

NOTICE OF INTENT
under the
Massachusetts Wetlands Protection Act

SUBMITTAL SUMMARY

APPLICANT: **KESTREL LAND TRUST**

LOCATION: **CHESTNUT PLAIN ROAD, WHATELY**
 ASSESSORS MAP 12, LOT 9

PROJECT: **WHATELY WOODS CONSERVATION AREA**
 REPLACEMENT AND UPGRADE OF AN EXISTING CULVERT AND
 CONSTRUCTION OF A NEW 4 CAR PARKING AREA

CONTENTS:

1. NOTICE OF INTENT - eDEP NOI form, with Fee Transmittal Form
2. Exhibit 1 - Locus Map (USGS) 1 page
3. Exhibit 2 - Sample Abutter Notice and List of Abutters 2 pages
4. Exhibit 3 - Project Description 1 page
5. Exhibit 4 – Compliance with Performance Standards 3 pages
6. Exhibit 5 – Culvert design calculations and Tributary Area Map 15 pages
7. Plan Sheets: “Proposed Culvert Replacement and Gravel Parking Area
 Whately Woods, Whately, MA, dated 10/02/20 2 sheets
8. Filing Fee Check for \$262.50 to Town of Whately

DISTRIBUTION:

- | | | | |
|----|-----------------------------|----------|-----------------------------|
| 1. | Conservation Commission | 2 copies | certified mail, 1 via email |
| 2. | DEP, Western Region | 1 copy | eDEP |
| 3. | Applicant | 1 copy | email |
| 4. | Owner | 1 copy | retained |
| 5. | Engineer | 1 copy | email |
| 6. | Town Highway Superintendent | 1 copy | email |



