



# Wilderness Park Stream Crossings

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Public Open House

Information gathering meeting

November 21, 2019



# Welcome!

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- Moderator: Steve Henrichsen, Lincoln/Lancaster County Planning Department
- Parks and Recreation Staff: JJ Yost, Sara Hartzell, Bobby Bartja
- Meeting purpose: To initiate development of written guidelines for replacement and development of stream crossing structures in Wilderness Park.

*This is an informational meeting to establish a basis of understanding that will guide development of these standards. We will be following the Open Meetings Act.*



# Meeting format

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- This meeting will be primarily informational
- Moderator will ask for questions at the end of the meeting
  - If you intend to speak, you must sign in on the sheet at the back of the room
  - if possible, please jot down questions and hold for that time
- A second meeting is planned for January 23<sup>rd</sup>, 6:30 to 8:00 pm in this same location to review draft guidelines
- Written comment forms will be used to gather information



# Important Information

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- Housekeeping items:
  - In an emergency, exit via stairwells across from the elevators, or go right as you leave this room to the exit at the end of the hall
  - Restrooms are to the right of the elevators
- Two sign in sheets in the back of the room
  - Sign in to be added to the Email list – optional
  - Sign in if you intend to speak – required
- Make sure you have a Comment Form



# Ground Rules

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- Be respectful of one another.
- Hold Questions to the question period at the end of the meeting
- Off-topic questions will be placed in a “Parking Lot” and answered outside the meeting



# Stream Crossing Structures in Wilderness Park

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## – Multi-use Steel Truss Bridges

Meet guidelines for all users

Allow maintenance and emergency vehicles

Able to span wider channels





# Stream Crossing Structures in Wilderness Park

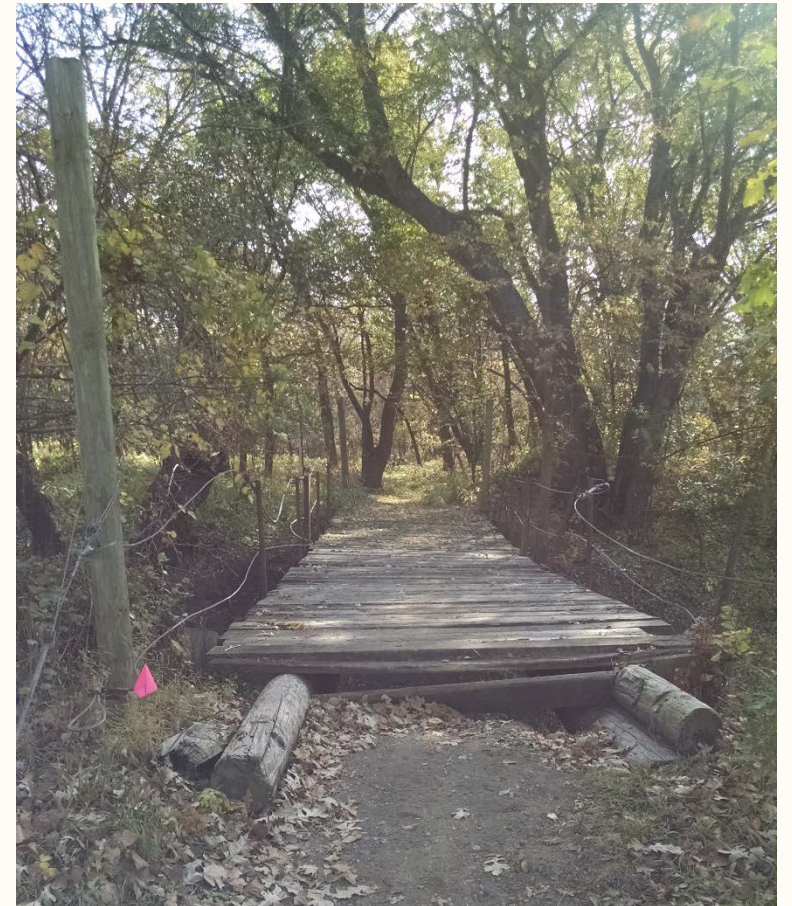
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- Pedestrian and horse bridges

Lighter duty bridges

Restrictions on types of users

May not be able to allow vehicles





# Stream Crossing Structures in Wilderness Park

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- Low-water crossings
- Cross at the stream level
- Usually on low flow or ephemeral streams





# Stream Crossing Structures in Wilderness Park

- Small structures
  - Small bridges (less than 5 feet off grade) boardwalks, bog bridges, turnpikes
  - May cross frequently wet areas as opposed to true streams





