Stone Wall Repair Workshop

Ellsworth Gardens

by Mary Graves

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Ellsworth Rock Gardens
Voyageurs National Park
2007

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EXECUTIVE SUMMARY

The Ellsworth Rock Gardens were determined eligible for the National Register in 1998, as an extraordinary and unique American art environment and outstanding example of mid-twentieth century vernacular landscape architecture. Jack Ellsworth, carpenter/building contractor from Chicago, constructed the Ellsworth Rock Gardens in a forested area on the north shore of Lake Kabetogama between 1944 and 1965. He and his wife Elsie spent summers on the lake transforming a 60-foot granite outcrop near their summer home into a grand garden. The Ellsworth Rock Gardens are a major visitor destination in Voyageurs National Park, attracting approximately 100 people a day from mid-May to mid-September.

Mr. Ellsworth used stone in a number of ways in the gardens. He first constructed 65 terraced flower beds which he filled primarily with tiger lilies, but augmented with a variety of other flowers. He created over 200 sculptures—spires, monuments, pyramids, multi-tier tables, and whimsical figures. He edged paths with stone, used stones to direct water away from and to desired areas, and used stone for other functional elements such as benches, bridges and steps.

The purpose of the stone wall workshop was to provide hands-on training for park staff, Ellsworth volunteers and others interested in learning to build and repair drystone walls. The intent was to create a cadre of trained personnel to continue work at the gardens and also increase the availability of trained workers for future projects in the park or other historic sites in the country with similar resources. Voyageurs acquired funding through grants and donations to bring master stonemason Neil Rippingale of the Dry Stone Conservancy to the park to teach the workshop.

A few walls required complete dismantling, some required disassembly of short segments to repair collapsed sections, other walls required only removal of the top layer of rocks or the top layer and the course below. Historic photographs were used when available to replicate the original appearance of the wall as closely as possible. Participants had the opportunity to work on different wall types including retaining, free-standing and double-boulder. The group of seven trainees repaired 617 linear feet of wall during the week, exceeding the estimated 150 linear feet of repairs. An optional stone wall construction day was offered to trainees at an off-site location to reinforce their understanding of the principles of drylaid stone construction. Four trainees constructed a 4’x15’ section of dry-stacked stone wall during this session (see photographs in Appendix C).

INTRODUCTION

The project site is the historic Ellsworth Rock Gardens located on the northern edge of Kabetogama Lake in Voyageurs National Park. Built between 1944 and 1965 by Chicago carpenter/contractor Jack Ellsworth (1899-1974), the Ellsworth Rock Gardens are a composite of 65 terraced flower beds constructed on a 60-foot granite outcrop, punctuated by some 200 delicately-balanced rock sculptures. During its peak (mid-1960s), the gardens bloomed with a profusion of perennial and annual flowers, drawing thousands of visitors across the lake to experience the "showplace of Lake Kabetogama."

Ellsworth Rock Gardens ca1959

The stone walls are an essential feature of the gardens. Ellsworth mortared most sculptures in place but he used a traditional technique for the rock walls and dry-stacked them without mortar. Ellsworth gathered stone for his walls and sculptures from the immediate area. Schist, granite and gneiss are easily found on or just below the surface of the ground in the forests surrounding the gardens. The elegant, finely-constructed dry-stacked stone walls form the flower beds and define pathways and borders throughout the garden.

The stone walls are level and typically range in height from 18"-36" with at least one wall over 6 feet tall. The stones are irregular in shape and size with some extremely large boulders incorporated into the walls. The walls throughout the gardens represent an evolution of Ellsworth's proficiency in their construction. Those that have been identified as less skillfully built are presumably indicative of his earlier work. Walls constructed later exhibit an impressive degree of craft, finesse, and structural integrity.

Ellsworth topped many of the walls with a distinctive white layer or "frosting" of crushed gneiss, a very coarse-grained metamorphic rock. Gneiss consists of a small amount of quartz, which provides the small chunky gray grains, and a large amount of feldspar, which gives the "frosting" its white color (correspondence from Brian Klawiter 4/17/2007).

ca1963↑
ca1959↓

ca1963↑
ca1965↓

Examples of Ellsworth's use of "frosting" on stone walls

The Ellsworths left Kabetogama in 1965 when Mr. Ellsworth became ill. The National Park Service acquired the property in 1978 but efforts to preserve the gardens did not start in earnest until 2001. Without regular maintenance over a nearly 20-year period, the gardens became overgrown and paths and other features were obscured under dense vegetation. However, since the gardens had become such a popular place, people continued to visit, resulting in new social trails and damage to some landscape features.