EXHIBIT 1

LOCUS MAP - WHATELY WOODS CULVERT REPLACEMENT

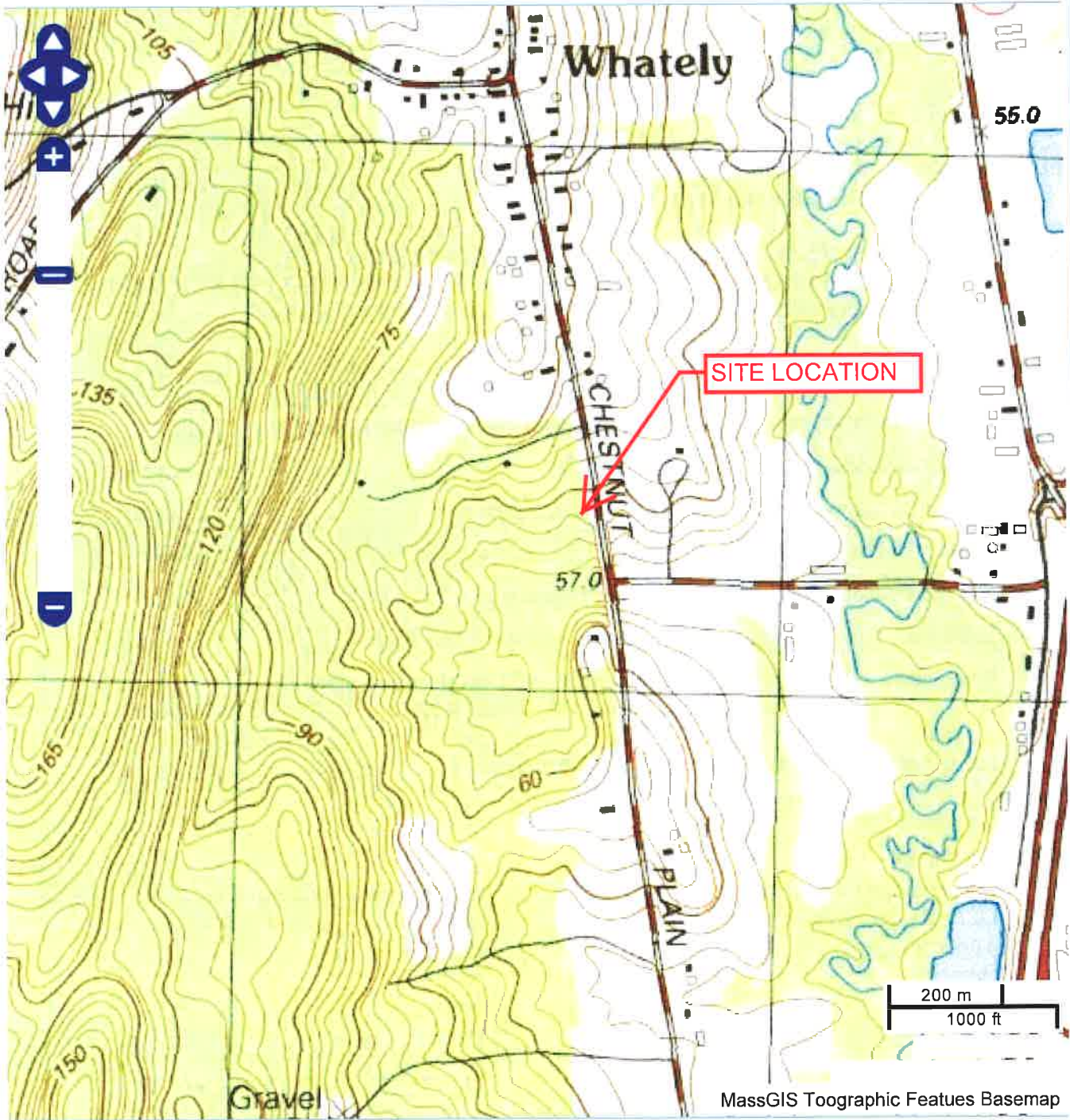


EXHIBIT 2

NOTIFICATION TO ABUTTERS

Under the Massachusetts Wetlands Protection Act

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, and the Town of Amherst Wetlands Protection Bylaw, you are hereby notified of the following:

- A. A Notice of Intent has been filed with the Conservation Commission for the municipality of Whately under the Wetlands Protection Act (General Laws Chapter 131, Section 40), proposing to: replace an existing culvert and construct a small gravel parking area for the future Whately Woods Conservation Area.
- B. The address of the lot where the activity is proposed is: Chestnut Plain Road, Whately, MA, Assessors Map 12, Lot 9.
- C. The name of the applicant is the Kestrel Land Trust
- D. To obtain a copy of the Notice of Intent and Plans or for more information on the proposed work, call Charles Dauchy, 413-548-8005. The Notice of Intent and plans may be reviewed at the Whately Town Offices during normal business hours.
- E. A Public Hearing on the proposal will be held on: Wednesday, October 21, 2020 at 7:00 PM via zoom. See link below.
- F. Notice of the public hearing, including its date, time and place, will be published at least five (5) business days prior in the Daily Hampshire Gazette.
- G. Notice of the public meeting will be posted in the Town Hall not less than forty-eight (48) hours in advance of the meeting date.

For more information about this application or the Wetlands Protection Act, contact the Whately Conservation Commission or the Department of Environmental Protection (DEP) Western Region Office at (413 784-1100).

[Topic: Whately Conservation Commission](#)

[Time: Oct 21, 2020 07:00 PM Eastern Time \(US and Canada\)](#)

[Join Zoom Meeting](#)

<https://us02web.zoom.us/j/85803171875?pwd=ODd5VG9XNDluaExTVHhsK2I1SmhSZz09>

Dial in audio: 888 788 0099 US Toll-free 877 853 5247 US Toll-free

Meeting ID: 858 0317 1875 Passcode: 477574



100 foot Abutters List Report

Whately, MA
October 05, 2020

Subject Property:

Parcel Number: 12-0-09
CAMA Number: 12-0-09
Property Address: E/S CHESTNUT PLAIN RD

Mailing Address: DAUCHY CHARLES H JR WEINTHALER
JUDITH
25 SANCTUARY LN
HOPKINTON, MA 01748

Abutters:

Parcel Number: 12-0-03
CAMA Number: 12-0-03
Property Address: W/S CHESTNUT PLAIN RD

Mailing Address: CASEY RICHARD J
31 VAILLENCOURT DRIVE
FRAMINGHAM, MA 01701

Parcel Number: 12-0-06
CAMA Number: 12-0-06
Property Address: W/S CHESTNUT PLAIN RD

