



Inspection Guidance: 3100 Maintained Landscapes

Version 2.1

Effective Date: January 25, 2017

End Date: Until Amended or Rescinded

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Introduction

This document contains the inspection guidance for maintained landscapes (ML). The critical components associated with a ML should be inspected using the guidelines found in this document. Where other asset types are collocated with a ML, these components should be inspected using the guidelines for that asset type.

All ML condition assessments should include a complete visual inspection of constructed architectural, civil/structural and mechanical components and managed vegetation. A field inspection should be performed using both a system and component inspection method to identify all maintenance and repair deficiencies that need correction. The inspector should determine if there is sufficient evidence to warrant complete replacement of a system versus repairing only specific components of that system.

A systematic approach to visual inspections must be employed to document all problems with a given ML. Some deficiencies are easily identifiable, while other deficiencies are more subtle and will require further examination to identify. Using a systematic approach reduces the likelihood that deficiencies will be missed.

During an inspection, the inspector should thoroughly document the information that will be needed in the preparation of cost estimates and inspection reports. At a minimum, the following should be recorded for each deficiency:

- The ML deficiency should be defined (e.g., hazardous tree limb, worn-out metal grate, sparse turf cover)
- The corrective action should be specified with the appropriate verb (e.g., build/add, repair, replace, realign, adjust, relocate, remove, reopen, maintain, monitor)
- Location data should be provided with global positioning system (GPS) reading coordinates and/or a wheeled distance from a recognizable ML component, and, if possible, the geographical location should be marked on a map (e.g., XYZ battlefield). For landscapes, ML delineation boundary lines may need to be surveyed and mapped
- Data should be quantified in sufficient detail to permit later development of budget-level cost estimates using the appropriate unit of measure (e.g., plant 4-5 foot Bradford pear trees using a 48-inch tree space, apply 1 yard shredded bark mulch). It may also be useful to note whether on-site or imported materials will be used
- The relative priority of the deficiency should be noted as high, medium or low
- Additional comments or notes should be included that will help to define the project needs or special circumstances to consider.

Condition assessments of cultural landscapes should be conducted with an understanding of the preservation goals/objectives for individual assets and the landscape as a whole. Management goals for cultural landscapes, their associated condition, deficiencies noted and corrective actions recommended may differ from industry standard MLs. For example, contemporary ML industry standards would indicate that vines growing on wooden

buildings should be removed to eliminate possible vegetative damage to the structure; in a cultural landscape, vine coverage on a building may be necessary to meet preservation goals and should be retained.

While this document lays out universal inspection guidance, it does not establish one standard for all MLs. MLs are constructed and maintained to different goals, as defined by the park unit's management plan. These goals must be considered when completing ML assessments and should guide the corrective action (and costs) of addressing identified deficiencies.

One of the primary goals of the inspection/condition assessment is to capture the amount of deferred maintenance related to a landscape's condition. In a ML, it is important to recognize that individual features may be in good physical condition, but the historic character of the site may be compromised as a result of changes (e.g. paint color, materials, design, location). An assessment of a ML is intended to identify these deficiencies and recommend corrective actions that improve conditions while respecting and preserving landscape character.

Roles and Responsibilities

To successfully complete an inspection of a ML, it is highly recommended that maintenance staff include cultural and natural resource staff in the inspection, planning and correction of deficiencies. This will ensure that specific values of the assets/features are identified and that the cultural integrity is not compromised. In addition, park planning documents outlining management goals and objectives, such as General Management Plans, Cultural Landscape Reports and Cultural Landscapes Inventories should be consulted.

Common Components and Critical Systems

Table 1 lists typical classifications used for the ML asset category. Any classification in the Facility Management Software System (FMSS) can be used to categorize components of a ML, but Table 1 contains those most commonly used.

Table 1. Maintained Landscape Common Component List

Top Level Classification	Classification	Critical System
Barrier/	Fence/Gate	No
Barrier/	Traffic Barrier	No
Exhibit/Sculpture	Sculpture	No
Furnishing/	Exterior Furnishing	No
Liquid and Gas/Plumbing	Fixture	No
Liquid and Gas/Plumbing	Irrigation System	No
Marking/	Sign	No
Structure/	Deck Structure	Yes
Structure/	Wall	Yes
Structure/	Walkable Structure	Yes
Structure/Access	Stairs	No
Structure/Base & Foundation	Base and Sub-Base	Yes
Surface/	Land Surface	Yes

Top Level Classification	Classification	Critical System
Surface/	Plant or Vegetation	Yes
Surface/	Traffic Surface	No
Surface/	Trailer Pad	No
Surface/	Turfgrass/Pasture Crop	Yes
Water Control/	Culvert	Yes
Water Control/	Drain	Yes

Comprehensive Condition Assessments

Safety

All inspections should be conducted in accordance with guidance found in the [National Park Service \(NPS\) Reference Manual 50B](#) and related federal, state and local safety and health standards. Examples include:

- [Occupational Safety & Health Administration \(OSHA\) 29 Code of Federal Regulations \(CFR\) 1910](#)
- [OSHA 29 CFR 1926](#)
- National Fire Protection Association (NFPA) Life Safety Code
- NFPA 70E: Standard for Electrical Safety in the Workplace
- [U.S. Environmental Protection Agency 40 CFR.](#)

In addition, inspectors should request current copies of all operating unit safety plans applicable to maintained landscapes before conducting the inspection. This will ensure that operating unit as well as required regulatory elements are taken into account.

Tips for Inspections

It is recommended that the park review all relevant inventory documents and the results of the most recent inspection before performing the condition assessment. Doing so will help familiarize the inspectors with the inventory and allow them to note previously reported deficiencies.

Below is a short list of additional items that may be useful during a field inspection:

- Fully charged GPS unit for collecting point and line data
- Digital camera with a fully charged battery and spares
- Sufficient storage space on the GPS unit and camera memory cards
- Blueprints, drawings, paper and a pencil/pen for field notes
- Compass
- Previous inspection information or a list of current work orders for the ML
- Necessary field gear (appropriate footwear, sun protection, clothing and rehydration equipment)
- Gloves
- Flashlight
- Magnifying glass
- Eye protection

- Binoculars
- Measuring tape/wheel
- Communication device (e.g., cell phone, radio).