The Dry Stone Conservancy assessed the condition of stone walls in July 2005 and recommended priorities for repair (report dated March 17, 2006). The majority of walls are sound and have good integrity. Integrity is highest where dense vegetation or more precarious footing protected walls from visitors and animals (especially deer). Over time, rock walls were displaced by animals and visitors and damaged by fallen trees and vandals. Some walls had become structurally unsound and a threat to visitor safety and the integrity of the walls. A few problems may be attributed to the original construction, however while some of Ellsworth's wall-building techniques were unconventional, the majority of these walls have survived the test of time. All of the walls have naturally weathered and are lichen covered. While this affects the look of the walls, it probably will not impact the condition of the walls.

Impacts to stone walls generally include:

- Intrusive vegetation (especially grass, vines, and shrubs)
- Large amounts of accumulated organic material
- People, animals and tree roots dislodging rocks
- Compaction from foot traffic
- Vandalism
- Uninformed repairs
- Displaced "frosting" from wall tops

Examples of damaged stone walls

METHODS AND MATERIALS

In July, 2006, the park sponsored a stone wall repair workshop with the Dry Stone Conservancy to begin repairs to damaged dry laid stone walls. A group of nine participants repaired approximately 600 linear feet of wall. Building on the success of the 2006 workshop, the park organized a second workshop in 2007 to continue repair of damaged stone walls at the gardens.

Stone wall before repairs

Same wall after repairs in 2006

Neil Rippingale, master stone mason at the Dry Stone Conservancy in Lexington, Kentucky, was the instructor for the workshop. Neil has been training program manager of the Dry Stone Conservancy since 2001. He attended the Barony Agricultural College in Dumfries, Scotland from 1975-1978, was previous owner and managing director of N.R. Stonecraft in Edinburgh and worked as an independent construction and walling contractor in Midlothian, Scotland. Neil has received several prestigious awards for his work including first place wins in Central Scotland Walling Competitions and the Pinnacle Award (the highest award presented by the Dry Stone Walling Association). Neil has worked in Australia, Switzerland, Scotland, England, Nova Scotia, Montreal and in 25 of the 50 states in the United States and taught drystone walling to over 3000 trainees over the past 18 years.

The workshop started with a classroom session at the Kabetogama Lake Visitor Center to review safety, tools and equipment and to introduce participants to basic dry stone construction theories, uses and principles. The instructor distributed informational materials including Building & Repairing Dry Stone Fences and Retaining Walls and showed an instructional video illustrating how to build and repair drystone walls from preparing the ground through finishing construction.

The group then traveled by boat to Ellsworth to begin hands-on repairs of damaged stone walls at the gardens. Participants initially worked as a group on the first wall to benefit from the instructor's one-on-one direction, learn basic principles, and gain practical experience. Later the group split into pairs or smaller groups as they gained experience and confidence to work on other walls. The following principles and rules were applied and frequently reviewed:

Basic Principles

- Length running into the wall
- Cover your joints
- Pack from the inside
- Lay stones level

Neil's Five Golden Rules

1. Lay one stone and pack it
2. Lay five stones and look
3. Build to the line
4. Don't build above the line
5. Don't hammer on the wall

RESULTS AND DISCUSSION

The group of seven trainees repaired seventeen sections of stone wall or 617 linear feet of wall during four days at the gardens. A few walls required complete dismantling, some required dismantling of short segments to repair collapsed sections, and the majority of walls required only removing the frosting layer or the frosting layer and the course below to dig out embedded

grass, roots, pine needles and other organic material. Rocks were carefully removed and set on the ground in the position they came off the wall so they could be replaced in the same position in the wall. Historic photographs were used when available to replicate the original appearance of the wall as closely as possible. Repairs to walls are generally described below and in more detail in the field notes in Appendix A.

