RECEIVED BY THE CONSERVATION COMMISISON, 8/30/23

KESTREL LAND TRUST

To: Town of Shutesbury – Community Preservation Committee
From: Kestrel Land Trust
Su: Ames Pond Update
Date: August 15, 2023

In its 2022 application to the Community Preservation Committee, Kestrel Land Trust (KLT) proposed to maintain the existing recreational opportunities at Ames Pond by rehabilitating and restoring trails, thus ensuring continued, safe public access to a community resource. We applied for CPA funding to support Phase 1 of this project, which focused on the parking and entrance area.

All the proposed Phase 1 work (listed below) has been completed as of May 2023.

Parking Area Improvements

- Expand and resurface with pervious material the existing 900-sf parking area to accommodate up to 8 vehicles
- Remove a large thicket of mostly invasive plants between the parking area and entrance meadow
- Install a kiosk at the trailhead

Accessible Trail & Viewing Platform

- Re-define the opening section of the trail with a crushed stone walkway
- Construct a puncheon-style wooden walkway through the meadow
- Install a wooden viewing platform at the meadow art installation near the pond edge

All these elements are accessible to people with mobility limitations, expanding access to a pond view.

By creating adequate parking, establishing a well-defined dry path, and minimizing users' impacts on the wet meadow, this work has improved overall public access to the site while protecting natural resources. Maintenance will include installing a larger, more durable kiosk map and managing invasives via monitoring and manual removal.

A separately funded Phase 2 project (2023-24) will replace the bog boardwalk, add a new wetland crossing, repair a puncheon-style wooden walkway, close trail sections as needed, stabilize the stone steps, and add signage. KLT is currently refining the plans for this project and fundraising to cover costs.

Thank you for your continued support as we strive to make Ames Pond a sustainable, welcoming, and accessible nature retreat for the community.

P.O. Box 1016, Amherst, MA 01004
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ACCREDITED LAND TRUST ACCREDITATION COMMISSION

RECEIVED BY THE CONSERVATION COMMISION, 8/30/23

Proposed Project Changes

Ames Pond Trail Maintenance – MA DEP#286-0291

Wendell Rd., Shutesbury, MA

Proposal by Walker Korby (Terramor, LLC) for
Kestrel Land Trust, PO Box 1016, Amherst, MA 01004

Submitted: August 28, 2023

Summary

Kestrel Land Trust proposes the following changes to the work outlined in our Notice of Intent:

A) Bog Boardwalk Improvements – See Figure 5, Wetland Delineation, Maps 2-3, attached

Approved Plan

- Within the bog (D, E & F wetlands), replace the existing boardwalk with a boardwalk supported by hand-driven Great Northern Docks galvanized pipe piers.
- Special Condition: No refueling of power equipment shall be allowed except in the area designated for a parking area.

Proposed Changes - Details page 4

- Within the bog (D, E & F wetlands), replace the existing boardwalk with a boardwalk supported by machine-driven helical piles (see example diagram and technical specs, attached).
- The machine to be refueled at the work site with special precautions.

B) Puncheon Improvements – See Figure 5, Wetland Delineation, Map 4, attached

Approved Plan

- Within the forested wetlands (K & L-wetlands), repair degraded portions of the 4-ft. wide puncheon.
- Extend puncheon length by 12 linear ft.

Proposed Changes - Details page 6

- Within the forested wetlands (K & L-wetlands), replace the entire puncheon with a boardwalk supported by specialized diamond piers, which are installed using battery operated or electric hand-held equipment (see example diagram, attached).
- Extend puncheon length by 60 linear ft. (approx. 30 ft added to each end), and reduce the width from 4 to 3 ft.

C) Mowing

Approved Plan

Special condition: Annual mowing of the A-series BVW shall occur only after the ground is frozen in November or later.

Proposed Change - Details page 7

As previously approved, tractor mowing of the A-series BVW shall occur only after the ground is frozen in November or later. Mowing when the ground is NOT frozen may be done using small-scale, walk-behind motorized equipment.

See Summary Table, next page

Summary Table

Current, Previously Approved, and Proposed Impacts

	Project & Wetland ID	Wetland Type & Jurisdiction	Current	Previously Approved	Proposed
A	***Bog Boardwalk Improvements*** Wetlands D, E & F	Palustrine Shrub Swamp [bog] BVW	1,248 sq ft	2,458.5 sq ft	2,641 sq ft
B	***Puncheon Improvements*** Wetlands K & L	Palustrine Forested Wetland (BVW & RFA)	378 sq ft	426 sq ft	450 sq ft
C	***Mowing*** Wetland A	Palustrine Emergent Marsh (BVW & RFA)	N/A	Mowing in frozen conditions only	Mowing allowed in non-frozen conditions using small-scale, walk-behind motorized equipment

See Additional Information, next page

Additional Information

Rationales, Work Details & Site Considerations

A) Bog Boardwalk Improvements

Rationale for the Change:

After extensive site analysis, we have determined that soil type and depth within the bog setting dictates the use of machine-driven helical piles (see Helical Pile Example Diagram, attached). Driving depths to properly penetrate load-bearing soil and ensure a stable supporting structure exceed practical limitations of hand-driven supporting systems. Site soil strength observations suggest that driving depths will be a minimum of 5 ft. and could exceed 10 ft.

