



INDIGO ECOLOGICAL DESIGN &  
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# SEVEN BRIDGES RAVINE AT GRANT PARK RESTORATION CONCEPT PLAN

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PREPARED FOR THE FRIENDS OF GRANT PARK &  
MILWAUKEE COUNTY PARKS

OCTOBER 2024



## OVERVIEW

Grant Park is a lakeshore park in South Milwaukee, part of the Milwaukee County Park system. The Seven Bridges area within the park features a trail system that navigates a steep ravine and stream system, providing access to Lake Michigan. Milwaukee County Parks (County Parks) manages the park, but due to limited resources, certain areas have fallen into disrepair. The Friends of Grant Park, a non-profit organization made up of community members, assists in maintaining the park and has been actively working to restore the ravine area. However, like County Parks, their time, resources, and capabilities are limited.

Before 2020, the park saw regular use by visitors, and its features remained relatively undisturbed. However, during the COVID-19 pandemic, the number of visitors dramatically increased, leading to overcrowded trails and off-trail walking. Since then, compacted bare soil areas created by off-trail use have widened, and nearby bridges, walls, and streambanks have continued to deteriorate.



*Bluff erosion at mouth of ravine at Lake Michigan.*



*Yellow trout lily*

### SENSITIVE & RARE RAVINE ECOSYSTEM

The ravines along Lake Michigan serve as natural green infrastructure, providing open drainage to the lake. They help filter water, provide habitat for local wildlife and migratory birds, and are home to many rare plants. Additionally, the Seven Bridges area of Grant Park and its associated ravine system offer a valuable recreational amenity for the region, providing scenic access to Lake Michigan beaches.



## ISSUES

### WATER QUALITY

The stream at the bottom of the Seven Bridges ravine is fed primarily by stormwater from a pipe outfall at the upper end. Although upstream watershed improvements could significantly enhance water quality, the ravine already provides some water quality benefits before the water reaches Lake Michigan, where children often play. However, erosion has become an increasing problem in recent years. Off-trail walking has trampled vegetation on the slopes and invasive Norway maple trees on the banks have fallen over, leaving bare soil that washes into the ravine stream and, ultimately, Lake Michigan.



*Eroding banks and turbid water after a storm.*

### HABITAT LOSS

Increased park visitation has led to more off-trail walking, trampling delicate woodland plants and causing their demise. As more visitors stray from the trails, the walking surface expands, resulting in wider areas of bare soil. Runners, remote control car users, and children running up bluff slopes have exacerbated the issue, damaging native vegetation and disrupting the ecosystem.

### SAFETY

Several safety hazards exist for trail users in the Seven Bridges area. Erosion has washed out portions of the trail, dead trees near the paths pose a risk of falling, and stairs are uneven, broken, and lack railings. New trails run close to steep drop-offs without warnings or other safety measures, and existing stone walls adjacent to trails are deteriorating and leaning over the trail.



*Erosion around bridge foundations and turbid water after a storm.*



## RAVINE STREAM RESTORATION

Stream restoration will address both water quality issues caused by erosion and trail safety concerns due to encroaching streambanks. Flashy stream flows, fallen trees, and off-trail walking have contributed to streambank erosion. Previous restoration efforts placed stones in the channel bottom and at the toe of the slope, but many stones have shifted, necessitating additional protection. Erosion is compromising nearby trails, bridges, and the ravine slope, requiring targeted restoration strategies.



*Erosion at the toe of the ravine slope, threatening upper parts of the hillside.*



*Bank erosion threatening an adjacent trail that serves as the main access path to the beach shown at low water level and immediately after a short storm.*





*Example stream condition: Vegetated stream banks with cross vane structure.*



*Example stream condition: Vegetated stream banks with riffle structure.*

## STONE TOE PROTECTION

In areas where erosion is actively occurring, stones should be added to the banks up to the bankfull elevation (approximately four feet above the channel bottom). Rounded natural Wisconsin granite boulders will match the stream and ravine area's existing character. These boulders will also help protect existing bridge foundations from wash-out. This work should be coordinated with County Parks and upcoming bridge abutment repairs.