FREE-STANDING PERIMETER WALL

This is one of six sections of free-standing stone wall that divide the summit of the garden from what appear to be Mr. Ellsworth's working parts of the garden, containing compost containment areas and piles of rock. Although there are sculptures beyond this wall, it seems that they were meant to be viewed from a distance or represent areas of the garden that were works in progress. This wall is different in that instead of frosting, it was topped with a rail fence. A 40' section of this stone wall was repaired by removing rocks to base, cleaning out organic debris, and restacking the wall. The wood fence will be reconstructed in the future based on historic photos and fence remnants that can still be found on site.

Historic photo of wall ca1963

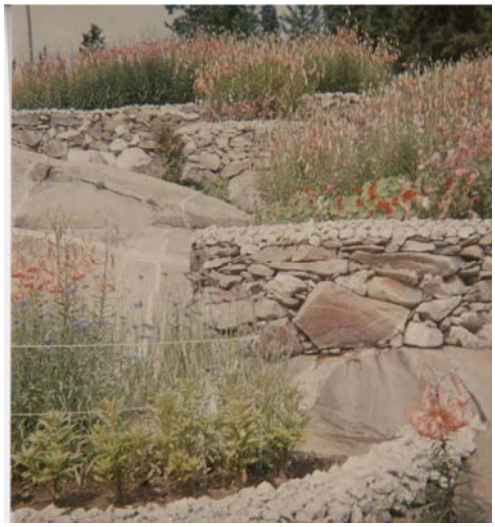
Before repairs—note remnant of fence

Repairs in progress

Repairs completed

FLOWER BED RETAINING WALLS

Ellsworth constructed approximately 65 flower beds throughout the garden. These are small beds built directly on granite outcrops and filled with soil. At the base of the garden and at the summit, the beds are constructed of low stone retaining walls. On the steep slopes, the beds are constructed in series of terraces and measure three to six feet in height on the downhill side. The trainees repaired the stone retaining walls of 15 small flower beds by taking away the first and sometimes second layer of rock, cleaning out grass, weeds, and other accumulated soil and organic debris, and replacing the rocks. The crew then covered the beds with black plastic to minimize the growth of grass and weeds until the beds can be planted in flowers.



Typical Ellsworth flowerbeds mid-1960s

<u>Flower bed A</u>

This bed is located at the base of the garden near the site of the Ellsworth's summer home. The front of the bed is more formal with frosting covering the wall, while the wall on the backside is constructed of cobbles.

Subject bed with yellow flowers in background ca1961

Before repairs

Repairs in progress

Final repairs

Flower Bed B

A small but prominent flower bed mid-way down the granite slope, this flower bed required repairs to a section of wall that was slumping on the downhill side.

Subject bed located in center of photo; ca1963

Before repairs

Repairs in progress

Completed repairs

Flower Bed C

The crew removed the frosting layer, cleaned out the pine needles and other organic debris and replaced the frosting on this small flower bed located on the summit.

Repairs in progress

Repairs in progress

Repairs completed

Series of Terraced Flower Beds

This is a series of terraced flower beds flanking a stairway that is part of the primary entrance path into the gardens from the base of the hill. This side of the slope is quite steep so the downhill sides of the flower beds typically measure three to four feet in height. A thick layer of organic debris had accumulated in these beds from many years of being overgrown with balsam trees. A large amount of frosting, wall rocks, and an occasional sculpture piece were found in these beds from flower beds located above. The work was primarily limited to removal of the frosting layer, cleaning out organic material and replacing the frosting. A drainage feature was uncovered in one of the terraced walls toward the base of the garden.

Visitors coming up the primary entrance path ca1963

Repairs in progress

Repairs in progress

Completed repairs

Completed repairs

Drainage feature in stone wall

Flower Beds D and E

Two flower beds adjoin on the path going down the granite slope. The stone walls of both of these beds had become entrenched in thick sod and moss. The crew removed the frosting layer, dug out the sod and moss and replaced the frosting. In addition, the instructor repaired a corner of one bed which had been damaged.

Before repairs

After repairs

During repairs

After repairs

Flower Bed F

Located at the base of the hill and behind the much-photographed table and chair sculpture, this flower bed had become thickly embedded with grass. The crew removed the frosting layer and embedded grass and restacked the frosting.

Subject flower bed on far left ca1959

Repairs in progress

Repairs in progress

Completed repairs (bed on left)

KABETOGAMA OVERLOOK WALL

A series of stone walls overlook Kabetogama Lake and separate the summit from the terraced gardens below. Breaks in the wall provide access to areas below via stone steps or following natural contours in the granite outcrop. Much of the missing frosting that covered this wall was recovered from the terraces below.

