THE CITY OF
COLUMBUS
ANDREW J. GINTHER, MAYOR

DEPARTMENT OF
PUBLIC UTILITIES

LAND STEWARDSHIP
DESIGN STANDARDS



August 2021

The design standards are available online at www.columbus.gov/watershed.
For further information or questions, please call 614-645-1721.

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Abbreviations

ACQ	Alkaline Copper Quaternary
FRP	Fiberglass-Reinforced Plastic
GFCI	Ground-Fault Circuit Interrupter
HHEI	Primary Headwater Habitat Evaluation Index
ISA	International Society of Arboriculture
NGVD	National Geodetic Vertical Datum
NRCS	Natural Resources Conservation Service
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
ORAM	Ohio Rapid Assessment Method
OSHA	Occupational Safety and Health Administration
psf	pounds per square foot
TRM	Turf Reinforcement Mat
USACE	United States Army Corps of Engineers
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
QHEI	Qualitative Habitat Evaluation Index

Glossary

Average Low Water Elevation – the 10th percentile of the historical average low water elevation based on data collected by the City (2000-2017). Listed below for each reservoir (National Geodetic Vertical Datum [NGVD] 1929):

- Hoover Reservoir: 884.2’
- Griggs Reservoir: 756.0’
- O’Shaughnessy Reservoir: 847.9’

Bank – the rising ground immediately bordering a body of water.

Basal Diameter – the diameter of a Tree or Woody Vegetation at ground level.

Best Management Practice (BMP) – methods that have been determined to be the most effective and practical means of preventing or reducing non-point source pollution to help achieve water quality goals.

Boardwalk – an elevated footpath or walkway built to cross Wetlands providing minimal interference to natural hydrology, where the entire structure is supported by posts or screw piles driven into the bottom of the Wetland.

Contiguous Landowner – a landowner who owns property that shares a border with city property located directly adjacent to Hoover, Griggs, or O’Shaughnessy Reservoirs or their direct tributary

Streams.

Contiguous Property – privately owned property that shares a border with city property located directly adjacent to Hoover, Griggs, or O'Shaughnessy Reservoirs or their direct tributary Streams.

Deadweight Freeboard – the distance between the water surface and the top of the dock decking with no Live Load (i.e., supporting the weight of only the dock structure itself).

Drive-on Dock – a Floating Dock that allows a vessel to be driven onto the dock directly from the water.

Embankment Stabilization – the use of vegetation, land management practices, or engineered structures to maintain the stability of the shoreline from future erosion.

Emergent Vegetation – plants rooted in underwater sediment whose leaves and stems extend out of the water.

Encroachment – any unauthorized activity or unauthorized building, structure, or personal property that extends beyond the property line of a Contiguous Property onto city owned or controlled property.

Filtered View Corridor – gaps in vegetation that provide a view; created through Invasive and Noxious Species removal and selected pruning, limbing, or removal of vegetation on city property.

Finger Dock – a secondary dock extension from the Header Dock.

Floating Dock – a dock which, rather than having supports driven into the reservoir substrate, is anchored to the land on one end and suspended in the water, rising and falling with the water levels.

Freeboard – the distance between the water surface and the top of the dock decking.

Gangway – the section of the dock that connects the floating portion of the dock to the shore.

Hazardous Tree – as defined by the United States Forest Service (USFS), dead Trees, diseased or dying Trees, dead parts of live Trees, or unstable live Trees that are within striking distance of people or property and have the potential to cause property damage or personal injury in the event of failure.

Header Dock – the primary structure of a Floating Dock to which other dock sections or a Gangway are attached.

Herbaceous Vegetation – vascular plants without significant woody tissue above or at the ground. Refer to the City of Columbus Watershed Management website for lists of Herbaceous Vegetation species native to each reservoir.

"I" Dock – a Private Dock extending from shore in a straight line, generally perpendicular to the shoreline, with no sections attached to the Header Dock.

Invasive Species – plant species that are, as defined by the National Invasive Species Council, both non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm, or harm to human health. Refer to the City of Columbus Watershed Management website for lists of Invasive Species that are actively managed for control or removal.

“L” Dock – a Private Dock shaped like a “L”, with one side being the Header Dock, and the other side a Finger Dock, that can be placed in several positions according to need or preference.

Land Stewardship Agreement – a license agreement between the City and the eligible Contiguous Landowner that allows certain stewardship activities and may include authorization to establish and maintain an Overland Path, Filtered View Corridor, Private Dock, and/or Embankment Stabilization. The license agreement will include a Land Stewardship Design Plan that is site-specific and details the extent and location of the authorized access to the reservoir property.

Land Stewardship Application – an application, submitted by eligible Contiguous Landowners to the City, requesting a Land Stewardship Agreement or stewardship activity based upon the site-specific eligibility.

Land Stewardship Design Plan – a document prepared by the City and available online that indicates a specific Contiguous Property’s eligibility for stewardship activities such as an Overland Path, Invasive and Noxious Species removal, Filtered View Corridor, Private Dock, and/or Embankment Stabilization.

Land Stewardship Design Standards – the criteria by which the City will uniformly administer the Land Stewardship Program elements such as an Overland Path, Invasive and Noxious Species removal, Filtered View Corridor, Private Dock, and/or Embankment Stabilization.

Land Stewardship Program – a program administered by the City of Columbus, Department of Public Utilities, Division of Water, Watershed Management Section that, through a license agreement, allows eligible Contiguous Landowners to legally access the City’s reservoir property for the purposes of establishing and maintaining an Overland Path, removal of Invasive and Noxious Species, establishing a Filtered View Corridor, installation and use of a Private Dock, and/or installation of an Embankment Stabilization.

Live Load – all the forces that are variable within a structure’s normal operation cycle, such as occupancy by people and associated gear, but not including construction or environmental loads.

Live Load Freeboard – the distance between the water surface and the top of the dock decking with a given Live Load.

Native Vegetation – as defined by the Natural Resources Conservation Service (NRCS), a plant that is a part of the balance of nature that has developed over hundreds or thousands of years in a particular region or ecosystem. Refer to the City of Columbus Watershed Management website for lists of plant species native to each reservoir.

Nature Preserve – a defined natural area or natural community within any City of Columbus park that the Columbus Recreation and Parks Department has formally designated as such.

Normal Pool Elevation – the stage of an artificially impounded water body that prevails for the greater part of the year. Listed below for each reservoir (NGVD 1929):

- Hoover Reservoir: 894.0’
- Griggs Reservoir: 756.2’
- O’Shaughnessy Reservoir: 848.5’

*If naturally occurring conditions on the shoreline show a conclusive and reliable Ordinary High Water Mark that differs from the Normal Pool Elevation listed above, the naturally occurring Ordinary High Water Mark may be used as the Normal Pool Elevation for that parcel in accordance with the terms outlined in the design standards.

Noxious Species – plant species, as defined by the Federal Plant Protection Act, that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products),

livestock, poultry or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public heath, or the environment. Refer to the City of Columbus Watershed Management website for lists of Noxious Species that are actively managed for control or removal.

Ornamental Tree – a native or non-native Tree species or cultivar purposefully planted for its aesthetic appeal.

Overland Path – a designated route across city property that provides a Contiguous Landowner water access.

Paddlecraft – vessels that include canoes, kayaks, paddleboards, and other similar watercraft approved by the City. Pedal boats, jon boats, and row boats are not included within this definition.

Platform Dock – a dock that is attached to shore by a Gangway, generally of a square or rectangular shape (although it may take different shapes), which can moor multiple vessels from respective sides.

Private Dock – a floating structure or platform designed to provide water access or an area to secure watercraft, and belonging to a Contiguous Landowner.

Potential Wetland – an area identified during preliminary surveys or an onsite field assessment as a having the potential to be designated as a Wetland, but not having had a recent formal Wetland and Waterbody Delineation.

Puncheon – a slightly elevated footpath or walkway built to cross Wetlands, in which sawed, treated lumber or native logs are laid directly on the ground to elevate the trail tread.

Riprap – the placement of rocks or other similar materials engineered and installed to armor a shoreline to prevent or reduce Shoreline Erosion.

Seasonal Dock Structure – a dock removed from the reservoir and stored on land during the colder months when docks are not in use.

Shoreline Buffer – a vegetated zone along a reservoir or Stream shoreline that serves to enhance and protect water quality, stabilize shoreline soils, mitigate flood flows, and provide habitat for fish and wildlife.

Shoreline Erosion – the gradual or rapid removal of sediments from a shoreline, caused by factors including storms, wave action, rain, ice, winds, overland runoff, and loss of Trees and other vegetation.

Shrub – species of Woody Vegetation that, at maturity, typically do not reach a height of 20 feet. Refer to the City of Columbus Watershed Management website for lists of Shrub species native to each reservoir.

Spuds – metal posts, no wider than four inches in diameter, inside a sleeve attached to the dock that stabilize the dock by use of friction against the riverbed and not by being driven, drilled, augured or pushed into the riverbed.

Stairs/Stairway – risers and treads supported by a continuous panel called a stringer, as well as any connected landings and platforms.

Stepping Stones – large stones embedded in soil or river gravel to form steps along an Overland Path with navigable slopes where Steps and Stairs are not required.

Steps – relatively long treads and short risers, typically installed resting on the ground on a gradual slope.

Stream – a water body which features a bed and bank and has surface water flowing occasionally or year-round. These include water bodies defined as ephemeral, intermittent, and perennial streams by the United States Army Corps of Engineers (USACE).

“T” Dock – a Private Dock consisting of a Header Dock with a Finger Dock attached in the shape of a “T”, or an inverted “T” shape.

Tree – species of Woody Vegetation that typically reach a height of at least 20 feet at maturity. Refer to the City of Columbus Watershed Management website for lists of Tree species native to each reservoir.

“U” Dock – a Private Dock consisting of a Header Dock, usually parallel to the shoreline, with at least two Finger Docks extending from the Header Dock into the shape of a “U”, “F”, “E”, or similar shape.

Vegetation Stratum – a vertical layer of vegetation with a common height range. Commonly defined vegetation strata include forest floor, herbaceous, understory, and canopy.

Vegetation Management – the planting, removal, physical or chemical alteration of existing native or non-native vegetation.

Wetland – as defined by the United States Army Corps of Engineers (USACE), an area that is 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 for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetland and Waterbody Delineation – a determination of Stream locations and Wetland boundaries performed according to the 1987 USACE Wetland Delineation Manual and applicable regional supplements. A Wetland and Waterbody Delineation must be performed by a qualified professional.

Woody Vegetation – a category of plant species producing hard, supportive woody tissue, such as bark, from cellulose and lignin (i.e., Trees and Shrubs).

1.0 INTRODUCTION

PROGRAM HISTORY



In the 1980s, with a growing population and an increasing demand for superior drinking water, the City recognized the need to maintain and protect its reservoirs. Around 1989, the Waterways Task Force was formed and given the responsibility of drafting management plans for each of the City's three reservoirs. The reservoir management plans were completed in 1990 (Hoover), 1991 (O'Shaughnessy), and 1995 (Griggs). In 1994, the Columbus Department of Public Utilities, Division of Water created the Watershed Management Section to oversee implementation of the Waterways Task Force plans, in cooperation with the Columbus Recreation and Parks Department.

The Land Stewardship Program has evolved several times, with changes reflecting Best Management Practices and supporting science. Today, Hoover, Griggs, and O'Shaughnessy Reservoirs are owned and operated by the City of Columbus to provide drinking water to 1.2 million people and include over 4,000 acres of recreational opportunities for residents and visitors throughout central Ohio. The city property surrounding these reservoirs and their direct tributaries is adjacent to approximately 900 Contiguous Landowners. The 2020 Land Stewardship Program Update was initiated to protect the long-term health of the reservoirs, while evaluating and determining the feasibility of access requested by many Contiguous Landowners. The Department of Public Utilities remains committed to maintaining the reservoirs for the primary function of providing a quality drinking water supply while also providing the community with compatible recreational access and opportunities.

COMPREHENSIVE PROGRAM UPDATE

Maintaining a healthy native Shoreline Buffer adjacent to the water protects reservoir health. Vegetated Shoreline Buffers are a widely employed water resource management tool and naturally provide environmental benefits such as protecting water quality, stabilizing shoreline soils, mitigating flood flows, and providing habitat for fish and wildlife.

The Department of Public Utilities, in conjunction with the Recreation and Parks Department, Stantec, CDM Smith, EMH&T, Hartman Engineering, Coldwater Consulting, and RAMA Consulting, has updated the Land Stewardship Program to include design standards and to clarify the program requirements. The design standards describe the conditions and means by which eligible Contiguous Landowners may perform stewardship activities on the reservoir property. The updated design standards were developed based on reviews of scientific literature, recommendations of state and federal agencies, and industry Best Management Practices.

Updates to the Land Stewardship Program have been designed to provide the following:

- A balanced approach for the City to meet water quality needs, maintain public access, and authorize stewardship activities for Contiguous Landowners
- Updated design standards to protect water quality and shoreline health, addressing:
    - Overland Paths (Section 1.1)
    - Steps and Stairs (Section 1.2)

    - Private Docks (Section 1.3)
    - Filtered View Corridors (Section 1.4)
    - Vegetation Management (Section 1.5)
    - Streams and Wetlands (Section 1.6)
    - Nature Preserves (Section 1.7)
    - Embankment Stabilization (Section 1.8)

- Inclusive design criteria to encompass the diversity of geological and ecological characteristics
- A transparent and streamlined program
- Clear guidelines that are applied consistently throughout the three reservoirs

LAND STEWARDSHIP PROGRAM ELIGIBILITY

Private properties eligible for participation in the Land Stewardship Program must be directly contiguous with either (1) City of Columbus property contiguous with Hoover, Griggs, or O'Shaughnessy Reservoirs (including direct tributaries of the reservoirs where city property borders the tributaries) or (2) Hoover, Griggs, or O'Shaughnessy Reservoirs themselves. The following exceptions apply:

- Private properties separated from the reservoir or a direct tributary by city property under land use restrictions
- Private properties separated from the reservoir or a direct tributary by an active city park which has developed direct public access
- Private properties separated from the reservoir or a direct tributary by a public road right-of-way or improved city roadway
- Private properties with an unresolved Encroachment

To inquire about a specific property's eligibility for the Land Stewardship Program, please refer to the City of Columbus Watershed Management website or contact the Watershed Management Section directly.