While conducting ML condition assessments, digital photographs of the entire component and specific deficiencies should be taken. These digital photographs can then be loaded onto [NPSFocus](#), and the FMSS asset number and other metadata may be added to the record in NPSFocus. Later, when developing a Project Management Information System (PMIS) project, the park can retrieve and link the photographs of the deficiencies that were uploaded to NPSFocus to the PMIS project.

Component Inspection Guidance

Barrier & Fencing

Fence/Gate

A fence consists of a line of posts secured to the ground and connected with railings, pickets, planks, braces and other fence members secured in place. Posts out of plumb may be checked by eyesight, string line or transit. Fencing and gates commonly found on MLs include those made of wood, metal, concrete and masonry/stone.

Gates are closable openings in a fence that permit people, animals and/or vehicles to move from one side of the fence to the other. Wood gates are constructed with wood rails, pickets, planks, braces and other members securely fastened into a single unit. Metal gates are fabricated with pipe/tube framing covered with metal chain link or other woven wire mesh, preformed panel or metal laced fabric and kept in shape with wires, rods or turn buckles.

Security components such as barbed, razor or concertina wire may be installed at the top of a fence or attached either directly to the posts or on a metal angle bracket attached to the top of the posts.

Checks to be made:

1. Fence panels and railings (wood):

- Splits/cracking/broken:
 - Surface fibers separated, extending over entire member, less than 25 percent of thickness affected
 - Surface fibers separated, extending over entire member, greater than 25 percent of thickness affected
 - Physically damaged and broken
- Loose connections:
 - Loose bolts or wire fasteners
 - Protruding fasteners
 - Missing or broken components
- Rot, fungus or decay:
 - Moist stained area
 - Discolored, soft or crushed area

- Parasite damage:
 - Holes less than 1/8" diameter, surface sag and frass observed
 - Large holes greater than 1/8" diameter, surface channels, punctures and crushing
- Out of plumb more than 3" in 8'
- Erosion/vegetation:
 - Soil erosion under fence wall
 - Vegetation, trees or shrubs climbing over or growing into fence in the context of cultural/historic significance

2. Fence panels (metal):

- Fence fabric
 - Defective
 - Loose or sagging greater than 2" in diameter
 - Damaged or missing
- Defective, loose, damaged or missing
- Loose connections/anchorage:
 - Loose bolts or wire fasteners
 - Loose or bent pipe posts or railing
 - Missing or broken components
- Out of plumb more than 3" in 8'
- Corrosion:
 - Missing protective coating-galvanizing/paint, no pitting evident
 - Corrosion evidenced by pitting or blistering
 - Rust/corrosion evidenced by loss of base metal
- Erosion/vegetation:
 - Soil erosion around posts
 - Vegetation, trees or shrubs climbing over or around posts in the context of cultural/historic significance



Figure 1. Corrosion of Metal Railing

3. Fence panels (concrete):

- Cracking:
 - Hairline cracks to 1/16" wide
 - Wide cracks more than 1/16" wide
 - Disintegration of concrete surfaces, with loss of surface exceeding depth of 2"
- Loose connections:
 - Loose bolts or wire fasteners
 - Protruding fasteners
 - Damaged or missing components
- Spalling:
 - Less than 1" deep or 6" in diameter
 - More than 1" in depth or greater than 6" in diameter or loss of more than 10 percent of surface area of a member

- o Disintegration of surface area, with corrosion of exposed reinforcing steel
 - Scaling:
 - o Loss of surface up to 1/2" deep, with exposure of coarse aggregates
 - o Loss of surface from 1/2" to 1" deep with coarse aggregates clearly exposed
 - o Loss of surface exceeds 1" reinforcing steel usually exposed
 - Reinforcing steel corrosion:
 - o Rusting/discoloration evident
 - o Cracks occurring parallel to reinforcement
 - Out of plumb more than 3" in 8'
 - Erosion/vegetation:
 - o Soil erosion around posts
 - o Vegetation, trees or shrubs climbing over or around posts in the context of cultural/historic significance
4. Fence panels (masonry/stone):
- Deteriorated mortar joint material:
 - o Cracked mortar joint material
 - o Loose/missing mortar joint material
 - o Eroded mortar greater than 1/2" deep
 - Damaged bricks, stones or concrete masonry unit (CMU):
 - o Cracked, split, damaged
 - o Loose, missing
 - Out of plumb more than 3" in 8'
 - Erosion/vegetation:
 - o Soil erosion around posts
 - o Vegetation, trees or shrubs climbing over or around posts in the context of cultural/historic significance
5. Fence posts (wood):
- Splits/cracking/broken:
 - o Surface fibers separated, extending over entire member, less than 25 percent of thickness affected
 - o Surface fibers separated, extending over entire member, greater than 25 percent of thickness affected
 - o Physically damaged and broken
 - Loose connections:
 - o Loose bolts or wire fasteners
 - o Protruding fasteners
 - o Damaged or missing components
 - Rot, fungus or decay:
 - o Moist stained area
 - o Discolored, soft or crushed area



Figure 2. Leaning and Rotted Fence Posts

- Parasite damage:
 - o Holes less than 1/8" diameter, surface sag and frass observed
 - o Large holes greater than 1/8" diameter, surface channels, punctures and crushing
 - Out of plumb more than 3" in 8'
 - Erosion/vegetation:
 - o Soil erosion around posts
 - o Vegetation, trees or shrubs climbing over or around posts in the context of cultural/historic significance
6. Fence posts (metal):
- Loose connections/anchorage:
 - o Loose bolts or wire fasteners
 - o Loose or bent pipe posts or railing
 - o Missing or broken components
 - Out of plumb more than 3" in 8'
 - Corrosion:
 - o Missing protective coating-galvanizing/paint, no pitting evident
 - o Corrosion evidenced by pitting or blistering
 - o Rust/corrosion evidenced by loss of base metal
 - Erosion/vegetation:
 - o Soil erosion around posts
 - o Vegetation, trees or shrubs climbing over or around posts in the context of cultural/historic significance
7. Fence posts (concrete):
- Cracking:
 - o Hairline cracks to 1/16" wide
 - o Wide cracks more than 1/16" wide
 - o Disintegration of concrete surfaces, with loss of surface exceeding depth of 2"
 - Spalling:
 - o Less than 1" deep or 6" in diameter
 - o More than 1" in depth or greater than 6" in diameter or loss of more than 10 percent of surface area of a member