Section of Kabetogama overlook wall ca1963

Repaired section of same wall

Section of Kabetogama overlook wall ca1961

Repaired section of same wall

Section of Kabetogama overlook wall ca1963

Repairs in progress on same wall

View of overlook wall from below ca1963

Repaired section of wall

BOULDER WALLS

Ellsworth used boulders to define walkways or edge paths, flower beds and other features such as ponds and the teepee ring located on the summit. He constructed both double boulder and single boulder walls.

Example of single boulder wall ca 1959

Double boulder wall before repairs

Repairing double boulder wall

Completed repairs

FREE-STANDING WALLS

Located in an area of the gardens that was recently covered in dense vegetation, these walls are more crudely constructed than most others built by Mr. Ellsworth. It may represent an area of the gardens that has not been finished or it could reflect earlier construction. The function of these walls is also not clear and it will take additional research of this area of the gardens for the walls to make sense. Work was limited to cleaning out organic debris from between the rocks and repairing one section that had fallen over.

Before repairs

Repairs in progress

Completed Repairs

CONCLUSIONS

Completing repairs to the stone walls in a workshop setting achieved the results the park set out to accomplish. The project resulted in a cadre of trained individuals to continue work at Ellsworth and increased the availability of craft skills for future projects—skills that are transferable to other historic sites in the country that have similar resources.

Repairs resulted in an immediate, dramatic difference in the visual quality of the gardens, restored structural stability where it had been compromised, prevented loss of historic fabric, and advanced visitor understanding of the history and significance of the gardens.

The workshop also resulted in information needed to make future repairs including:

- Dismantling of walls to the foundation rocks should be undertaken only where absolutely necessary to restore structural stability or repair badly damaged sections. Although some of Ellsworth's techniques may reflect inexperience or divergence from custom, it is critical to retain the distinctive character of Mr. Ellsworth's walls to the extent possible.

- When repairing stone retaining walls, it is necessary and prudent to address issues with the planting beds at the same time. With very little maintenance from the time the Ellsworths left the gardens in 1965 until 2001 when the park began rehabilitation, flower beds became seriously overgrown with trees, shrubs, and grass. Trees have been cut but stumps and roots remain imbedded in walls. Grass and vines are a constant challenge and roots have become intertwined in the walls. While there is not time during a wall repair workshop to dig up entire flower beds, it is worthwhile to complete some maintenance of the flower beds. This includes removing stumps that are in close proximity to walls, removing the top course of rocks to clean out roots before replacing rocks, and digging soil and vegetation within eight-ten inches from the inside of stone walls. The beds should then be covered with heavy plastic to discourage new growth until flowers can be planted. These extra steps will also prevent damage to newly repaired walls when intrusive vegetation is removed in the future.

- Vegetation should be cut away from the sides of walls once a year to aid in checking condition and prevent growth of woody vegetation. Trees should not be allowed to grow beside walls where roots can make the foundations unstable and eventually displace rocks.

- Damaged walls should be repaired as soon as possible.

- Excess rock is an unanticipated outcome of stone wall repair. As walls are dismantled and rebuilt, the amount of rock used in the wall intuitively should not change. Despite methodical sorting of rocks and deference to Ellsworth's construction methods, rocks may not be positioned exactly the same way when rebuilding—rocks may be reshaped to fit a particular spot and rocks in the immediate vicinity may be used for repairs that weren't originally part of the wall. This resulted in extra rock from nearly every wall repair. Extra rock from wall repairs should be stockpiled in one place and identified as such. This rock could be used for future repairs where needed.

- Future repair of rock walls should only use those rocks specifically identified as excess from previous repair work or other rocks found that can clearly be identified as those used in the construction of Ellsworth's walls.

- Rocks used for repairs in stone walls should be carefully inspected to avoid incorporating sculpture stones into the walls. Absent telltale mortar, sculpture stones may be difficult to recognize, especially for anyone not intimately familiar with Ellsworth's work.

- Protocol for routine maintenance of the walls and to minimize future threats should be incorporated into the Cultural Landscape Report. The protocol should address maintenance of the "frosting," removal of hazard trees, removal of tree roots and other vegetation at the base of walls and along inside edges of flowerbeds, planting procedures, and mowing/weed-whipping practices.