LAND STEWARDSHIP PROGRAM PARTICIPATION AND PROCESS

Participation in the Land Stewardship Program is a requirement for any eligible Contiguous Landowner who desires to install or maintain a Private Dock or Overland Path, manage vegetation, or otherwise perform work on city property. By participating in the Land Stewardship Program through a Land Stewardship Agreement, the Contiguous Landowner receives permission from the City to perform stewardship activities on city-owned property via a license agreement in accordance with the Land Stewardship Design Standards. Participation in the Land Stewardship Program is optional for those who do not wish to perform any stewardship activities.

As part of the 2020 Land Stewardship Program Update, all Contiguous Properties were individually assessed to determine which elements of the program would be permissible for each property. While most Contiguous Properties are eligible, some limitations or exclusions apply based upon a property's location, environmental conditions, or protection status of the adjacent city property. Current and prospective Contiguous Landowners can inquire about the eligibility for the Land Stewardship Program and view the individual Land Stewardship Design Plan prepared for each Contiguous Property by accessing the City of Columbus Watershed Management website, or by contacting the Watershed Management Office.

Any activity or structure on city property which is not covered by an approved, valid Land Stewardship Agreement will be considered an Encroachment. Encroachments may affect a Contiguous Landowner's Land Stewardship Program eligibility, and may subject the Contiguous Landowner to legal action and/or recovery of damages or costs associated with unauthorized activity or structure.

Prospective applicants should thoroughly review the presented Land Stewardship Design Standards. These standards provide important information to anyone owning or considering the purchase of a Contiguous Property. Additional resources, including the Land Stewardship Application and other

required forms, are available for review through the City of Columbus Watershed Management website or the Watershed Management Office.

Current Contiguous Landowners interested in participating in the Land Stewardship Program are advised to follow the below procedure:

- Verify the eligibility status for a Contiguous Property for participation in the Land Stewardship Program. This can be done by accessing the City of Columbus Watershed Management Website or contacting the Watershed Management Office.
- Review the individual Land Stewardship Design Plan for the Contiguous Property to view its eligibility for stewardship activities such as an Overland Path, Private Dock, or Filtered View Corridor.
- Review the Land Stewardship Design Standards for an understanding of program guidelines and applicable standards.
- Submit a Land Stewardship Application to the Watershed Management Office. If applying for Vegetation Management, Wetland crossing, or Embankment Stabilization, indicate interest on application form and submit the required documentation following a site visit.
- Watershed Management staff will contact the applicant and schedule a site visit.
- If approved, a Land Stewardship Agreement reflecting the revised design plan will be executed and then work will be authorized as outlined.

1.1 OVERLAND PATHS

An Overland Path is a designated route across city property that provides an eligible Contiguous Landowner with access to the reservoir or a direct tributary. Overland Paths are the Contiguous Landowner's responsibility to install and maintain. The approved location of the Overland Path will take into consideration slope, erosion, soil type, existing vegetation, and location of a Private Dock, if applicable.

Property Eligibility

Eligibility for an Overland Path will be evaluated by the City for each Contiguous Property. Most Contiguous Landowners will be eligible for an Overland Path except for properties with extreme slopes (Section 1.2) or high-quality Wetlands (Section 1.6) within the proposed path location. Establishment and maintenance of an Overland Path on city property requires prior written approval. The City reserves the right to deny proposed paths. Overland Paths not installed or maintained to the City's design standards or determined to be a hazard to health and safety, will be subject to the City's Encroachment enforcement procedures.

Obtaining Approval for an Overland Path

A Contiguous Landowner's request for an Overland Path starts with reviewing the Land Stewardship Design Plan on the City's website to confirm eligibility. If the Land Stewardship Design Plan indicates eligibility, the Contiguous Landowner shall complete a Land Stewardship Application and submit to the City for review. The City will review the application and contact the applicant for an onsite meeting to confirm that the proposal meets the Land Stewardship Design Standards. A Land Stewardship Agreement reflecting the revised design plan will be prepared and executed. The Contiguous Landowner will then receive a copy of the approved agreement and proceed with the authorized work.

Items to submit for approval:

- Land Stewardship Application, which will describe the proposed Overland Path location and materials

DESIGN CRITERIA

1. Overland Paths should avoid known Streams, Wetlands, and drainage swales whenever possible.
2. Overland Paths are not permitted to extend beyond the shoreline at Normal Pool Elevation.
3. The following factors, if present, may require greater scrutiny, denial, and/or use of other design standards for implementation:
    a. Slope (Section 1.2)
    b. Streams and Wetlands (Section 1.6)
    c. Nature Preserves (Section 1.7)
    d. Existing Herbaceous or Woody Vegetation (Section 1.5)
4. Overland Path alignment will be considered in the following order, from most to least preferred:
    a. Straight line path, marking the shortest distance from the property line to the dock area or shoreline.
    b. Meandering path to avoid Streams, drainage swales, Wetlands, steep slopes, and removal of native Herbaceous or Woody Vegetation.
    c. Steps or Stairs due to alignment and slope (Section 1.2).
    d. Path with a Stream or Wetland crossing (1.6).
5. Overland Paths located in a city-designated Nature Preserve shall not exceed a width of five feet (Section 1.7).
6. In areas not designated as Nature Preserves, preferred Overland Path width is five feet but shall not exceed a maximum of eight feet (Figure 1).
7. Overland Path heights (i.e., the clearing above the path) shall be a maximum of ten feet vertically (Figure 1).

8. Vegetation removal for path establishment, if necessary, must have prior approval by the City and may include:
    a. Invasive and Noxious Species (Section 1.5)
    b. Herbaceous Vegetation
    c. Native Tree limbs no larger than half of the trunk's diameter at point of connection and no more than four inches in diameter (Section 1.4)
    d. Woody Vegetation with Basal Diameter of two inches or less at ground surface
    e. Dead, diseased, or Hazardous Trees (Section 1.5)
9. Construction and activities that require permits from the Ohio Environmental Protection Agency (OEPA), United States Fish and Wildlife Service (USFWS), or United States Army Corps of Engineers (USACE) will not be allowed, with the exception of Embankment Stabilization and Section 10 permits for Private Docks.
10. All reasonable efforts must be made to establish and maintain the authorized Overland Path in a manner that minimizes any adverse impacts on fish, wildlife, or the natural environment, including water quality.

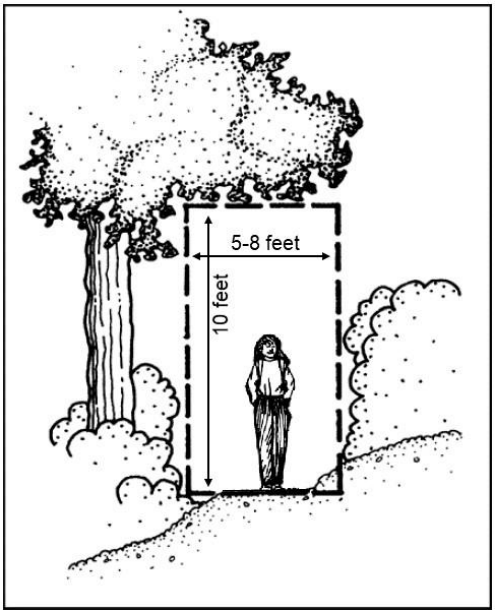


Figure 1. Overland Path Height and Width[1]

MATERIALS

1. Overland Path materials will be considered in the following order, from most to least preferred:
    a. Mown vegetation (Figure 2)
    b. Soil
    c. Mulch – only natural and undyed, up to three inches thick – Not permitted in city-designated Nature Preserve
    d. Washed river gravel (Figure 2), up to three inches thick – Not permitted in city-designated Nature Preserve
    e. Stepping Stones (Figure 3) – Not permitted in city-designated Nature Preserve

2. For mulch and washed river gravel, a plastic or wood landscape edging is required (Figure 2).
    a. Treated wood materials used for landscape edging shall comply with Federal and State Environmental Protection Agency recommendations and regulations. All wooden materials shall

[1] Image modified from North Country National Scenic Trail Handbook for Trail Design, Construction, and Maintenance.

be free of any chemicals that are toxic to aquatic and human life. Lumber pressure-treatment with the Alkaline Copper Quaternary (ACQ) process is very corrosive; therefore, special care shall be used when selecting fasteners and hardware.

b. The use of treated wood not specifically approved by the City is strictly prohibited. Creosote or pentachlorophenol or products containing these compounds (e.g., railroad ties) shall not be used.

3. Slopes under 20% (11°): These are considered navigable slopes and no Steps or Stairs are permitted (Section 1.2). If Stepping Stones or washed river gravel are used, an underlayment of filter fabric is required.
4. Slopes between 20%-33% (11°-18°): Shall utilize the above noted materials. The City will consider Steps or Stairs (Section 1.2) for health or safety reasons as requested by the eligible Contiguous Landowner.
5. Slopes between 33%-119% (18°-50°): Steps or Stairs are required (Section 1.2).
6. For slopes exceeding 119% (50°): An Overland Path, Steps, or Stairs are prohibited (Section 1.2)
7. No hard surface paths such as asphalt, crushed limestone, compacted gravel, pavers, or concrete will be permitted.



Figure 2. Overland Path Design
Example Using Mown Vegetation and Washed River Gravel[2]

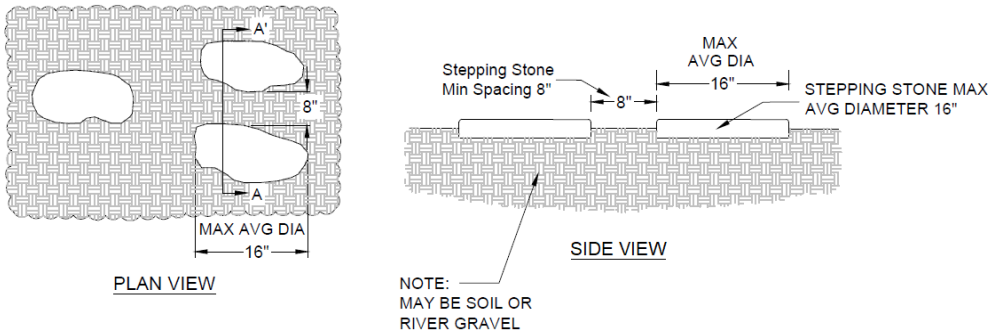


Figure 3. Design Plan of Overland Path with Stepping Stones

[2] Images from TrekOhio and TripAdvisor.

MAINTENANCE

1. The Contiguous Landowner is responsible for ensuring that all elements of the Overland Path are safely passable, maintained in a good condition, and to the approved specification.
2. If erosion is observed along, or as a result of, an approved Overland Path, the Contiguous Landowner shall remediate the erosion. The proposed remediation shall be submitted to the City for approval prior to working on city property.
3. The Contiguous Landowner is allowed to routinely mow the approved Overland Path. Periodic side trimming of Herbaceous Vegetation and Tree branches is allowed to the extent necessary to maintain the approved path corridor.
4. The City must be consulted and authorize the removal of any Tree that blocks, falls across, or has a potential to fall across the Overland Path. No Trees, living or dead, shall be cut or removed from city property without prior city approval (Section 1.5).
5. Paths on city property may not be maintained with fertilizer, pesticides, or herbicides, except as allowable for control of Invasive or Noxious Species (Section 1.5) and with prior written approval.
6. Routine maintenance shall be conducted by hand, although motorized lawnmowers and trimmers are allowed, assuming their use does not impact areas outside the approved path corridor. Refueling of motorized equipment is not allowed on city property.

1.2 STEPS AND STAIRS

Steps or Stairs may be permitted or required in conjunction with Overland Paths based on the final Overland Path alignment. Steps are intended for gradual slopes and are installed resting on the ground, with long treads connecting relatively short risers (Figure 5). Stairs are intended for use on steeper slopes and have risers and treads supported by a continuous panel called a stringer (Figure 6). Construction of Steps and Stairs on city property shall be avoided when possible. If Steps or Stairs are authorized, the design standard for Steps and Stairs shall follow Occupational Safety and Health Administration (OSHA) regulations that govern the design and construction of such structures when used to access public lands (Tables 1 and 2). Steps and Stairs are the Contiguous Landowner's responsibility to install and maintain. Steps and Stairs will require annual permitting, annual inspection by the Contiguous Landowner, and inspection by a qualified professional every five years.

Property Eligibility

Eligibility for Steps and Stairs will be evaluated by the City for each Contiguous Property as part of the Overland Path request. Properties with slopes between 20%-33% (11°-18°) may be eligible for Steps and Stairs if approved by the City for health or safety reasons. Properties with slopes between 33%-119% (18°-50°) will be eligible for Steps and Stairs. Properties with slopes >119% (>50°) or with high-quality Wetlands (Section 1.6) within the proposed location will not be eligible for Steps and Stairs. Overland Paths crossing city-designated Nature Preserve may be eligible for Steps, but not Stairs. Installation or maintenance of Steps and Stairs on city property requires prior written approval. The City reserves the right to deny proposed Steps and Stairs. Steps and Stairs not installed or maintained to the City's design standards, or determined to be a hazard to health and safety, will be subject to the City's Encroachment enforcement procedures.

Obtaining Approval for Steps and Stairs

A Contiguous Landowner's request for Steps or Stairs starts with reviewing the Land Stewardship Design Plan on the City's website to confirm eligibility. If the Land Stewardship Design Plan shows eligibility, the Contiguous Landowner shall complete a Land Stewardship Application and submit to the City for review. The City will review the application and contact the applicant for an onsite meeting to confirm that the proposal meets the Land Stewardship Design Standards. A Land Stewardship Agreement reflecting the revised design plan will be prepared and executed. The Contiguous Landowner will then receive a copy of the approved agreement and proceed with the authorized work.

