TOWN OF BOXFORD
PLANNING BOARD
7A Spofford Road
Boxford, Massachusetts 01921
Phone: (978) 887-6000 x 191 Fax: (978) 887-0758
Email: rpovenmire@town.boxford.ma.us

APPLICATION FOR DRIVEWAY PERMIT

The purpose of this permit is to provide safe and adequate access for emergency and other vehicles from the public way to residential dwellings. It has been developed in accordance with §196-29 of the Boxford Zoning Bylaw. The applicant shall read the bylaw on the back of this page.

Name Gilbert Sullivan Date November 3, 2016

Driveway location/address 81A Stiles Pond Road

Required Design Criteria		Compliance – Yes	No
1. Finished driveway width shall be no less than 9 feet		X	
2. Grade for the first 25 feet of driveway from the public way – 3% or less	N/A		
3. 12% maximum slope along the centerline		X	
4. Any slope over 8% shall be paved		X	
5. Driveway apron should be 90° to the road	N/A		
6. Driveway apron should have curved flare radii of 6'	N/A		
7. No physical barriers on inside of driveway curves		X	
8. Rate of post-development runoff should not exceed pre-development runoff		X	
9. Water shall not flow from driveway onto road		X	
10. Sight distance shall exceed 50' in both directions	N/A		
11. Driveways longer than 500' shall have a turn-around		X (larger turnout proposed than what currently exists)	
12. No cut or fill shall exceed 8' from the natural topography		X	
13. Shared driveways shall be no closer than 100' apart	N/A		
14. Shared portion of a driveway shall be no less than 12 feet	N/A		

The Superintendent of Public Works and Fire Chief may impose other conditions at their discretion to ensure safe access and to prevent any damage or dangerous situation(s) because of drainage, icing, etc. onto public roads. These conditions are indicated below.

Applicant Signature Kathleen Molina (as authorized) Date 11-3-16

Planning Board Approval _____ Date _____

Conditions:

Authorization Form

Re: 81A Stiles Pond Road, Boxford

I, Gil Sullivan, authorize The Morin-Cameron Group to sign any and all applications to the Town of Boxford on my behalf regarding the above-referenced property.

Gilbert Sullivan

Gil Sullivan

10/28/15

Date

§196-29. Driveways

It shall be unlawful to install, construct, reconstruct or relocate any driveway without first obtaining a driveway permit from the Planning Board. Normal maintenance such as repairs and repaving shall be exempt provided repairs and repaving do not increase water runoff onto the public way or abutting lots..

A. Driveways for detached single-family houses shall comply with the following:

1. Layouts and configurations shall avoid excessive curves, switchbacks, and slopes to provide optimal safety for access to and from the dwelling site.
2. To the extent possible, the driveway apron shall be aligned at ninety degrees (90°) to the road and have curved flare radii of six feet (6') between the road and drive.
3. No person or persons shall cut or destroy any tree on Town property (right-of-way along side of the road), without first obtaining the approval of the Boxford Planning Board and the Boxford Tree Warden. No person or persons shall remove, alter, or destroy any stone wall on or bordering Town property (right-of-way along side of the road) without first obtaining the approval of the Boxford Planning Board in accordance with the Scenic Road bylaw.

