

CHAPTER III: TRAIL DESIGN STANDARDS, SPECIFICATIONS & PERMITS

CHAPTER III Trail Design Standards, Specifications & Permits

This chapter discusses trail standards, preferred surface types for different activities, permits, and other requirements one must consider when developing trails in particular when certain funding is used.

Trail Standards

Trail standards impact many things, such as impact to the environment, construction cost, maintenance cost and even funding eligibility. *Most importantly, the design standard selected will impact user experience and ultimately which user groups will utilize the system.* As an Adventure Tourism destination, users have a certain vision or expectation. *See Chapter VI for more on this.*

Seemingly every agency has its own referenced standards. Standards considered during the course of this study include standards referenced by:

- Federal Highway Administration (FHWA)
- National Park Service (NPS)
- Kentucky Department of Parks
- United State Department of Agriculture Forest Service (USDAFS)
- United States Access Board
- American Association of State Highway and Transportation Officials (AASHTO)
- United States Forest Service (USFS)
- United States Fish and Wildlife Service (USFWS)
- International Mountain Biking Association

When reviewing published standards, one must consider the intended use and desires of the agency. Standards adopted by FHWA and AASHTO are intended for trails designed to be a component of a transportation system, typically in an urban setting and largely do not apply to the stated Buckhorn objective. The following discussion is generally based on a more applicable standard utilized by federal agencies NPS, USDAFS, USFS and USFWS which **utilizes five basic trail fundamentals for planning and management of trails.**

The Five Basic Trail Fundamentals that are utilized by the Federal Trail Data Standards (FTDS) and are the cornerstones of their trail management include 1) Trail Type, 2) Trail Class, 3) Managed Use, 4) Designed Use, and 5) Design Parameters.

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- 1) **Trail Type** –Trail type defines the trail category that indicates the predominant trail surface and general mode of travel the trail accommodates (Ground, snow, water). In the case of the Buckhorn Trail system, all trails will be standard ground-based trails.

- 2) **Trail Class** - The prescribed scale of development for a trail, representing its intended design and management standards. The National Trail Classes provide a chronological classification of trail development on a scale ranging from Class 1 to Class 5. *See Trail Class Matrix in Appendix A.*
 - Trail Class 1: Minimal/Undeveloped Trail
 - Trail Class 2: Simple/Minor Development Trail
 - Trail Class 3: Developed/Improved Trail
 - Trail Class 4: Highly Developed Trail
 - Trail Class 5: Fully Developed Trail

Unlike a greenway or urban multi-use trail, **Adventure Tourism trail systems should involve a feeling of exploration or travel to remote areas, where the traveler should expect the unexpected.** With this type of user experience in mind, the Buckhorn “Backbone” trails must be developed sufficiently to accommodate the anticipated volume of users yet not over developed to the point of changing the natural setting or minimizing the expected user experience. Class 3 development meets these criteria and should be the minimum and target class of trail for the majority of “Backbone” segments. *Recommendations for each “Backbone” segment are found in Chapter V.*

- 3) **Managed Use** – Managed use defines the mode of travel that is actively managed for and appropriate on a trail, based on its design and management. There can be more than one Managed Use per trail or trail segment. The Managed Uses for a trail are usually a small subset of all the allowed uses on the trail, that is, uses that are allowed unless specifically prohibited.

In order to accomplish the economic goals desired, the recommendations for the Buckhorn Trail system are that it be closed to all motorized use but open to all non-motorized use, the Managed Uses for the “Backbone” segments will be Hiker/Pedestrian and equestrian/pack and saddle. The allowed uses, however, will also include bicycles and all other non-motorized uses.

- 4) **Designed Use** - The Managed Use of a trail is the use that requires the most demanding design, construction, and maintenance parameters and that, in conjunction with the applicable Trail Class, determines which Design Parameters or technical specifications that will apply to a trail. For the Buckhorn “Backbone” system, that will generally be a Class 3, equestrian/pack and saddle design. *Recommendations for each “Backbone” segment are found in Chapter V.*

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5) **Design Parameters** – Technical specifications for trail construction and maintenance, based on the Designed Use and Trail Class. Design parameters include technical specifications regarding:

- Tread Width
- Surface Material
- Profile Grade
- Cross slope
- Corridor Width (Clearing)

A table summarizing design parameters and standards for different agencies can be found in Appendix A. Recommended design parameters for each “Backbone” segment are found in Chapter V.