- o Disintegration of surface area, with corrosion of exposed reinforcing steel
 - Scaling:
 - o Loss of surface up to 1/2" deep, with exposure of coarse aggregates
 - o Loss of surface from 1/2" to 1" deep with coarse aggregates clearly exposed
 - o Loss of surface exceeds 1", reinforcing steel usually exposed
 - Reinforcing steel corrosion:
 - o Rusting/discoloration evident
 - o Cracks occurring parallel to reinforcement
 - Out of plumb more than 3" in 8'
 - Erosion/vegetation:
 - o Soil erosion around posts
 - o Vegetation, trees or shrubs climbing over or around posts in the context of cultural/historic significance
8. Fence posts (masonry/stone):
- Deteriorated mortar joint material:
 - o Cracked mortar joint material
 - o Loose/missing mortar joint material
 - Out of plumb more than 3" in 8'
 - Damaged bricks, stones or CMU:
 - o Cracked, split, damaged
 - o Loose, missing
 - Erosion/vegetation:
 - o Soil erosion around piers
 - o Vegetation, trees or shrubs climbing over or around piers in the context of cultural/historic significance
9. Gates (wood):
- Defective gate:
 - o Surface fibers separated, extending over entire member, less than 25 percent of thickness affected
 - o Surface fibers separated, extending over entire member, greater than 25 percent of thickness affected
 - o Damaged or missing wood sections
 - Rot, fungus or decay:
 - o Moist stained area
 - o Discolored, soft or crushed area
 - Pest damage:
 - o Holes less than 1/8" diameter, surface sag and frass observed
 - o Large holes greater than 1/8" diameter, surface channels, punctures and crushing
 - Out of plumb more than 3" in 6'
 - Connections:



Figure 3. Missing Sections in Wood Gate

- o Loose wood at connection site
 - o Broken, split or damaged wood at connection site
 - Missing fasteners or anchorage
10. Gates (metal):
- Defective gate fabric:
 - o Loose or sagging gate fabric
 - o Damaged or missing gate fabric
 - Defective gate panels:
 - o Loose gate panels
 - o Damaged or missing gate panels
 - Loose connections:
 - o Loose bolts or wire fasteners
 - o Loose or bent pipe post/bracing
 - o Missing or broken hinges, latches or other components
 - Out of plumb more than 1/2" in 6'
 - Corrosion:
 - o Missing protective coating-galvanizing/paint, no pitting evident
 - o Corrosion evidenced by pitting or blistering
 - o Corrosion evidenced by loss of base metal
11. Security wires:
- Loose, broken or missing brackets or bolts
 - Loose, defective, sagging, broken or missing wire
 - Corroded wire:
 - o Missing protective coating-galvanizing/paint, no pitting evident
 - o Corrosion evidenced by pitting or blistering
 - o Rust/corrosion evidenced by loss of base metal
 - Corroded brackets:
 - o Missing protective coating-galvanizing/paint, no pitting evident
 - o Corrosion evidenced by pitting or blistering
 - o Rust/corrosion evidenced by loss of base metal.

Traffic Barrier

A traffic barrier is a permanent device to keep vehicles within their roadway and prevent collision with dangerous obstacles or to prevent vehicles from accessing an area.

Guardrails & Barriers

A guardrail is a fence-like construction built at the outermost edge of the roadway or sidewalk. The primary function of the guardrail is safety, to keep errant vehicles from driving off the edge of the road and to guard and guide the movement of pedestrian traffic. The guardrail must also smoothly redirect the vehicle in such a manner that the vehicle does not overturn and the guardrail does not fail.

Inspection of proper design and placement of guardrail should be conducted by a licensed engineer. Inspectors should document any obvious safety issues (damaged or silted culverts, vegetation obstructing signs, potholes, etc.) and report them to park engineers for further review. Additional information on guardrail design can be found in *A Policy on Geometric*

Design of Highways and Streets published by the American Association of State Highway and Transportation Officials (AASHTO) and state roadside design guides.

The following checks should be made in addition to the [Fence/Gate](#) checks (see page 6):

1. Vehicular damage:

- Railing out of alignment
- Post out of alignment
- Railing shattered or damaged
- Post shattered or damaged member
- Member out of alignment, shattered member or major damage to member



Figure 4. Guardrail and Posts Out of Alignment

2. Reflective devices:

- Missing or damaged reflective surfaces
- Reflector misalignment that might impact visibility
- Peeling or flaking of thermoplastic marking.

Exhibit/Sculpture

This section contains guidance on sculptures, plaques and headstones/markers that may be located on MLs. Sculptures and monuments and memorials share a number of similar features. Sculptures as features on a ML are treated as single assets. For further information on inspection of monuments and memorials, see “Inspection Guidance – Monuments and Memorials.”

Sculpture

Sculptures commonly associated with a ML are typically made of stone, metal or glass.

Checks to be made:

1. Stone sculpture (granite, marble, limestone, concrete, brick and tile):

- Deteriorated surface
- Cracking
- Missing pieces of sculpture
- Evidence of moisture intrusion
- Spalling or broken areas
- Exposed reinforcing



Figure 5. Scratches and Graffiti on Metal Sculpture

- Out of plumb
- Eroded or sandy mortar joints
- Mortar cracking
- Soft or spalling surfaces
- Scratched surfaces
- Vegetation/root uplifting
- Graffiti/vandalism

2. Metal sculpture (bronze, aluminum, steel, cast/wrought iron):

- Deteriorated surface
- Cracking
- Evidence of moisture intrusion
- Rust/tarnish/corrosion
- Exposed reinforcing
- Out of plumb
- Scratched surfaces
- Vegetation/root uplifting
- Graffiti/vandalism

3. Glass sculpture:

- Broken or missing panes of glass
- Scratched surfaces
- Vegetation/root uplifting.

Plaques

A plaque is an ornamental tablet, typically of metal, porcelain or wood, which is affixed or adjacent to a sculpture. Plaques often provide descriptive information commemorating a person or event.

Checks to be made (in addition to those above for Sculpture):

- Loose or missing plaques
- Improper attachment.

Headstones/Markers

A headstone is a slab of stone set up at the head of a grave, typically inscribed with the name of the deceased.

Markers are also used to denote the resting place of the deceased but may or may not be inscribed. Headstones and markers require regular inspection and maintenance, as stones may become overgrown with vegetation, settle or even fall.

Checks to be made:

- Deteriorated surface



Figure 6. Cracked Headstone

- Cracking
- Missing pieces
- Evidence of moisture intrusion
- Spalling or broken areas
- Exposed reinforcing
- Out of plumb
- Eroded or sandy mortar joints
- Mortar cracking
- Soft or spalling surfaces
- Scratched surfaces
- Vegetation/root uplifting.