Helical piles have the following benefits:

1. The lifespan of the boardwalk's supporting structure will be dramatically increased. The supports could potentially remain viable for over 100 years. A long lifespan eliminates any need to disturb the resource area for maintenance or replacement of structural supports for decades to come. Pipe piers cannot offer that level of durability.
2. The boardwalk frame and decking can be repaired or replaced with no change to the structural support system .
3. Unlike pipe piers, installed helical piles will not shift in any way. This (a) minimizes or eliminates the need to repair the structural supports, and (b) ensures a perfectly level support system for the boardwalk deck, important for long-term accessibility.
4. Helical piles do not displace soils (the Army Corp of Engineers considers them in the "No Fill" category for wetlands).
5. Helical piles can be unscrewed and removed (and reused) if ever required, with little impact.

Construction Details & Site Considerations

The helical piles, or screw piles, will be installed using a tracked hydraulic machine no wider than 39 inches, and no heavier than 4,000 lbs. The machine will be supported by 5x8 ft., temporary aluminum deck sections resting on the current boardwalk, acting as marsh mats. The existing boardwalk width of 1.5 ft. will support at least half the weight of the temporary deck sections and substantially reduce overall site impact. The supporting temporary deck sections will distribute the weight of the machine and workers for an impact of less than 1.5 lbs. psi (per square inch). (Adult humans have a foot pressure between 2.5-3.5 lbs psi.)

The temporary deck sections are 3.5 ft. wider than the existing boardwalk, with vegetation impact limits estimated to be no more than 21 inches on each side of the current corridor footprint. No vegetation cutting or removal is planned. Vegetation will be compressed along that corridor, and any broken branches will be trimmed after removal of aluminum mats. Because work will happen during the dormant season, vegetation will rebound in the growing season.

Piles are installed in pairs, spaced 36 inches apart. Sets will be installed every 11 ft., for a total of approx. 180 pile locations. Due to the unstable upper bog soils (more than 5 ft. thick in areas), piles may need to be driven more than 10 ft. deep to properly penetrate load-bearing soil. Cross-bracing within the structure may be necessary for lateral support. If required, additional piles will be installed at strategic locations. See technical spec for Mascore Helical Pile (attached).

The piles can be installed during the dormant season, ideally when the ground is frozen. Piles can even be installed when there is snow on the ground. This timing greatly reduces residual impacts of the work. The frame and boardwalk can then be built in early spring when the weather is less of a factor for efficient construction and is more amenable for volunteer help.

Access for work on the bog boardwalk will be through the main entrance and along the route indicated on Map 5 - Wetland Delineation - Overview (first map in the attached series). Materials will be staged in the parking area and brought out on this access with a 48" wide trailer with high flotation low impact tires, pulled behind a small, wide tracked motorized material handling machine, designed for pulling logs out of sensitive areas. We plan to bring only the material needed for each day's work. Any material or equipment that needs to be left in place for more than 24 hours will be stored along the trail outside the 100 ft BVW buffer.

The boardwalk will be built from the SE end to the NW end (far to near). The plan is to move the machine across the bog in one direction, using the aluminum dock pieces as marsh mats, on top of the existing boardwalk. Once at the far end we will begin to install piles, and work back towards the NW end installing as we go. The existing boardwalk will serve as a walkway for bringing materials out to the machine. Once the piles are all in, the machine will be removed and construction can begin on the frame and the decking. The existing boardwalk will be pulled up just before each section of frame and decking is installed in that location. Old decking will be brought from the work site with the same low impact machine that brings the materials in and will be taken off site and disposed of properly. Any gaps in infrastructure during construction will be bridged with aluminum docking pieces or scaffolding to keep workers out of the bog.

Rather than moving the machine back and forth from the work site to shore and back again, we can minimize impacts by leaving the machine in place on the aluminum decking at the end of the day. Special precautions will be taken: (a) The machine will rest on absorbent mats designed to soak up oils and hydrocarbons, but not become saturated with water. (b) The hydraulic fluid in the driving machine will be an industrial biodegradable type. (c) Refueling will be done with spill-proof containers in conjunction with the absorbent mats.

B) Puncheon Improvements

Rationale for the Change:
After additional site analysis, we have determined that the current puncheon structure does not fully span the existing wetland, falling short on either end by 30 linear feet. Additionally, the current structure is of unknown age (assumed older than 20 years), raising concerns about its longevity even with the proposed repairs. We propose that the best course of action is to fully replace the puncheon with a boardwalk in conjunction with the other planned boardwalk improvements. The boardwalk will be supported by diamond piers (see Diamond Pier Example Diagram, attached).

Replacing the entire puncheon structure will have the following benefits:

- Adding to the length of the crossing increases protection of the resource area.
- Eliminates concerns about limited life functionality of the current structure, and the potential need for repair or replacement in the near future.
- Eliminates the need for significant repairs within this resource area for 20 years.
- Ensures that the quality of this crossing is commensurate with the other infrastructure across the trail system.

Construction Details & Site Considerations:
The new structure will be constructed on the current puncheon footprint. Diamond piers are specialized precast concrete blocks that are secured by four galvanized steel rods driven into the soil. They perform well in soil that is sandy or has a high amount of clay, silt, or water. The four pins driven through the pier and into the ground provide a large support base for the pier, so that the weight of the boardwalk is supported by a much larger area than just the footprint of the pier. The angles of the rods counteract the freezing and thawing forces, allowing for the concrete blocks to be installed with only 10-12 inches of hand digging for each pier, minimizing construction impacts. The rods will be driven with battery operated or electric hand-held equipment.

The piers will be installed during the dormant season. Working from the far (northern) end to the near (southern) end, we will use the existing boardwalk as staging, pulling it up and removing it as we work backwards towards the near side. Access will be via the existing driveway from Wendell Rd., along the route indicated on Map 5 - Wetland Delineation - Overview (attached). Materials will be staged on the trail near the intersection with the driveway and will be transported by hand, using the low impact tracked materials handler if needed. We plan to bring only the material needed for each day's work.