B. Single driveways shall meet the following standards.

1. All single driveways shall have a finished width no less than nine feet (9').
2. The first twenty five feet (25') in from the paved portion of the public way shall have a maximum slope of three percent (3%); the maximum driveway slope along the centerline shall be twelve percent (12%); any slopes over eight percent (8%) shall be paved. To preserve the stability of the existing natural topography, no cut or fill in excess of eight feet (8') of the natural topography shall be allowed within the limits of the driveway cross section.
3. The slope grade shall allow rapid emergency access during normal weather conditions. No physical barrier shall be located on the inside of the curves that could impede fire truck or emergency vehicle access.
4. The rate of runoff during construction and post-development shall not exceed the rate of pre-development runoff.
5. After driveway completion, water runoff from the new driveway shall not be allowed to enter onto the public right-of-way and abutting property at any time.
6. The Planning Board may impose conditions on the construction, re-construction or relocation of a driveway at their discretion to ensure safe access onto public roads and to prevent any damage or dangerous situation(s) due to drainage, icing, or other hazards. The conditions may incorporate recommendations made by the Fire Chief, Police Chief and Superintendent of Public Works.
7. The Superintendent of Public Works and Fire Chief may impose other conditions at their discretion to ensure safe access and to prevent any damage or dangerous situation(s) because of drainage, icing, etc. onto public roads.
8. Sight distance entering the public way, shall be fifty feet (50') in either direction to the best extent possible.
9. During construction, no debris shall be left on the road or shoulder; nor shall drainage structures, culverts, or ditches be blocked or impeded at any time.
10. All driveways longer than five hundred feet (500') shall have a turn-around location within twenty five feet (25') of the dwelling for large vehicle turnaround.
11. Driveways shall conform to all other rules and regulations of the Town of Boxford.

C. Shared Driveways shall conform to all the regulations as set forth in Subsection B and §196-13B (11)(m) of the Zoning Bylaw, plus the following:

1. The shared driveway shall not enter the roadway at a point separated by less than one hundred feet (100') (centerline to centerline) from any other driveway or intersection.
2. The shared portion of the driveway shall have a finished width no less than twelve feet (12') plus a one foot (1') level shoulder on either side.

D. Application

1. The driveway location, layout, slopes, drainage, and associated improvements, shall be shown on a plan prepared by a professional architect, engineer, or landscape architect. The Planning Board at its sole discretion may waive the requirements for a driveway site plan.
2. Four copies of the plan shall be submitted to the Planning Board for review. The Planning Board may circulate the copies to the Fire Chief, Police Chief, and the Superintendent of Public Works.
3. The Fire Chief, Police Chief, and the Superintendent of Public Works may return recommendations within 14 days to the Planning Board. If no recommendations are received within 14 days to the Planning Board, the official failing to submit a report shall be deemed to have approved the proposed work on the driveway.

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PLANNING BOARD
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Boxford, Massachusetts 01921
Phone: (978) 887-6000 x 191 Fax: (978) 887-0758
Email: rpovenmire@town.boxford.ma.us

APPLICATION FOR DRIVEWAY PERMIT

Kerry Stickney
Gordon Russell
John Dold

The attached driveway permit has been submitted for review by the Planning Board. Could you please review the plans and send any comments and suggested conditions to me by: _____