Furnishing

Exterior Furnishing

There are many different types of exterior landscape furnishings, such as pads, benches, fire rings, food lockers and picnic tables. This is a broad category encompassing most built and moveable features on a ML. Other categories, such as other exterior furnishings and miscellaneous structures, are used mainly for other asset types. Additionally if parks have an earthworks, ruins or archeological site as a feature of a ML, the park manager should consult “Inspection Guidance – Maintained Archaeological Sites.” Some common examples of exterior furnishings and checks to be made are listed below.

Checks to be made:

1. Exterior furnishings—general:

- Vandalized and/or presence of graffiti
- Components missing/damaged/broken
- Potential safety hazard
- Loose/in danger of falling
- Deteriorated/decayed surfaces
- Mortar failing
- Excessive vegetation/weight
- Erosion of ground surface around base
- Blistering/peeling/bare surfaces
- Out of plumb, uplifted or settled

2. Wooden exterior furnishings:

- Damaged or missing wood—splits, cracking or broken
- Rot, fungus or decay—moist stained area; discolored, soft or crushed area
- Insect/pest damage—holes, surface sag and/or frass observed; large holes, surface channels, punctures and/or crushing
- Connections—loose wood, broken, split or damaged wood at connection site

3. Pads:

- Damaged/deteriorated surface

- Cracking
- Missing components
- Evidence of moisture intrusion
- Spalling or broken areas
- Exposed reinforcing
- Vandalized and/or presence of graffiti
- Out of plumb, uplifted or settled
- Undermined/eroded

4. Benches—wood (log, lumber):

- Structural soundness of seating surface (weld and metal framework, backrest, base)
- Gouges, wood splinters and protruding fasteners (bolts and spikes) on seating surface and backrest (if applicable)
- Loose/rusted nails and fasteners
- Loose bases (asphalt, concrete or earth)
- Corroded or loose bolted areas
- Fading/peeling of painted surfaces
- Erosion around base
- Missing/damaged component
- Vandalized and/or presence of graffiti
- Insect/pest damage—holes, surface sag and/or frass observed; large holes, surface channels, punctures and/or crushing

5. Benches—granite/stone:

- Structural soundness of seating surface (backrest and base)
- Spalling chipping of surface
- Excessively damp surfaces
- Missing/damaged metal plate
- Vandalized and/or presence of graffiti
- Erosion around base

6. Fire rings:

- Corrosion of grate or fire ring:
 - o Surface corrosion (no pitting evident)
 - o Corrosion evidenced by pitting or blistering
 - o Rust/corrosion evidenced loss of base metal
- Broken/damaged grate or fire ring
- Missing stones (if a stone fire ring)

7. Food lockers:

- Rusted, broken
- Missing/damaged components
- Vandalized and/or presence of graffiti

8. Picnic tables:



Figure 7. Picnic Table with Deteriorated Wood Surface

- Structural soundness of frame, table surface, seating surface, backrest (if applicable) and base
- Gouges, wood splinters and protruding fasteners (bolts and spikes) on table surface, seating surface and backrest (if applicable)
- Melted or damaged surfaces

9. Chair:

- Missing/displaced
- Excessive paint layer buildup

10. Flag pole:

- Foundation movement indicated by changes in gradient of top tier
- Vandalized and/or presence of graffiti
- Damaged, rotted pole
- Peeling paint
- Deteriorated base
- Deteriorated hardware
- Cracks (horizontal, vertical, diagonal, hairline or major)
- Soil/debris buildup
- Eroding/missing layer of soil underneath base



Figure 8. Partially Missing Tree Grate

11. Grill:

- Rusted, broken
- Missing/displaced
- Potential safety hazard
- Erosion around base or cracked
- Vandalized and/or presence of graffiti

12. Bike rack:

- Rusted, broken
- Missing/displaced
- Vandalized and/or presence of graffiti.

13. Planting grate:

- Grate damaged, sunken or missing.

Recreational Equipment

Recreational equipment primarily includes playground equipment or equipment used for sporting or fitness activities.

Checks to be made:

1. General:

- Improper surfacing (depth and material)
- Broken or rusted equipment or fencing material
- Torn nets
- Loose fill surfaces (sand, pea gravel, wood products, rubber products)

- Protruding bolts
- Vandalized and/or presence of graffiti
- Erosion around base or cracked
- Loose/missing edging
- Missing parts or components
- Loose or unstable
- Potential safety hazard
- Blistering/peeling/bare surfaces
- Inadequate clearing around individual units

2. Wood:

- Rough surface, corrugated with cracks or seriously deteriorated
- Vibration in deck when users pass
- Member out of alignment; shattered or injured timber member
- Decayed or rotting wood
- Loose or broken fasteners
- Insect/pest damage—holes, surface sag and/or frass observed; large holes, surface channels, punctures and/or crushing
- Deck planks missing or hole in deck.

Refuse Container

Refuse containers may be used for waste or recycling and contain an animal proof or standard lid.

Checks to be made:

- Rusted or rotting components
- Broken or damaged containers
- Missing/damaged components/lids
- Rusted or corroded
- Vandalized and/or presence of graffiti.

Liquid and Gas/Plumbing

Fixture

A fixture is related to a plumbing system that is associated with the ML (e.g., drinking fountain).

Drinking Fountain

Drinking fountains associated with MLs are generally stand-alone devices located outside but in proximity to a building or developed area.

Checks to be made:

- Leaking fixtures
- Weak or non-existent water flow

- Non-functioning valves/buttons
- Corroded/clogged nozzle
- Clogged/non-functioning drainage
- Tainted water
- Vandalized and/or presence of graffiti
- Broken components
- Leaning or out of plumb.

Irrigation System

An irrigation system enables artificial application of water to the land or soil. Irrigation systems for MLs include backflow preventers, valves, pumps, pipe, sprinkler heads and tanks.