C) Mowing

Rationale for the Change:

The winter of 2022-2023 has shown us that with the effects of climate change, our region may frequently experience years when the ground remains substantially unfrozen, a condition that inhibits mowing using wheeled tractors. We anticipate that the current special condition allowing mowing only when the ground is frozen will prevent mowing altogether in warmer years, undermining KLT's ability to maintain the current vegetation composition in the meadow. For management flexibility, when conditions prevent mowing with a tractor, we propose to use a DR Power Equipment walk-behind brush cutter (see image below).

Details & Site Considerations:

The walk-behind brush cutter sits on two powered wheels and has a 34 inch wide cutting deck. Total weight is 340 pounds, considerably less than a tractor/brush cutter combination. We estimate the psi of this machine to be 10-14, standard for lawn mowers.

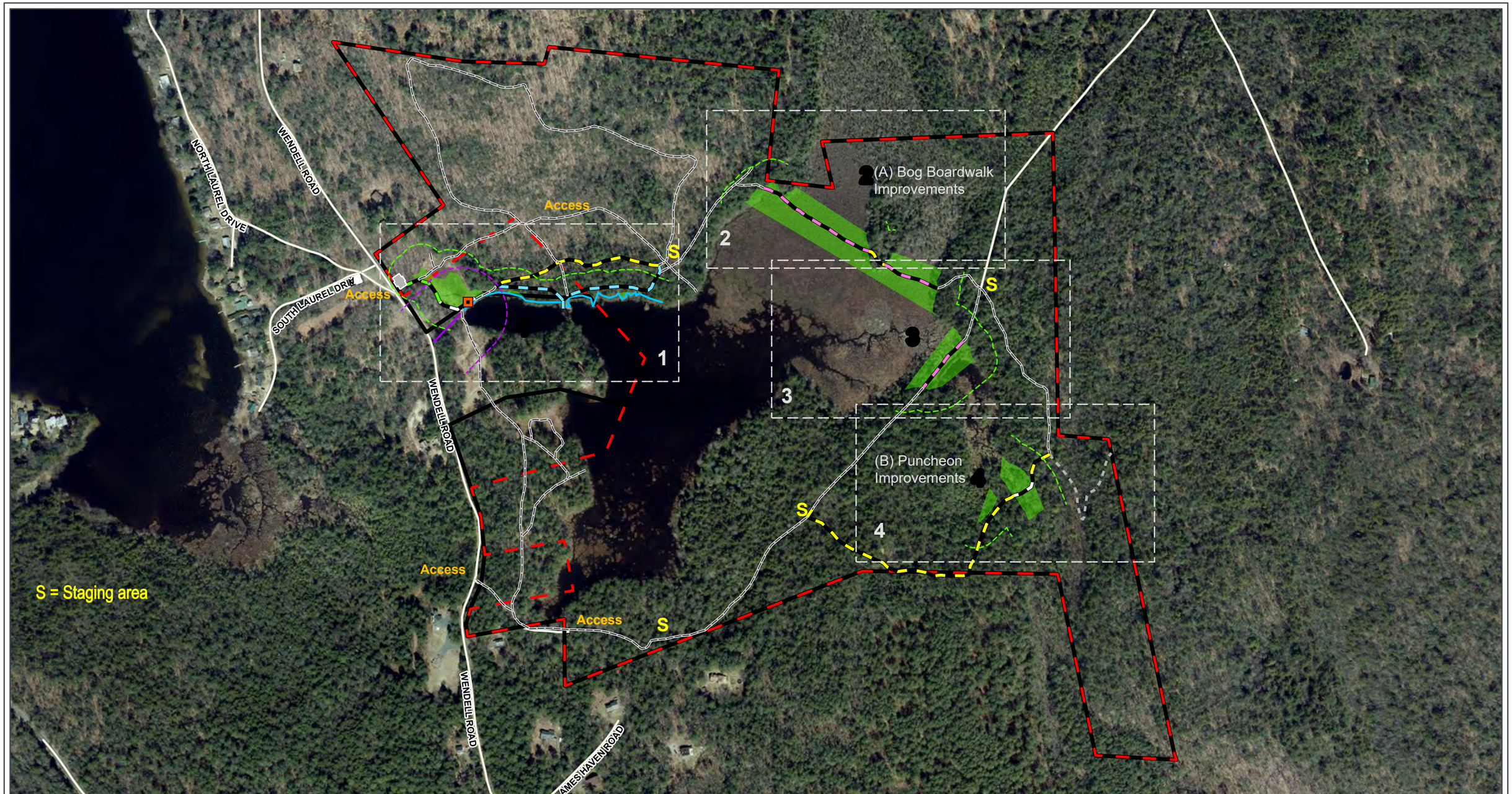
Mowing timing would be made based on current conditions observed during KLT's regular maintenance. Indicators for mowing would include a run of dry weather, low-flow or dry ephemeral streams, and firm, dry soil upon inspection. Seasonality might include late summer, fall or winter.