Thanks,

Ross Povenmire,
Boxford Planning Board Administrator

HYDROLOGIC ANALYSIS
Of
81A Stiles Pond Road
Boxford, Massachusetts

October 31, 2016

Prepared for: Gilbert Sullivan
81A Stiles Pond Road
Boxford, MA 01921

Prepared by: The Morin-Cameron Group, Inc.
66 Elm Street
Danvers, MA 01923

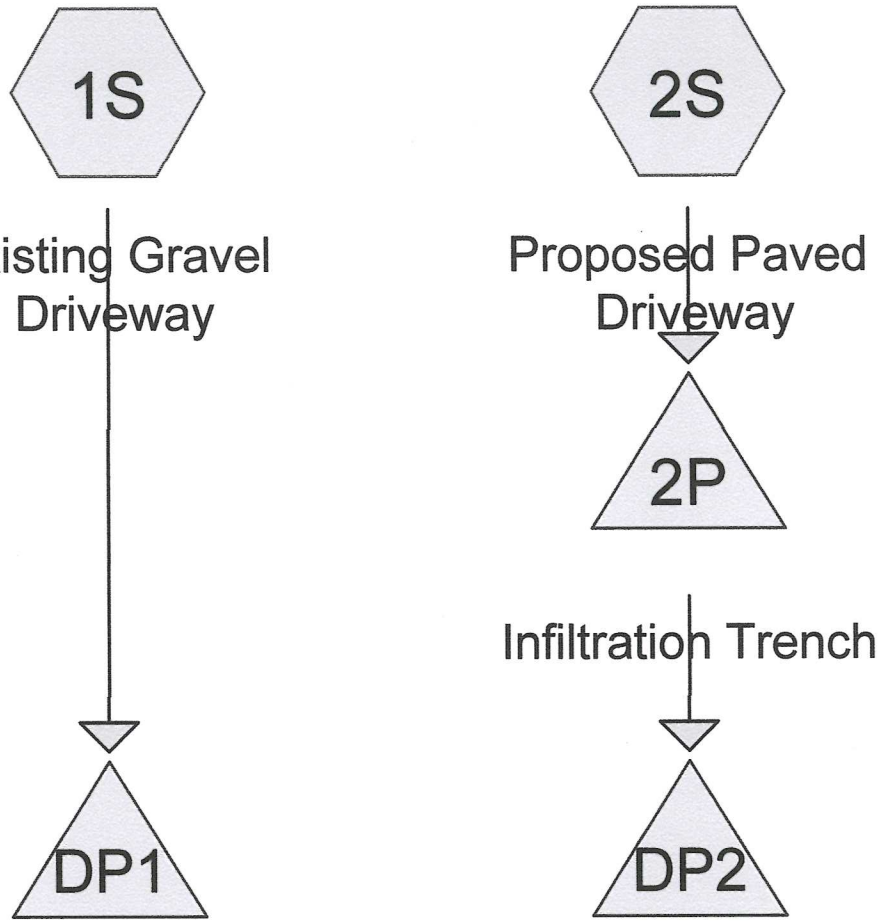
HYDROLOGIC ANALYSIS

This analysis was performed to verify that the proposed driveway would not result in an increase in the rate of stormwater runoff from pre to post developed conditions as required in the Town of Boxford's Driveway Bylaw.

The existing dwelling is accessed by means of a gravel driveway with sections of the driveway in excess of 15%. In an effort to improve the existing access and increase safety the property owner would like to build a new paved driveway at a more reasonable slope. By relocating the driveway and modifying the grades we are able to propose a driveway with a maximum slope of 11%. By implementing the use of an infiltration trench along the eastern shoulder of the proposed driveway we have mitigated the increase in the rate of runoff created through the construction of the proposed paved driveway. There is no increase in the rate of runoff from pre to post developed conditions for all storm events up to the 100-year storm event. See Hydrologic Summary below and the drainage calculations and plans included in this report.

HYDROLOGIC SUMMARY

Storm Event	2-YR	10-YR	50-YR	100-YR
Pre-Developed (CFS)	0.16	0.25	0.38	0.44
Post-Developed (CFS)	0	0	0.20	0.44



Pre - Developed **Post - Developed**

Subcat Reach Pond Link

Routing Diagram for Sullivan - 3417 Driveway
Prepared by The Morin-Cameron Group, Inc., Printed 10/31/2016

Summary for Subcatchment 1S: Existing Gravel Driveway

Runoff = 0.16 cfs @ 12.00 hrs, Volume= 464 cf, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
2,100	96	Gravel surface, HSG A
2,100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	175	0.1500	7.86		**Shallow Concentrated Flow, driveway** Paved Kv= 20.3 fps

Summary for Subcatchment 2S: Proposed Paved Driveway

Runoff = 0.21 cfs @ 12.00 hrs, Volume= 645 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
2,700	98	Paved parking, HSG A
2,700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	175	0.1100	6.73		**Shallow Concentrated Flow, Paved** Paved Kv= 20.3 fps

Summary for Pond 2P: Infiltration Trench

Inflow Area = 2,700 sf,100.00% Impervious, Inflow Depth = 2.87" for 2-Year event
Inflow = 0.21 cfs @ 12.00 hrs, Volume= 645 cf
Outflow = 0.01 cfs @ 11.00 hrs, Volume= 645 cf, Atten= 94%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.00 hrs, Volume= 645 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 100.52' @ 13.28 hrs Surf.Area= 541 sf Storage= 257 cf

Plug-Flow detention time= 156.4 min calculated for 645 cf (100% of inflow)
Center-of-Mass det. time= 156.2 min (908.1 - 751.9)

Volume	Invert	Avail.Storage	Storage Description
#1	99.33'	578 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 1,444 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.33	541	0	0
102.00	541	1,444	1,444