Trail Typicals

Below and on the following pages are trail typicals for Trail Class 3 design parameters for hikers/pedestrians, equestrian, and mountain bike trails.

Trail Class III Design Parameters for **Hikers/Pedestrian**:

- Design clearing width (max.): 5’
- Shoulder clearance (maximum): 18”
- Design clearing height (maximum): 8’
- Slope (maximum sustained): 12%
- Slope (maximum): 25% for 200’
- Cross slope (maximum.): 15%
- Surface: Native, some on-site borrow or imported material where needed for stabilization and occasional grading; intermittently rough; protrusions are equal to or less than 3”; obstacles are 6” maximum.



Larger versions of trail typicals are provided in Appendix B.

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Trail Class 3 Design Parameters for **Equestrian/Pack & Saddle Trails:**

- Design clearing width (maximum): 8'
- Shoulder clearance (maximum): 18"
- Design Clearing Height (maximum): 10'
- Slope (maximum sustained): 12%
- Slope (maximum): 20% for 200'
- Cross slope (maximum): 8%
- Surface: Native, some on-site borrow or imported material where needed for stabilization and occasional grading; intermittently rough; protrusions are less than or equal to 3"; obstacles are 6" maximum.



Larger versions of trail typicals are provided in Appendix B.

Trail Class 3 Design Parameters for **Bicycle Trails:**

- Design clearing width (maximum): 6'
- Shoulder clearance (maximum): 12"
- Design Clearing Height (maximum): 8'
- Slope (maximum sustained): 10%
- Slope (maximum): 15% for 200'
- Cross slope (maximum): 8%
- Surface: Native, some on-site borrow or imported material where needed for stabilization and occasional grading; intermittently rough; protrusions are less than or equal to 3"; obstacles are 10" maximum.



Larger versions of trail typicals are provided in Appendix B.

Americans with Disabilities Act (ADA) Compliance

The following is an excerpt from the United States Access Board's website:

"Achieving accessibility in outdoor environments has long been a source of inquiry due to challenges and constraints posed by terrain, the degree of development, construction practices and materials, and other factors. The Board has issued new accessibility

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*guidelines for national parks and other outdoor areas developed by the federal government. These guidelines address access to trails, picnic and camping areas, viewing areas, beach access routes and other components of outdoor developed areas on federal sites when newly built or altered. **They also provide exceptions for situations where terrain and other factors make compliance impracticable.** The requirements become mandatory on November 25, 2013 as part of the Architectural Barriers Act Accessibility Standards, which apply to facilities that are built, altered, or leased with federal funds.”*

Although these new guidelines are currently applicable only to federally funded projects, they should be the basis for all new recreational trail projects. When reviewing the guidelines, it is clear that the access board understands that recreational trails are unique and thus the guideline provides exceptions under certain conditions. The following table lists the guidelines conditions for exceptions:

Conditions for Exceptions	
1	<i>Compliance is not practicable due to terrain.</i>
2	<i>Compliance cannot be accomplished with the prevailing construction practices.</i>
3	<i>Compliance would fundamentally alter the function or purpose of the facility or the setting.</i>
4	<i>Compliance is limited or precluded by any of the following laws, or by decisions or opinions issued or agreements executed pursuant to any of the following laws: Endangered Species Act; National Environmental Policy Act; National Historic Preservation Act; Wilderness Act; or other federal, state, or local law the purpose of which is to preserve threatened or endangered species; the environment; or archaeological, cultural, historical, or other significant natural features.</i>

As mentioned throughout this study, the function and purpose of developing the Buckhorn Trail system is **to encourage economic growth through adventure tourism**. As such, conditions for exception in specifications will apply. In many areas, the terrain dictates that full compliance is not practical and further would fundamentally alter the purpose of the facility.

Although ADA compliance is not practical for a large portion of the Buckhorn system, there will be opportunities to incorporate accessible features and elements. Many of the proposed trailheads will have portions of the trail adjacent to the trailhead where profile grade and terrain will allow accessibility. Where trail-related facilities, such as parking, shelters, toilets, drinking fountains, and other features are provided on or along an accessible portion of the trail, they must provide the required level of accessibility and be served by an accessible route.

