noise in terms of historical significance. The broad pattern of these dendritic systems can usually be seen on state water rights maps. Although a large number of these small infrastructure ditches are certainly old enough to be recorded and evaluated under the NRHP Criteria, they are commonplace and of such uniformity that they do not offer any significant physical characteristics or important data. Consequently, documenting them as cultural resources cannot be expected to enhance our understanding or appreciation of history. Of course, there may always be an exception to such a general conclusion, and if such an exception is found, recording is not precluded or discouraged. As a result, it is recommended that only named primary ditches and canals 50 or more years old be recorded, and that unnamed secondary or smaller ditches be excluded from the necessity of recordation or evaluation. As clarification, named canals and ditches means those that are listed by name in a state water rights database, not just canals and ditches that appear or are named on USGS maps. For researchers, this often means doing research in the state databases to properly identify a canal or ditch of interest. Care should be taken in using the name of a canal or ditch on a USGS map because it may not be the historic name or the name in the state water rights database. It should also be noted that ditches no longer in use that do not appear in current water rights databases can still be identified through water rights adjudication records or ditch plats frequently housed in county courthouses.

In addition to canals and ditches for agricultural use, some canals and ditches were constructed to facilitate industry. These single-use canals and ditches are not dendritic like the agricultural canals. They should be considered worthy of recordation, and their importance should be considered relative to their role in industrial development. Like agricultural canals and ditches, industrial canals and ditches will have water rights associated with them and can be found in state water rights databases.

Drainage canals and ditches have been constructed to convey wastewater and sewage from urban development, to reduce flooding during high water and heavy precipitation, to remove water from marshy areas for land reclamation, and to transport irrigation runoff away

from agricultural fields. Many of these drainage canals and ditches will have collection ditches, culverts, or pipelines that form a dendritic system, much like the distribution systems for agricultural water in reverse. Like irrigation ditches and canals, the minor feeder elements are ubiquitous and of little historical research value. Consequently, it is recommended that only the larger, named drainage ditches and canals be recorded.

### ***Historic Contexts***

Holleran, Michael<sup>6</sup>

2005 *Historic Context for Irrigation and Water Supply Ditches and Canals in Colorado*. Prepared by the Colorado Center for Preservation Research, University of Colorado at Denver. On File at the State Historical Fund, History Colorado, Denver.

### ***Water Pipelines***

Water pipelines represent conduits for transporting water for domestic water supplies, principally to town or cities. In addition, many canals and ditches, or portions thereof, have been converted from open systems to buried pipelines to enable urban development to proceed adjacent to or above them. Development of community water systems has historically been undertaken as public works to ensure a regular supply of clean water for residents. Reservoirs, tanks, and filtration and treatment plants are common facilities of water systems, with pipelines serving as delivery mechanisms. In many instances, an important factor in funding a water system was fire prevention. Most water systems were financed by the municipalities and paid for by their users.

Water penstocks are pipelines that transport water for power production, generally to hydroelectric power plants, but also for other industrial uses. Because they are point to point systems without divisions that should always be recorded, they will not be considered further here.

Water pipelines are important primarily for their role in infrastructure development and as examples of technological advancement. In general, a water pipeline will gain significance because of its association with a facility to which it conveyed water or because the pipeline was technologically innovative. Unlike other linear sites, a pipeline usually forms a direct conveyance between an intake and an outlet facility without intermediary use. As a result, few, if any, associated sites will be found along its route. The only exception might be sites resulting from construction, maintenance, or storage of maintenance items along the route. Once at its primary destination, dendritic distribution water lines provide service to users. Water pipelines can be associated with a variety of themes depending upon their use and purpose. In a general sense, all water pipelines convey a material – water – satisfying the Transportation theme, but

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<sup>6</sup> Please note that this document was never officially accepted as a historic context by the Office of Archaeology and Historic Preservation, and has faced criticism from several federal and state agencies for failing to differentiate between eligible and ineligible resources. However, the authors still find this resource to be useful, and the only state-wide context to date.



this is clearly a weak association and one that requires bolstering with other more pertinent secondary themes. Such themes include:

- **Commerce** – A water pipeline may have importance to commerce if it was constructed specifically to allow a commodity to be brought to market or if it enabled the successful exploitation and development of a commodity (Criterion A). For instance, a pipeline to a precious-metals stamp mill may have made it possible to concentrate previously unmarketable low-grade ore so that it could be sold profitably, allowing mines in the area to expand and succeed where otherwise they would not have been able to operate.
- **Community Planning and Development** – A water pipeline may have importance to community planning and development if it can be demonstrated that the success and growth of a community was the direct result of the water system (Criterion A).
- **Conservation** – A pipeline may have importance to conservation if it was installed to satisfy the needs for preservation, maintenance, or management of natural resources (Criterion A). This may particularly be the case if a pipeline was installed to prevent loss of water due to seepage or evaporation, or to prevent its being contaminated.
- **Engineering** – A water pipeline may have engineering importance if it is a good example of a method or type of construction (Criterion C). Frequently, this is best ascribed to physical elements of workmanship, such as masonry retaining walls. Associated features, such as bridges, culverts, and tunnels, may also have engineering importance if they are good examples of a method or type of construction or if they are associated with a noteworthy engineer or designer (Criterion B). In addition, significance might be ascribed if the pipe used in its construction was the result of innovation in design or materials.
- **Industry** – A water pipeline may have importance to industry if it can be demonstrated to have furthered the development of goods and services (Criterion A).
- **Landscape Architecture** – A water pipeline or its constituent elements, may be considered to have importance to landscape architecture if they have design elements that further our enjoyment or appreciation of the land (Criterion C). For instance, a water pipeline intake structure may have been created by design, workmanship, or materials to blend with its natural surroundings in such a way that we find it aesthetically pleasing or enhancing.
- **Politics/Government** – A water pipeline may have importance to politics or government if it was the result or a good example of a particular political event, series of events, or governmental policy or philosophy (Criterion A).
- **Social History** – A water pipeline may have importance to social history if its construction was specifically part of an effort to promote the welfare of society (Criterion A). For

instance, a water pipeline may have been constructed as the result of governmental action to provide a community with healthful water where such a supply did not previously exist.

### ***Guidance for Field Recordation***

It is expected that most of the important early water pipelines can be identified through the examination of historical records and maps. Water supply pipelines to towns and communities should be recorded from their source to their initial point of destination, which may be a filtration or water treatment plant, from where smaller distribution lines emanate. These smaller distribution lines will form a buried dendritic system of ever-diminishing size to delivery points at residences, businesses, and other destinations. Although a large number of these small infrastructure water delivery pipelines are certainly old enough to be recorded and evaluated under the NRHP Criteria, their ubiquity suggests they will not add important data and their documenting them cultural resources cannot be expected to enhance our understanding or appreciation of history. Of course, there may always be an exception to such a general conclusion, and if such an exception is found, recording is not precluded or discouraged. As a result, it is recommended that only primary water supply pipelines be recorded and that secondary or smaller delivery pipelines be excluded from recordation or evaluation.

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### ***Oil and Gas Pipelines***

Oil and gas pipelines represent conduits for transporting petroleum products of all sorts from their place of production to a storage facility or to its place of utilization or conversion into other products. Small gas or oil pipelines often feed into larger transportation pipelines in a dendritic fashion. In most cases, the pipelines are buried with aboveground facilities evident along their routes that facilitate movement of the product or valves that regulate its flow to its destination. In some cases, small pipelines are laid aboveground between a well and a storage facility or a facility that introduces its contents into a larger pipeline. For oil or oil byproduct lines, the final destination is usually a large processing facility or storage facilities where it can be loaded into railroad or truck tankers. Natural gas for lighting and industrial use was largely restricted to towns and cities with nearby sources until the late 1920s when large interstate gas lines began to be constructed. Since then, an increasingly large network of gas pipelines has developed. Like water, gas is distributed from storage facilities through a series of smaller pipelines that terminate at homes, businesses, or industrial plants. Demand for oil products

increased dramatically with the advent of the automobile beginning in the 1910s and with the growth of the plastics and other manufacturing industries after World War II. Oil and oil byproducts require processing, so the destination of oil pipelines is large industrial facilities often in or near large metropolitan areas.