Walk-Behind Brush Cutter:

Maps & Diagrams

On the following pages please find:

- Figure 5 - Wetland Delineation - Overview (showing access & staging)
- Figure 5 - Wetland Delineation - Maps 2 & 3 – Bog Boardwalk Improvements
- Figure 5 - Wetland Delineation - Map 4 – Puncheon Improvements
- Helical Pile Example Diagram
- Mascore Chance Helical Pile Technical Specifications
- Diamond Pier Example Diagram



AMES POND TRAIL RESTORATION

Figure 5. Wetland Delineation

Overview

SWCA ENVIRONMENTAL CONSULTANTS

- Proposed Viewing Platform
- Boardwalk
- Existing Trail - No Maintenance
- General Maintenance
- Proposed Accessible Trail
- Puncheon
- Repair / Stabilize Rocks
- Trail Closure
- 100-Foot Buffer Zone
- 200' Riverfront Area
- Road
- Top of Bank
- Mean Annual High Water Line
- Bordering Vegetated Wetland
- Conservation Restriction Boundary
- Map Index
- Proposed Parking Area
- Property Boundary

Shutesbury, MA
USGS 7.5' Quadrangle:
Millers Falls
Shutesbury
72.4167°W 42.4978°N

N

1:5,000

Base Map: ESRI ArcGIS Online, accessed June 2022

Updated: 6/30/2022
Project No. 69584

0 250 500 Feet

0 50 100 Meters

AMES POND TRAIL RESTORATION

Figure 5. Wetland Delineation

Map 2 of 4

SWCA® ENVIRONMENTAL CONSULTANTS

- Boardwalk
- Existing Trail - No Maintenance
- General Maintenance
- Wetland Flag
- 100-Foot Buffer Zone
- Delineated Wetland Line
- Road
- Bordering Vegetated Wetland
- Conservation Restriction Boundary
- Property Boundary

Shutesbury, MA
USGS 7.5' Quadrangle:
Millers Falls
Shutesbury
72.4151°W 42.5004°N

N

1:1,000

Base Map: ESRI ArcGIS Online, accessed June 2022

Updated: 6/30/2022
Project No. 69584

0 50 100 Feet
0 10 20 Meters

AMES POND TRAIL RESTORATION

Figure 5. Wetland Delineation

Map 3 of 4

SWCA ENVIRONMENTAL CONSULTANTS

- Boardwalk
- Existing Trail - No Maintenance
- General Maintenance
- Wetland Flag
- 100-Foot Buffer Zone
- Delineated Wetland Line
- Road
- Bordering Vegetated Wetland
- Conservation Restriction Boundary
- Property Boundary