*Example stream condition: Natural stone toe protection and riffle in-stream structure.*

## REGRADE, FABRIC, & PLANT

Incised slopes should be regraded from the toe of the slope or top of stone toe protection to stable vegetated ground. During the design phase, care should be taken to minimize earthwork by balancing the amount of material to be imported or exported. Newly graded slopes should be seeded, covered with erosion control blanket, and planted for stabilization, water quality, and habitat.

## IN-STREAM STRUCTURES

Although head-cutting does not appear to be a major issue in the ravine stream, existing riffle structures have shifted, causing streambank erosion. Larger stones should be added to these riffles to prevent further shifting and direct water flow toward the center of the stream, reducing pressure on the banks and improving habitat. Debris jams that cause similar issues should be removed.



## WATER ACCESS

To address erosion caused by visitors trying to access the water, stacked outcropping stone can be added at key areas to provide stable access points, preventing further damage along the stream. This sanctioned access will serve as a point of least resistance and will help prevent new desire paths up and downstream.



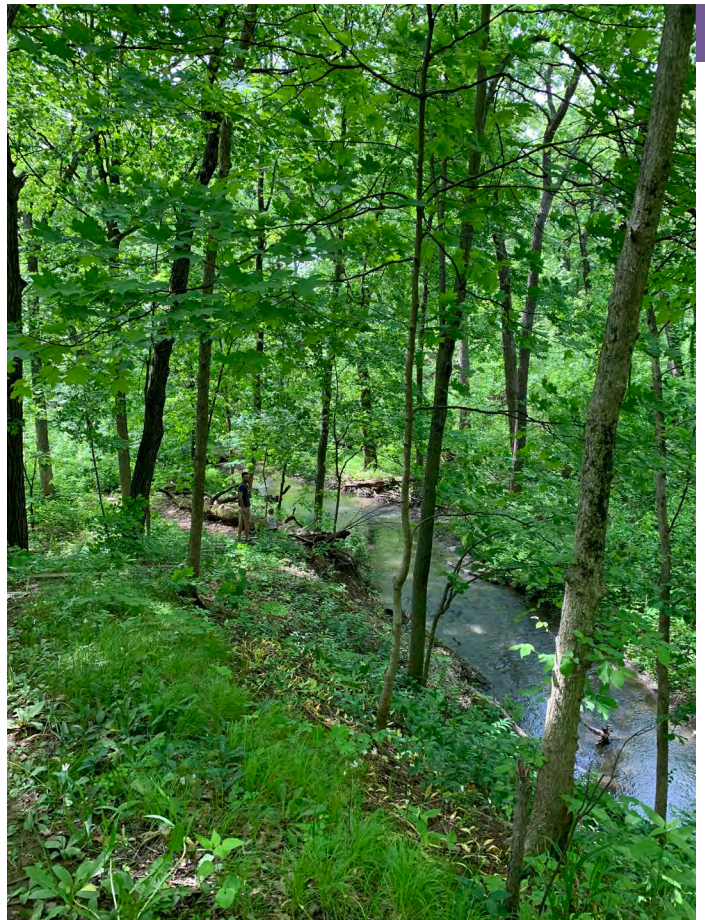
*Example water access: Stacked outcropping stone at key points along stream.*



*Example water access: Stacked outcropping stone at key points along stream.*



*Example water access: Stacked cut stone at key points along stream.*



*Example stream condition: Stream banks vegetated with native species.*



## SLOPE RESTORATION

Grant Park's landscape has been shaped by human activity over the years, which is evident in the current state of vegetation throughout the Seven Bridges ravine. While there are many high-quality native plants in this woodland ecosystem, there are also patches of exotic species, both invasive and non-invasive. For example, areas planted with *Pachysandra* are remnants of past landscaping efforts. These plants hold the soil in place but grow very slowly. The presence of non-native Norway maple trees has created additional challenges. These shallow-rooted trees dry out the surface soil, making it difficult for other plants to thrive within their root zone. Additionally, they are prone to falling over, especially near streambanks, due to their shallow roots.