# Bridge Inspections

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- Instituted after the Wilderness South Bridge collapsed in 2009
- Routine = annually to every 5 years depending on the stability of the structure
- Conducted by a qualified engineer
- Maintenance needs are identified in a report
- Staff can do routine maintenance, typically cutting back trees from abutments, removing debris, fixing railings, fixing decking
- More extensive maintenance/repair require assistance of an engineer and/or contractor





# Wilderness Park Stream Crossings and Planning

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- Prior Planning Efforts

- 1972 Master Plan – basis for development, not completely realized

- 1999-2000 Wilderness Park Subarea Plan

- *Long range, wide variety of topics, extensive public process*

- Strategic Planning

- *Conducted fairly regularly over past 20 years*

- *Stakeholder input*

- *Used to identify operation issues as well as projects for inclusion in 10 Year Facility Plan*



# Wilderness Park Stream Crossings and Planning

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- Future Planning Efforts

- Annual Strategic Planning to continue

- Update of Master Plan

- *Early 2020 review and update of portions of the Master Plan*

- *Focus on “User Experience”*

- *Include signage, trailheads, trails crossings, access, etc...*

- *Include public input component*

- *Will use prior work – Strategic Plan, sign plan, and guidelines developed through this process*





# Guideline Considerations for Stream Crossings in Wilderness Park

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- North/South Connectivity through the park
- User safety
- Appropriate type of crossing
- Follow local, state and federal requirements for floodplains, streams and wetlands
- Provide for multi-use trails
- Stream bank stability and climate resiliency

A decorative graphic of a pine needle branch, rendered in a light green color, positioned on the left side of the slide. It features several long, thin needles radiating from a central stem.

# Guideline Considerations for Stream Crossings in Wilderness Park, Cont.

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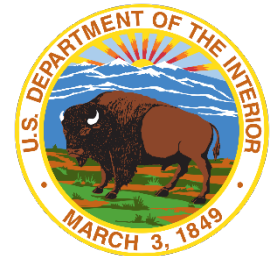
- Maintenance Access
- Emergency Vehicle Access
- Constructability
- Location of Alternative Routes
- Funding availability



# Public Agency Approaches to Design and Construction of Stream Crossings



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natural resources district



## What We Can Learn From Others

# Design Considerations for Stream Crossings

- **Explore Bridge Alternatives First:** Trail reroute, boardwalk, puncheon, user frequency
  - **Site Sustainability:** Straight channel, stable watershed, stable banks, high banks, floodplain, span
  - **Alignment with Existing Trail Network:** Connectivity, destinations, traffic
  - **Access for Construction:** Heavy Equipment, Rigging, Helicopters, trail/road closures, impact
  - **Users:** Hikers, bikers, equestrian, maintenance/emergency equipment, ATVs
  - **Cost:** Available budget, span of crossing, material selection, engineering
  - **Safety:** Engineering, materials + methods, railing, lighting, maintenance and inspections
  - **Materials:** Urban or backcountry, adjacent materials, budget, intended users
  - **Aesthetics:** Historic designations, adjacent designs, building codes, masterplan, view sheds
  - **Environment:** Adjacent habitat, protected resources, environmental loads, soil type
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## Grand Canyon National Park

Bridges: A bridge is a structure-providing passageway over an impediment such as a waterway, gully, or crevice. There is a variety of components involved in constructing a bridge such as abutments, sill piers, stringers, decking, etc. **The majority of bridges at Grand Canyon are large-scale engineered features.** The maintenance of these features performed by the National Park Service is primarily limited to re-decking or replacement of damaged handrails as needed. **Any additional work to the major bridge features at Grand Canyon National Park should be preformed via contract with bridge specialists.**

Reference:

Trail Management Standards for Grand Canyon National Park's Class IV Stock Trails (pg. 15)





## Grand Teton National Park

- No park specific written standards or guidelines on bridges
- Original bridges were developed with engineers
- Replace bridges in kind following the Secretary of the Interiors Standards for the Treatment of Historic Properties
- Engineers involvement for new projects that are outside of the normal

Reference: Sarah Zermani, Trails Supervisor Grand Teton National Park



## North Country National Scenic Trail (MI, MN, ND, NY, OH, PA, VT, WI)

**The National Park Service, the Forest Service, and other agencies generally require that an engineer either develop or review all bridge plans.**

Bridge engineering design - Bridges must be designed to provide for visitor safety, withstand snow loads, accommodate flood waters, etc. **A bridge is a major investment and it is common sense to seek engineering consultation for certain bridges—those greater than 25 feet in length or greater than 5 feet in height (above the water level or the bottom of the dry ravine).** All trail bridges should be designed to bear a load that meets or exceeds current management standards for architectural design and engineering of pedestrian structures. To achieve this standard, qualified personnel, such as engineers, should review the elements of proposed designs (stringer size, strength, snowload, peak flows, etc.) and approve them prior to installation.