Shutesbury, MA
USGS 7.5' Quadrangle:
Millers Falls
Shutesbury
72.414°W 42.4986°N

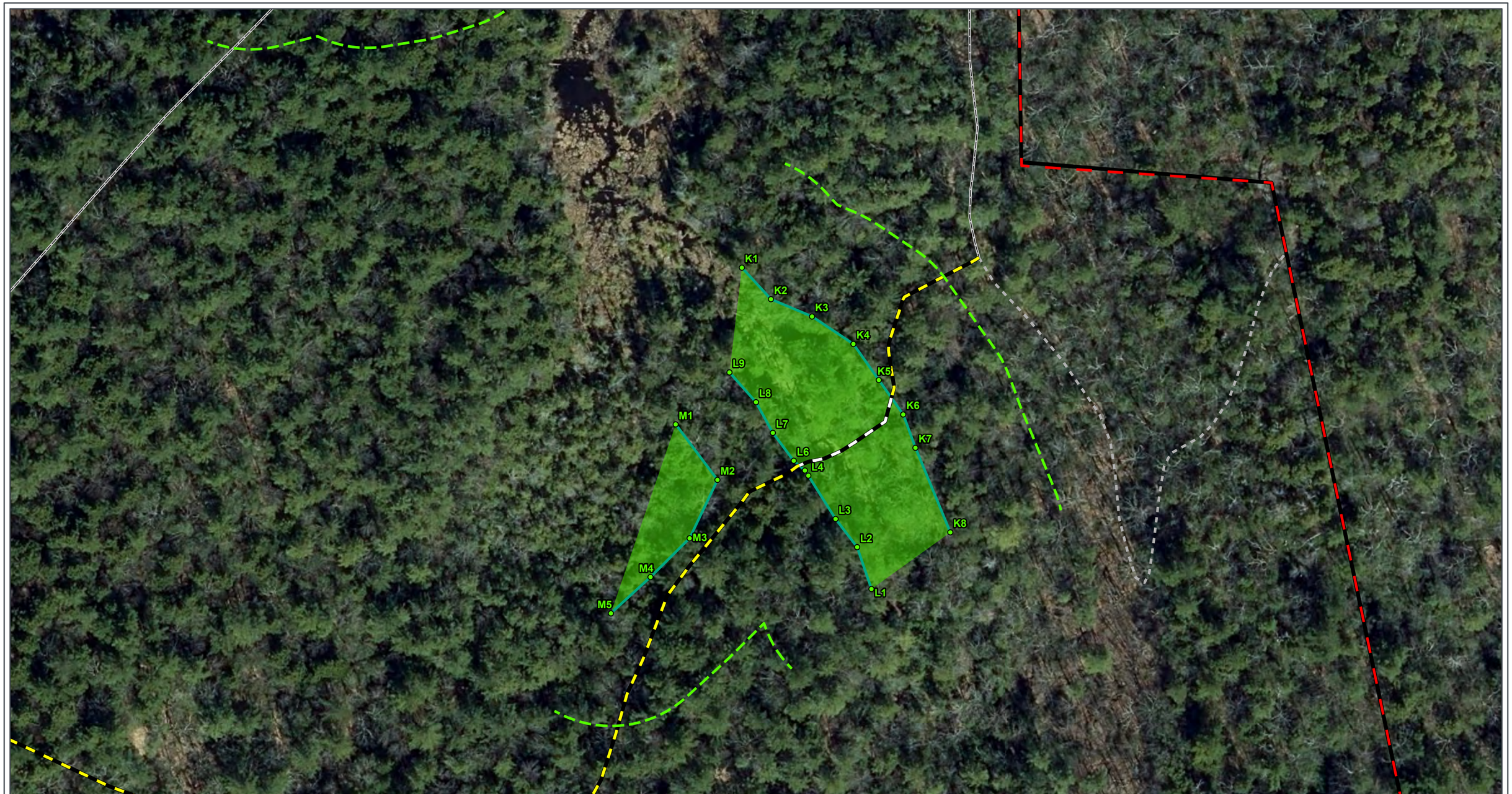
N

1:1,000

Base Map: ESRI ArcGIS Online, accessed June 2022

Updated: 6/30/2022
Project No. 69584

0 50 100 Feet
0 10 20 Meters



AMES POND TRAIL RESTORATION

Figure 5. Wetland Delineation

Map 4 of 4

SWCA ENVIRONMENTAL CONSULTANTS

- Existing Trail - No Maintenance
- General Maintenance
- Puncheon
- Repair / Stabilize Rocks
- Wetland Flag
- 100-Foot Buffer Zone
- Delineated Wetland Line
- Bordering Vegetated Wetland
- Conservation Restriction Boundary
- Property Boundary

Shutesbury, MA
USGS 7.5' Quadrangle:
Millers Falls
Shutesbury
72.4126°W 42.4968°N