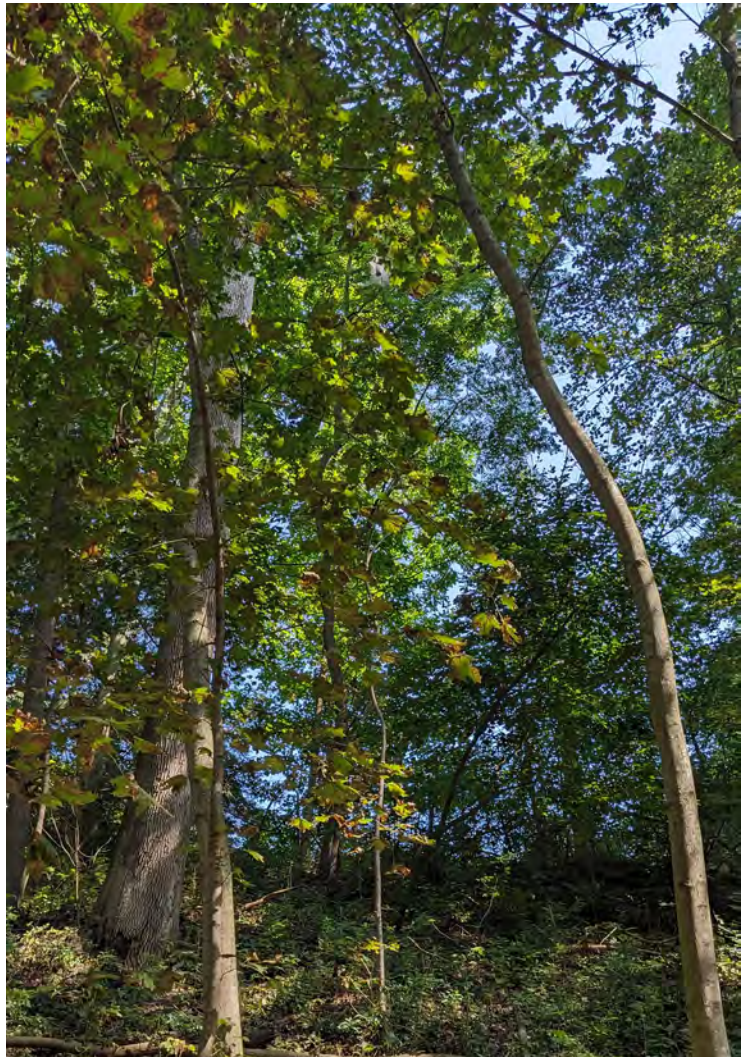
Human activities, such as off-trail walking, remote control car use, erosion from water, and the spread of invasive species, have led to vegetation loss throughout Grant Park. The restoration strategies described below should be implemented following the Milwaukee County Parks' Ecological Restoration Standards and Specifications.

### EXISTING VEGETATION MANAGEMENT

The selective removal of Norway maple trees along streams and on ravine slopes is recommended to gradually phase out this non-native species from the canopy. This wood can be utilized for stream restoration, trail edging or other restoration activities. Ongoing management of other invasive species, such as garlic mustard, buckthorn, and honeysuckle, should continue through hand-pulling where possible and cutting and spot-treating with herbicide when necessary. Additionally, areas with *Euonymus fortunei* near Lake Michigan should be closely monitored to ensure it does not spread or invade other areas of the park.



*Existing slope condition: Spotty areas of bare soil.*



*Existing vegetation: Norway maples on ravine slopes.*





*Existing bluff erosion and off-trail remote control car use. Image from Google Maps.*

## SOILS

In areas where trampling has compacted the soil, it should be lightly tilled or disked before seeding or planting to improve soil quality. Some bluff areas have eroded so severely that tree roots are exposed due to the loss of topsoil and sand. In these locations, new soil should be brought in to restore the original grade before seeding or planting. This effort should be coordinated with stream restoration grading to balance the earthwork, minimizing the amount of material that needs to be imported or exported.