Gas and oil pipelines are important primarily for their role in industrial development. They can often gain significance because of their association with the development of a particular oil and gas field. Gas and oil pipelines can form a direct conveyance between a single well to a storage facility, can be a system of lines leading to a storage facility or a facility where the product is introduced into a large transportation pipeline, or can be the large transportation pipeline that terminates at a production facility many miles away or even many states away. Large pipelines require aboveground facilities to facilitate movement of the pipeline contents. Because of the products that they carry, oil and gas pipelines are primarily associated with the Industry theme, but also satisfy the Transportation theme because they convey oil or gas. Other associated secondary themes might include:

- **Commerce** – A gas or oil pipeline will likely have importance to commerce as most were constructed specifically to allow a commodity to be brought to market and enabled the successful exploitation and development of the commodity (Criterion A).
- **Community Planning and Development** – A gas or oil pipeline may have importance to community planning and development if it can be demonstrated that the success and growth of a community was the direct result of the pipeline or pipeline system (Criterion A).
- **Engineering** – A gas or oil pipeline may have engineering importance if it can be demonstrated to be a good example of a particular method or type of construction (Criterion C). Because nearly all oil and gas pipelines are buried, this may be difficult to ascertain, but historical information may indicate that something about the pipeline may be innovative in terms of design or materials.
- **Politics/Government** – A gas or oil pipeline may have importance to politics or government if it was the result or a good example of a particular political event, series of events, or governmental policy or philosophy (Criterion A).

### ***Guidance for Field Recordation***

It is expected that most of the important early gas and oil pipelines can be identified through the examination of historical records and maps. Belowground pipelines may be completely obscured or evident by construction scars, above-ground facilities along the routes, and markers warning of their presence. The routes should be mapped and the aboveground elements documented. Gas pipeline distribution systems from a supply source will form a buried dendritic system of ever-diminishing size to delivery points at residences, businesses, and other destinations. Although a large number of these small infrastructure delivery pipelines are certainly old enough to be recorded and evaluated under the NRHP Criteria, their

ubiquity suggests they will not add important data and documenting them as cultural resources cannot be expected to enhance our understanding or appreciation of history. Of course, there may always be an exception to such a general conclusion, and if such an exception is found, recording is not precluded or discouraged. Most gathering oil and gas pipeline systems will also form dendritic infrastructure that will not add important data if recorded. As a result, it is recommended that only primary oil and gas pipelines be recorded and that secondary or smaller gathering or delivery pipelines be excluded from the necessity of recordation or evaluation. A possible exception may be small aboveground oil and gas pipelines forming gathering systems because of their departure from the norm of being buried.

### ***Historic Contexts***

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2013 *Rangely Oil Field Cultural Landscape Survey*. Prepared by Metcalf Archaeological Consultants for Bureau of Land Management, White River Field Office. On file at the Office of Archaeology and Historic Preservation, History Colorado, Denver.

### ***Utility Lines***

Utility lines are linear sites that carry wires or conductors, typically above ground, on wooden poles or metal structures. In recent years, conductors are more frequently being buried, usually in some sort of conduit. Electrical transmission lines carry electricity from generating facilities to electrical substations and from substations to places of consumption. Initial electrical generation was of direct current, which could only be distributed short distances. As a result, early direct-current power plants were small, private operations that conveyed electrical power to a limited area, usually only for a commercial enterprise, such as a mine, but sometimes for a town (Armstrong 1976:345). The advent of alternating-current generation in the 1890s resulted in long-distance electrical transmission and the development of the electrical grid as we now know it. The significance of electrical transmission lines comes primarily as linkages to or from facilities that, themselves, have historical significance. The advent of installation of solar panels and wind turbines, beginning in the 1970s but becoming economically viable in the 1990s, form new sources of electrical generation that will need to be considered in the future. Large solar arrays and wind farms are high-output facilities comparable to more traditional electrical-generation facilities, many of which are being phased out. High-output facilities often have dedicated transmission lines and substations that tie into the larger electrical grid. In contrast to traditional generation facilities are small-capacity solar or wind generating arrays installed and owned by private citizens that feed into the electrical grid. These typically utilize existing transmission line systems to introduce the electricity they generate into the electrical grid. Electrical transmission lines should be viewed as parts of systems that may continue to function to the present day.