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Environmental/Permits

Permitted Areas - The Louisville District of the USACE manages the dam and surrounding areas of the lake. The lake has protected lake shoreline areas and limited development shoreline areas that may require Permits, Licenses and Consents to Easement or Regulatory Permits in accordance with the lakes Shoreline Management Plan as defined below.

- **Permits** - Permits are issued to authorize private use on project lands or waters such as boat docks, vegetation control, and erosion control structures.
- **Licenses** - Licenses are issued to authorize non-exclusive use of the shoreline, to include private utility lines, improved pathways, special access for mobility impairment, private drives and roadways, boat ramps, turnarounds, and parking areas.
- **Consents to Easement** - In addition to property the Government acquired in fee for project construction, USACE lakes have specific areas over which flowage easement rights were acquired. The Government may issue Consent to Easement for non-habitable structures that do not jeopardize the Government's right to flood the property and do not present an environmental or hazardous threat to the project.
- **Regulatory Permits** - Some permits are required for work even if it is on your own property. The USACE evaluates permit applications for essentially all construction activities that occur in the nation's waters, including wetlands. USACE permits are also necessary for any work, including construction and dredging, in the nation's navigable waters.

Water Resources - Buckhorn Lake was not only created to control flooding and enhance recreational activities, but is also a source of water for the surrounding area. The Clean Water Act is in place to "restore and maintain the chemical, physical and biological integrity of the Nation's waters." Since this is also a source of water for the surrounding areas, protection of water quality consistent with the Clean Water Act will have to be considered. The USEPA, USACE, KDOW and FEMA are all responsible for permitting and overseeing work in and around Buckhorn Lake.

Permits may be required from these agencies, such as USACE 404, KDOW 401 Water Quality Certification and National Pollution Discharge Elimination System permit (NPDES) to allow any disturbance of soil and vegetation and mitigate any runoff during the construction of the trail using erosion control devices. Even though the trail would not directly impact the lake it would be parallel to the lake and cross many streams and creeks feeding the lake. The natural runoff of water from above the trail may wash across the trail and deliver sediments into the lake.

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Wetlands - The Clean Water Act also regulates wetlands. The Clean Water Act defines wetlands as “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions.” Wetlands generally include swamps, marshes, bogs and similar areas. The proposed trail alignment does not impact any known wetlands. If it is later found the trail may impact a wetland, realignment of the trail can be considered.

Fish and Wildlife - Buckhorn Lake lies within the heart of the Daniel Boone National Forest. It is also within the U.S. Fish & Wildlife Service (USFWS), Southeast Region. Within this region the Kentucky Department of Fish & Wildlife Resources (KDFWR) focuses on three major Geographic areas based on biological data from state, federal and private organizations. Although Buckhorn Lake is not directly in one of these areas, it is centrally located between the focus areas of Rockcastle River, Upper Cumberland River and Licking River. Due to being in this area the KDFWR may require an endangered species permit and a special use permit.

Floodplains – Federal Emergency Management Agency (FEMA) is mandated to strive to preserve floodplain values and minimize hazardous floodplain conditions. Executive Order 11988, Floodplain Management, requires all federal agencies to avoid construction within the 100 year floodplain unless no other practical alternative exists. Since the waters of Buckhorn Lake are regulated by the USACE technically it is not considered a floodplain. A statement of findings for floodplains would not be necessary for this project because unpaved trails that are constructed at grade do not produce adverse impacts to floodplain functions.

Vegetated Areas - Construction of a multi-use non-motorized trail would result in long term and permanent loss of native vegetation within the trail corridor. Long term use of the trail may result in further damage to surrounding vegetation as users may hike, walk or bike off the trail corridor. Mitigation in this area may consist of planting native vegetation in sparse areas along the corridor.

NEPA - The National Environmental Policy Act requires all federal agencies prepare an in-depth study of the impacts to the environment when there is any major federal action to an area. They must also involve the effected public. A study of this area may be required for certain types of funding on this project.

NHPA - The National Historic Preservation Act was established to preserve any properties that may be of any historical significance. The Bowlingtown and the military plane crash areas may need to be further investigated to determine if they should be recognized as places of National Historic value.