Device	Routing	Invert	Outlet Devices
#1	Discarded	99.33'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	102.00'	**180.0' long x 3.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50
			Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.01 cfs @ 11.00 hrs HW=99.36' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=99.33' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP1: Design Point

Inflow Area = 2,100 sf, 0.00% Impervious, Inflow Depth = 2.65" for 2-Year event
Inflow = 0.16 cfs @ 12.00 hrs, Volume= 464 cf
Primary = 0.16 cfs @ 12.00 hrs, Volume= 464 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Summary for Pond DP2: Design Point

Inflow Area = 2,700 sf,100.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1S: Existing Gravel Driveway

Runoff = 0.25 cfs @ 12.00 hrs, Volume= 741 cf, Depth= 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
2,100	96	Gravel surface, HSG A
2,100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	175	0.1500	7.86		**Shallow Concentrated Flow, driveway** Paved Kv= 20.3 fps

Summary for Subcatchment 2S: Proposed Paved Driveway

Runoff = 0.32 cfs @ 12.00 hrs, Volume= 1,004 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
2,700	98	Paved parking, HSG A
2,700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	175	0.1100	6.73		**Shallow Concentrated Flow, Paved** Paved Kv= 20.3 fps

Summary for Pond 2P: Infiltration Trench

Inflow Area = 2,700 sf,100.00% Impervious, Inflow Depth = 4.46" for 10-Year event
Inflow = 0.32 cfs @ 12.00 hrs, Volume= 1,004 cf
Outflow = 0.01 cfs @ 9.85 hrs, Volume= 1,004 cf, Atten= 96%, Lag= 0.0 min
Discarded = 0.01 cfs @ 9.85 hrs, Volume= 1,004 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 101.52' @ 14.48 hrs Surf.Area= 541 sf Storage= 475 cf

Plug-Flow detention time= 310.2 min calculated for 1,004 cf (100% of inflow)
Center-of-Mass det. time= 310.1 min (1,053.9 - 743.9)

Volume	Invert	Avail.Storage	Storage Description
#1	99.33'	578 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 1,444 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.33	541	0	0
102.00	541	1,444	1,444

Device	Routing	Invert	Outlet Devices
#1	Discarded	99.33'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	102.00'	**180.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.01 cfs @ 9.85 hrs HW=99.36' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=99.33' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP1: Design Point

Inflow Area = 2,100 sf, 0.00% Impervious, Inflow Depth = 4.23" for 10-Year event
Inflow = 0.25 cfs @ 12.00 hrs, Volume= 741 cf
Primary = 0.25 cfs @ 12.00 hrs, Volume= 741 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Summary for Pond DP2: Design Point

Inflow Area = 2,700 sf,100.00% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1S: Existing Gravel Driveway

Runoff = 0.38 cfs @ 12.00 hrs, Volume= 1,159 cf, Depth= 6.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.10"

Area (sf)	CN	Description
2,100	96	Gravel surface, HSG A
2,100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	175	0.1500	7.86		**Shallow Concentrated Flow, driveway** Paved Kv= 20.3 fps

Summary for Subcatchment 2S: Proposed Paved Driveway

Runoff = 0.49 cfs @ 12.00 hrs, Volume= 1,544 cf, Depth= 6.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-Year Rainfall=7.10"

Area (sf)	CN	Description
2,700	98	Paved parking, HSG A
2,700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	175	0.1100	6.73		**Shallow Concentrated Flow, Paved** Paved Kv= 20.3 fps

Summary for Pond 2P: Infiltration Trench

Inflow Area = 2,700 sf,100.00% Impervious, Inflow Depth = 6.86" for 50-Year event
Inflow = 0.49 cfs @ 12.00 hrs, Volume= 1,544 cf
Outflow = 0.21 cfs @ 12.19 hrs, Volume= 1,544 cf, Atten= 57%, Lag= 11.3 min
Discarded = 0.01 cfs @ 8.50 hrs, Volume= 1,257 cf
Primary = 0.20 cfs @ 12.19 hrs, Volume= 287 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 102.00' @ 12.20 hrs Surf.Area= 541 sf Storage= 578 cf