Telephone or telegraph lines carry communication signals by wire from a source to a receiver with major lines. Telephones were initially connected directly to each other. As other users were added, switchboard exchanges were necessary with manual switching by an

operator. As technology improved, switching became automated. Switchboard exchanges were connected to each other so that long distance communication was possible with undersea cable enabling international telephonic communication. Telegraphic communication is largely extinct and telephone communication by wire is largely being phased out. New technology has resulted in increased installation of fiber-optic communication lines. Fiber-optic technology is not yet 50 years old; the first successful long-distance fiber-optic installation was in Italy in 1977. Evaluation of fiber-optic systems for significance will be in line with that of telegraph and telephone systems.

Electrical transmission lines and telegraph and telephone lines can be ascribed to a variety of areas of significance (themes) depending upon their purpose. In a general sense, all electrical transmission lines are a conveyance, satisfying the Transportation theme, but this weak association requires bolstering with other more pertinent themes. Telegraph and telephone lines all fall within the Communication theme that can also be bolstered by other secondary themes. Such themes include:

- **Commerce** – A utility line may have importance to commerce if it was constructed specifically to allow a commodity to be brought to market or if it enabled the successful exploitation and development of a commodity (Criterion A). For instance, an electrical transmission line to a precious metals concentrating mill may have resulted in the economical operation of the mill, enabling mines in the area to afford to have their ore processed there, thereby making mining on a regional scale viable.
- **Community Planning and Development** – An electrical transmission line may have importance to community planning and development if it can be demonstrated to have been a major constituent in the design of a community or if the success and growth of a community was the direct result of the transmission line (Criterion A).
- **Engineering** – An electrical transmission line or telegraph or telephone line may have engineering importance if it is a good example of a particular method or type of construction (Criterion A). Frequently, this is best ascribed to physical elements of workmanship, but in the case of utility lines, this may be best applied to structures that are typical of a particular period of time or retain historic hardware.
- **Industry** – An electrical transmission line, telephone, or telegraph line, or fiber optic line may have importance to industry if it can be demonstrated to have furthered the development of goods and services (Criterion A). For instance, an electrical transmission line may have significance if it was the first to convey electricity from a particularly important power plant or if it was constructed specifically to provide electricity to an important industrial facility. Telegraph lines were often constructed as a communication system to facilitate the smooth operation of a railroad, so may gain significance because of that connection. Likewise, telephone lines that served a single purpose, such as to a fire lookout or to facilitate the operation of an aerial tramway, may be considered significant if they can be demonstrated to have been key to the success of the use of a facility or

industrial operation. Fiber optic lines may have made it possible for an industry to develop in an area only because of the improved level of communication that it provided.

- **Landscape Architecture** – An electrical transmission line may be considered to have importance to landscape architecture if it has design elements that further our enjoyment or appreciation of the land or if it exhibits elements designed specifically to make it blend with the environment (Criterion C). For instance, a transmission line may have structures that were innovatively designed not to be intrusive to the scenic values of the landscape through which it passes.
- **Politics/Government** – An electrical transmission line or telegraph or telephone line may have importance to politics or government if it was the result or a good example of a particular political event, series of events, or governmental policy or philosophy (Criterion A).

### ***Guidance for Field Recordation***

Historic utility lines are likely to be identified through research, perhaps through examination of historical records of major electrical companies in an area, telephone exchanges, local predecessor companies, the Western Area Power Administration, and Bureau of Reclamation. Electrical transmission lines are generally determined significant under Criteria A or C, and, more rarely, Criterion B. Documentary research, as opposed to field recordation, is more likely to reveal important association with early electrification projects, important historical events such as the association of an electrical line with the development of a town or industry, or significant engineering achievement. Electrical transmission systems pose complex challenges for field recordation as they are typically significant in aggregate, or total, but are encountered when an APE crosses one or more sections of the system. An electrical transmission system is composed of power plants/generation; transmission lines; towers; poles; substations; and transformers. Each of these features is, in turn, characterized by additional features. Ideally, electrical transmission lines should be recorded from their source (i.e., generating facility or substation division) to their initial point of destination, which may be an industrial complex or a substation, from where smaller distribution lines may emanate. These smaller distribution lines will form a dendritic system of ever-diminishing size to delivery points at residences, businesses, and other destinations. Early single-purpose telephone or telegraph lines should be recorded from their end points of communication, such as from a mine office to a mine. With larger systems that utilized exchanges, they should be recorded from exchange to exchange. Smaller distribution lines to and from the exchanges are also dendritic down to the individual user. Although a large number of small infrastructure electrical, telegraph, and telephone distribution lines are certainly old enough to be recorded and evaluated under the NRHP Criteria, their ubiquity suggests they will not add important data, and documenting them as cultural resources cannot be expected to enhance our understanding or appreciation of history. Of course, there may always be an exception to such a general conclusion, and if such an exception is found, recording is not precluded or discouraged. As a result, it is recommended that only primary utility lines be recorded, or those lines originating from a