Items to submit for approval:

- Land Stewardship Application, which will describe:
    - Proposed location of Steps or Stairs
    - Drawings showing dimensions, materials, and design specifications for the Steps or Stairs
    - Specifications for hand rail, mid rail, Stair rail, and/or guard rail locations, as applicable

DESIGN CRITERIA

1. Steps and Stairs shall follow OSHA regulations that govern the design and construction of such structures when used to access public lands (Tables 1 and 2).
2. The use of ladders, alternating tread-type stairs, ship stairs, and spiral staircases are prohibited.
3. Figure 4 identifies the onsite slope criteria for each acceptable structure type.
4. Steps may be authorized in a city-designated Nature Preserve. Stairs are not permitted (Section 1.7).
5. Installation of Steps and Stairs shall be conducted by hand, although motorized hand-operated equipment (e.g., saws, drills) is allowed, assuming their use does not impact areas outside the Steps or Stairs. No vehicles or heavy equipment shall be used on city property. Refueling of motorized equipment is not allowed on city property.
6. All construction shall be completed on land.

7. No grade modifications on city property are permitted. Excavation for structural supports may be permitted upon approval from the City.
8. The Contiguous Landowner is responsible for the disposal of all excess construction material.
9. Steps and Stairs shall not exceed a width of five feet.
10. Width of the construction workspace footprint on city property for Steps or Stairs shall not exceed a maximum of eight feet.
11. No concrete is permitted as a part of the construction design for Steps and Stairs.
12. Large and non-typical Steps or Stairs design may require review by a qualified professional (i.e., licensed Professional Engineer or architect). If Stairs require elevated landings, or an extensive length, the City may require the Stairs to be designed by a licensed Professional Engineer or architect.
13. Construction and activities that require permits from the OEPA, USFWS, or USACE will not be allowed, with the exception of Embankment Stabilization and Section 10 permits for Private Docks.
14. All reasonable efforts must be made to construct and maintain the authorized Steps or Stairs in a manner that minimizes any adverse impacts on fish, wildlife, or the natural environment, including water quality.

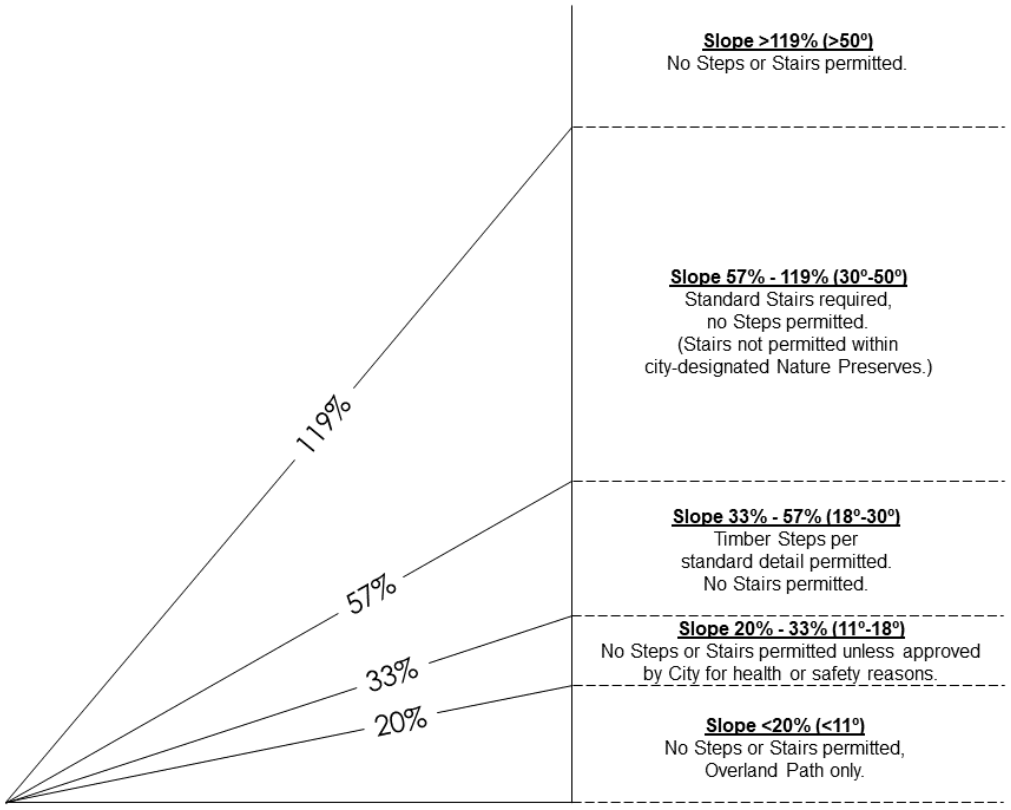


Figure 4. Steps and Stairs Eligibility

Steps
Steps denote a structure with long treads and relatively short risers, typically installed resting on the ground on a gradual slope. Step design criteria include the following points:

1. Steps design shall be a wood framed timber Step design (Figure 5).
2. Tread depth may vary from a minimum of one foot to a maximum of eight feet.
3. Handrails for Steps may be permitted with city approval.



Figure 5. Wood Framed Timber Step Design[3]

Standard Stairs
Stairs denote risers and tread supported by a stringer and include any connected landings and platforms. Standard Stairs may either be conventionally built or can be a prefabricated system that adheres to the design criteria. Standard Stairs have a maximum riser height of 9.5 inches, a minimum tread depth of 9.5 inches, and a minimum width of 22 inches between vertical barriers (OSHA 1910.25(c)). Further standard Stairs design criteria include the following points:

1. Each Stair should be able to support at least five times the normal anticipated Live Load, but never less than a concentrated load of 1,000 pounds applied at any point (OSHA 1910.25(b)(6)).
2. Stairs should have uniform riser heights and tread depths between landings (OSHA 1910.25(b)(3)).

Guardrails, Stair rail systems, and Handrails (Figure 6) all prevent slips, trips, and falls, but they serve different purposes and have different OSHA regulations. Guardrails are barriers erected along an unprotected or exposed side or edge of a walking surface such as a landing or elevated walking platform to prevent falls. A Stair rail system is a barrier erected along the exposed or open side of Stairways to prevent a fall. Handrails are rails that provide a handhold for support. Refer to Table 1 or OSHA criteria for guardrails and Stair rails, and to Table 2 for OSHA handrail criteria.

[3] Image modified from naturetrailsnc.com.

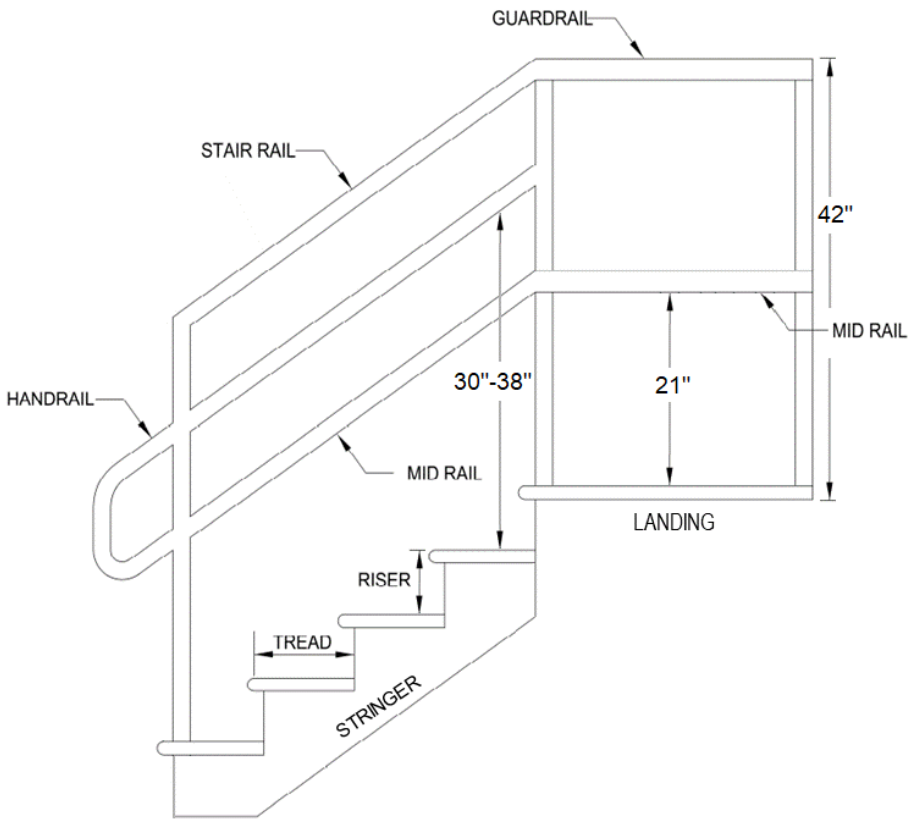


Figure 6. Stairway Railing System – Guardrail, Stair Rail, Mid Rail, and Handrail

Table 1. Guardrail or Stair Rail System Criteria

Guardrail or Stair Rail System, per OSHA Guidelines				
Required for Landing when	Required for Stairway/Ramp when	Height	Mid Rail Height	Other Dimensions
≥ 4 ft. above lower level	Stairway has at least 3 treads and at least 4 risers	42" (±3")	21"	Per OSHA guidelines

Table 2. Handrail Criteria

Handrail System, per OSHA Guidelines				
Stair width	1 Exposed Side	2 Exposed Sides	Height	Other Dimensions
< 44"	Handrail on exposed side	Handrail on both sides	30"-38"	Per OSHA guidelines
≥ 44"	Handrail on both sides	Handrail on both sides	30"-38"	Per OSHA guidelines

MATERIALS

1. Steps using timber frames shall be constructed out of natural rot-resistant hardwoods (e.g., cedar), pressure-treated timber, or fiberglass-reinforced plastic (FRP) materials and filled with topsoil, mulch, or washed river gravel. If washed river gravel is used, an underlayment of filter fabric is required.
2. Standard Stairs shall consist of metal, FRP, and/or pressure treated timber materials only. All Stair treads and ramp surfaces should have a non-slip surface.
3. The use of treated wood not specifically approved by the City is strictly prohibited. Creosote or pentachlorophenol or products (e.g., railroad ties) containing these compounds shall not be used.
4. Treated wood materials used for decking and/or walkways shall comply with Federal and State Environmental Protection Agency recommendations and regulations. All wooden materials shall be free of any chemicals that are toxic to aquatic and human life.
5. Hardware used in Step and Stair construction shall be galvanized or plated. Lumber pressure-treated with the ACQ process is very corrosive; therefore, special care shall be used when selecting fasteners and hardware.
6. No concrete is permitted as a part of the construction design for Steps or Stairs.

MAINTENANCE

1. The Contiguous Landowner is responsible for ensuring all elements of the Steps or Stairs are maintained in good working condition, and to the approved specification. The Contiguous Landowner shall be required to conduct an annual inspection of the Steps or Stairs structure for permit renewal.
2. The Contiguous Landowner is allowed to maintain vertical clearance from surrounding obstructions and Woody Vegetation, per Section 1.1. Vertical clearance is the distance above any Stair or Step tread to any overhead obstruction, as measured from the leading edge of the tread.
3. Every five years, the structure will require inspection by a qualified professional (i.e., licensed Professional Engineer or architect) at the expense of the Contiguous Landowner to certify the structural integrity of the structure. The Contiguous Landowner must provide the City an inspection report signed by the qualified professional, indicating whether the structure is sound and free from any safety issues and in conformance with the Land Stewardship Design Standards. If the structure is found to have structural deficiencies, safety issues, or other non-conformances, then the Contiguous Landowner will have 30 days to resolve. If unable to resolve, the Steps or Stairs will require removal performed by the Contiguous Landowner or at their expense.
4. The Contiguous Landowner must renew the Steps or Stairs permit by the annual deadline. Failure to renew the Steps or Stairs permit will be subject to the City's Encroachment enforcement procedures.
5. Once installed, requests to modify or renovate an existing Steps or Stairs must be submitted through the Land Stewardship Application and require prior written approval. The Contiguous Landowner is authorized to make minor repairs to the Steps or Stairs when necessary to ensure the safety of the users. These repairs must use identical replacement materials and may not alter the appearance or dimensions of the permitted Steps or Stairs.
6. No chemical treatments (e.g., paint, waterproofing) or power washing may be performed to the Steps or Stairs while on city property.
7. Maintenance of Steps or Stairs shall be conducted by hand, although motorized hand-operated equipment (e.g., saws, drills) is allowed, assuming their use does not impact areas outside the Steps or Stairs. No vehicles or heavy equipment shall be used on city property. Refueling of motorized equipment is not allowed on city property.

1.3 PRIVATE DOCKS AND PADDLECRAFT STORAGE

A Private Dock or Paddlecraft storage on city property provides an eligible Contiguous Landowner with boating access to the reservoir or a direct tributary. Private Docks or Paddlecraft storage are the Contiguous Landowner's responsibility to install and maintain. The approved location of the Private Dock or Paddlecraft storage will take into consideration existing Wetlands, Overland Path location, neighboring docks, effects to navigation, and width of the water body. Private Docks or Paddlecraft Storage will require annual permitting. Private Docks will require annual inspection by the Contiguous Landowner, and inspection by a qualified professional every five years.

New private boat stakes will not be issued. Any current Contiguous Landowner with a valid private boat stake permit will be allowed to renew their annual permit, provided they comply with all terms of the Land Stewardship Agreement and the private property ownership has not changed.