N

1:1,000

Base Map: ESRI ArcGIS Online, accessed June 2022

Updated: 6/30/2022
Project No. 69584

0 50 100 Feet

0 10 20 Meters

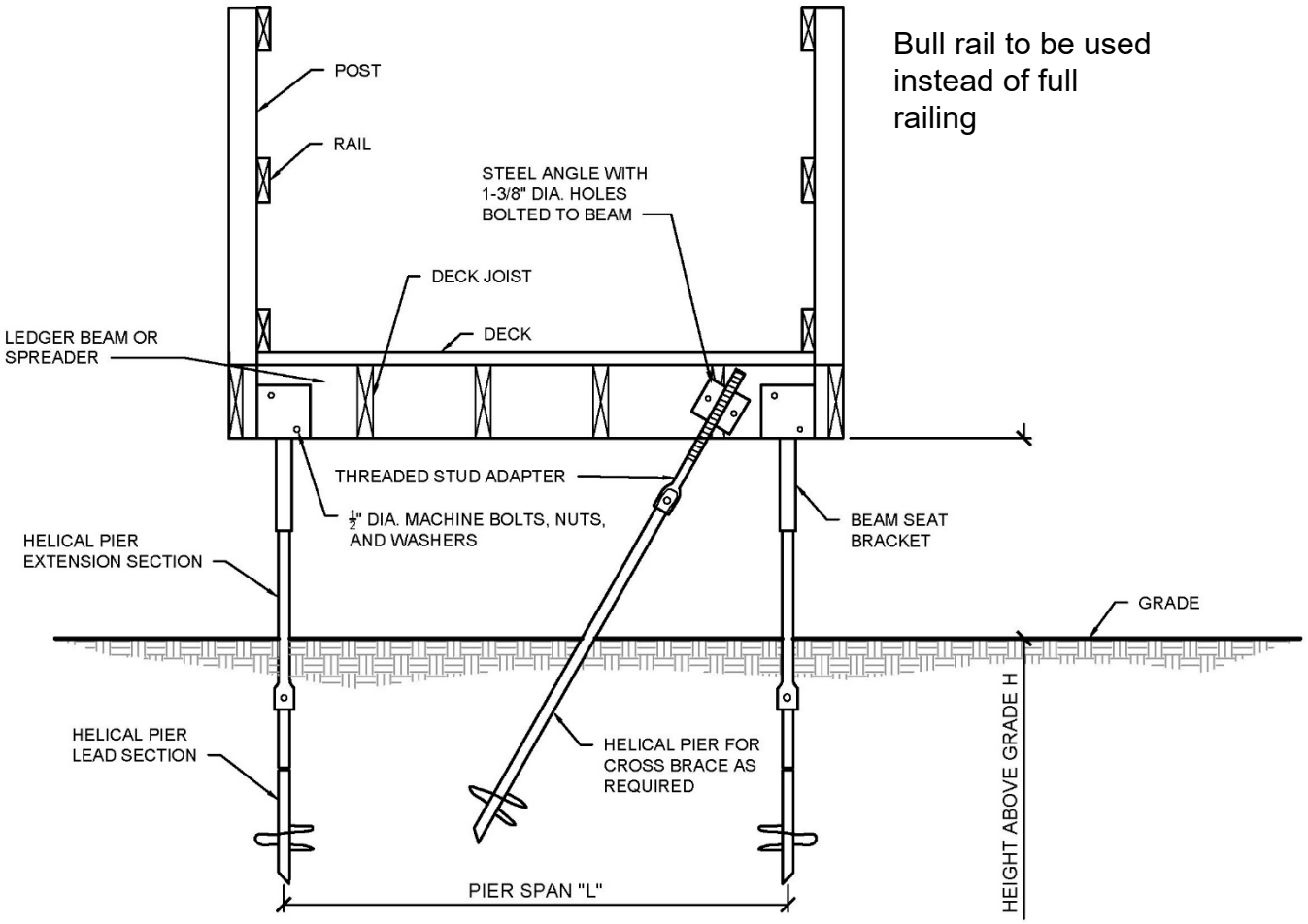


Figure 15.32 - Helical Pier

HELICAL PIER

CALIFORNIA STATE PARKS

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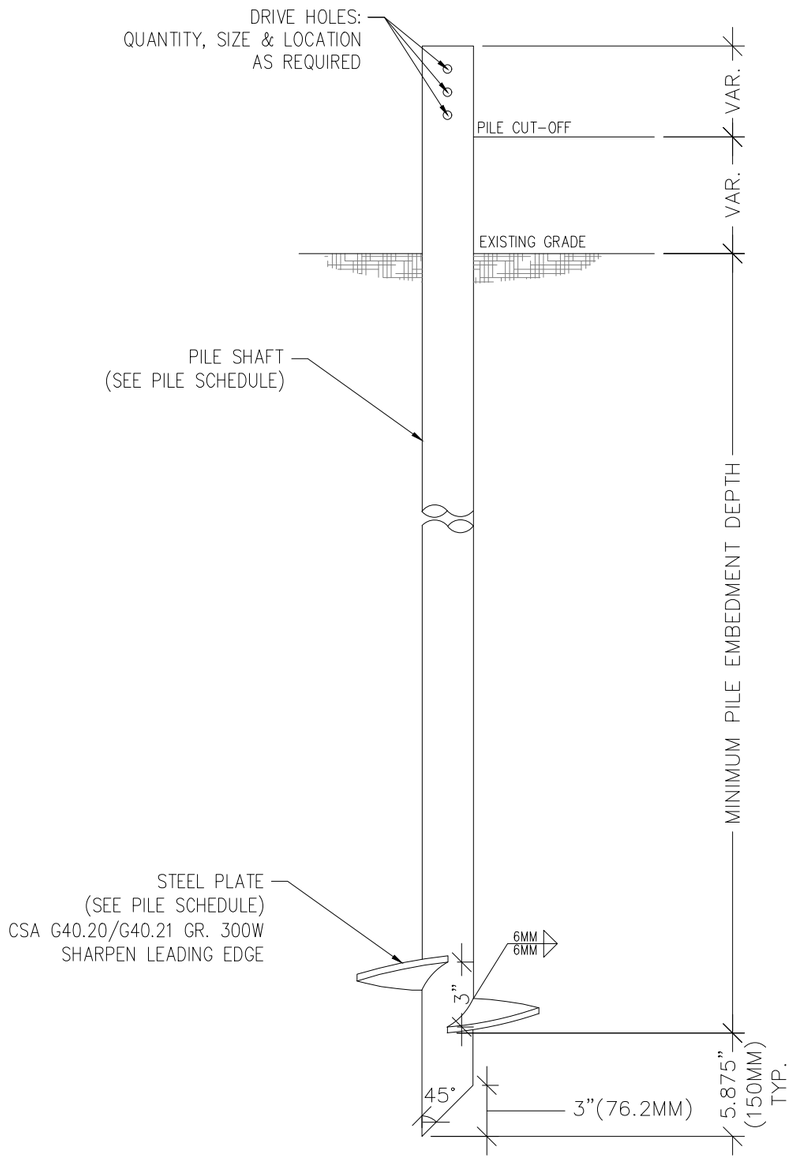


NOTES:

1. GENERAL:
   - 1.1. THE DESIGN, FABRICATION AND INSTALLATION OF PILES SHALL BE GOVERNED BY THE FOLLOWING CODES, STANDARD AND REGULATIONS:
   - 1.1.1. CSA G40.21 STRUCTURAL QUALITY STEEL.
   - 1.1.2. 2012 ONTARIO BUILDING CODE.
   - 1.1.3. CSA W48-18 FILLER METALS AND ALLIED MATERIAL FOR METAL ARC WELDING.
   - 1.1.4. CSA W47.1 CERTIFICATION OF COMPANIES FOR FUSION WELDING OF STEEL STRUCTURES.
   - 1.1.5. ASTM A252 WELDED AND SEAMLESS STEEL PIPE PILES.
   - 1.1.6. ASTM A53 WELDED AND SEAMLESS STEEL PIPE.
   - 1.1.7. PROVINCIAL HEALTH AND SAFETY REGULATIONS.
   - 1.2. PILE SHAFT DIAMETER, WALL THICKNESS AND HELIX PLATE THICKNESS SHALL NOT BE LESS THAN MINIMUM SPECIFIED IN PILE SCHEDULE.

2. MATERIALS:
   - 2.1. STEEL PIPE PILE MATERIALS SHALL CONFORM TO ASTM A500, GRADE B OR ASTM A252 (GRADE 3) MINIMUM.
   - 2.2. HELICES SHALL CONFORM TO CSA-G40.21, GRADE 300W.
   - 2.3. HELICES SHALL BE WELDED TO THE PIPE SECTION USING A CONTINUOUS FILLET WELD ON BOTH SIDES OF THE HELIX-PIPE CONNECTION. HELICES SHALL HAVE MINIMUM THICKNESS AS SPECIFIED.
   - 2.4. SACRIFICIAL STEEL THICKNESS HAS BEEN PROVIDED TO ACCOUNT FOR CORROSION, AS PER ONTARIO BUILDING CODE SECTION 4.2.3.10.
   - 2.5. ALL WELDS SHALL BE MIN. 6MM FILET WELDS, UNLESS NOTED OTHERWISE.
   - 2.6. WELD TENSILE STRENGTH = 480MPA.
   - 2.7. WELDING ELECTRODES SHALL CONFORM TO CSA W48.1.