Checks to be made:

1. Backflow preventer:

- Test on an annual basis for public health requirements
- Check valves are functioning

2. Valves:

- Leaking valve packing glands/gaskets
- Broken/missing valve handle
- Bent valve stem
- Cracked valve body
- Corrosion

3. Pumps:

- Physical damage
- Cracked or damaged pump housing
- Broken pump base
- Excessive pump noise and vibration
- Loose, broken or missing pump assembly/mounting bolts
- Leakage
- Deterioration of protective covering/corrosion
- Problems priming or engaging pump
- Pest problems

4. Pump base and coupling:

- Loose, broken or missing pump/motor assembly/mounting bolts
- Loose/missing set screws
- Defective coupling
- Loose/missing coupling guard
- Deterioration of protective covering/corrosion
- Abandoned pump assemblies that require disposal

5. Pump controls:

- Electrical arcing noise

- Damage to control panel
- Burned out pilot lamps
- Access to panel blocked
- Deterioration of protective covering/corrosion
- Pressure gauges malfunction

6. Pipe:

- Bent/cracked pipes
- Signs of leakage
- Loose supports/hangers and/or broken/missing supports/hangers
- Loose, damaged, deteriorated and/or missing insulation
- Galvanic anode cathode protection system for reduction in thickness and/or loose fasteners or broken welds
- Corrosion, pitting, blistering and/or loss of base metal
- Impressed current cathode protection system
- Not functioning due to plugging/clogging

7. Sprinkler heads:

- Damaged or broken head (observe spray patterns while functioning)

8. Tanks:

- Leakage
- Vandalized and/or presence of graffiti
- Corrosion of metal tanks
- Wear on fiberglass tanks.

Marking

Sign

Signs are displayed to convey information. Signs differ in purpose and size, and signs may be made of acrylic, aluminum, concrete, fiberglass embedment, fiberglass, glass, high-pressure laminate, laminate, masonry/stone, metal, plastic, recycled plastic, steel, timber and wood.

Checks to be made:

1. Signage—general:

- Missing sign resulting in noticeable damage, such as inappropriate social trails or resource damage
- Signs contain incorrect information

2. Kiosk/bulletin boards:

- Warped, rotting or loose shingles on kiosk roof
- Ultraviolet damage to Lexan/Plexiglas case, cracked or checked
- Kiosk/bulletin board contains incorrect information

3. Signage (wood):



Figure 9. Wood Sign with Peeling Paint

- Loose, damaged, illegible or missing sign face
 - o Peeling paint
 - o Physically damaged
- Splits/cracks/broken posts:
 - o Surface fibers separated, less than 25 percent of thickness affected
 - o Surface fibers separated, greater than 25 percent of thickness affected
 - o Physically damaged and broken
- Rot, fungus or decay of posts:
 - o Moist stained area
 - o Discolored, soft or crushed area
- Pest damage of posts:
 - o Holes less than 1/8", surface sag and frass observed
 - o Large holes greater than 1/8", surface channels, punctures and crushing
- Out of level:
 - o Less than or equal to 3" in 4'
 - o More than 3" in 4'
- Out of plumb:
 - o Less than or equal to 3" in 8'
 - o More than 3" in 8'
- Erosion/vegetation:
 - o Soil erosion around posts
 - o Vegetation, trees or shrubs climbing over or obscuring sign

4. Signage (metal):

- Loose, damaged, illegible or missing sign face
- Out of level:
 - o Less than or equal to 3" in 4'
 - o More than 3" in 4'
- Out of plumb:
 - o Less than or equal to 3" in 8'
 - o More than 3" in 8'
- Corrosion of posts:
 - o Surface corrosion, no pitting evident
 - o Corrosion evidenced by pitting or blistering
 - o Rust/corrosion evidenced loss of base metal
- Erosion/vegetation:
 - o Soil erosion around posts
 - o Vegetation, trees or shrubs climbing over or obscuring sign

5. Signage (concrete):

- Loose, damaged, illegible or missing sign face
- Cracking:
 - o Hairline crack
 - o Medium cracks 1/16" wide
 - o Wide cracks more than 1/16" wide
 - o Disintegration of concrete surfaces, with loss of surface exceeding depth of 2"
- Spalling:

- o Less than 1" deep or 6" in diameter
 - o More than 1" in depth or greater than 6" in diameter or loss of more than 10 percent of surface area of a member
 - o Disintegration of surface area with corrosion of exposed reinforcing steel
 - Scaling:
 - o Loss of surface up to 1/2" deep with exposure of coarse aggregates
 - o Loss of surface from 1/2" to 1" deep with coarse aggregates clearly exposed
 - o Loss of surface exceeds 1", reinforcing steel usually exposed
 - Reinforcing steel corrosion: rusting/discoloration evident, cracks occurring parallel to reinforcement
 - Out of level:
 - o Less than or equal to 3" in 4'
 - o More than 3" in 4'
 - Out of plumb:
 - o Less than or equal to 3" in 8'
 - o More than 3" in 8'
 - Erosion/vegetation:
 - o Soil erosion around posts
 - o Vegetation, trees or shrubs climbing over or obscuring sign
6. Signage (masonry/stone):
- Loose, damaged, illegible or missing sign face
 - Deteriorated mortar joint material:
 - o Cracked mortar joint material
 - o Loose/missing mortar joint material
 - Out of level:
 - o Less than or equal to 2" in 8'
 - o More than 2" in 8'
 - Out of plumb:
 - o Less than or equal to 3" in 8'
 - o More than 3" in 8'
 - Damaged bricks, stones or CMU:
 - o Cracked, split, damaged
 - o Loose, missing
 - Erosion/vegetation:
 - o Soil erosion around sign footing
 - o Vegetation, trees or shrubs climbing over or obscuring sign.

Structure

Deck Structure

Deck structures include any type of outdoor platform associated with a ML.

Platforms

Typical platforms associated with MLs include minor campground amphitheater stages and observation decks. A platform can be used for observation or presentation and may consist of asphalt, concrete, earth, masonry/stone, metal, stone or wood.

Checks to be made:

- Structural soundness of stage support
- Missing stones or pavers
- Vandalism/graffiti
- Loose footings
- Warping/distorting of stage flooring
- Loose/rusted nails and fasteners
- Deteriorated surface
- Cracking
- Evidence of moisture intrusion
- Spalling or broken areas
- Exposed reinforcing
- Out of plumb
- Eroded or sandy mortar joints
- Mortar cracking
- Soft or spalling surfaces
- Scratched surfaces.



Figure 10. Stone Retaining Wall with Joint Cracking

Wall

Retaining Walls

The kinds of walls included in this section for the ML asset type are retaining and crib (walls present on MLs that enclose a boundary or landscape). Retaining walls are structures used to prevent the flow or lateral movement of soil. Retaining walls are typically constructed of rock, concrete, brick, wood or a combination of these materials. The checks are similar for each type.