Property Eligibility

Eligibility for a Private Dock or Paddlecraft storage will be evaluated by the City for each Contiguous Property. Most Contiguous Landowners will be eligible for boat docks or Paddlecraft storage except for properties with extreme slopes (Section 1.2) and high-quality Wetlands (Section 1.6) within the proposed location. Installation or maintenance of a Private Dock or Paddlecraft storage on city property requires prior written approval. The City reserves the right to deny proposed Private Docks or Paddlecraft storage. Private Docks or Paddlecraft storage not installed or maintained to the City's design standards or determined to be a hazard to health and safety, will be subject to the City's Encroachment enforcement procedures.

Eligible Contiguous Landowners wishing to install a Private Dock at Griggs or O'Shaughnessy Reservoirs are required to obtain a USACE Section 10 permit. Private Docks at Hoover Reservoir do not require Section 10 permits. Dock installation in the vicinity of Wetlands may require additional review and evaluation (Section 1.6).

Obtaining Approval for a Dock

A Contiguous Landowner's request to install or modify a Private Dock or Paddlecraft storage starts with reviewing the Land Stewardship Design Plan on the City's website to confirm eligibility. If the Land Stewardship Design Plan indicates eligibility, the Contiguous Landowner shall complete a Land Stewardship Application and submit to the City for review. The City will review the application and contact the applicant for an onsite meeting to confirm that the proposal meets the Land Stewardship Design Standards. Private Dock applications for eligible Contiguous Properties on Griggs or O'Shaughnessy Reservoirs shall include a completed USACE Section 10 application for review. After city review, the Contiguous Landowner is responsible for any necessary coordination and permitting with the USACE and/or the OEPA prior to receiving the City's final approval for installation. A Land Stewardship Agreement reflecting the revised design plan will be prepared and executed. The Contiguous Landowner will then receive a copy of the approved agreement and proceed with the authorized work.

Items to submit for approval:

- Land Stewardship Application, which will describe:
    - Proposed location of Private Dock or Paddlecraft storage
    - Drawings showing dimensions, materials, and design specifications for the dock or storage
    - Detail of dock landing platform and dock tiebacks including shore attachment
    - Specifications for boatlift, if requested
    - USACE Section 10 Application (for Private Docks at Griggs or O'Shaughnessy Reservoir)
    - Personal property to be used in connection with recreational water activities, and the means to attach or secure the items
    - Specifications for solar powered lights, if requested

DESIGN CRITERIA

6. **Dock and Gangway Design**
    a. Private Docks shall be a Floating Dock design.
    b. Pre-engineered Private Docks and Gangways provided by qualified dock manufacturers are preferred.
    c. If the dock submittal is not pre-engineered and provided by a qualified dock manufacturer, the applicant shall provide detailed plans and specifications for the Private Dock design. The design shall include a plan view showing the dock configuration, Gangway location, flotation materials, and Freeboard calculations that are signed and stamped by a licensed Professional Engineer.
    d. Gangways must adhere to OSHA regulations, according to which guardrails are required if the lowest point of the Gangway is raised four feet or more above ground level or water level. The design criteria for Gangway guardrail systems are the same as those used for Stairs and outlined in Section 1.2 (Table 1).
    e. The Gangway must be designed for a minimum Live Load of 50 pounds per square foot (psf) if utilizing a railing of any kind. If no railing is proposed and/or required, the Gangway may be designed for a minimum Live Load of 30 psf.
    f. Maximum slope of Gangway must be less than 33% (18°) at Normal Pool Elevation and 40% (21.8°) at Average Low Water Elevation or where dock bottoms out.

7. **Dock Freeboard (height from water surface to top of dock decking)**
    a. Deadweight Freeboard of the unoccupied Private Dock must be between 12 inches and 24 inches, except for Drive-on Docks.
    b. The Live Load Freeboard, assuming a Live Load of 30 psf, must be more than 6 inches.

8. **Floats**
    a. Floats must be commercially manufactured flotation units that meet or exceed Ohio Department of Natural Resources (ODNR) standards (Ohio Administrative Code 1501:41-12-12), completely encase the flotation material, and do not consist of metal drums or plastic barrels.

9. **Size**
    a. The width (shortest dimension from edge to edge) of any section of any Private Dock, with the exception of a Gangway, may not be less than four feet (Figure 7).
    b. The overall width (shortest dimension from edge to edge) of any Finger Dock may not exceed eight feet (Figure 7).
    c. The overall width (shortest dimension from edge to edge) of any Header Dock may not exceed eight feet (Figure 7).
    d. The overall width (shortest dimension from edge to edge) of any Platform Dock may not exceed 12 feet (Figure 7).
    e. The overall width (shortest dimension from edge to edge) of any Gangway may not be less than three feet or exceed eight feet (Figure 7).
    f. The overall width of any Private Dock, including any vessel(s) docked at that location, may not exceed 26 feet (parallel to shore) (Figure 7).
    g. The Private Dock (including any Gangway, attachment(s) and docked vessel(s)) may not extend greater than 50 feet or 25% of the width of the channel at the installation location, whichever is less. The 50 feet will be the measurement of the length of the dock and Gangway at the point it is attached to the onshore landing platform or otherwise affixed to shore. It is not the distance the Private Dock extends into the reservoir due to the angle of attachment.

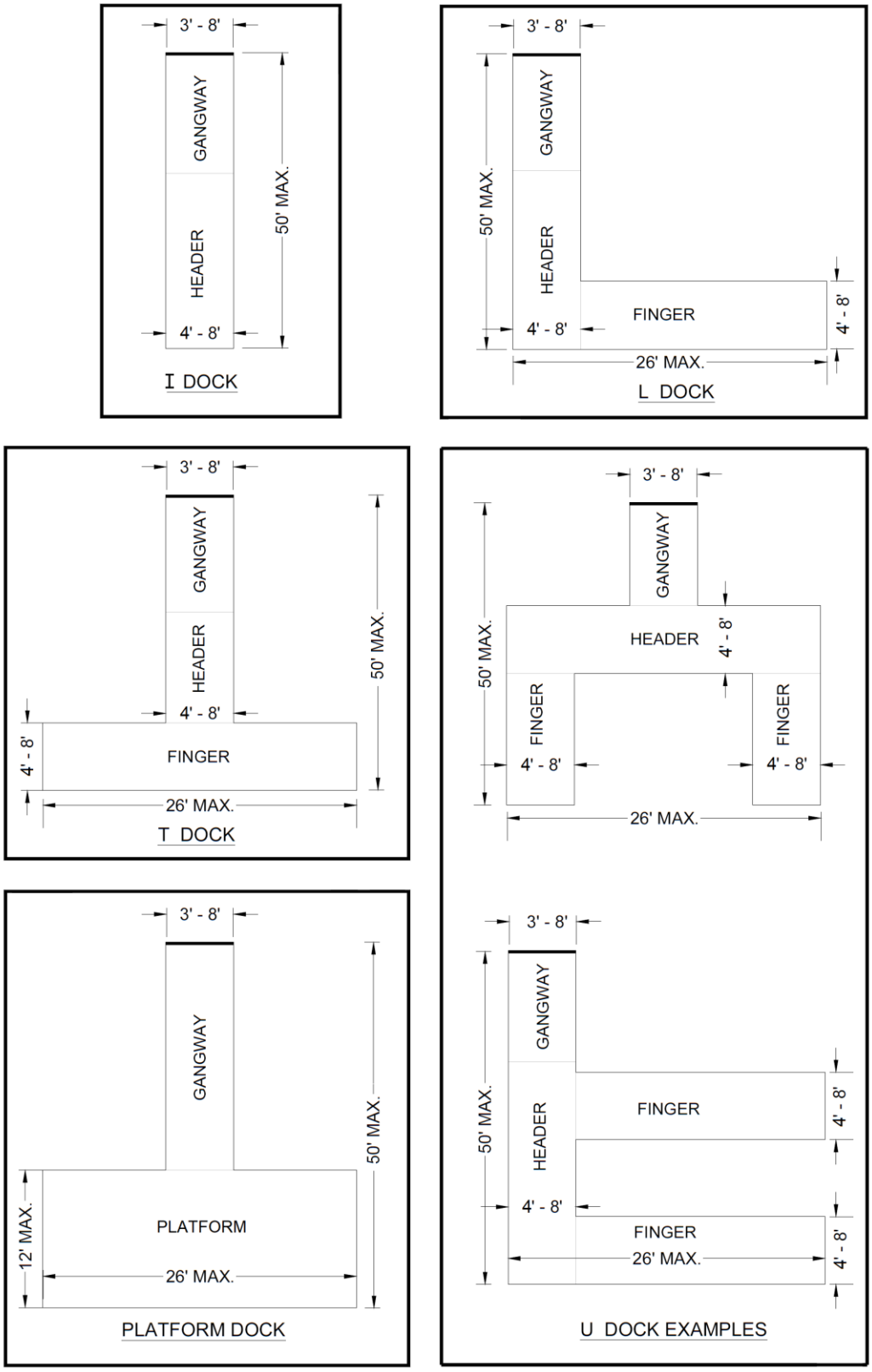


Figure 7. Private Dock Configuration Examples
(Final dimensions must include attached vessels with maximum allotments)

10. **Paddlecraft Storage**
    a. Storage of Paddlecraft or placement of Paddlecraft storage racks is limited to the location of an approved Overland Path or Private Dock.
    b. Paddlecraft storage along the Overland Path is not permitted if a Private Dock is installed.
    c. Paddlecraft storage shall be above the Normal Pool Elevation, except when stored on or moored to the Private Dock.
    d. Attachment of Paddlecraft or Paddlecraft storage racks to any natural living feature (e.g., Trees) is not permissible.
    e. Paddlecraft storage racks may be permitted on city property with prior approval from the City. Storage rack designs shall be freestanding.

11. **Additional Design and Use Criteria**
    a. No more than one Private Dock or Paddlecraft storage rack will be permitted per Contiguous Property.
    b. Up to three vessels registered to the Contiguous Landowner may be permitted. Additional vessels may be approved by the City upon request.
    c. The proposed location of the Private Dock shall be determined by the City. The dock and any approved vessels must be completely contained within the area of city-owned shoreline defined by an extension of the Contiguous Landowner's boundary lines. In cases where the boundary angles are not perpendicular, or nearly perpendicular, to the shoreline, this area will be determined by the City and designated on the Land Stewardship Design Plan. Private Docks shall be located such that the dock and vessels attached to the dock can maintain a minimum separation of 20 feet from an adjacent dock or vessel. This will be measured from nearest outside edge of the dock or vessel. All new docks will be inset at least ten feet from the sidelines of the city-owned shoreline area as defined above. If there is not a suitable site within this area, the Private Dock eligibility may be denied.
    d. Installation of a Private Dock shall be conducted by hand, although motorized hand-operated equipment (e.g., saws, drills) is allowed, assuming their use does not impact areas outside the Private Dock. No vehicles or heavy equipment shall be used on city property. Refueling of motorized equipment is not allowed on city property.
    e. Navigational channels artificially established by dredging the bottom of the waterway are prohibited.
    f. No pilings may be driven through the water into the bottom of the waterway. Guide or support poles attached to the Private Dock (or lift device) must have flat feet that rest on the bottom of the waterway or use non-driven Spuds. Spuds must be removable using common hand tools, and the permit holder must be able to demonstrate this upon request. Failure or inability to remove the Spuds will be considered grounds for revoking Private Dock eligibility.
    g. If Spuds are used, they must be no greater than four inches in diameter. The "foot" end of the Spud (the portion against the reservoir substrate) must be capped or otherwise closed and not be an open pipe. Spuds shall not have chisel shaped or pointed ends.
    h. The installation of facilities conducive to human habitation including, but not limited to, household furnishings, water or electrical lines or hook ups, living quarters, sewers, toilets, or fueling facilities are not permitted on any Private Dock.
    i. Personal property used in connection with recreational water activities including, but not limited to, chairs and dock boxes may be approved provided the items can be secured and receive prior written authorization.
    j. Dock boxes must be anchored to the Private Dock or landing platform and may not enclose or create a wall on the dock.
    k. No storage of fuel or oil is permitted on city property.
    l. No chemical treatments (e.g., paint, waterproofing) or power washing may be applied to the Private Dock or landing platform while on city property.
    m. Permitted Private Docks must properly display the Private Dock placard and annual permit stickers as provided by the Watershed Management Section. The locations shall be determined by the City to be visible from shore and open navigable water.

n. Attachment of the Private Dock, landing platform, or watercraft to any natural living feature (e.g., Trees) is not permissible. Dock stabilization proposals must be reviewed and approved by the City.
o. Vegetation removal (Section 1.5) for Private Dock establishment, if necessary, must have prior approval by the City and may include:
    i) Invasive and Noxious Species (Section 1.5)
    ii) Herbaceous Vegetation
    iii) Tree limbs no larger half of the trunk's diameter at point of connection and no more than four inches in diameter (Section 1.4)
    iv) Woody Vegetation with Basal Diameter of two inches or less at ground surface
    v) Dead, diseased, or Hazardous Trees (Section 1.5)
p. Guest watercraft meeting requirements may moor to the permit holder's dock. However, if the duration exceeds 24 hours, the permit holder must obtain a temporary permit from the City and all related regulations apply.
q. As part of the Private Dock, there may be a landing platform area on shore, not to exceed 80 square feet in size. The purpose of this platform is to provide a secure attachment point for the Private Dock. No concrete, cement, or mortar is permitted as part of this platform. This structure may not include any walls, roofs, or other improvements except for an approved handrail if desired. The landing platform shall be constructed at ground level unless the terrain is not even, in which case it shall be level as close to the ground as possible. The landing platform may not extend over the water beyond the Normal Pool Elevation. The specific site of the landing platform will be determined by the City based upon Best Management Practices.
r. The Private Dock shall not have any walls or enclosed areas. An open sided canopy may be permitted provided that the overall height of the canopy structure does not exceed 12 feet vertically from the top of the dock decking.
s. A hand powered or mechanical boatlift may be permitted. Lifts that require electricity must operate using either solar power or a temporary ground-fault circuit interrupter (GFCI) protected extension cord from private property. Permanent electrical connections on city property are prohibited.
t. No devices used to prevent ice accumulation surrounding a Private Dock (e.g., bubbler or circulator pump) shall be permitted.
u. Solar powered lights for the Private Dock may be approved and must be submitted with the Land Stewardship Application for city approval.
v. Construction and activities that require permits from the OEPA, USFWS, or USACE will not be allowed, with the exception of Embankment Stabilization and Section 10 permits for Private Docks.
w. All reasonable efforts must be made to construct and maintain the authorized Private Dock in a manner that minimizes any adverse impacts on fish, wildlife, or the natural environment, including water quality.