Mailing Address: HUSTED ANITA J, TRUSTEE ANITA J
HUSTED REVOC TRUST
PO BOX 145
WHATLEY, MA 01093

Parcel Number: 12-0-06-1
CAMA Number: 12-0-06-1
Property Address: 121 CHESTNUT PLAIN RD

Mailing Address: HUSTED ANITA J, TRUSTEE ANITA J
HUSTED REVOC TRUST
PO BOX 145
WHATLEY, MA 01093

Parcel Number: 12-0-06-2
CAMA Number: 12-0-06-2
Property Address: 113 CHESTNUT PLAIN RD

Mailing Address: GOODRIDGE GEORGE MARTHA
PO BOX 164
WHATLEY, MA 01093

Parcel Number: 12-0-08
CAMA Number: 12-0-08
Property Address: W/S CHESTNUT PLAIN RD

Mailing Address: DENEHY DANIEL G JR & MICHAEL J
PO BOX 126
WHATLEY, MA 01093

Parcel Number: 12-0-09-2
CAMA Number: 12-0-09-2
Property Address: 141 CHESTNUT PLAIN RD

Mailing Address: LITWIN FAMILY TRUST OF OCT 16
LITWIN THOMAS S & MAUREEN B
PO BOX 266
WHATLEY, MA 01093

Parcel Number: 12-0-09-3
CAMA Number: 12-0-09-3
Property Address: W/S CHESTNUT PLAIN RD

Mailing Address: LITWIN FAMILY TRUST OF OCT 16
LITWIN THOMAS S & MAUREEN B
PO BOX 266
WHATLEY, MA 01093

Parcel Number: 12-0-10
CAMA Number: 12-0-10
Property Address: 155 CHESTNUT PLAIN RD

Mailing Address: CAPLAN JAY L MARIE HELENE HUET
PO BOX 214
WHATLEY, MA 01093

Parcel Number: 12-0-11
CAMA Number: 12-0-11
Property Address: 7 CLAVERACK RD

Mailing Address: LOMELI ANN FUTTER
PO BOX 107
WHATLEY, MA 01093

Parcel Number: 18-0-23-1
CAMA Number: 18-0-23-1
Property Address: OFF HAYDENVILLE RD

Mailing Address: RAYMIK REALTY TRUST
152 LONG PLAIN RD
S DEERFIELD, MA 01373



www.cai-tech.com

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10/5/2020

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PROJECT DESCRIPTION

SUMMARY SITE DESCRIPTION:

The site of the proposed work is the entrance to the new Whately Woods Conservation Area on the west side of Chestnut Plain Road south of the town center. There is an existing logging road and culvert at the entrance from Chestnut Plain Road. The culvert carries flow from an intermittent stream and road drainage ditch flowing along the west side of the road. Except for the slopes to the stream and the logging road, the area of work is wooded and relatively level.

RESOURCE AREA DELINEATION:

The Bordering Vegetated Wetlands (BVW) on the site were flagged in the field by Charles H. Dauchy, MFS, Environmental Consultant, based on criteria in 310 CMR 10.55(2)(c). The wetland boundaries were flagged with sequentially numbered blue flags. Soil investigations were marked with orange flags labeled "NH" for non-hydric, and yellow flags labeled "H" for hydric. Flags were located by survey as shown on the project plan.

The Bank of the intermittent stream was also flagged by Charles H. Dauchy, based on physical indicators of the mean annual high water and/or first break in slope. The Bank is marked with sequentially numbered blue flags as shown on the plan.

SUMMARY OF PROPOSED WORK :

The purpose of the proposed work is to provide safe and maintainable public access to the new 120 acre Whately Woods Conservation Area. The existing culvert is well over 40 years old, is too short to allow stable side-slopes, and is sagging at a joint. It also is undersized resulting in turbulence at the inlet and scour at the outlet.

The proposed work consists of two elements:

1. Replacement of the existing 20' x 24" concrete culvert with a 40' x 36" concrete culvert, with a stone apron at the outlet. The larger diameter reduces both the upstream headwater and turbulence, and the outlet velocity. The longer length provides for a safe 12 ft. road width 2' shoulders, and for stable and easily maintainable side slopes. The longer length also reduces the culvert slope, also reducing velocity.