Figure 11. Retaining Wall with Stones Missing

Checks to be made:

1. Masonry or stone retaining walls:

- Stains, wet spots, bulges, spalling, efflorescence and missing brick
- Foundation movement indicated by changes in gradient of top tier
 - Eroding/missing layer of soil underneath foundation (footing)

- o Overhanging or loose rocks in foundation (footing)
 - Slipping joints/poor contact between rock on wall
 - Loose or missing rocks on wall
 - Missing fill between rocks on wall
 - Loose or missing cap stones
 - Loose or missing chinking on wall
 - Collapsing, leaning or bulging of wall
 - Cracks (horizontal, vertical, diagonal, hairline or major)
 - Vegetation causing damage (paint peeling, joint deterioration, roots causing damage, plants holding water against structure)
 - Insect/termite infestation and decay on wood members
 - Mechanical/chemical damage
 - Improper or clogged drains or weep holes
 - Poor drainage away from wall
 - Soil/debris buildup
 - Walls that have become separated from their peer
 - Vandalized and/or presence of graffiti
2. Pinned rock retaining walls:
- Loose or damaged pins
 - Exposed (hazardous) pins
3. Log retaining walls (cribbing):
- Foundation movement indicated by changes in gradient of top tier
 - Eroding/missing layer of soil underneath foundation (footing)
 - Loose or deteriorating logs on wall
 - Loose or missing chinking on wall
4. Switchback corners:
- Signs of switchback cutting and erosion
 - Check for roots/brush
 - Waterbar blocked causing drainage to flow through switchback corner (ice buildup)
 - Check for debris; sediment should be distributed over trail under the drainage or added to backfill
 - Check if soil is too compacted/rocky.



Figure 12. Brick Wall with Spalling

Walkable Structure

Decks and Patios

This section contains guidance on decks and patios that may be located on MLs. All bridges (small foot bridges) located on MLs should be captured with the trail or road with which they are typically associated.

Checks to be made:

1. Timber deck:

- Weathering and wear:
 - Surface of wood is rough and corrugated, and member may be warped
 - Surface of wood is rough and corrugated with cracks partially through the wood member, may have minor section loss to the top surface
 - Warped members
 - Large cracks extend deeply or completely through the wood
 - Wood is crumbly and seriously deteriorated
- Vibration per span:
 - Slight vibration in deck when users pass
 - Noticeable vibration in deck when users pass
 - Excessive vibration in deck when users pass
- Collision damage: member out of alignment; shattered or injured timber member
- Decay (decay from rot/fungus is most likely to occur at connections, splices, support points or around bolt holes—this may be due either to the tendency of such areas to collect and retain moisture or to bolt holes or cuts being made in the surface after the preservative treatment has been applied)
 - Moist and stained or discolored area with signs of fungi although surface is solid
 - Surface spongy, and member may show signs of crushing
 - Brown and white discolored area, and member may show section loss and crushing
- Connections:
 - Loose fasteners
 - Member broken, split or damaged
 - Missing fasteners or anchorage
- Parasites (termites, carpenter ants, powder post beetles):
 - Pinholes with dark stain area around the holes
 - Holes, surface sag and sawdust observed
 - Surface channels and crushing of the member
- Deck missing, hole in deck

2. Timber railing and post:

- Weathering:
 - Surface of wood is rough and corrugated, and member may be warped
 - Surface of wood is rough and corrugated with cracks partially through the wood member, may have minor section loss
 - Warped member
 - Large cracks extend deeply or completely through the wood
 - Wood is crumbly and seriously deteriorated
- Decay (decay from rot/fungus is most likely to occur at connections, splices, support points or around bolt holes—this may be due either to the tendency of such areas to collect and retain moisture or to bolt holes or cuts being made in the surface after the preservative treatment has been applied):

- o Moist and stained or discolored area with signs of fungi although surface is solid
 - o Surface spongy, and member may show signs of crushing
 - o Brown and white discolored area, and member may show section loss and crushing
- Pest (termites, carpenter ants, powder post beetles):
 - o Pinholes with dark stain area around the holes
 - o Holes, surface sag and sawdust observed
 - o Surface channels and crushing of the member
- Post connections:
 - o Loose fasteners, protruding fasteners
 - o Broken, split or damaged
 - o Missing fasteners or anchorage
- Corrosion at post anchors:
 - o Surface rust, no pitting evident
 - o Corrosion evident, pitting and blistering of base material
 - o Corrosion evident with loss to base section
- Collision damage:
 - o Railing out of alignment
 - o Post out of alignment
 - o Railing shattered or damaged
 - o Post shattered or damaged member
- Vertical joint displacement due to substructure or bearing settlement
- Horizontal joint misalignment due to substructure or bearing settlement.

Generic Structure

Generic structures commonly found on MLs include trellises, arbors, pergolas, gazebos, colonnades and arches.

Checks to be made:

- Vandalized/graffiti
- Deteriorated/damaged supports
- Out of plumb
- Components missing/damaged/broken
- Potential safety hazard
- Loose/in danger of falling
- Deteriorated/decayed surfaces
- Mortar falling
- Excessive vegetation/weight.

Structure/Access

Stairs

Stairs in MLs would typically be associated with a cultural landscape or campground, among other uses.

Checks to be made:

1. Iron rungs:

- Loose rungs
- Corroded or cracked rungs
- Missing rungs

2. Log:

- Loose or missing steps
- Strength/sturdiness of ladder
- Visible signs of decay

3. Logs pinned to rock:

- Loose or missing logs
- Strength/sturdiness of logs
- Corroded pins/loose pins
- Visible signs of decay

4. Rocks pinned to ledge:

- Water has damaged edges of steps
- Corroded pins
- Loose or missing steps

5. Treated timber:

- Water has damaged edges of steps
- Loose or missing steps
- Strength/sturdiness of steps
- Visible signs of decay

6. Steps—stone:

- Continuous stone steps installed where grade exceeds 10 percent in order to prevent erosion
- No steps are present where there should be
- Water damage has dislodged steps or made them not level or loose
- Steps are too small and likely to be dislodged
- Steps are not keyed with rock
- Steps are too high (>10" high)
- Stones are separated where they are intended to be congruous.

7. Steps—concrete:

- Stains, wet spots, bulges, spalling, efflorescence or missing concrete
- Foundation movement indicated by changes in gradient of top tier
- Eroding/missing layer of soil underneath footing
- Deterioration of footing

- Deterioration of risers or treads
- Slipping joints/cracks
- Collapsing of steps
- Rotation of risers or treads
- Erosion problems
- Vandalized and/or presence of graffiti.