3. DESIGN:
   - 3.1. PILE CAPACITY GIVEN IN THIS SHEET SHOULD BE USED FOR THE PRELIMINARY GUIDE AND ESTIMATION ONLY.
   - 3.2. PILES MUST BE INSTALLED BY A PROFESSIONAL CONTRACTOR.
   - 3.3. PILES MUST HAVE SUFFICIENT EMBEDMENT DEPTH TO RESIST FROST ACTION.

4. CONSTRUCTION:
   - 4.1. PILES SHALL BE INSTALLED OPEN ENDED; AND ENDS SHALL BE CUT AT 45 DEGREES.
   - 4.2. PILES SHALL BE INSTALLED CONTINUOUSLY WITHOUT INTERRUPTION TO THE MINIMUM EMBEDMENT DEPTH AND MINIMUM INSTALLATION TORQUE INDICATED ON THE PILE SCHEDULE.
   - 4.3. PILE INSTALLATION RECORDS SHALL BE DOCUMENTED BY A QUALIFIED PILING INSPECTOR REPRESENTING THE GEOTECHNICAL ENGINEER.
   - 4.4. FABRICATION SHALL BE CARRIED OUT IN ACCORDANCE WITH STANDARD PRACTICES AND APPLICABLE CODES.
   - 4.5. PILE EMBEDMENT DEPTHS INDICATED IN THE PILE SCHEDULE ARE HELIX DEPTH FROM THE EXITING GRADE. STICKUP AND TIP PROJECTION LENGTHS SHALL BE ADDED TO THE PILE LENGTH, AS REQUIRED.
   - 4.6. INSTALL PILES VERTICALLY AND ENSURE THE RATE OF ADVANCEMENT INTO THE SOIL PER REVOLUTION IS EQUAL TO THE HELIX PITCH.

5. TOLERANCES:
   - 5.1. PILE SHALL BE INSTALLED TO THE FOLLOWING TOLERANCES:
   - 5.1.1. TOP OF PILE WITHIN 75MM OUT OF ALIGNMENT.
   - 5.1.2. NOT MORE THAN 2% INCLINATION FROM VERTICAL.
   - 5.2. ANY GAP AROUND INSTALLED PILE MUST BE BACKFILLED WITH CRUSHED STONES OR APPROVED EQUIVALENT.
   - 5.3. WHERE PILES DEVIATE FROM ABOVE TOLERANCE AND DESIGN REQUIREMENTS, THE CONDITION OF THE FOUNDATION SHALL BE ASSESSED BY THE ENGINEER AND WHERE REQUIRED, CORRECTIONS SHALL BE MADE.

6. ACCEPTANCE:
   - 6.1. BOTH MINIMUM TOP HELIX EMBEDMENT DEPTH AND MINIMUM INSTALLATION TORQUE MUST BE ACHIEVED FOR PILE ACCEPTANCE.

HELICAL PILE SCHEDULE (FOR PRELIMINARY GUIDE ONLY)1

PILE TYPE	FACTORED ULTIMATE AXIAL CAPACITY KN (KIP)2		AXIAL STRUCTURAL CAPACITY KN (KIP)4	SHAFT SIZE MM (INCH)	HELIX SIZE MM (INCH)	TOP HELIX MIN. EMBEDMENT	MAX. TORQUE KN-M (FT-LBS)
	COMPRESSION	TENSION3					
M1	50 (11)	35 (8)	220 (49)	60.3X3.91 ($2\frac{3}{8}$X$\frac{5}{32}$)	203 X 9.53 (8X$\frac{3}{8}$)	SEE NOTE 5	5 (3,700)
M2	85 (19)	60 (13)	280 (63)	76.2X4.76 (3X$\frac{3}{16}$)	254 X 9.53 (10X$\frac{3}{8}$)	SEE NOTE 5	8.3 (6,200)
M3	130 (29)	90 (20)	430 (97)	88.9X6.35 (3.5X$\frac{1}{4}$)	305 X 9.53 (12X$\frac{3}{8}$)	SEE NOTE 5	14.8 (10,900)

NOTES:
1. THIS SHEET MUST BE USED AS A PRELIMINARY GUIDE ONLY. ENGINEERED SHOP DRAWINGS SHOULD BE PREPARED BY A PROFESSIONAL ENGINEER FOR ANY PROJECT USING THESE MATERIALS.
2. FACTORED ULTIMATE COMPRESSION CAPACITY INCLUDES RESISTANCE FACTOR OF 0.4. ACTUAL PILE CAPACITY MUST BE DETERMINED BY A PROFESSIONAL ENGINEER BASED ON SOIL CONDITIONS, FINAL EMBEDMENT DEPTH AND FINAL INSTALLATION TORQUE.
3. TENSIONAL CAPACITY PROVIDED IN THIS TABLE SHOULD BE USED FOR PRELIMINARY ESTIMATION ONLY. FINAL TENSIONAL CAPACITY OF A PILE DEPENDS ON EMBEDMENT DEPTH AND SOIL CONDITIONS AND MUST BE DETERMINED BY A PROFESSIONAL ENGINEER.
4. AXIAL STRUCTURAL CAPACITY INCLUDES A RESISTANCE FACTOR OF 0.85 AND DOES NOT INCLUDE STRENGTH REDUCTION FACTOR TO ACCOUNT FOR STEEL CORROSION.
5. MINIMUM HELIX EMBEDMENT DEPTH SHOULD BE DETERMINED BASED ON THE FROST DEPTH. IF PILE IS SUBJECTED TO TENSIONAL LOAD, A HIGHER EMBEDMENT DEPTH MIGHT BE REQUIRED.