MATERIALS

1. Dock decking material must be made of wood, plastic, metal, or FRP.
2. No part of the Private Dock or landing platform may be constructed from any materials or constructed in any manner to be considered a permanent structure (i.e., there will be no use of concrete, and all sections must be removable by use of common hand tools).
3. Floats must be commercially manufactured flotation units that meet or exceed ODNR standards (Ohio Administrative Code 1501:41-12-12), completely encase the flotation material, and do not consist of metal drums or plastic barrels.
4. Treated wood materials used for decking and/or walkways shall comply with Federal and State Environmental Protection Agency recommendations and regulations. All wooden materials shall be free of any chemicals that are toxic to aquatic and human life.
5. Hardware used in dock construction shall be galvanized or plated. Lumber pressure-treated with the ACQ process is very corrosive; therefore, special care shall be used when selecting fasteners and hardware.

6. Canopy covers must be metal, canvas, nylon or other fabric, and no advertising may be displayed on the canopy. Canopy covers shall be of a neutral color. The final color of the canopy will be subject to city approval.

MAINTENANCE

1. The Contiguous Landowner is responsible for ensuring all elements of the Private Dock are maintained in a good working condition, and to the approved specification. The Contiguous Landowner shall be required to conduct an annual inspection of the Private Dock for permit renewal.
2. Every five years, the structure will require inspection by a qualified professional (i.e., licensed Professional Engineer or architect) at the expense of the Contiguous Landowner to certify the structural integrity of the structure. The Contiguous Landowner must provide the City an inspection report signed by the qualified professional, indicating whether the structure is sound and free from any safety issues and in conformance with the Land Stewardship Design Standards. If the structure is found to have structural deficiencies, safety issues, or other non-conformances, then the Contiguous Landowner shall have 30 days to resolve. If unable to resolve, the dock will require removal performed by the Contiguous Landowner or at their expense.
3. The Contiguous Landowner must renew the Private Dock permit by the annual deadline. Failure to renew the Private Dock permit will be subject to the City's Encroachment enforcement procedures.
4. Once installed, requests to modify or renovate an existing Private Dock must be submitted through the Land Stewardship Application and require prior written approval. The Contiguous Landowner is authorized to make minor repairs to the Private Dock and landing platform when necessary to ensure the safety of the users. These repairs must use identical replacement materials and may not alter the appearance or dimensions of the permitted dock.
5. Seasonal Dock Structures (i.e., those removed and stored during the winter months) shall be stored on private property beyond the top of the Bank. The City will consider applications requesting approval for seasonal dock storage on city property on the Overland Path. Reinstallation shall occur in the previously used footprint in order to avoid or minimize damage to the surrounding area.
6. Seasonal Dock Structures must not be stored in Potential Wetland areas (Section 1.6).
7. No chemical treatments (e.g., paint, waterproofing) or power washing may be applied to the Private Dock or landing platform while on city property.
8. Maintenance of a Private Dock shall be conducted by hand, although motorized hand-operated equipment (e.g., saws, drills) is allowed, assuming their use does not impact areas outside the Private Dock. No vehicles or heavy equipment shall be used on city property. Refueling of motorized equipment is not allowed on city property.

1.4 FILTERED VIEW CORRIDORS

A Filtered View Corridor may be considered to provide the eligible Contiguous Landowner with an enhanced view of the adjacent water body where it does not compromise reservoir water quality or negatively impact riparian habitat. Filtered View Corridors (Figure 8) are gaps in vegetation created through removal of Invasive and Noxious Species and selected pruning, limbing, or removal of Herbaceous or Woody Vegetation. A view cannot be created through the complete removal of vegetation.

Property Eligibility

Eligibility for Filtered View Corridors will be evaluated by the City for each Contiguous Property. Most Contiguous Landowners will be eligible for Filtered View Corridors except for properties located adjacent to city-designated Nature Preserve (Section 1.7) or greater than 250 feet from reservoir shoreline based upon the Normal Pool Elevation. Implementation or maintenance of a Filtered View Corridor on city property requires prior written approval. The City reserves the right to deny proposed Filtered View Corridors. Filtered View Corridors not implemented or maintained to the City's design standards will be subject to the City's Encroachment enforcement procedures.



Figure 8. Filtered View Corridor Example
Creation Through Appropriate Pruning and Limbing

Obtaining Approval for a Filtered View Corridor

A Contiguous Landowner's request to implement or maintain a Filtered View Corridor starts with reviewing the Land Stewardship Design Plan on the City's website to confirm eligibility. If the Land Stewardship Design Plan indicates eligibility, the Contiguous Landowner shall complete a Land Stewardship Application and submit to the City for review. The City will review the application and contact the applicant for an onsite meeting to review the proposed Filtered View Corridor and confirm that the proposal meets the Land Stewardship Design Standards. A Land Stewardship Agreement reflecting the revised design plan will be prepared and executed. The Contiguous Landowner will then receive a copy of the approved agreement and proceed with the authorized work.

Items to submit for approval:

- Land Stewardship Application, which will describe the proposed Filtered View Corridor location, width, and Vegetation Management strategy (maintenance will require subsequent applications)

DESIGN CRITERIA

1. No more than one Filtered View Corridor will be permitted per Contiguous Property with a primary residential structure.
2. Filtered View Corridors are not permitted in city-designated Nature Preserves (Section 1.7). Filtered View Corridors are not permitted to extend beyond the shoreline at Normal Pool Elevation.
3. The Filtered View Corridor location shall align with an Overland Path whenever possible.
4. The maximum width for a Filtered View Corridor shall not exceed 1/3 of the width of the Contiguous Landowner's property at the adjoining boundary with city property, nor shall it exceed 50 feet (Figure 9). For example, if the eligible Contiguous Landowner property width is 100 feet at the adjoining boundary, then the maximum width for the Filtered View Corridor would be 33 feet.
5. Open or sparsely vegetated areas shall be selected for sight lines before considering undisturbed areas.
6. Installation of a Filtered View Corridor shall be conducted by hand, although motorized hand-operated equipment (e.g., pole saw, chain saw) is allowed, assuming their use does not impact areas outside the Filtered View Corridor. No vehicles or heavy equipment shall be used on city property. Refueling of motorized equipment is not allowed on city property.
7. Primary methods for Filtered View Corridor creation shall be Invasive and Noxious Species removal, trimming of Herbaceous Vegetation, crown reduction for Shrubs, and crown lifting for Trees. Removal of healthy native Trees is prohibited, except under rare circumstances described below.
8. In establishing a Filtered View Corridor, an entire Vegetation Stratum shall not be removed.
9. Invasive and Noxious Species removal shall be completed prior to any city authorization for additional Vegetation Management strategies. After Invasive and Noxious Species removal, the City will review the Filtered View Corridor with the Contiguous Landowners to determine if onsite Herbaceous or Woody Vegetation will be approved for selective limbing, pruning, or removal. Retention of existing buffer vegetation shall be prioritized before considering the pruning, limbing, or removal of living or dead vegetation.
10. Limbing and pruning shall be conducted by a city-approved International Society of Arboriculture (ISA) certified arborist in a manner that follows guidelines to maintain healthy Trees and Shrubs.
11. Limbing and pruning of Trees (deciduous or coniferous) shall be subject to three restrictions (Figure 10 and 11). City personnel will make the final determination on limbs that are eligible for removal. The three restrictions are:
    a. Height restriction: limbing and pruning shall be limited to 20 feet above the ground surface or 1/3 the height of the Tree, whichever is less.
    b. Leaf area restriction: no more than 25% of the total crown (leaf area) may be removed when limbing or pruning.
    c. Limb size restriction: limbing of Trees shall be limited to branches no more than half the trunk diameter at the point of limb attachment and must be four inches or less in diameter.
12. Shrubs shall not be pruned below three feet above ground surface. No more than 25% of a Shrub's total crown (leaf area) may be removed in each pruning (Figure 11).

13. Limbing and pruning may be restricted between April 1 and October 31 to protect the health of certain Tree species, particularly oaks.
14. The City encourages preservation of Trees, including those dead and dying, which may provide habitat for wildlife. Dead and dying Trees will be evaluated by the City to determine if the Tree is hazardous and eligible for removal.
15. Material from ground level to three feet, including humus, leaf litter, Herbaceous or Woody Vegetation, shall not be disturbed or removed.
16. In recently restored areas where dense Tree sapling growth obscures visibility and no alternative sight lines are present, selective removal of sapling or young Trees may be approved. This will be determined by the City on a case-by-case basis.
17. Construction and activities that require permits from the OEPA, USFWS, or USACE will not be allowed, with the exception of Embankment Stabilization and Section 10 permits for Private Docks.
18. All reasonable efforts must be made to implement the authorized Filtered View Corridor in a manner that minimizes any adverse impacts on fish, wildlife, or the natural environment, including water quality.

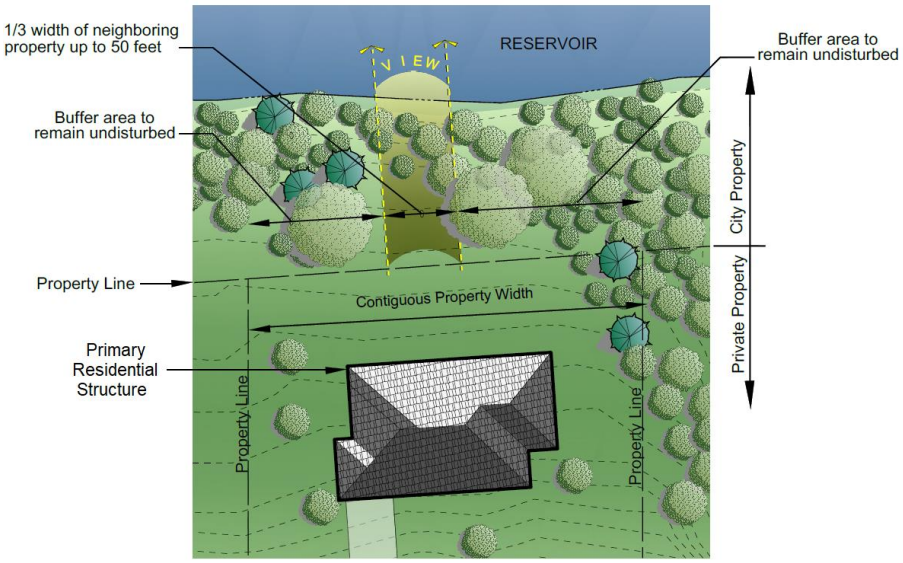


Figure 9. Typical Filtered View Corridor Placement

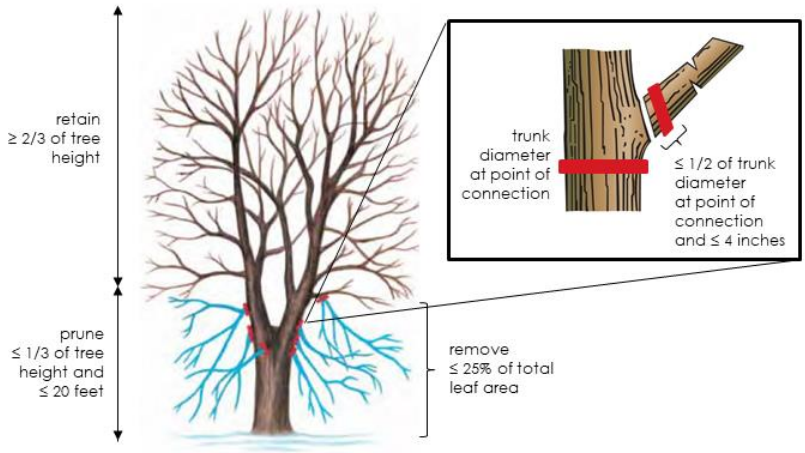


Figure 10. Height, Leaf Area, and Limb Size Restrictions on Crown Lifting for Trees[4]

[4] Image modified from USDA Publication NA-FR-01-095.

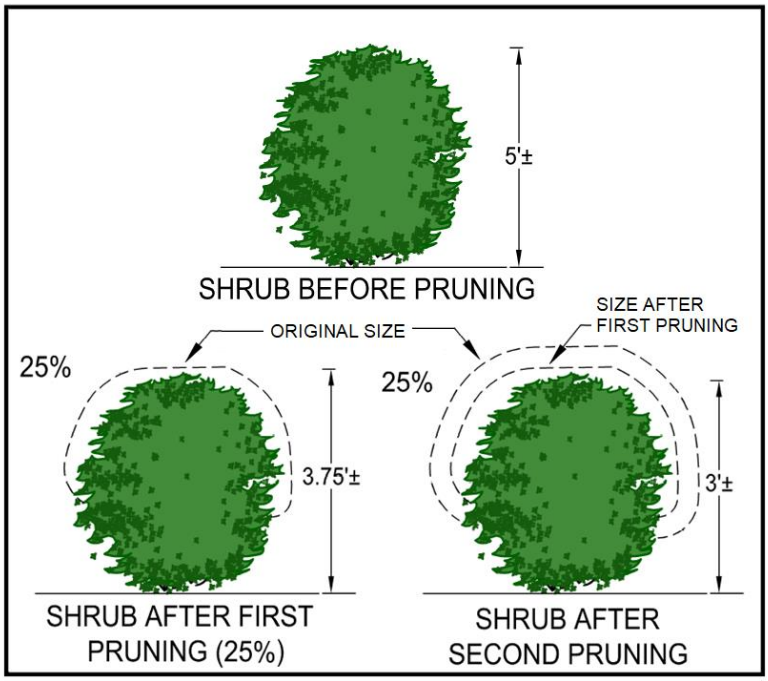


Figure 11. Appropriate Crown Reduction for Shrubs

MAINTENANCE

1. Once established, requests to maintain an existing Filtered View Corridor must be submitted through the Land Stewardship Application and require prior written approval.
2. Limbing and pruning shall be conducted by a City-approved International Society of Arboriculture certified arborist, in a manner that follows guidelines to maintain healthy Trees and Shrubs.
3. The Contiguous Landowner is responsible for legally and properly disposing of all material resulting from pruning, cleanup, and restoration of disturbed areas to a natural state. Disposal methods must be approved by the City.
4. Maintenance of a Filtered View Corridor shall be conducted by hand, although motorized hand-operated equipment (e.g., pole saw, chain saw) is allowed, assuming their use does not impact areas outside the Filtered View Corridor. No vehicles or heavy equipment shall be used on city property. Refueling of motorized equipment is not allowed on city property.