During removal and installation of the culverts, the stream will be protected from sediment discharge by a downstream sediment barrier, and by pumping any stream-flow around the site to a stable outlet. Side slopes will be seeded and mulched, as appropriate for the season.

2. Construction of a gravel parking lot for 4 cars, with 12 ft. wide gravel access driveway. The driveway and parking will be finished at approximate existing grade so as not to change drainage patterns. The parking will slope gently away from the driveway, draining to well vegetated upland. The adjacent stream and bordering vegetated wetland will be protected by a sediment barrier during construction.

COMPLIANCE WITH PERFORMANCE STANDARDS:

WORK IN THE 100' BUFFER ZONE:

The proposed construction of the gravel access road and parking area will not alter any wetland resource area. The wetland and stream will be protected by sediment barriers during construction. Disturbed areas not covered with gravel and TRG will be seeded for permanent cover. Sediment barriers will be removed after vegetative cover is established.

REPLACEMENT OF AN EXISTING STREAM CROSSING (310CMR10.53(8):

(a) Compliance with Mass. Stream Crossing Standards to the maximum extent practicable:
Due to the location of the culvert on a small intermittent stream with minimal importance either for wildlife passage or habitat, we are requesting exemption from full application of the standards in this situation. We address the considerations listed in the regulation below.

The potential for downstream flooding:

There is no significant ponding area upstream of the culvert location. The slight increase in culvert capacity will therefore not increase flood flows, but will instead slightly reduce the velocity, helping to prevent erosion. There will be no increase in downstream flow rates.

Upstream and downstream habitat:

There is only approximately 120 feet of stream upstream of the culvert location and that has minimal wildlife value. Downstream impacts will be prevented by erosion controls during construction.

Potential for erosion and head-cutting:

The new culvert will be installed with inverts matching the existing stream grade, and a stone apron at the outlet. There will be no increase in flows that could change downstream erosion patterns.

Stream Stability:

There will be no change in grade or flow that would impact stream stability. By re-aligning the culvert to match the stream channel, the new culvert will eliminate the existing bend at the culvert outlet that is now subject to erosion.

Habitat fragmentation caused by the crossing:

As noted above, upstream habitat within the stream is minimal. At the outlet of the existing culvert there is a drop of several inches that could impede upstream movement. The proposed culvert design will eliminate that drop and protect against future erosion at the outlet.

The amount of stream mileage made accessible by the improvements:
120 feet.

Storm flow conveyance:

The proposed culvert will improve the capacity of the culvert, reducing the upstream headwater depth and reducing erosive flow velocities. Due to the lack of storage upstream of the culvert, there is no detention basin effect and there will be no change in downstream storm runoff rates.

Engineering design constraints specific to the crossing:

Not applicable

Impacts to wetlands that would occur by improving the crossing:

None. There are no wetlands within the stream channel in the area of work or impact.

Potential to affect property and infrastructure:

No negative impact. The proposed culvert will allow safe public access to a newly protected conservation area and trails.

Cost of replacement:

Cost is a significant consideration in this situation, where the applicant is a non-profit conservation trust relying on donations to pay for the culvert. Four options were evaluated based on cost estimates from culvert suppliers, a local excavating contractor, and the Town Highway Superintendent.

1. Full compliance with streams crossing standards, using an open bottom box culvert:

The cost of the culvert and footings alone would be approximately \$16,000, not including installation. No estimates were obtained for installation because the overall cost would clearly not be practicable.

2. Nearly full compliance with stream crossing standards (less than 1.2x width) using retaining wall block abutments and a precast concrete slab deck, 5 ft. span and 16' width:

Cost of concrete blocks and deck would total \$8,100. Cost of installation, based on preliminary estimate by the Town Highway Superintendent would be approximately \$4,300, for a total of \$12,400.

4. An embedded 42" diameter culvert, which would not fully meet openness or width criteria, but would provide a naturalized bottom:

The cost estimate from a local contractor totals \$11,130 including materials.

4. The proposed 36" diameter culvert at existing stream grade:

An estimate from a local contractor totals \$10,090 including materials. This is the most financially practicable means to accomplish the project goal of providing safe public access.

WORK ON A "BANK" - 310CMR10.54(4)(a)

"any proposed work on a Bank shall not impair the following:"

1. the physical stability of the Bank;

The proposed culvert will improve the stability of the bank by reducing the velocity and realigning the culvert to match the stream alignment.