FOR INFORMATION ONLY

MASCORE HELICAL PILES | WWW.MASCORE.CA

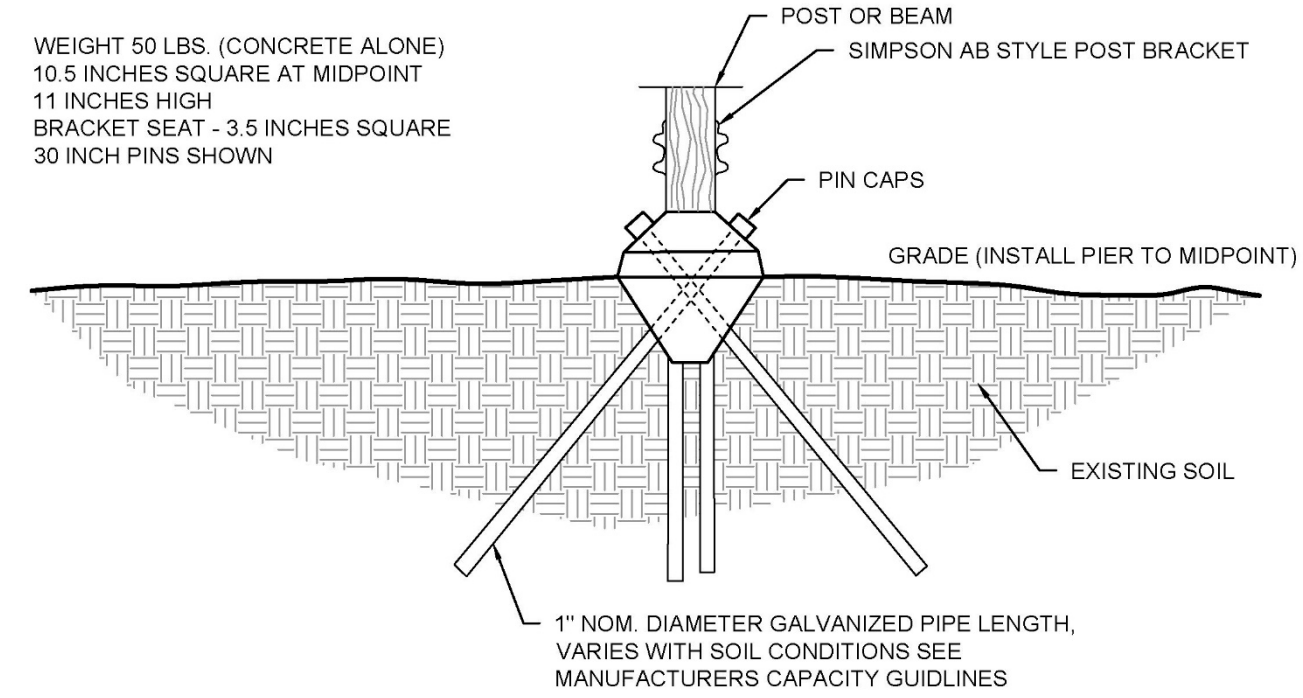
MASCORE INC.
BRANTFORD, ON

DRAWING TITLE

MASCORE HELICAL PILE SPECIFICATIONS

DATE

NOVEMBER 2019



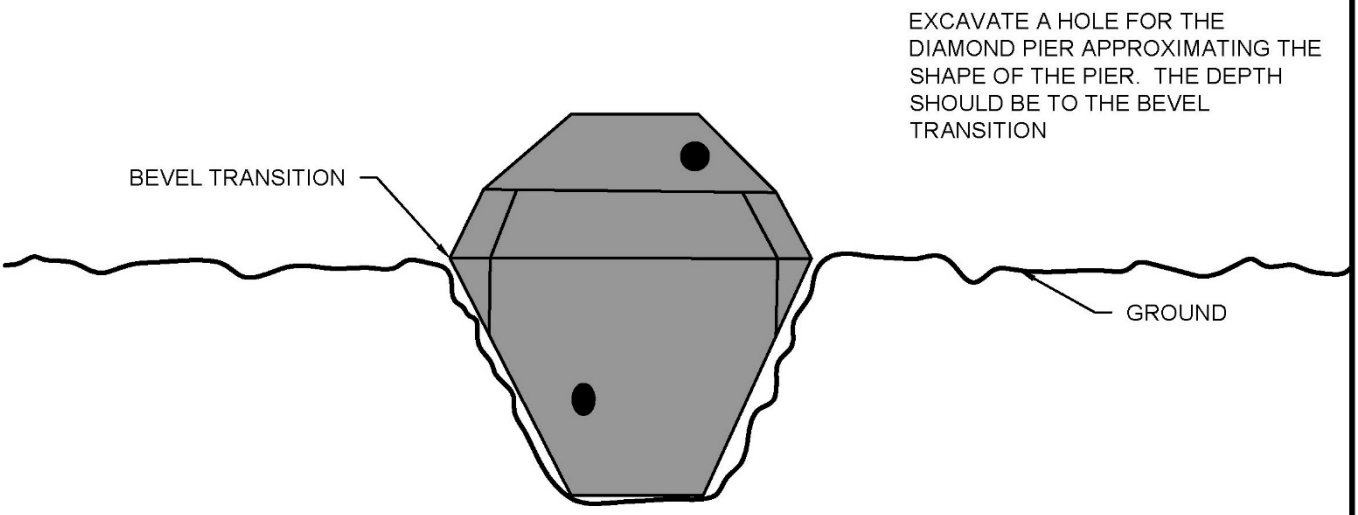


Figure 15.31 - Diamond Pier DP-50 Model

DIAMOND PIER DP-50 MODEL

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