Plug-Flow detention time= 319.8 min calculated for 1,542 cf (100% of inflow)
Center-of-Mass det. time= 320.0 min (1,057.6 - 737.6)

Volume	Invert	Avail.Storage	Storage Description
#1	99.33'	578 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 1,444 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.33	541	0	0
102.00	541	1,444	1,444

Device	Routing	Invert	Outlet Devices
#1	Discarded	99.33'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	102.00'	**180.0' long x 3.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50
			Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.01 cfs @ 8.50 hrs HW=99.36' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.06 cfs @ 12.19 hrs HW=102.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.12 fps)

Summary for Pond DP1: Design Point

Inflow Area = 2,100 sf, 0.00% Impervious, Inflow Depth = 6.62" for 50-Year event
Inflow = 0.38 cfs @ 12.00 hrs, Volume= 1,159 cf
Primary = 0.38 cfs @ 12.00 hrs, Volume= 1,159 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Summary for Pond DP2: Design Point

Inflow Area = 2,700 sf,100.00% Impervious, Inflow Depth = 1.27" for 50-Year event
Inflow = 0.20 cfs @ 12.19 hrs, Volume= 287 cf
Primary = 0.20 cfs @ 12.19 hrs, Volume= 287 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1S: Existing Gravel Driveway

Runoff = 0.44 cfs @ 12.00 hrs, Volume= 1,369 cf, Depth= 7.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.30"

Area (sf)	CN	Description
2,100	96	Gravel surface, HSG A
2,100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	175	0.1500	7.86		**Shallow Concentrated Flow, driveway** Paved Kv= 20.3 fps

Summary for Subcatchment 2S: Proposed Paved Driveway

Runoff = 0.58 cfs @ 12.00 hrs, Volume= 1,814 cf, Depth= 8.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.30"

Area (sf)	CN	Description
2,700	98	Paved parking, HSG A
2,700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	175	0.1100	6.73		**Shallow Concentrated Flow, Paved** Paved Kv= 20.3 fps

Summary for Pond 2P: Infiltration Trench

Inflow Area = 2,700 sf,100.00% Impervious, Inflow Depth = 8.06" for 100-Year event
Inflow = 0.58 cfs @ 12.00 hrs, Volume= 1,814 cf
Outflow = 0.45 cfs @ 12.06 hrs, Volume= 1,814 cf, Atten= 21%, Lag= 3.6 min
Discarded = 0.01 cfs @ 8.05 hrs, Volume= 1,319 cf
Primary = 0.44 cfs @ 12.06 hrs, Volume= 495 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 102.01' @ 12.05 hrs Surf.Area= 541 sf Storage= 578 cf

Plug-Flow detention time= 289.7 min calculated for 1,812 cf (100% of inflow)
Center-of-Mass det. time= 289.9 min (1,025.5 - 735.6)

Volume	Invert	Avail.Storage	Storage Description
#1	99.33'	578 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 1,444 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.33	541	0	0
102.00	541	1,444	1,444

Device	Routing	Invert	Outlet Devices
#1	Discarded	99.33'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	102.00'	**180.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.01 cfs @ 8.05 hrs HW=99.36' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.17 cfs @ 12.06 hrs HW=102.01' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.17 cfs @ 0.18 fps)