2. the water carrying capacity of the existing channel within the Bank;

There will be no change in capacity of the channel within the bank. The capacity of the culvert without excessive headwater will be increased slightly.

3. ground water and surface water quality;

There will be no discharges to the groundwater. Surface water quality will be protected by erosion controls during construction.

4. the capacity of the Bank to provide breeding habitat, escape cover, and food for fisheries;

There is no important fish habitat in the intermittent stream. In the event that small fish did find their way to the culvert in high stream flows, their passage would be facilitated by reduced flow velocity and by elimination of the drop at the existing culvert outlet.

5. the capacity of the Bank to provide important wildlife habitat functions;

The proposed work will permanently alter approximately 50 feet of existing bank (20' of additional culvert and 5' of stone apron x 2 for both sides of the stream), of over 1000 feet of bank on just this stream on the property. The low habitat value of the bank in this area has already been noted.

6. Compliance with Mass. Stream Crossing Standards;

Waiver of full compliance is requested under 310CMR10.53(8).

EXHIBIT 5

CULVERT DESIGN CALCULATIONS:

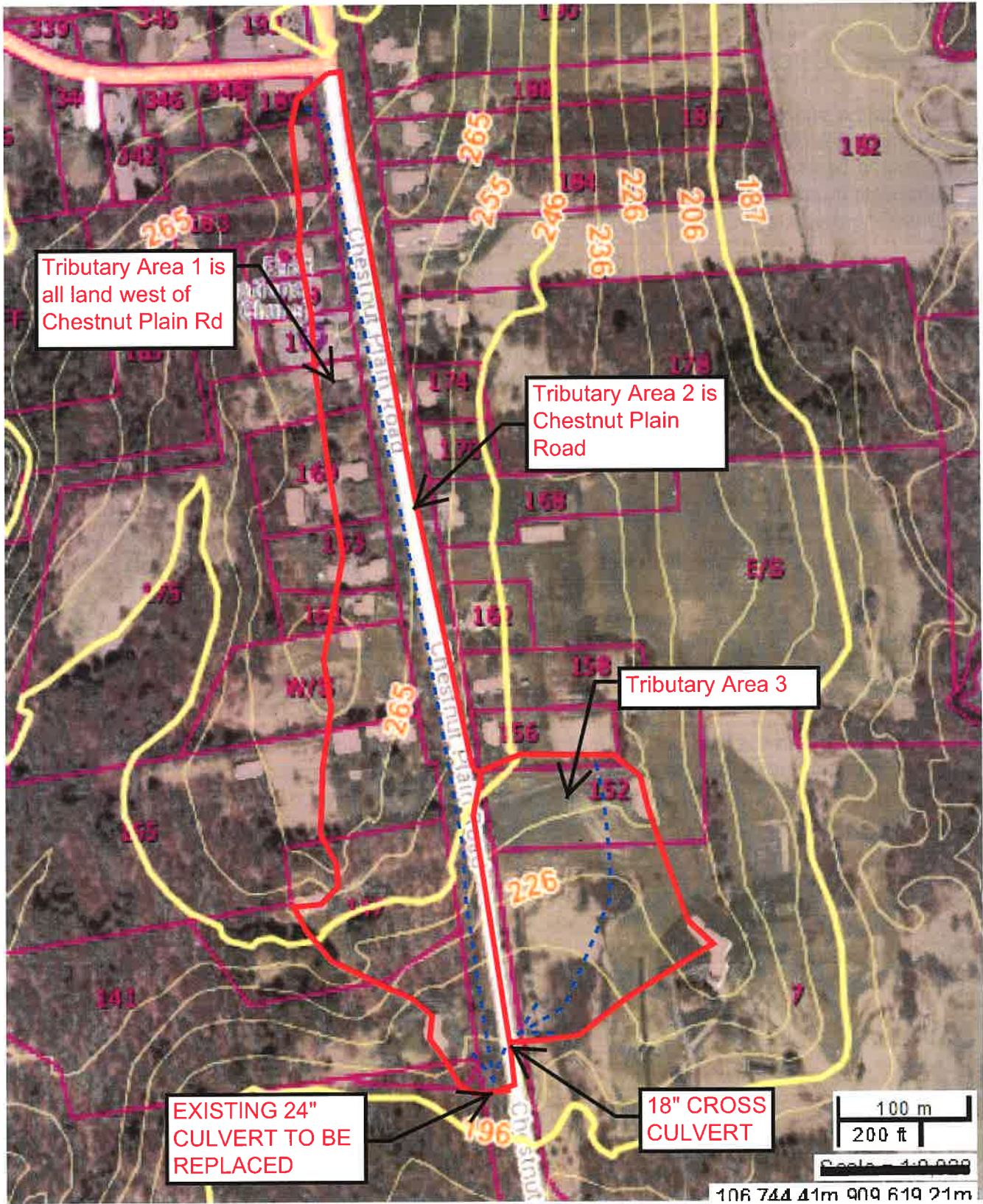
The existing and proposed culverts were compared as to hydraulic and hydrologic characteristics using the HydroCad stormwater modeling program. The tributary watershed was delineated based on MA GIS data and measurements using the Oliver application and planimeter measurements of Oliver printouts. The culverts were modeled in HydroCad as "ponds", termed CB, in this case the method for modeling with no or minimal upstream storage.