1.5 VEGETATION MANAGEMENT

Vegetation Management refers to any planting, removal, physical or chemical alteration of existing native or non-native vegetation not expressly detailed in previous sections. This includes, but is not limited to mowing, pruning, trimming, or limbing of live or dead, native or non-native, Herbaceous or Woody Vegetation.

Property Eligibility

Eligibility for Vegetation Management will be evaluated by the City for each Contiguous Property on a case-by-case basis. Properties eligible for Invasive and Noxious Species removal, revegetation, Hazardous Tree removal, or a special vegetation management area will be required to follow the prescribed design standards for Vegetation Management. Vegetation Management on city property requires prior written approval. The City reserves the right to deny proposed Vegetation Management. Vegetation Management not implemented or maintained to the City's design standards will be subject to the City's Encroachment enforcement procedures.

Obtaining Approval for Vegetation Management

A Contiguous Landowner may initiate a request for Vegetation Management by indicating interest on the Land Stewardship Application form. The City will review the request and contact the applicant for an onsite meeting. If the preliminary evaluation determines the request may be approved, the Contiguous Landowner shall submit any additional documentation requested to the City for review. The City will review the application to confirm the proposal meets the Land Stewardship Design Standards. A Land Stewardship Agreement reflecting the revised design plan will be prepared and executed. The Contiguous Landowner will then receive a copy of the approved agreement. Further onsite meetings may be required prior to proceeding with the authorized work. For Hazardous Tree removal, a Land Stewardship Application may not be required. However, the City's prior written approval is required for commencement of any work.

Items to submit for approval:

- Land Stewardship Application, which will describe the proposed work request and list the contact information for the city-approved company performing the work

DESIGN CRITERIA

1. Motorized equipment is prohibited on city property, with the exception of lawnmowers and hand operated motorized equipment (e.g., weed trimmers, hedge trimmers) approved by the City. Refueling of motorized equipment is not allowed on city property.
2. Native Woody Vegetation may not be removed from city property, except for conditions presented in Sections 1.1, 1.3, 1.4, and 1.5.
3. Construction and activities that require permits from the OEPA, USFWS, or USACE will not be allowed, with the exception of Embankment Stabilization and Section 10 permits for Private Docks.
4. All reasonable efforts must be made to implement and maintain the authorized Vegetation Management in a manner that minimizes any adverse impacts on fish, wildlife, or the natural environment, including water quality.

Invasive and Noxious Species Removal

The City maintains a current list of Invasive and Noxious Species that may be actively managed for removal or control. Please refer to the City of Columbus Watershed Management website for the current list of Invasive and Noxious Species.

1. Any vegetation planted on city property must be Native Vegetation. Existing non-native Ornamental Trees may be retained on city property if not on the City's Invasive and Noxious Species list.

2. No removal, pruning, or trimming of vegetation is permitted on city property without the prior approval of the City.
3. Only city staff or city-approved, licensed contractors are permitted to apply chemical treatments on city property.
4. Invasive and Noxious Species removal must be conducted by a city-approved contractor under city staff oversight. Volunteer groups may be utilized to conduct Invasive and Noxious Species removals with prior approval under the supervision of city staff.
5. Any person applying chemical treatments for Invasive and Noxious Species removal shall possess a valid Commercial Pesticide Applicator License through the Ohio Department of Agriculture.
6. Any proposed chemical treatments shall conform to the City's specifications.
7. When Invasive and Noxious Species cover is equal to or greater than 50% of total plant cover, a native revegetation plan shall be developed. Revegetation activities should occur immediately following the Invasive and Noxious Species removal, or as approved by the City.
8. To avoid increased Shoreline Erosion, Invasive and Noxious Species removal shall not occur within ten feet of the top of shoreline Bank or below the top of the Bank unless the area will be reseeded and/or replanted with Native Vegetation.
9. The Contiguous Landowners shall be responsible for legally and properly disposing of all material resulting from Invasive and Noxious Species removal.

Revegetation

A native revegetation plan describes how an area will be revegetated with Native Vegetation. A revegetation plan may be required when transitioning the land use, replacing lost or removed vegetation, or reestablishing Native Vegetation following Invasive or Noxious Species removal. Typical components of the native revegetation plan include the following:

1. Revegetation schedule
2. Total revegetation area (i.e., map and dimensions)
3. Revegetation methods (e.g., broadcast seeding, live staking, hydroseeding)
4. Type and quantity of seeds/plantings (i.e., species composition and sizes, pounds of pure live seed)
5. Soil preparation methods and erosion control measures as directed
6. Plant material supplier name and certifications

Hazardous Tree Removal

Hazardous Trees include dead Trees, diseased or dying Trees, dead parts of live Trees, or unstable live Trees on city property that are within striking distance of structures located on private property and city-permitted Overland Paths, Private Docks, or other structures.

1. The City or a City-approved contractor (i.e., approved ISA-certified arborist) will determine whether a Tree or parts of a Tree are hazardous and require removal.
2. Hazardous Tree removal must be authorized and performed by city staff, a designee of the City (contractor), or by a city-approved contractor.
3. The City will determine and approve the Tree mitigation strategy.
4. Mitigation methods may include leaving standing and fallen Trees, or portions of these, at the location.

Special Vegetation Management Area

When an eligible Contiguous Landowner's existing primary residential structure is located less than 20 feet from the city property line, the landowner may request authorization to regularly maintain an area that extends a maximum of 20 feet from the existing primary residential structure (Figure 12). For example, if an existing primary residential structure is located ten feet from city property, the eligible Contiguous Landowner may be permitted to maintain up to ten feet of city property. The following restrictions apply:

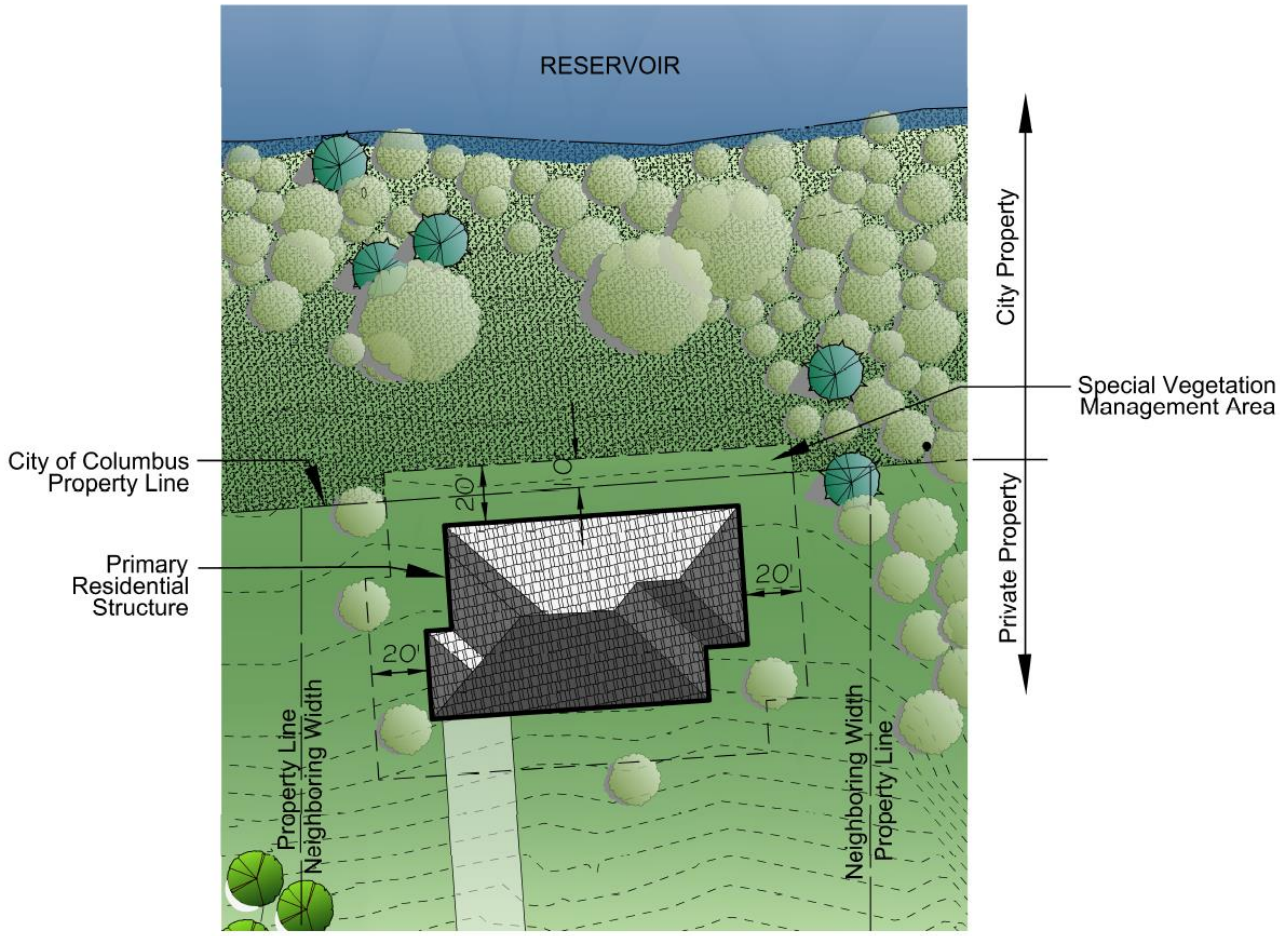


Figure 12. Special Vegetation Management Area Location

1. No maintenance will be permitted in the Shoreline Buffer area extending 50 feet inland from the top of the Bank.
2. Only primary residential structures located within 20 feet from city property prior to March 2020 are eligible for a special vegetation management area.
3. Special vegetation management areas will not be considered in city-designated Nature Preserve or Wetlands.
4. Woody Vegetation with a Basal Diameter of two inches or less will be considered for removal.
5. Peripheral and ancillary structures including, but not limited to, garages, pool houses, sheds, patios, or decks are not considered a primary residential structure.
6. Dimensions of a city-approved special vegetation management area will be delineated within the Contiguous Landowner's Land Stewardship Agreement and Design Plan.

MAINTENANCE

1. Once vegetation management has been implemented, requests for subsequent maintenance not explicitly approved must be submitted through the Land Stewardship Application and require prior written approval.
2. Disposing of lawn waste including, but not limited to, grass clippings, leaves, limbs, or brush on city-owned parkland or waterways is prohibited.
3. Contiguous Landowners are responsible for the actions of contractors working on their behalf.
4. Vegetation Management shall be conducted by hand, although motorized lawnmowers and hand-operated equipment (e.g., pole saw, chain saw) may be used where approved by the City. No vehicles or heavy equipment shall be used on city property. Refueling of motorized equipment is not allowed on city property.

1.6 STREAMS AND WETLANDS

Streams and Wetlands are subject to special protections and regulations under the jurisdiction of the USACE and the OEPA. Land Stewardship Design Plans on the City of Columbus Watershed Management website show the location of Streams and Potential Wetlands on city property surrounding each reservoir. Additionally, an onsite meeting may reveal a Stream or Potential Wetland that was not previously identified on the Land Stewardship Design Plans due to changes in field conditions over time. When the location of an Overland Path or Private Dock cannot avoid existing Streams or Potential Wetlands, the City may consider Stream or Wetland crossings provided applicable federal and state Stream and Wetland regulations and conditions are followed. The Contiguous Landowner will be required to have a qualified professional with experience in Wetland and Waterbody Delineation conduct an assessment and jurisdictional determination request at the Contiguous Landowner's expense to verify that federal and state permitting requirements are satisfied. If approved by the City, existing Streams and Wetlands may only be crossed through use of a Boardwalk (Figure 13) or Private Dock according to the Stream and Wetland design standards. Private Docks or Boardwalks will require annual permitting, annual inspection by the Contiguous Landowner, and inspection by a qualified professional every five years.

Property Eligibility

Eligibility for Stream and Wetland crossings will be evaluated by the City for each Contiguous Property as part of the Overland Path and/or Private Dock request. Where Streams and Potential Wetlands cannot be avoided, Private Dock, and Overland Path designs, including Boardwalks, approved to cross Streams and Wetlands must follow applicable federal and state regulations. If required, Contiguous Landowners are responsible for coordinating a formal Wetland and Waterbody Delineation with the City, OEPA, and USACE. If the Wetland and Waterbody Delineation finds a Wetland to be either an isolated Wetland or a Category 3 Wetland according to the Ohio Rapid Assessment Method (ORAM), Private Docks and Overland Paths, including Boardwalks, will not be allowed. Approved structures may be allowed spanning perennial, intermittent, or ephemeral Streams and in jurisdictional Category 1 and 2 Wetlands. Installation or maintenance of a Stream or Wetland crossing on city property requires prior written approval. The City reserves the right to deny proposed Stream and Wetland crossings. Stream and Wetland crossings not installed or maintained to the City's design standards or determined to be a hazard to health and safety, will be subject to the City's Encroachment enforcement procedures.