Summary for Pond DP1: Design Point

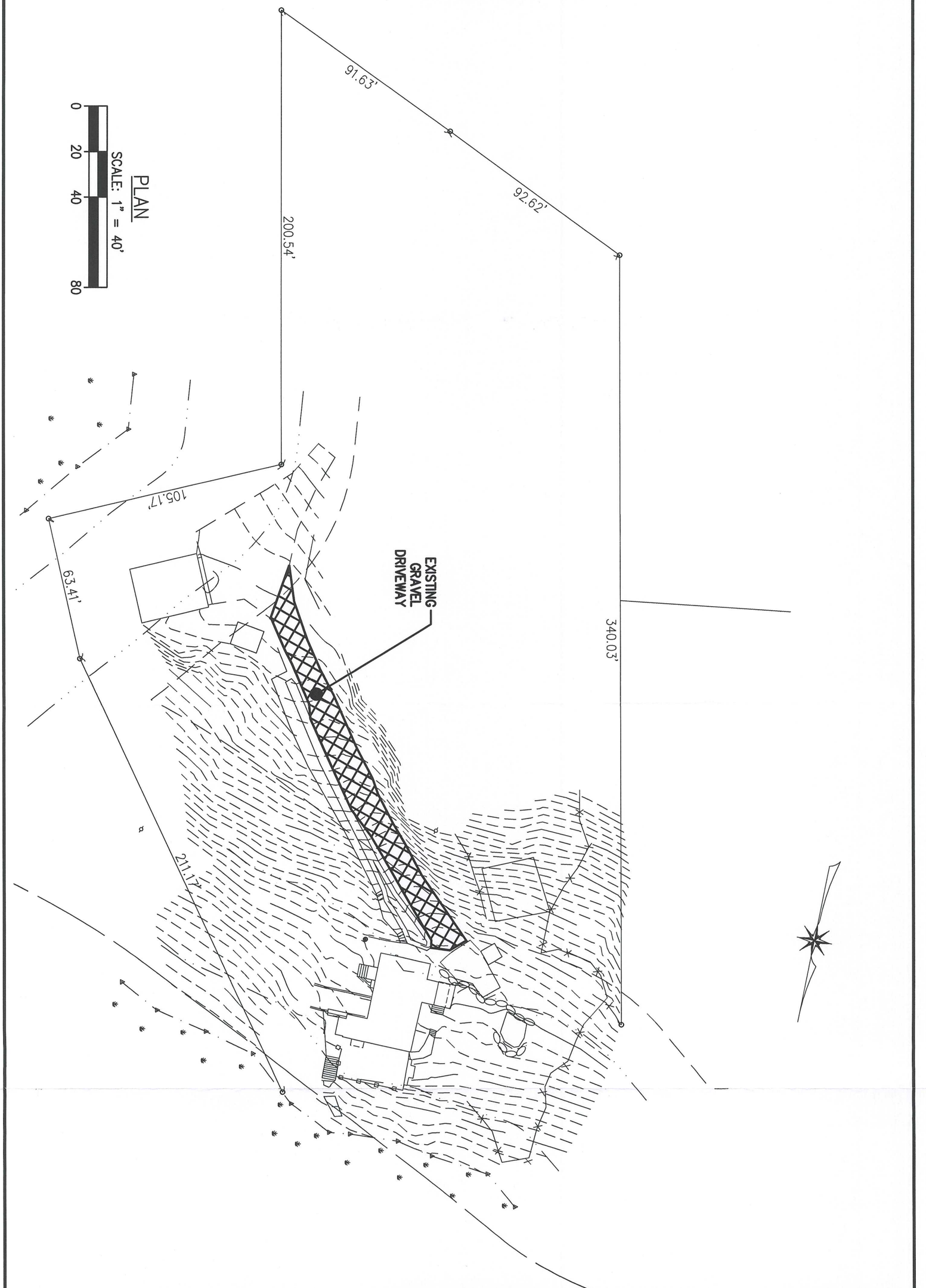
Inflow Area = 2,100 sf, 0.00% Impervious, Inflow Depth = 7.82" for 100-Year event
Inflow = 0.44 cfs @ 12.00 hrs, Volume= 1,369 cf
Primary = 0.44 cfs @ 12.00 hrs, Volume= 1,369 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Summary for Pond DP2: Design Point

Inflow Area = 2,700 sf,100.00% Impervious, Inflow Depth = 2.20" for 100-Year event
Inflow = 0.44 cfs @ 12.06 hrs, Volume= 495 cf
Primary = 0.44 cfs @ 12.06 hrs, Volume= 495 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs



PRE-DEVELOPMENT
AT:
81A STILES POND ROAD
BOXFORD, MASSACHUSETTS

DATE: OCTOBER 31, 2016
SCALE: 1" = 40'