## SEEDING

All bare soil areas within the project site should be seeded with a woodland seed mix that includes species native to the ravine ecosystem. Seed can be collected on-site or sourced from other local areas. It is estimated that roughly one-third of the project area will require seeding, including streambanks, trampled areas, and other ravine slopes that have washed out or where Norway maples have reduced groundcover.

## EROSION CONTROL

Biodegradable erosion control fabric with a lifespan of 36 months should be used to stabilize slopes while seeds and plants are becoming established. Coir logs, embedded in the ground every five vertical feet along the contour lines, can further improve erosion control and help with the establishment of vegetation. All bluff restoration shall follow the Milwaukee County Coastline Management Guidelines.



*Loss of vegetation due to off-trail use to be planted.*



*Proposed erosion control approach with erosion control fabric and coir logs.*





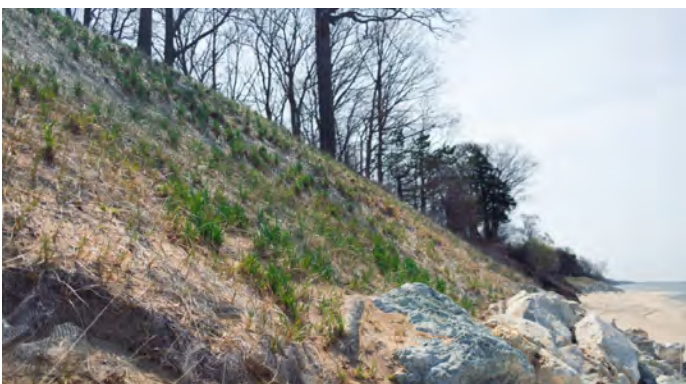
*Proposed plug planting through erosion control fabric after seeding.*



*Example lush, high-quality woodland plant community.*

## PLANTING

Native trees, such as white oak, shagbark hickory, and sugar maple, should be planted to replace the removed Norway maples. Native shrubs should also be planted in areas like the tops of walls to deter foot traffic and remote control car use. In slope restoration areas or adjacent to narrowed trails, supplemental plug plantings should be added to accelerate vegetation establishment and improve species diversity.



*Example bluff restoration with seeding, erosion control fabric, and planting.*



## TRAIL INFRASTRUCTURE

The trail infrastructure in the Seven Bridges area of Grant Park has deteriorated due to overuse and a lack of funding. Restoration strategies focus on improving trail surfaces, defining trail boundaries, and enhancing safety throughout the park.

### TRAIL SURFACING

Many of the trail areas consist of dirt paths that have expanded due to visitors walking off-trail. Adding a standard trail surface, such as gravel, can help define the trail limits and strengthen the walking surface. Gravel also drains water quickly, preventing the formation of muddy areas that often lead to the creation of new, undesigned trails. The historic paths were constructed with lannon limestone slabs, many of which remain today, though some have been covered or are missing. Stones around bridge landings should be reset to ensure they are level with the bridge surface, and new lannon stone should be installed to fill in gaps at the bottom of existing stairs and near the main bridge by the lake.



*Existing stair landing with missing lannon stone paving and adjacent wash-out.*

### TRAIL EDGING

In parts of Grant Park, granite boulders and fallen logs have been used as trail edging to keep visitors on the designated paths. Extending this approach to the upper bluff trails and along the stream will help define the walking surface and provide a high-ground area for visitors to step onto during wet conditions. Granite boulders embedded in the ground will also serve as excellent edge restraints for the lannon stone paths and should be added where edging is missing.



*Existing example of boulder trail edging successfully preserving adjacent vegetation.*



*Existing trail with boulder edge protecting slope vegetation and opposite side without edging expanding.*





*Existing timber stair in disrepair to be removed.*



*Newer existing stair on the south side of the ravine to be used as model for proposed stair.*



*Wooden bluff stair at Virmond Park. Photo courtesy of Ozaukee County.*

## STAIRS

Two existing sets of stairs are in poor condition. The first is an old timber stair with small sections of asphalt between steps. It lacks a handrail, and the steps are crumbling and eroding. This stair receives little use and should be removed. The second stairway, made of limestone, connects to the upper bluff trails but is cracked, uneven, and lacks a handrail. Additionally, its bottom is located in an area that is not intuitive to beachgoers, causing visitors to traverse the slope instead. Assess existing stones from the stair for potential reuse for a new stair or for paving stones.