Obtaining Approval for Crossing Streams and Wetlands

A Contiguous Landowner's request for a Stream or Wetland crossing starts with reviewing the Land Stewardship Design Plan on the City's website. If the Land Stewardship Design Plan indicates that the proposed Overland Path or Private Dock crosses a Stream or Potential Wetland area, the Contiguous Landowner may initiate a request for a Stream or Wetland crossing by indicating interest on the Land Stewardship Application form. The City will review the request and contact the applicant for an onsite meeting. If the preliminary evaluation confirms existing Stream or Potential Wetland cannot be avoided, the Contiguous Landowner must hire a qualified professional to conduct a Wetland and Waterbody Delineation, ORAM assessment (for Wetlands), and Qualitative Habitat Evaluation Index (QHEI) or Primary Headwater Habitat Evaluation Index (HHEI) assessment (for Streams). Note that an onsite meeting may reveal Streams or Potential Wetlands not previously identified on the Land Stewardship Design Plan. Contiguous Landowners shall be responsible for coordinating the Wetland and Waterbody Delineation with the City, OEPA, and USACE. If the Stream or Wetland is not found to be an isolated Wetland or a Category 3 Wetland, the City will review the application to confirm the proposal meets the Land Stewardship Design Standards. A Land Stewardship Agreement reflecting the revised design plan will be prepared and executed. The Contiguous Landowner will then receive a copy of the approved agreement.

Items to submit for approval:

- Land Stewardship Application, which will describe:

- Wetland and Waterbody Delineation, ORAM assessment (for Wetlands), and QHEI or HHEI assessment (for Streams) performed by a qualified professional
- Proposed location of Stream or Wetland crossing
- Drawings showing dimensions, materials, and specifications of structure to cross the Stream or Wetland

DESIGN CRITERIA

1. Streams and Potential Wetlands shall be avoided if other practical alternatives exist onsite.
2. Contiguous Landowners requesting an Overland Path or Private Dock across Stream or Potential Wetland areas are required to obtain a Wetland and Waterbody Delineation performed by a qualified Wetland professional. The delineation must confirm the jurisdictional status, ORAM category and/or QHEI or HHEI rating, and extent of Streams and Wetlands on city property requested to be accessed.
    a. Wetland Delineation is not required if the Potential Wetlands exist only along the shoreline below Normal Pool Elevation AND the proposed Private Dock design spans the Wetland (i.e., does not have floats or supports within the limits of the Potential Wetland areas).
3. Installation of a Private Dock, Boardwalk, or Stream crossing shall be conducted by hand, although motorized hand-operated equipment (e.g., saws, drills) is allowed, assuming their use does not impact areas outside the Private Dock, Boardwalk, or Stream crossing. No vehicles or heavy equipment shall be used on city property. Refueling of motorized equipment is not allowed on city property.
4. The private dock must adhere to all applicable Private Dock design standards (Section 1.3).
5. Navigational channels artificially established by dredging the bottom of the waterway are prohibited.
6. The width of an Overland Path in Wetlands and over Streams, including a Boardwalk or Stream crossing, shall not exceed five feet (Figure 13).
7. Preferred width of the construction footprint on city property for a Wetland crossing is five feet but shall not exceed a maximum of eight feet.
8. Private Docks, Boardwalks, and Stream crossings shall maintain a one foot minimum clearance over ground surface and Normal Pool Elevation from the bottom of the structure (Figure 13).
9. Private Dock and Overland Path materials crossing Wetlands shall use grated material (i.e., framework of parallel or crossed bars such as expanded metal) or planks spaced at least 0.5 inch apart to allow light penetration.
10. Access across Wetlands above Normal Pool Elevation will require a Boardwalk with a deck elevated above the ground surface (Figure 13).
11. Boardwalks are not permitted to extend beyond the Normal Pool Elevation.
12. Boardwalks must be anchored to the ground to prevent floating away during periods of high water or flooding.
13. Direct placement of soil, dirt, gravel or other material, and placement of Puncheons for the construction of Private Docks, Boardwalks, or Stream crossings are not permitted.
14. Stream crossing structures (boardwalks and any supports or bracing) shall be placed above the top of stream bank.
15. Boardwalks and Stream crossings must adhere to OSHA regulations, according to which platforms raised four feet or more above ground level require guardrail systems outlined in Section 1.2 (Figure 13).
16. Pruning and trimming of vegetation within the portion of the Boardwalk or Private Dock in Wetland areas is limited to a maximum five foot wide by ten foot high area. In all other respects, Wetland crossings are subject to the same Vegetation Management restrictions as Overland Paths and Private Docks (Section 1.1 and 1.3).
17. Construction and activities that require permits from the OEPA, USFWS, or USACE will not be allowed, with the exception of Embankment Stabilization and Section 10 permits for Private Docks.
18. All reasonable efforts must be made to construct and maintain the authorized Wetland or Stream crossing in a manner that minimizes any adverse impacts on fish, wildlife, or the natural environment, including water quality.

MATERIALS

1. The use of treated wood not specifically approved by the City for use in Wetlands and aquatic environments is strictly prohibited. Creosote or pentachlorophenol or products containing these compounds (e.g., railroad ties) shall not be used.
2. Treated wood materials used for decking and/or walkways shall comply with Federal and State Environmental Protection Agency recommendations and regulations. All wooden materials shall be free of any chemicals that are toxic to aquatic and human life. Lumber pressure-treated with the ACQ process is very corrosive; therefore, special care shall be used when selecting fasteners and hardware. Hardware used in Boardwalk construction shall be galvanized or plated.
3. No part of the Boardwalk or Stream crossing may be constructed from any materials or constructed in any manner to be considered a permanent structure (i.e., there will be no use of concrete and all sections must be removable by use of common hand tools).
4. Boardwalks, piles, and supports used to span Wetlands or Streams must be made of wood, metal, or FRP.

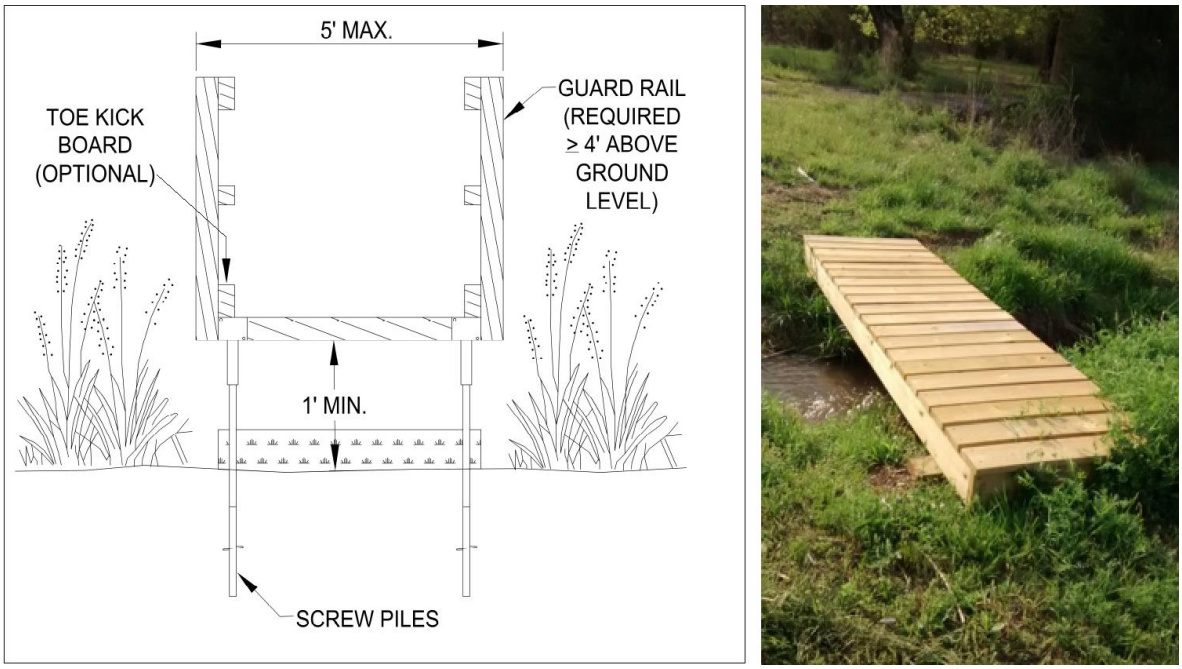


Figure 13. Boardwalk Cross Section Design Plan (L) and Stream Crossing Example (R)

MAINTENANCE

1. The Contiguous Landowner is responsible for ensuring all elements of the Private Dock, Boardwalk, or Stream crossing are maintained in a good working condition. The Contiguous Landowner shall be required to conduct an annual inspection of the Private Dock, Boardwalk, or Stream crossing for each permit renewal.
2. Every five years, the structure will require inspection by a qualified professional (i.e., licensed Professional Engineer or architect) at the expense of the Contiguous Landowner to certify the structural integrity of the structure. The Contiguous Landowner must provide the City an inspection report signed by the qualified professional, indicating whether the structure is sound and free from any safety issues and in conformance with the Land Stewardship Design Standards. If the structure is found to have structural deficiencies, safety issues, or other non-conformances, then the Contiguous

Landowner shall have 30 days to resolve. If unable to resolve, the structure will require removal performed by the Contiguous Landowner.

3. The Contiguous Landowner must renew the Private Dock, Boardwalk, or Stream crossing permit by the annual deadline. Failure to renew the Private Dock, Boardwalk, or Stream crossing permit will be subject to the City's Encroachment enforcement procedures.
4. Once installed, requests to modify or renovate an existing Private Dock or Boardwalk must be submitted through the Land Stewardship Application and require prior written approval. The Contiguous Landowner is authorized to make minor repairs to the Private Dock and Boardwalk when necessary to ensure the safety of the users. These repairs must use identical replacement materials and may not alter the appearance or dimensions of the permitted structure.
5. Maintenance of a Private Dock or Boardwalk shall be conducted by hand, although motorized hand-operated equipment (e.g., saws, drills) is allowed, assuming their use does not impact areas outside the Private Dock or Boardwalk. No vehicles or heavy equipment shall be used on city property. Refueling of motorized equipment is not allowed on city property.
6. Pruning and trimming of vegetation along the Boardwalk or Private Dock in Wetland areas is limited to a maximum five foot wide by ten foot vertical area. In all other respects, Wetland crossings are subject to the same Vegetation Management restrictions as Overland Paths and Private Docks (Section 1.1 and 1.3).
7. Seasonal Dock Structures (i.e., those removed and stored during the winter months) must not be stored in Potential Wetland areas or directly on the Bank. Seasonal Dock Structures shall be stored on private property beyond the top of the Bank. The City will consider applications requesting approval for seasonal dock storage on city property along the Overland Path. Reinstallation shall occur in the previously used footprint in order to avoid or minimize damage to Wetlands.
8. No chemical treatments (e.g., paint, waterproofing) or power washing may be performed to a Private Dock, landing platform, Boardwalk, Steps, or Stairs while on city property.

1.7 NATURE PRESERVES

Some areas of city parkland surrounding Hoover, Griggs, and O'Shaughnessy Reservoirs are designated as Nature Preserves, which are managed by the Recreation and Parks department. While Contiguous Landowners adjacent to these areas are eligible to participate in the Land Stewardship Program, there are additional restrictions and limitations which apply within city-designated Nature Preserves. These restrictions are required to balance the Land Stewardship Program and Nature Preserve management objectives.

In addition to the other prohibitions found in Chapter 919, 912, 1117, or within these design standards, the following acts and uses are expressly prohibited in Nature Preserves unless authorized by a valid Land Stewardship Agreement, Permit, or by written permission. Activities performed by city personnel or authorized agents on behalf of city may be exempt from these prohibitions.

- Use of motorized on non-motorized vehicles, including, but not limited to snowmobiles, ATVs, motorcycles, bicycles, scooters, and mopeds. Official vehicles of the City, State or Federal agencies are permitted, as well as the use of handicapped accessible equipment on approved trails.
- Feeding any wild animal found within the confines of the Nature Preserves.
- Camping, hunting, trapping, wading, bathing, and swimming.
- Kindling, building, maintaining, or use of fire.
- Harassment of any of the animal life or disturbance of animal habitat including, but not limited, to trees, bat boxes, and bird nesting (including nesting boxes) locations.
- Littering, dumping, or burial of any refuse, debris, yard waste, fill, or soil.
- Allowing dogs, cats, livestock, horses, or other animals to enter a nature preserve, except for at designated locations in which animals must be controlled at all times on a leash not more than six feet long. This does not prohibit the use of a certified service animal.
- Traversing the Nature Preserve outside of approved trail or waterway.
- Storing materials or equipment for non-nature preserve projects.
- Constructing infrastructure that doesn't directly improve the nature preserve.
- Release of any wild of domestic animal, or plant culture, seed, or vegetation of any type.
- Collection, removal, or other disturbance of ice, soil, sand, gravel, rocks, fossils, mineral, trees, plant materials, animals, or any other natural substance.
- Any act or use that is not in compliance with the Nature Preserve Management Plan, or Land Stewardship Program.

Property Eligibility

Eligibility for Contiguous Landowners to perform stewardship activities within city-designated Nature Preserve areas will be evaluated by the City. Contiguous Landowners directly adjacent to a city-designated Nature Preserve may be eligible for an Overland Path, Private Dock, Steps, Embankment Stabilization, Wetland crossings, Invasive and Noxious Species removal, revegetation, and Hazardous Tree removal. Other Land Stewardship Program elements including Filtered View Corridors, Stairs, and special vegetation management areas are not allowed within city-designated Nature Preserves. Installation and maintenance of any stewardship activities on city-designated Nature Preserves requires prior written approval. The City reserves the right to deny proposed stewardship activities in city-designated Nature Preserves. Stewardship activities not implemented, installed, or maintained to the City's design standards, or determined to be a hazard to health and safety, will be subject to the City's Encroachment enforcement procedures.