Structure/Base & Foundation

Base and Sub-Base

Base and sub-base are the compacted and prepared gravel, soil, or geosynthetic layers that are placed prior to the installation of the final surface. Geosynthetics (e.g., geotextile, geonets, sheet drains, geogrids, geocells) are plastic or non-woven fabrics, sheets, nets, grids or honeycomb-like mats usually made of polypropylene or polyethylene that can help stabilize the treadway. Inspection of base and sub-base applies primarily to unpaved, graded paths with non-native surfaces (e.g., off-road bicycle trails).

Checks to be made:

1. Exposed and/or worn out geosynthetic layer
2. Shoulders:
 - High shoulders (secondary ditches)
3. Standing water:
 - Standing water on the surface that seeps into the subgrade, causing a general softening of the entire path
4. Rutting:
 - Longitudinal depressions in the paths caused by high moisture content in the subsurface soil or base, inadequate surface course thickness or heavy traffic loads
5. Depressions:
 - Localized low areas one or more inches below the surrounding tread surfaces caused by settlement, excessive moisture content or improper drainage.

Surface

Land Surface

Land surfaces could include recreational surfaces, boat ramps, mulch or tent pads.

Recreational Surface

A recreational surface is a surface used for recreational purposes. It may be either paved or unpaved.

Checks to be made:

1. Paved surfaces—concrete (poured, pavers/paving stones, blocks, etc.):
 - Cracked, pitted, damaged

- Spalling
 - Potholes (or patches)
 - Surface materials depleted or missing
 - Erosion problems
 - Uneven, uplifted, sunken—hazardous
 - Vandalized and/or presence of graffiti
 - Joint material missing or pulled out
2. Unpaved surfaces—compacted surfaces (gravel, stone, mulch, etc.):
- Inadequate drainage
 - Erosion problems
 - Surface material depleted or missing
 - Uneven, uplifted, sunken—hazardous
 - Exposed base material
 - Damaged/missing, uplifted, sharp or settled edging
 - Accumulation of debris.



Figure 13. Plant Bed with Soil Compaction

Plant or Vegetation

This includes vegetation, such as plants, trees or shrubs, which are placed or grown on a structure or defined area.

Landscape Vegetation Features

Landscape vegetation may require different levels of inspection. Individual trees and shrubs may be important and need to be inspected separately, or it may be more important to look at groupings of trees or shrubs. Individual plants may contribute to a larger landscape feature that should be inspected as a system. For example, a large elm tree may have historic value and be an important specimen tree on the property and require its own inspection. An orchard, on the other hand, may require inspection of individual trees and the planting of the orchard as a whole. The checks for the orchard, or groupings of fruit trees, will be different than the checks for an individual fruit tree. For example, individual tree inspections would look for dead limbs, whereas an assessment of a whole orchard would inspect for any trees missing from a planted row. If the conclusion is made that further inspection or testing is required, the note should be made as such.

Keep in mind that because vegetation is a living organism, the time of year in which the inspection is conducted is important. It is recommended that parks conduct their inventory assessments at the best time of year for the species of vegetation in the park. For example, in certain climates, if parks inspect cool weather grass in August, the grass will appear to be



Figure 14. Eroded Trail Tread



Figure 15. Elk Damage to Historic Apple Tree

stress/wilted (as is expected). If parks were to inspect cool weather grass during spring/fall, however, the grass would be in a better state to judge its overall condition. The opposite inspection cycle would apply to warm weather grass, however.

The following checks to be made apply to all landscape vegetation features as follows and range from simple plantings to more complex plant features/groupings.

Checks to be made:

1. Soil:

- Compacted
- Fertility/pH/moisture improper
- Texture/structure poor
- Erosion or buildup
- Presence of holes, burrows, ruts or depressions
- Further inspection/testing required
- Inadequate mulching or fertilization



Figure 16. Girdled Tree Roots

2. Vegetation:

- Plant health/vigor problems
- Flowers/fruit problems (insect, disease or pest damage)
- Trunk/root problems/defects (cavities, gouges, excessive leaning, cracks, areas of bark peeling/missing, mechanical damage, root rot, girdling or exposed roots, materials embedding, etc.)
- Plant growth excessive/irregular
- Foliage problems (insect damage/disease, chlorotic, wilting, etc.)
- Branch/limb problems (cavities, hanging, cracked, dead, broken, hazard/safety issues, etc.)
- Inappropriate size and shape (in the context of cultural and historical significance)
- Inappropriate pruning (dead stubs of limbs left behind, bad cuts)
- Weed/exotic species problems
- Density problems/plant mortality
- Overgrown with vegetation
- Inadequate mulching
- Damaged/improperly installed/removed components (tree staking, guy wires, cable and bracing, lightning protection)
- Vandalized
- ID tag missing/damaged
- Damaged/missing, uplifted, sharp or settled edging.



Figure 17. Hanging Deadwood in Tree

Traffic Surface

Traffic surface is the durable surface material laid down on an area that is intended to provide the capability of moving vehicular or pedestrian traffic.

Paved and Unpaved Surfaces – Tread

Tread is material that is placed atop the base layer to provide the walking, riding or driving surface. Options include asphalt, concrete, gravel, native, paver block (cobble or other block stone), riprap (native rocks embedded in the ground), wood chips or other materials (if other materials are used, these should be described in the inspection documentation).

Native and gravel surfaces must be checked for gullies, silting, mounding, displaced soils, sloughing and muddy or washed-out areas. Gullies should be repaired to prevent continued erosion and wash-outs. Gullies are natural ditches created by water rapidly eroding a section (or the entire width) of a ML. Gullies may be converted into inside (uphill) drainage channels.

Slough is soil, rock and silt that have accumulated on the inside of the tread at the base of the backslope, narrowing the width of the tread. Slough, muddy areas and washed-out sections force users to move upslope or downslope of the original tread and should be remedied.

Checks to be made:

1. Paved surfaces:

- Alligator cracking: a series of interconnecting cracks resembling alligator skin or chicken wire, which usually occur in the wheel path
- Longitudinal cracking: cracks that are parallel to the pavement centerline or asphalt lay down direction
- Transverse cracking: cracks perpendicular to the pavement centerline
- Potholes (or patches): bowl-shaped hole in the pavement surface
- Rutting: surface depressions in the wheel paths
- Eroded surface
- Deteriorated striping

2. Unpaved surfaces:

- Minor surface hazards (exposed roots and loose rocks)
- Gullies
- Poor drainage, bogs and mud holes
- Sloughing
- Washed-out/eroded trail sections(from heavy use or improper drainage)



Figure 18. Cracked and Deteriorated Walkway

- Braids or social paths: multiple parallel trails caused by users avoiding obstacles described above
- Width either too narrow or too wide.