We recommend installing a new stairway with a graspable handrail opposite the main bridge by the lake, utilizing part of the existing desire line path and working with the nearby topography. In this location, the stair can be constructed of stone slabs with connecting asphalt sections, similar to the stair south of the bridge. Alternately, a structured stair, potentially made with a combination of steel structure and wood planking and utilizing the already trampled bluff slope, should be studied. This area comes with soil stability and coastal challenges, but may be the most functional and preserve the remaining existing vegetation best.

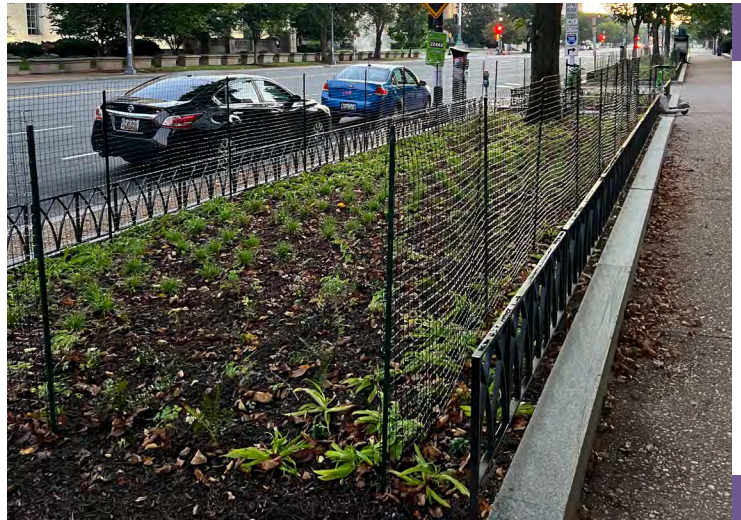
## FENCING

Fencing is not the preferred method for keeping visitors on the trails, but it is necessary in certain key areas. The bluff along the lake is one of the park's steepest, most erodible areas and is being actively degraded by visitors. A standard County Parks log fence, similar to the one used south of the ravine, should be installed along the top of the bluff to provide a safe barrier and prevent visitors from traversing the slope. Another fence should be installed at the bottom of the slope, where most foot traffic originates, however, this can be a temporary welded wire fence set back from the beach to minimize visual impact. Temporary fencing, consisting of short metal stakes and connecting ropes, should also be installed between trails and restoration areas to signal that these areas are off-limits. These low-cost fencing options can also be used to keep visitors off the tops of walls and away from the stream.





*Example log fence to be used at the top of the bluff to protect slope.*



*Example temporary sand fence to be used at the base of the bluff slope to keep people off.*



*Example temporary stake and rope fence to protect restoration areas.*

## BOARDWALKS

Boardwalks should be added where seepage causes trails to remain wet, where the soil has subsided, and where grading issues make traditional trails difficult to maintain. A boardwalk/overlook structure with a railing should be added at the top of the bluff setback from where the stream meets the beach. This area is the most severely eroded in the park, but it is also a popular point of interest for visitors. Adding this feature will create low-impact access at the top of the bluff while blocking access to the slope, preventing further erosion along the bluff.



*Example overlook character.*

## BRIDGES

As the name of the area suggests, the bridges are a central feature of the park. Many of these historic bridges have been rebuilt over the years following major storms. While recent repairs have improved the bridge railings, several bridge foundations are at risk of being undermined by erosion. As indicated in the restoration map, stone toe protection should be added or repaired around select bridge foundations to safeguard them from future erosion. One particular bridge foundation is leaning and requires ongoing observation and further study to determine if reconstruction is necessary.