- Stone walls that need repair should be prioritized using the following factors:

  1. Walls that are structurally unsound and a threat to visitor safety will be the highest priority for repair.

  2. Walls that have structural defects that may threaten the integrity of the wall over time are considered a high priority.

  3. Walls that are prominent in historic photographs or important to defining visitor pathways are considered a high priority for repair. Walls with good photo documentation would be a higher priority than those without.

  4. Any new damage to stone walls through vandalism, fallen trees, etc. should be repaired as soon as possible.

  5. The gardens have been divided into management zones with specific treatment actions defined for each area and for features within each zone. The prescribed treatment considers historical integrity, level of documentation, and existing or potential threats. The prescribed treatment for the Central Terrace Zone, where historical integrity is high and stone walls exhibit Ellsworth's more skillful construction, is preservation. Minimal intervention should be the goal for any walls within the Central Terrace Zone needing repair.

ACKNOWLEDGMENTS

I would like to acknowledge the importance of the Dry Stone Conservancy's mission to "*revive and promote the ancient craft of dry stone masonry and to preserve existing dry stone structures"* and its value to historic sites like the Ellsworth Rock Gardens.

I would like to thank program director Jane Wooley for sending us expert stone mason, fine instructor, and gentleman Neil Rippingale, who kept us motivated, on track, and amused. Thanks to Chris Morris, Dave Chute, Mark Buechel, Al O'Bright, Geoff Burt, and Beau Readman who generously took time out of their regular jobs to work in the extreme heat, annoying flies and occasional rain shower to advance the preservation of a very unique cultural landscape.

The workshop would not have been completed without the generosity and support of the following organizations who contributed financially.

National Center for Preservation Training and Technology

Mission: *"NCPTT advances the application of science and technology to historic preservation. Working in the fields of archeology, architecture, landscape architecture and materials conservation, the Center accomplishes its mission through training, education, research, technology transfer and partnerships."*

Kirk A. Cordell, Executive Director
Contributed $5,000

Voyageurs National Park Association

Mission: "The mission of the Association is to protect and promote the nature, recreational and historical resources of Voyageurs National Park."

Cory McNaulty, Executive Director
Contributed $1,000

Friends of Voyageurs National Park

Mission: "The mission of the Friends is to sponsor outreach that supports natural, historical and educational activities available at Voyageurs National Park."

Jo Kallemeyn, President
Contributed $500

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Appendix A: Stone Wall Repair Workshop Field Notes

Ellsworth Rock Gardens
July 23-27, 2007

1. Perimeter wall behind serpent sculpture (#57)
   40’ (L) x 12” (H) x 28” (D)
   Removed rock to base, cleaned out organic debris, restacked
   Large amount of excess rock at downhill end that looks like sculpture pieces but no mortar found. Left this rock in a pile near wall.
   Photos 2a-2h

2. 2 connecting flower beds below raven sculpture (#67)
   18’ (L) x 19” (H) x 16” (D)
   30’ (L) x 28” (H at corner) x 16” (D)
   Removed frosting, dug out grass & organic debris, replaced frosting
   Neil repaired corner that was damaged during blitz
   Photos 15a-15d

3. Bee balm flower bed behind picnic shelter
   29’ (L) x 12” (H) x 16” (D) of stacked wall with frosting at the front of bed
   20’ (L) x 12” (H) x 16” (D) of cobble wall at back of bed
   Front of bed generally located between sculptures 176 & 100
   Back of bed constructed of cobbles, not well defined & appears to incorporate a path leading back in the woods (to gateway found in 2006?)
   End of bed near sculpture 176 impacted by 3 large trees
   Large amount of grass and organic debris removed between rocks; redefined edges of bed to the extent possible
   Photos 1a-1d

4. Flower bed located between sculptures 43 & 44 and near arrow sculpture (#45) on the granite outcrop descent path
   Wall is level with ground on uphill side and 3’ tall at the tallest point on the downhill side
   33’ (L) x 3’ (at tallest point) x 16” (D)
   Removed frosting, dug out thick sod & other organic material, replaced frosting, repaired section on downhill side that had slumped
   Photos 7a-7d