Trailer Pad

A trailer pad is the structure or surface on which a trailer is placed.

Checks to be made:

- Damaged/deteriorated surface/edging
- Cracking
- Missing components (e.g., bumper stop)
- Evidence of moisture intrusion
- Spalling or broken areas
- Exposed reinforcing
- Vandalized and/or presence of graffiti
- Out of plumb, uplifted or settled
- Undermined/eroded.

Turfgrass/Pasture Crop

Turfgrass/pasture crop is a section of land or turf used for growing grass or crops.

Checks to be made:

- Turf thin/spotty/poorly established
- Mowing damage/improper
- Inadequate drainage/excessive water
- Turf species improper
- Thatch layer excessive
- Turf wilted/stressed
- Presence of holes, burrows, ruts or depressions
- Edge poorly defined
- Debris/organic matter on surfaces
- Insect/disease/pest problems
- Vandalized
- Irrigation (see [Irrigation System](#) on page 18)
- Weed/exotic species problems.

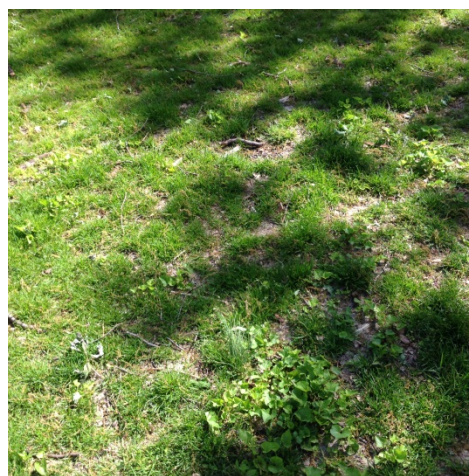


Figure 19. Thin, Poorly Established Turf



Figure 20. Ponding/Poor Drainage

Water Control

Culvert

This includes construction and installation of culverts for storm water systems. Culverts are a type of drainage structure that allows the passage of water over, under or through MLs. Such structures include open culverts (either rock or wood) and closed culverts (metal, rock or wood).

Checks to be made:

1. Open culvert (wood):

- No culvert structure where one is needed
- Overhanging or loose wood or logs in footing
- Deterioration or decay of material
- Loose or missing material

2. Closed culvert (rock):

- No culvert structure where one is needed
- Overhanging or loose rocks in footing
- Slipping joints/poor contact between rock on drywall
- Loose or missing rocks on drywall and spanning rock(s)

3. All metal and concrete culverts:

- No culvert structure where one is needed
- Check for inadequate armoring of entrance and exit
- Check for shallow gradient or culvert filled with silt
- Check cover on culvert—see if culvert is being crushed or punctured
- Erosion or scouring: voids, undermining of structure
- Joints and connections to anti-seep collars should be completely watertight
- Check for signs of physical damage, corrosion, abrasions or dents
- Check for loss of protective coatings
- Check for damaged connections and missing or damaged fasteners

4. Concrete culverts:

- No culvert structure where one is needed
- Erosion or scouring: voids, undermining of structure
- Check for concrete deficiencies

5. Steel culverts:

- No culvert structure where one is needed
- Erosion or scouring: voids, undermining of structure
- Check for signs of corrosion
- Check for broken welds.

Drain

A drain is a structure that typically provides a gravity exit point or directs the movement of storm water or water that is to be re-circulated.

Waterbars and Retainer Bars

Drainage structures that channel water along and off trails, such as waterbars, checks (retainer bars or steps), dip drains (swales) and drainage ditches, should be inspected and assessed using the guidelines found in the document entitled “Inspection Guidance – Trails”.

Drainage systems channel water over or below the landscape area. Stepping stones allow water to pond or flow naturally across the landscape area while allowing users to cross the water.

Checks to be made:

- Loose, missing or overhanging rocks (in crossing, footing, etc.)
- Slipping joints/poor contact between rocks
- Uplifted or sunken
- Loose riprap
- Uneven, uplifted, sunken—hazardous.

Resources

Name	Work Group/Company Name	E mail Address	Date Added
Susan Dolan	Program Manager, Park Cultural Landscapes Program	Susan_Dolan@nps.gov	7/24/2013
Kathleen Fitzgerald	Historical Landscape Architect, Olmsted Center for Landscape Preservation	Kathleen_Fitzgerald@nps.gov	7/24/2013
Linda Hamilton	Facility Management Systems Specialist, Harpers Ferry National Historical Park	Linda_Hamilton@nps.gov	7/24/2013
Stephanie Nelson	Cultural Landscapes Asset Preservation Coordinator	Stephanie_Nelson@nps.gov	5/20/2014
Charlie Pepper	Manager, Cultural Landscape Preservation Maintenance and Education, Olmsted Center for Landscape Preservation	Charlie_Pepper@nps.gov	7/24/2013

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References

The following is a list of suggested references that parks may wish to use in developing their own ML standards:

- A Policy on Geometric Design of Highways and Streets – AASHTO
- Cultural Landscape Inventory (one for each park cultural landscape)
- [Park Cultural Landscapes Program website](#).

Related Documents

The following documents provide additional information on the asset category discussed in this IG:

- Maintained Landscapes Asset Business Practice
- Maintained Landscapes Asset Best Management Practice
- Critical Systems List
- Life-Cycle Estimates.

Appendix A Inspection Guidance Change Log

Inspection Guidance Title:	Maintained Landscapes (3100) Asset Inspection Guidance
Responsible Group:	Comprehensive Asset Strategic Tools (CASTL) Development Group
Title of Inspection Guidance Origin White Paper:	N/A
Last Change Made On:	January 25, 2017

#	Page #	Change Description	Reason for Change	Requested By	Requested On	Change Made On	Approved By	Approved On
2.0	N/A	Initial Release	Initial Release	N/A	N/A	N/A	Mike Seibert	6/2/2014
2.1	3	Mark Plant or Vegetation as a Critical System	Correction	Leah Edwards	1/19/2017	1/25/2017	Mike Seibert	1/25/2017