Obtaining Approval for Stewardship Activities in a Nature Preserve

A Contiguous Landowner's request for stewardship activities within a city-designated Nature Preserve will follow the applicable design standards sections below, except the restrictions noted within the design criteria and materials:

1. Overland Paths (Section 1.1)
2. Steps (Section 1.2)
3. Private Dock (Section 1.3)
4. Invasive and Noxious Species removal (Section 1.5)
5. Revegetation (Section 1.5)
6. Hazardous Tree removal (Section 1.5)
7. Wetlands (Section 1.6)
8. Embankment Stabilization (Section 1.8)

DESIGN CRITERIA

The Land Stewardship Design Standards presented throughout this document will apply in city-designated Nature Preserves with the following additional conditions or restrictions.

1. All Overland Paths located in a city-designated Nature Preserve shall not exceed a width of five feet (Section 1.7).
2. Wood framed timber Steps may be permitted depending on the slope or site-specific conditions (Section 1.2).
3. Chemical treatments are prohibited in city-designated Nature Preserves unless associated with Invasive and Noxious Species removal. Chemical treatments for Invasive and Noxious Species removal must be reviewed and approved by both the Recreation and Parks Department and the Department of Public Utilities.
4. The Recreation and Parks Department and the Department of Public Utilities must both review and approve stewardship activities involving Embankment Stabilization, Invasive and Noxious Species removal or revegetation.
5. An Overland Path may not be approved if the location would threaten rare or endangered species of plants or wildlife. The Ohio Department of Natural Resources shall be considered the naming authority for these species.

MATERIALS

The Land Stewardship Design Standards presented throughout this document will apply in city-designated Nature Preserves with the following additional conditions or restrictions.

1. The installation of mulch, gravel, or Stepping Stones is prohibited in the construction of an Overland Path (Section 1.1)

1.8 EMBANKMENT STABILIZATION

The impact of water flow, wave action, and ice on a shoreline over time can cause substantial areas of Shoreline Erosion. Embankment Stabilization techniques are used to reduce the erosion rate or prevent Bank failure. Embankment Stabilization techniques are typically separated into soft and hard-armor options. Soft-armor techniques use primarily organic materials, such as the root mass of plants, to create a living barrier of protection. Revegetation, bioengineered banks, and reinforced banks are examples of soft-armor techniques. Hard-armor techniques are used where the root mass from vegetation would not be sufficient to prevent further erosion. The most common hard-armor technique is Riprap revetment, which is the engineered placement of large rocks in the water and up the slope of an eroding shoreline.

Property Eligibility

Embankment Stabilization requests which affect city property or city-held easements will be evaluated by the City on a case-by-case basis. Reservoir shoreline properties may be candidates for Embankment Stabilization if they have significant erosion and the potential for further erosion of either city or private property. Embankment Stabilization must be designed by a qualified professional (e.g., licensed engineer or landscape architect) to address the specific site conditions. Installation or maintenance of Embankment Stabilization on city property requires prior written approval. The City reserves the right to deny proposed Embankment Stabilization.

Obtaining Approval for an Embankment Stabilization

A Contiguous Landowner may initiate a request for Embankment Stabilization by indicating interest on the Land Stewardship Application form. The City will review the request and contact the applicant for an onsite meeting. If the preliminary evaluation determines the request may be approved, the Contiguous Landowner shall submit any additional documentation requested to the City for review. Obtaining approval for Embankment Stabilization is an iterative process. Embankment Stabilization projects may require state and federal permitting (e.g., Section 404/401 permitting), long-term maintenance obligations, erosion easements, and/or temporary construction easements. Where permitting is required, Contiguous Landowners will be responsible for completing the permit applications. Due to site variability, design complexities, and time required for review and approval, the expected timeframe to obtain city approval for Embankment Stabilization is several months at minimum. A Land Stewardship Agreement reflecting the revised design plan will be prepared and executed. The Contiguous Landowner will then receive a copy of the approved agreement and proceed with the authorized work.

Items to submit for preliminary review (after initial site evaluation):

- Land Stewardship Application, which will describe:
    - Location of proposed Embankment Stabilization
    - Detailed design for Embankment Stabilization with supporting design calculations and revegetation plans as required
    - Maintenance plan

DESIGN CRITERIA

Table 3 provides a comparison of different Embankment Stabilization techniques and their application, benefits, limitations, and relative costs. The techniques are shown from most preferred methods to least preferred.

Table 3. Embankment Stabilization Comparison Matrix

Preferability	Method	Application	Benefits	Limitations	Cost
Most preferred	Revegetation	• Existing slope of 33% (18°) or less • Low to moderate existing erosion • Low wave/wake action	• Re-establishes Native Vegetation and ecosystem function • Easy to implement	• Requires good soil for establishment • Effective only after root establishment • Not suitable for high energy areas (i.e., high wave/wake action)	Low
	Bioengineered Bank	• Proposed slope range of 33%-100% (18°-45°) • Low wave/wake action	• Re-establishes Native Vegetation and ecosystem function • Can rebuild areas previously lost to erosion	• Requires specialized installation techniques • Requires import and use of specialized materials • Fully effective only after root establishment	Moderate
	Reinforced Bank	• Proposed slope range of 33%-100% (18°-45°) • Moderate wave/wake action	• Re-establishes Native Vegetation and ecosystem function • Can rebuild areas previously lost to erosion	• Requires specialized installation techniques • Requires import and use of specialized materials • Fully effective only after root establishment	Moderate to High
Least preferred	Riprap Revetment	• Proposed slope range of 20%-100% (11°-45°) • High wave/wake action	• High resistance to wave action • Effective in areas where vegetative methods infeasible • Can rebuild areas previously lost to erosion • Low maintenance	• Must be founded on non-erosive material • Requires heavy equipment to install • Requires import of materials • Limited ecological function	High to Very High

Note: All Embankment Stabilization designs shall include protection below Normal Pool Elevation. Onsite conditions may require incorporation of multiple Embankment Stabilization techniques.

Examples of Embankment Stabilization:

The following is provided to give a general overview of Embankment Stabilization techniques, which may be appropriate based upon onsite conditions. Information and photos are for illustrative purposes only. Site-specific evaluation and professional design is a critical component of any proposed Embankment Stabilization project. Contiguous Landowners are not permitted to regrade, place fill, rock, or otherwise modify city property without prior written approval.

Revegetation

Vegetation is a critical component of a stable shoreline, providing energy dissipation, soil stabilization, and numerous ecosystem functions. Re-establishing this feature can be an effective way to correct shoreline problems (Figure 14). Once established, the deep roots of the plants protect the shoreline from erosion by holding the soil below, while the above-ground portions deflect wind and wave energy. Revegetation is applicable in areas with low to moderate slopes (typically ≤33% or 18°) and low to moderate existing erosion. The method typically begins by removing existing Invasive and Noxious Species by hand or mechanical means. The seed bed is then prepared by raking to minimize soil compaction. Native seed is sown with temporary soil stabilization measures, which could include a cover crop, mulch, biodegradable erosion control blanket, or a combination depending on specific site conditions. This method can be modified to include Woody Vegetation through the installation of live stakes, wherein dormant cuttings (typically collected November-March) from colonizing species (e.g., willow, dogwood, buttonbush) are directly inserted into the ground with a mallet or by hand in a pilot hole. These stakes add to the tensile strength and shear resistance of the soil by adding physical support from the woody portion of the stake and establishing vegetative material with a deeper rooting depth.



Figure 14. Revegetation Example During and After Construction

Successful implementation is limited by the presence of good soil for seed germination and root development. Revegetated areas become more stable with time as plants mature, but there is a time lag between installation and full effectiveness while root systems are developing. Maintenance of plantings (typically watering, replacement of dead material, and Invasive and Noxious Species management) may be required until vegetation becomes fully established. Beyond this establishment period (typically two to three growing seasons), maintenance is generally limited to Invasive and Noxious Species removal that shall be performed in accordance with applicable Vegetation Management design standards (Section 1.5).

Refer to *Natural Resources Conservation Service (NRCS) Technical Release 69* on the City of Columbus Watershed Management website for additional design details and procedures.

Bioengineered Bank

The bioengineered bank uses natural materials to construct a fill slope that can be used to rebuild an area previously lost to erosion, repair a previous fill, restore a shallow slump, or stabilize a loose slope (Figure 15). The slope is built by stacking 12 to 18 inch tall lifts of soil wrapped in coir fabric with layers of live branches (typically species used for live stakes) installed between the lifts. The outside face of the lifts is sown with native seed and mulched prior to wrapping with coir. Lifts are offset to create an average slope of 50% (27°, with a range of 33%-100% or 18°-45°) with approximately 75% of the live branches' total length buried between the lifts. The coir fabric provides initial structural stability and erosion resistance for the Bank. Once the vegetation becomes established, the root systems reinforce the fill, and exposed vegetative portions dissipate energy while the mass of fill provides global stability.



Figure 15. Bioengineered Bank During and After Construction

This technique can be used in areas that are steeper and subjected to more wave action than those that can be simply revegetated. Bioengineered banks are particularly well suited for situations where the existing Bank cannot be reshaped to a lesser slope. Bioengineering provides many of the advantages of more traditional hard-armor techniques while also enhancing the ecosystem function and aesthetics of the shoreline it repairs. Construction must incorporate installation of the live branches during the dormant season (typically November-March). Full benefits are not realized until the vegetation becomes established, but effectiveness increases with time and the coir fabric reinforcement helps mitigate the time lag. Maintenance of plantings (typically watering, replacement of dead material, and Invasive and Noxious Species management) may be required until vegetation becomes fully established. Beyond this establishment period (typically two to three growing seasons), maintenance is generally limited to Invasive and Noxious Species removal which shall be performed in accordance with applicable Vegetation Management design standards (Section 1.5).

Refer to *NRCS Technical Release 69* on the City of Columbus Watershed Management website for general design details and procedures. Bioengineered banks shall be designed and certified by a licensed Professional Engineer.

Reinforced Bank

Reinforced banks are constructed using bioengineering techniques with the addition of structural materials to further increase stability (Figure 16). They can be used in the same situations as bioengineering techniques but are better suited for higher energy scenarios that exceed the capabilities of coir fiber matting, but do not require hard-armor techniques. Therefore, the reinforced bank technique can provide many of the benefits of both bioengineering and traditional hard armoring. Typically, a fill slope is built by stacking lifts of soil wrapped in turf reinforcement mat (TRM), a web of interlocking synthetic fibers stitched between netting. Further structural support for the Bank is provided by placing geogrid, a webbed sheet of synthetic material with high tensile strength, horizontally between the TRM soil wraps. The face of the lifts is sown with native seed, and layers of live branches (typically species used for live stakes) are installed between the lifts. Approximately 75% of the live branches' total length must be buried between the lifts. This allows for development of a diverse native plant community on the rebuilt slope while enhancing the stability of the Bank.



Figure 16. Reinforced Bank Example Under Construction

The reinforced bank technique achieves natural aesthetics and ecological benefits not achievable by hard-armor techniques. The TRM and geogrid reinforcement have a long service life (up to 50 years) and provide stability from initial installation until after the vegetation matures. Consultation with a design professional is required to properly size and distribute the structural reinforcement in the Bank. Construction must incorporate installation of the live branches during the dormant season (typically November-March). Maintenance of plantings (typically watering, replacement of dead material, and Invasive and Noxious Species management) may be required until vegetation becomes fully established. Beyond this establishment period (typically two to three growing seasons), maintenance is generally limited to Invasive and Noxious Species removal which shall be performed in accordance with applicable Vegetation Management design standards (Section 1.5).

Refer to *NRCS Technical Release 69* on the City of Columbus Watershed Management website for general design details and procedures. Reinforced banks shall be designed and certified by a licensed Professional Engineer.

Riprap Revetment

Riprap revetment is used where vegetative methods are less effective, typically in steeply sloped areas, areas with substantial erosion, and/or those subject to high wave/wake energy (Figure 17). The primary limitation are the soils located below the structure; they must be stable enough to support the weight of the stone to be placed. The area to be protected is first graded in preparation for structure placement; the final slope shall be 100% (45°) or less. A layer of gravel bedding and/or geotextile fabric is placed on the prepared slope to act as a filter layer, which prevents soil piping through the voids in the rock installed above. If piping occurs, the structure will subside as bank materials move through the rock, eventually causing the structure to fail. Riprap is placed over the filter layer to the required thickness, which is typically two times the diameter of the median sized stone in the gradation selected. Riprap shall be durable limestone, dolomite, or granite to minimize weathering and shall be angular in shape to maximize aggregate interlock and resulting structure stability. Riprap placement will be required to a certain elevation both above and below the Normal Pool Elevation based upon site-specific conditions.



Figure 17. Riprap Revetment Example Before and After Construction

Riprap revetment provides immediate, substantial erosion protection to an unstable shoreline; however, the required materials provide limited ecological value. Consultation with a design professional is required to determine proper rock size, gradation, and Riprap layer depth. There is no establishment period as with soft-armor stabilization techniques, but the structure must be monitored periodically. Long-term maintenance may be required to control unintentional vegetation establishment, and if rock weathering, displacement, slumping, and structure settling occurs.

Refer to *NRCS Technical Release 210-69, Rock Riprap for Slope Protection Against Wave Action* on the City of Columbus Watershed Management website for general design details and procedures. Riprap revetment shall be designed and certified by a licensed Professional Engineer.

MAINTENANCE

1. Once established, requests to maintain to an existing Embankment Stabilization must be submitted through the Land Stewardship Application and require prior written approval.
2. Maintenance of Embankment Stabilization on city property shall be maintained by the City unless defined through applicable easements or the Land Stewardship Agreement.