5. Small flower bed on upper terrace near leaf sculpture (#108). A round boulder with missing top (sculpture #104) is located at one end of stone wall. Other end of wall butts up against a bedrock outcrop.
   19’ (L) x 10” (H) x 12” (D)
   Removed frosted, cleaned out organic material, and replaced frosting.
   Photos 4a-4d

6. 36’ long section of Kabetogama Lake overlook wall from staircase at teepee ring west to corner
   3” (H) on summit side; average of 16” (H) on hillside; 18” (D)
   Retrieved a lot of rock fallen down hill; this wall is still missing a lot of frosting
   Photos 3a-3b

7. 29’ long section of Kabetogama Lake overlook wall between staircases
   10” average (H) on summit side; 14” average (H) on hillside; 18” (D)
   Retrieved rock fallen down hill
   Photos 8a-8b

8. Small flower bed immediately below wall 7above and at top of gateway ascent path
9’ (L) x 18” (H) x 10” (D)
Removed frosting, cleaned out organic debris and replaced frosting
Visible on bottom of photo 18b

9. 48’ long section of Kabetogama Lake overlook wall between sculpture #76 & sculpture #144
At ground level on summit side; 36” maximum height on hillside; 20” (D)
Redefined summit-side edge; removed top layer, cleaned out organic debris and restacked wall
Photos 18a-18f

10. Series of terraced flower beds on east side of primary entrance path
a. 16’ (L); 36” average height on downhill side; 14” (D); cleaned frosting layer
b. 12’ (L); 14” average height on downhill side; 12” (D); cleaned frosting layer
c. 27’ (L);
d. 20’ (L); 56” at tallest point on downhill side; 12” (D); cleaned frosting layer
Photos 10a-10g

11. Series of small terraced flower beds on west side of primary entrance path in association with sculpture #155 (the “knight”)
a. 29’ (L); 16” average height on downhill side; 18” (D); cleaned frosting layer
b. 14’ (L); 36” average height on downhill side; 12” (D); cleaned frosting layer
c. 8’ (L); 20” average height on downhill side; 13” (D); cleaned frosting layer
d. two 8’ connecting sections above knight; 20” average height on downhill side; 12” deep; cleaned frosting layers
Photos 9a-9j

12. Single boulder wall (continuing repairs from 2006) and double-boulder wall at base of garden east of primary entrance path from below sculpture #8 east to sculpture #2
30’ (L) x 12” (H) x 12” (D)
Rolled boulders out one at a time, removed grass and accumulated soil from between rocks and rolled back in place
Photos 5a and 5e

13. Single boulder wall at base of garden between sculpture #2 and table & chair (sculptures #3 & 4)
16’ (L) x 10” (H) x 8” (D)
Rolled boulders out one at a time, removed grass and accumulated soil and rolled rocks back in place
Photo 19

14. Flower bed wall at base of garden starting from table & chair and east to bedrock
20’ (L) x 12” (H) x 14” (D)
Removed sod and accumulated soil from frosting layer.
Photos 20a-20g