*Existing exposed bridge foundation.*



*Uneven trail and bridge surface with muddy landing area where a boardwalk connection is proposed.*

## WALLS

Vandalism, foot traffic on top of the walls, and age/hydrostatic pressure have contributed to the deterioration of the historic walls throughout the ravine. One major wall along the north branch of the ravine is leaning significantly and needs to be rebuilt. During reconstruction, care should be taken to stabilize the slope, and the existing stones should be reused as much as possible. Drainage should be installed behind the wall to relieve hydrostatic pressure. All walls should be protected by planting shrubs and herbaceous plants above them, with temporary restoration fencing to aid establishment. It was observed that a downed log on top of one wall prevented visitors from walking on it, allowing vegetation to re-establish. This could be considered as part of the restoration strategy.



*Existing leaning stone wall to be rebuilt.*



*Existing trails along the top of walls to be restored.*



## SIGNAGE

Signs play a crucial role in helping park users navigate and understand the importance of the ravine ecosystem and the ongoing restoration efforts. While excessive signage can be overwhelming, strategically placed signs will help protect the park and inspire visitors to become environmental stewards.

### MAPS

Although the Seven Bridges area is not vast, its network of trails, bridges, stairs, and elevation changes can make navigation challenging. A key issue is the bluff near the lake, where visitors, unaware of nearby stairs, climb the slope, damaging vegetation. A few well-placed map signs could help visitors navigate the area using designated paths and stairs, reducing off-trail movement. Three map signs are recommended to guide park visitors through the ravines, ensuring they use appropriate trails and stairs.



*Example sign with map and interpretive features.*



*Example interpretive sign and map.*



*Existing Oak Leaf Trail Map in other parts of Grant Park.*

### INTERPRETIVE ELEMENTS

Interpretive signs that highlight the unique ravine ecosystem can foster an appreciation for the delicate plants and wildlife inhabiting the area. Instilling respect for nature will encourage visitors to stay on the trails and protect the landscape.



*Example interpretive element.*



## STAY ON THE TRAIL

The Friends of Grant Park have already installed small signs throughout the park, reminding visitors to stay on designated trails. These signs should remain, with additional signs placed at locations where new desire paths (informal trails created by foot traffic) have emerged.



Existing signs encouraging visitors to stay on the trail.



Example sign showing impact of off-trail use.

## RESTORATION IN PROGRESS

Temporary “Restoration in Progress” signs can be useful during the early stages of restoration, as newly restored areas often appear more disturbed than established landscapes. These signs will inform visitors of ongoing efforts and the importance of protecting newly planted areas, especially when seedlings are young and vulnerable.



Example temporary sign noting restoration-in-progress.



Example temporary sign noting restoration-in-progress.





**PLAN KEY & LEGEND**

- ① Stone Toe Protection
- ② In-Stream Structure Repair
- ③ Water Access
- ④ Regrade, Fabric & Plant

- ⑤ Gravel Trail
- ⑥ Trail Edging
- ⑦ Lannon Stone Trail
- ⑧ Boardwalks
- ⑨ Overlook

- ⑩ Remove Stairs
- ⑪ New Stone Stairs
- ⑫ Signage
- ⑬ Slope Restoration
- ⑭ Wall Reconstruction

- ⑮ Log Fence
- ⑯ Temporary Fence
- ⑰ Overseeding
- ⑱ Invasive Tree Removal & Replanting
- ⑲ Alternate Wood Stairs