Reference:

Handbook for Trail Design and Construction and Maintenance (NCT Chapter 5)



## United States Forest Service

**On national forests, all bridges require design approval from engineering before being constructed. Some regions have standardized, approved designs for simple bridges.**

**A qualified engineer with trail bridge design experience must approve the use of these Standard Trail Bridge plans for each trail bridge project.** Proper bridge siting and design includes many other aspects such as siting, hydrology, hydraulics, foundation, etc. Forest Service Trail Bridge design requirements are found in Forest Service Directives Forest Service Manual (FSM) 7723 and Forest Service Handbook (FSH) 7709.56b, Chapter 80 and in Technology and Development Center's publication "Locating Your Trail Bridge for Longevity".

Non-Forest Service entities are welcome to use these trail bridge plans but must take full responsibility for their use. We further recommend they seek review and approval from their qualified engineer of record for the project.



## 81 - DESIGN STANDARDS FOR TRAIL BRIDGES AND OTHER ENGINEERED TRAIL STRUCTURES

Design trail bridges and other engineered trail structures in accordance with AASHTO's LRFD Bridge Design Specifications and AASHTO's LRFD Guide Specifications for the Design of Pedestrian Bridges. These specifications, along with the additional references listed in section 80.6, are the nationally accepted guidance for trail bridge design.

## 83 - DESIGN CALCULATIONS AND PLANS

When National or Regional standard designs and plans are not used, prepare designs and plans as follows:

1. Complete structural and foundation design calculations and prepare construction plans for each trail bridge and other engineered trail structure in accordance with FSM 7723.03. **All designs must be performed by a certified Bridge Design Engineer or by an Engineer who is under the direct supervision of a Certified Bridge Design Engineer.**
2. When trail bridge and other engineered trail structure designs and plans are prepared by a Forest Service Engineer, ensure they are reviewed and checked by another Certified Bridge Design Engineer

## American Association of state Highway and Transportation Officials

3. When trail bridge and other engineered trail structure designs and plans are prepared by a Consulting Engineer, **ensure that designs and plans are reviewed by a Certified Bridge Design Engineer and bear the seal and signature of the responsible professional engineer, registered in the State in which the bridge will be installed.**
4. **A Certified Bridge Design Engineer shall review all supplier or manufacturer product designs and plans in accordance with applicable Regional guidance and contract requirements (FSM 7723.1).** Ensure that supplier or manufacturer product designs and plans bear the seal of the responsible professional Engineer registered in the State in which the bridge or products are manufactured.
5. Show foundation investigation, hydrological, and hydraulic data (FSH 7709.56b, ch. 30 & ch. 60), design users, snow and wind loads, and bearing pressures on the plans.
6. Design “half through trusses” (also referred to as side trusses or pony trusses) for lateral loadings and compression chord stability as specified in AASHTO’s LRFD Guide Specifications for the Design of Pedestrian Bridges.

# American Association of state Highway and Transportation Officials

7. Include as-built plans, design information, design calculations, inspection reports, and load ratings for each trail bridge in the permanent bridge file.

Reference:

AASHTO-FHWA Pedestrian and Bicycle Information Center

[https://webcache.googleusercontent.com/search?q=cache:Vxx-7s2QNfAJ:https://www.fs.fed.us/im/directives/fsh/7709.56b/wo\\_7709.56b\\_80.doc+&cd=2&hl=en&ct=clnk&gl=us](https://webcache.googleusercontent.com/search?q=cache:Vxx-7s2QNfAJ:https://www.fs.fed.us/im/directives/fsh/7709.56b/wo_7709.56b_80.doc+&cd=2&hl=en&ct=clnk&gl=us)

AASHTO





## Nebraska Recreational Trails Program

Trails must meet AASHTO (American Association of State Highway & Transportation Officials; [www.transportation.org](http://www.transportation.org)) guidelines

**Non-motorized trails shall be designed and certified by a licensed engineer or landscape architect of Nebraska.** All structures shall be designed and certified by a licensed engineer of Nebraska. When using concrete, it is suggested that the design be 5" thick and 8 to 10 feet wide. If using asphalt, it is suggested that the design be 6" thick and 8 to 10 feet wide. If using limestone, it is suggested that the design be 6" thick and 8 to 10 feet wide and use quarter inch screenings. **When dealing with a federal agency sponsor, the plans/specifications must come from a registered, professional engineer of the agency who is sponsoring the project.**

Reference:

<https://webcache.googleusercontent.com/search?q=cache:3RtyR8HQ1m0J:https://outdoornebraska.gov/wp-content/uploads/2017/08/RTP-Policies-2017.doc+&cd=1&hl=en&ct=clnk&gl=us>



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## Pedestrian Bridge Standards

- Minimum width= 10ft.
- Minimum Load= All NRD bridges are designed to accommodate maintenance vehicles
- Engineer Involvement= The NRD hires engineers for all bridge projects
- NRD Maintenance= Limited to repairs related to railing, decking and surfacing.