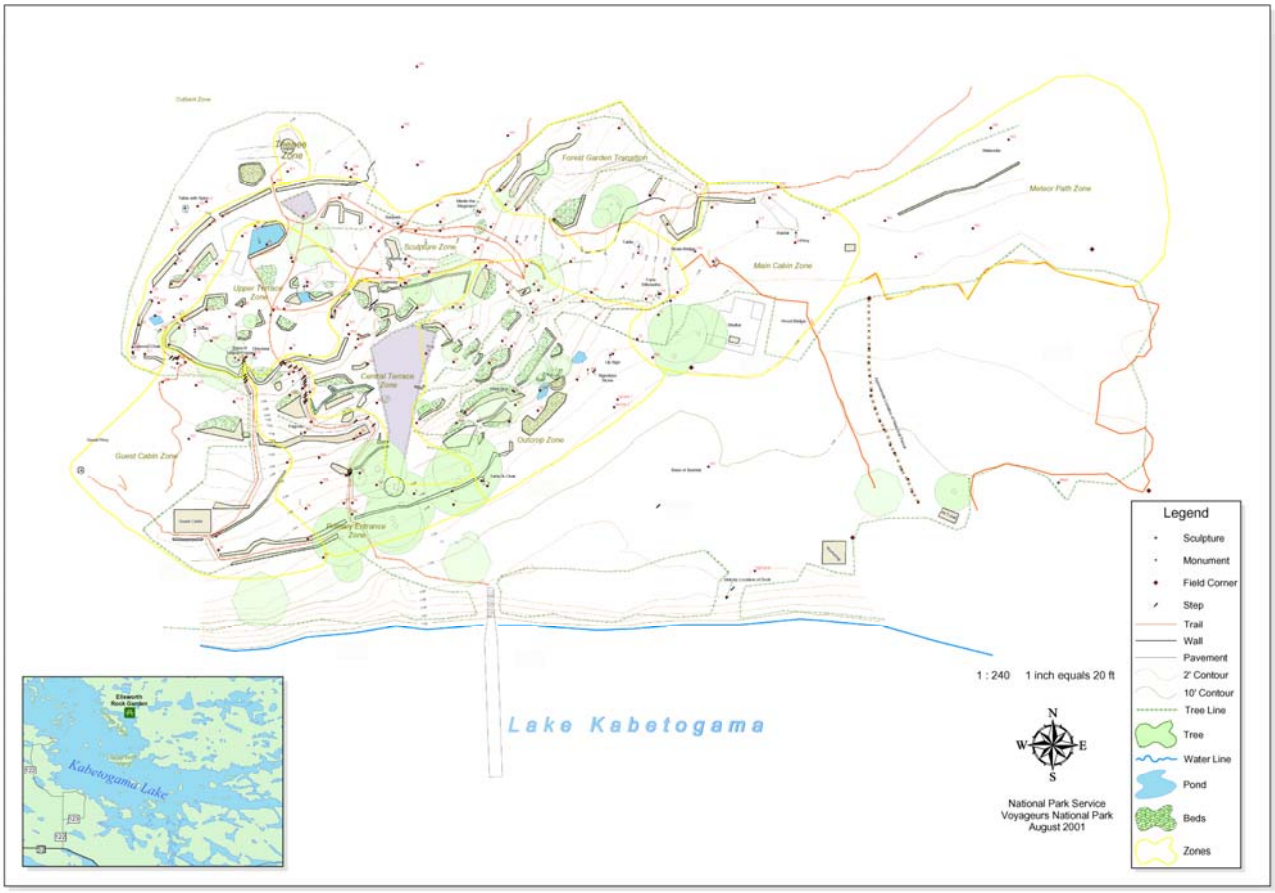
15. 16’ long section of wall between pagoda sculpture (#83) and base of garden at primary entrance
Average height 32” on downhill side; 21” (D)
Cleaned debris and accumulated organic material from top layer of rocks. This wall does not have frosting.
Drainage feature uncovered at west end of wall.
Photos 11a & 11b

16. Wall on upper terrace from top of western-most staircase (at sculpture #112) north to sculpture #113 across from small pond
13’ (L) x 16” (H) x 26” (D)
Removed top layer, cleaned and restacked
Photos 12b & 12d

17. Walls in newly exposed area north of perimeter wall and east (below) teepee zone. One 34’ long section of wall extends between sculpture #164 and sculpture #165 and the other section extends from sculpture #164 approximately 35’ to the north. These are crude rubble walls approximately 24” H and 16” D. There is no frosting on these walls. Neil reset fallen boulders between sculpture #163 & #164 flanking a possible staircase.
Photos 14a-14i

ELLSWORTH ROCK GARDEN

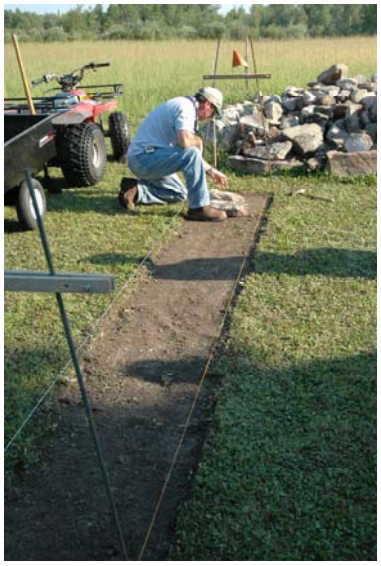
Site Plan



Appendix C: Optional one-day stone wall construction course

Preparing ground for wall construction

Setting batter frames



Laying the first stone

First course completed

Laying the cover course

Building the coping layer

Completed section of wall