The Morin-Cameron GROUP, INC.
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LAND SURVEYORS | LAND USE PLANNERS
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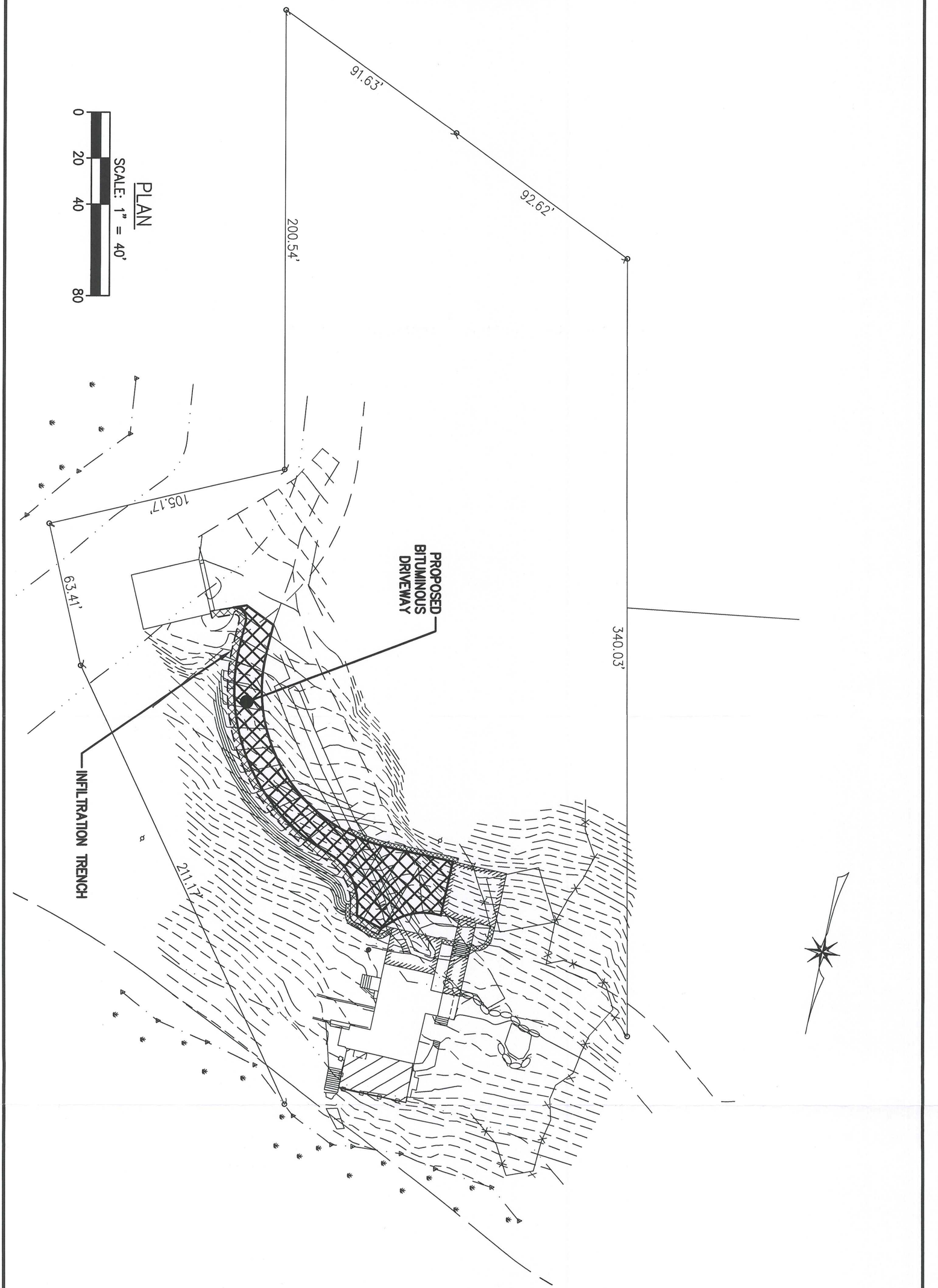
PROJ. #3417



POST-DEVELOPMENT

AT:

81A STILES POND ROAD
BOXFORD, MASSACHUSETTS

DATE: OCTOBER 31, 2016
SCALE: 1" = 40'

The Morin-Cameron GROUP, INC.
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