# OPINION OF PROBABLE CONSTRUCTION COST

Item	Item	Quantity	Unit	Unit Cost	Item Total	Subtotal
01	<b>General Requirements</b>					
	1. Mobilization/Demobilization	1 LS	\$	80,000.00	\$ 80,000	
	2. Survey and Layout	1 LS	\$	10,000.00	\$ 10,000	
	<b>Subtotal</b>					\$ 90,000
12	<b>Furnishings</b>					
	3. Map Sign	3 Each	\$	5,000.00	\$ 15,000	
	4. Interpretive Signage	3 Each	\$	3,000.00	\$ 9,000	
	5. Stay on Trail Sign	6 Each	\$	500.00	\$ 3,000	
	6. Temporary Restoration in Progress Sign	8 Each	\$	250.00	\$ 2,000	
	<b>Subtotal</b>					\$ 29,000
31	<b>Earthwork</b>					
	7. Earthwork	1.0 LS	\$	20,000.00	\$ 20,000	
	8. Soil Augmentation	176 CY	\$	90.00	\$ 15,873	
	9. Remove Debris Jam	2.0 EA	\$	2,500.00	\$ 5,000	
	10. Remove Existing Steps & Asphalt	44 CY	\$	150.00	\$ 6,556	
	<b>Erosion and Sedimentation Controls</b>					
	9. Tracking Pad	278 SY	\$	22.00	\$ 6,111	
	10. Erosion Mat - NAG C125BN or C700BN	0.47 AC	\$	13,500.00	\$ 6,320	
	11. Coir Logs	1,320.0 LF	\$	6.00	\$ 7,920	
	<b>Subtotal</b>					\$ 67,780
32	<b>Exterior Improvements</b>					
	<b>Hardscape</b>					
	12. Trail Edging - granite boulders	305 LF	\$	27.50	\$ 8,388	
	13. Trail Edging - log edging	305 LF	\$	7.00	\$ 2,135	
	14. Rebuild Existing Stone Wall w/Drainage	660 FF	\$	40.00	\$ 26,400	
	15. Reset Lannon Stone Paving	200 SF	\$	5.50	\$ 1,100	
	16. New Lannon Stone Paving	350 SF	\$	24.69	\$ 8,642	
	17. Lannon Stone Steps	76 EA	\$	1,170.00	\$ 88,920	
	18. Stair Handrail	120 LF	\$	150.00	\$ 18,000	
	19. Gravel Trail	2,132 SF	\$	6.00	\$ 12,792	
	20. Asphalt Trail -between steps	156 SF	\$	12.00	\$ 1,872	
	21. Stream Access Outcropping Stone	37 TON	\$	480.00	\$ 17,820	
	22. Boardwalk	325 SF	\$	55.00	\$ 17,875	
	23. Boardwalk Handrail	77 LF	\$	150.00	\$ 11,550	
	24. Trail Fence	256 LF	\$	75.00	\$ 19,200	
	25. Temporary Fence - welded wire, 4' ht.	492 LF	\$	5.18	\$ 2,546	
	26. Temporary Fence - stake and rope	1,273 LF	\$	3.38	\$ 4,296	
	27. Stone Toe Protection - natural granite boulders	203 TON	\$	412.50	\$ 83,600	
	28. Cross Vane - existing stone	4 EACH	\$	6,500.00	\$ 26,000	
	<b>Landscape</b>					
	<b>Site Prep</b>					
	29. Spot herbicide invasive species; 2 treatments	1.0 AC	\$	1,500.00	\$ 1,500	
	30. Clear and Grubbing	0.5 AC	\$	5,000.00	\$ 2,500	
	31. Tree Removal	1.0 LS	\$	30,000.00	\$ 30,000	
	<b>Irrigation</b>					
	32. Temporary Watering	1 LS	\$	15,000.00	\$ 15,000	
	<b>Seeding</b>					
	33. Woodland Seed Mix	2.3 AC	\$	9,000.00	\$ 20,291	
	<b>Plant Materials</b>					
	34. Perennial Plugs	20,391 Each	\$	10.00	\$ 203,910	
	35. Shrubs - 3 gal.	200 Each	\$	120.00	\$ 24,000	
	36. Trees 5 Gallon	150 Each	\$	180.00	\$ 27,000	
	37. Trees 1-1 1/2" Cal.	50 Each	\$	650.00	\$ 32,500	
	<b>Landscape Maintenance</b>					
	38. Management of Plantings (All Zones, 3 Years)	6.76 AC	\$	10,000.00	\$ 67,643	
	<b>Subtotal</b>					\$ 775,480
	<b>Construction Subtotal</b>					\$ 962,259
	Construction Contingency & Remaining Elements	20%			\$ 192,500	
	A/E Design & Permitting Fees	10%			\$ 96,225.94	
	<b>Project Total (Construction, contingency, design, and permitting)</b>					\$ 1,250,985
	<b>Alternates</b>					
	1. Alternate Wood stair	1 LS	\$	200,000.00	\$ 200,000	