power/generating station and terminating at a substation or transformer, or other significant locale of termination. Secondary or smaller delivery lines that terminate at residences or businesses should be considered as features of that site or district, and their significance as contributing or not contributing should be considered in the evaluation of the historical significance of the house or business.

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### **Summary Recommendations**

There are many things to consider when evaluating linear resources. It is recommended that significant historical and archival research be conducted regarding the potential presence of linear resources *prior* to field work to determine the need for or level of field recordation for individual features. As with field survey, historic documentary research should be commensurate with the size and scope of the undertaking. Colorado SHPO does not maintain a list of historic resources that can be eliminated from evaluation, although does advise in the Cultural Resources Survey Manual (OAH 2007:18) that “It is not necessary to fully document features such as dirt roads, stock ponds, soil berms, fence lines, small irrigation ditches, pastures or fields” unless they are part of a larger site or district; are named; or some other aspect of project methodology or federal agency guidance requires that these features be recorded. It is therefore incumbent on the researcher to make informed decisions based on the resources and nuanced understanding of the Section 106 evaluation and documentation requirements. At a minimum, this will likely include reviewing historical maps and local history documents.

- A Site File search with the Office of Archaeology and Historic Preservation at History Colorado will provide the researcher with information on whether a linear resource has been previously evaluated, either in total or as a contributing segment. Determine if you

are the first person to evaluate this resource in its entirety or whether you are evaluating a segment of a previously known resource.

- If you are the first person to evaluate a linear resource, it is recommended that you conduct archival research on the resource in totality.
  - Regardless of the length of a linear segment that is in your project area, a researcher should evaluate *at minimum* a **quarter-mile-long** (¼-mile-long) segment for integrity (please note some agencies, such as the Bureau of Reclamation, prefers one-mile long segments). Of course, this may not always be possible because of project right-of-way constraints, the ability to access private lands, or situations where a project is on private land and a linear may extend onto a federal or state agency's land that otherwise would have no project involvement. In general, the more that can be recorded of a linear, the better it can be understood and evaluated.
- If it is decided that a linear does not meet the Criteria for recording in the field, a data-based argument based on evaluation of significance must be presented to the federal agency and SHPO.
  - If a linear is determined to be significant, it is most likely that it would be eligible for listing under Criteria A or C, and to a much lesser extent, Criterion B. Although most linear resources have been lumped in with archaeological resources in the context of CRM, linear resources are typically structures or objects that do not provide data potential under Criterion D in the way that an archaeological site does.
  - It is important to define the Period of Significance for a linear resource.
  - Under what themes in specific Criteria does the linear resource add to our knowledge of the human past? There are many contexts both Colorado-specific and nationwide that can help aid in formulating these arguments. If a context does not exist, that does not mean that the linear resource is not eligible or does not add to our understanding of Colorado history.
  - It is also necessary to consider whether an individual resource, while not eligible for listing on the National or State Register from its own merit, may be a contributing element to a larger district or landscape.
  - Our collective understanding of the past is constantly evolving. Considerations of resources with a new lens, such as the importance of a resource to an underrepresented community, a period of significance, or events that have only recently become "historic" may be applicable to the evaluation of a linear resource.
  - OAHF has site evaluation forms specific to linear resources. A single Management Data Form should be completed for each linear resource, regardless of the number of



segments into which the resource has been divided. In addition to the Management Data Form, Colorado SHPO also has a Linear Component form that should be completed for each individual segment. If a linear resource is evaluated and recorded in its entirety, a single linear resource form should be completed.

- It is also worth noting that the Bureau of Land Management Colorado, in consultation with OAHP, has developed both guidance and a unique linear site form which can be found in Appendix A.