Reference:

Ariana Kennedy, Resources Conservationist LPSNRD



## California State Parks

Using all the information developed during the bridge site assessments, select a bridge design that is the most appropriate for the site conditions, trail standards, user types, and management policies.

**Regardless of the chosen design, it must be properly engineered to be considered safe for public use.**

The design must accommodate the Department's minimum live load rating (100 pounds per square foot), dead load (weight of the bridge's superstructure), snow load (maximum anticipated snow fall on the bridge), wind shear (wind force against the bridge), and seismic conditions (level of seismic activity in the geographic area of the bridge). The ability of a bridge to accommodate these engineering requirements is dependent on the design of the bridge and the materials used to construct it. A variety of designs, required materials, and their relative merits and limitations are discussed below

Reference:

<file:///C:/Users/QPPRXB/Desktop/Guiding%20Documents/CA%20State%20Parks%20Chapter%2016%20-%20Trail%20Bridges.FINAL.04.04.19.pdf>





## Appalachian Trail Conservancy

Proposals for new and replacement bridges must include: 1) A summary description of the need for the bridge and a map showing the location; 2) Construction plans (or an ATC-approved standard design) that show the bridge's elevation (side view), maximum span, and the material, species, diameter, and condition of proposed bridge stringers; 3) Documentation of whether the proposed bridge will be located in a FEMA-mapped flood hazard area, and, if so, additional documentation of any requirements imposed by the municipality administering the FEMA program in that location; 4) A commitment to periodic inspections and maintenance.

**Depending on the size and complexity of the structure, ATC or the land-managing agency may require that bridge plans, specifications, and the inspection/maintenance schedule and procedure be prepared under the supervision of a registered professional engineer.** If that is the case, it is the responsibility of the project proponent to engage a qualified engineer. ATC may provide engineering assistance if the bridge is included in the capital plan.

Reference:

[http://www.appalachiantrail.org/docs/default-source/trail-management-policies/general-trail-management/stream-crossings-and-bridges-2011.pdf?sfvrsn=f4c3bb96\\_4](http://www.appalachiantrail.org/docs/default-source/trail-management-policies/general-trail-management/stream-crossings-and-bridges-2011.pdf?sfvrsn=f4c3bb96_4)

# City Government Standards



- **Bridge design shall be signed and sealed by a Colorado Professional Engineer qualified in structural bridge design. Calculations shall be submitted for all pedestrian bridges on public lands.**
- **Pedestrian bridges located on public lands shall be designed according to AASHTO requirements.** Pedestrian bridges on private lands may be designed according to AASHTO or IBC requirements.

Reference: Boulder County Multimodal Transportation Standards



- **Bridges should be level and avoid a step up if the trail is intended to be accessible. Plastic lumber or wood may be used for the deck material. Spans greater than 10' should generally be engineered and may require site specific geotechnical work.**

Reference: <https://www.portlandoregon.gov/parks/38306?a=250105>



- **The design of all public improvements with a construction value in excess of Fifty Thousand Dollars (\$50,000.00) shall be prepared by or under the direct supervision of a Professional Engineer** duly registered and licensed by the State of South Dakota

Reference: Rapid City Infrastructure Design Criteria 2012 edition



# Proposed Framework for Guidelines

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- Width
- Loading Capacity
- Railing Height
- Materials
- Construction methods and access
- Proximity to alternative routes
- Return on investment
- User experience



# Questions?



- Please be sure to share any comments you have on the comment sheet provided



# Next Steps

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- This PowerPoint presentation and notes from this meeting will be sent out to everyone who leaves their email address
- Staff will prepare draft proposed guidelines to be shared before the January 23<sup>rd</sup> meeting – again, leave your email address to receive these
- Public meeting on January 23<sup>rd</sup>, 6:30 to 8:00 pm, this location
  - Collect comments on draft guidelines
  - Incorporate comments as appropriate
- Review and adoption of guidelines for stream crossing structures by Parks and Recreation Advisory Board March 12, 2020
- Adopted guidelines will be used in preparation of Wilderness Park 2.0 Master Plan