### ***Segmentation***

When possible, recordation of an entire linear resource is an ideal outcome of encountering a linear in the field. In reality, this is rarely possible, so the recordation and evaluation should focus on recording the largest segment possible and evaluating the segment as a contributing or non-contributing component of the linear site as a whole. In general, contributing segments retain sufficient integrity to convey the historic significance of the linear. As mentioned previously, integrity may relate to the function of the linear more than its retention of historic components. Such an evaluation will require sufficient knowledge of the linear resource as a whole, its place in history, and a reasonable expectation of sufficient physical integrity for elements to have survived that can convey the linear's importance to history. When encountered for the first time, this may require considerable historical research, the possible development of a historic context, and possible use of data, such as aerial photos and historic maps, to determine the full extent of a resource and the likelihood for it to have integrity beyond a project area's boundaries. It should be entirely possible to determine if a linear resource was important to the history of a locality, region, state, or the nation through historical research. The next step is determining if elements of the linear resource have survived in a condition that enables the linear's historic importance to be conveyed in a meaningful way. If a linear resource is determined not to be historically significant through historical research and no characteristics are identified in the field that indicate significance for other reasons, such as engineering, grounds for detailed recordation beyond basic description may be lacking. In some instances, formal recording may not be necessary if recognition of the linear is made in a report and grounds for not recording it are adequately made.

For most linear sites for which significance can be expected, segmentation is a likely and reasonable approach to recordation for logistical reasons and because of project constraints. Segmentation, when used properly, can allow researchers to understand where previous recordation has taken place, what the condition of other sections of a linear are, what the significance evaluations of other segments have been, and if mitigation of those segments has taken place. Once a section of a linear has obtained a segment designation, it should retain that designation so that past actions can be tracked. Subsequent encounters of the linear within a segment should refer to the earlier segment documentation and build from it, not replace it, even if a subsequent visitation encounters only a portion of the original segment. A common problem with subsequent encounters of linear segments is a narrower focus that tends to diminish the perceived importance or integrity of a segment resulting in changes in

evaluations from contributing to non-contributing, thereby diminishing the integrity of the resource as a whole through a process of loss by a hundred small cuts.

### ***Mitigation***

If there is an adverse effect to a linear resource, avoidance, minimization, and/or mitigation may be in order. Under Section 106 of the NHPA, the lead federal agency consults with local stakeholders and the SHPO regarding potential efforts to avoid, minimize, or mitigate an adverse effect. As with all mitigation efforts, considerations for public benefit and adequately addressing the effects to the resource should be prioritized. The type and scale of mitigation also need to take into consideration the scope of the undertaking and to the overall adverse effects to a historic resource from a proposed undertaking. Cultural resource professionals also have to consider the nature of the resource that is being adversely affected, the significance Criteria for which the resource is eligible, as well as the needs of consulting parties and stakeholders. To that end, strategies such as Level II documentation of an irrigation ditch is often too simplistic a mitigation that does nothing to further the documentation of a resource to serve the public good, so perhaps should be reconsidered as the default mitigation that it has become. However, if the portion of an adversely effected ditch is a headgate that is eligible under Criterion C for engineering, Level II documentation may be an appropriate mitigation effort. Although interpretative signage may also seem a bit blasé, it is still wildly popular with local municipalities and even everyday citizens who view interpretive signage in public spaces as an accessible way to learn local history. Along the same lines, other forms of interpretive signage can include storyboards, interactive maps, or other digital toolkits that are accessible by the public on an open website. For both interpretive signs and digital platforms, these types of public-education products have a definite lifespan, either from deterioration due to the elements or the speed at which websites and technology change. It behooves the agency, SHPO, and CRM companies to consider these lifespans in their mitigation planning processes.

More extensive mitigation efforts may be appropriate for projects with a large scope or greater cumulative effects. Historic contexts are always needed for a variety of subjects. Please visit the SHPO website for ideas, or consult the list of contexts available (and the glaring holes of what is not available) in the references of this publication. Likewise, National or State Register nominations, amendments to existing nominations, or other scholarly type works may be appropriate for your project. Creative ideas regarding mitigation of a resource are likely to emerge through consultation with the various interested parties involved with a project that can lead to innovative solutions.

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