The modeling shows that in larger storms, the small diameter of the existing 24" culvert and the relatively steep slope results in headwater ponding and turbulence at the upstream end and flow velocities that have created a scour pool and drop at the downstream end. The proposed 36" culvert will reduce culvert slope, the headwater depth, and the velocity, and the proposed stone outlet apron will maintain an even stream grade eliminating the drop and scour pool at the culvert outlet.

Comparison of existing and proposed conditions:

	2 year storm		25 year storm		100 year storm	
	HW depth	Vel.	HW depth	Vel	HW depth	Vel
Existing 24"	0.84 ft.	3.11 fps	1.41 ft.	4.05 fps	2.82 ft.	6.5 fps
Proposed 36"	0.83 ft	2.44 fps	1.35 ft.	3.12 fps	2.09 ft.	3.88 fps

Please note that in the Hydrocad calculation printouts that follow, the watershed characteristics are shown only once, with the 100 year storm calculations for the existing culvert. They do not change for all other calculations for either culvert. Incoming flow calculations for the three storms also do not change for either culvert. To save paper, repetitive calculations are not shown.



DRAINAGE DIVIDE
Tc FLOW PATH



DRAINAGE AREA MAP
PROPOSED CULVERT
REPLACEMENT
WHATELY WOODS

WATERSHED CHARACTERISTICS WORKSHEET WHATELY WOODS CULVERT

DRAINAGE AREA #1

Tc FLOW PATH

ELEV. FT	TO ELEV. FT	ELEV DROP FT	DIST. FT	SLOPE DESCIP. FT/FT
288	287	1	60	0.017 sheet - lawn
287	246	41	1794	0.023 shallow - roadside
246	202	44	552	0.080 shallow - swale

IMPERV.
AREA (SF)

BUILDINGS AND	1900
DRIVES FROM	2500
NORTH TO SOUTH	3000
(MA GIS)	2700
	8000
	3800
	7000
	6400
	1400
	2000
	10000
	7500
	4080

TOTAL IMPERVIOUS 60280 SF 1.38 ACRES
 ASSUME 0.38 AC CONNECTED IMPERVIOUS AND 1 AC UNCONNECTED

TOTAL TRIB AREA	564570 SF	12.96 ACRES	ALL CHESHIRE SOIL SERIES: HSGA
LESS IMPERVIOUS =	504290 SF	11.58 ACRES	
WOODED AREA =	190440 SF	4.37 ACRES	
LAWN/LANDSCAPE	313850 SF	7.21 ACRES	

DRAINAGE AREA #2 CHESTNUT PLAIN ROAD

Tc FLOW PATH

ELEV. FT	TO ELEV. FT	ELEV DROP FT	DIST. FT	SLOPE DESCIP. FT/FT
Assumed from road crown				
287	246	41	1794	0.023 shallow - roadside
246	202	44	552	0.080 shallow - swale

ROADWAY IMPERVIOUS 54360 SF 1.25 ACRES

DRAINAGE AREA #3 EAST OF ROAD

Tc FLOW PATH

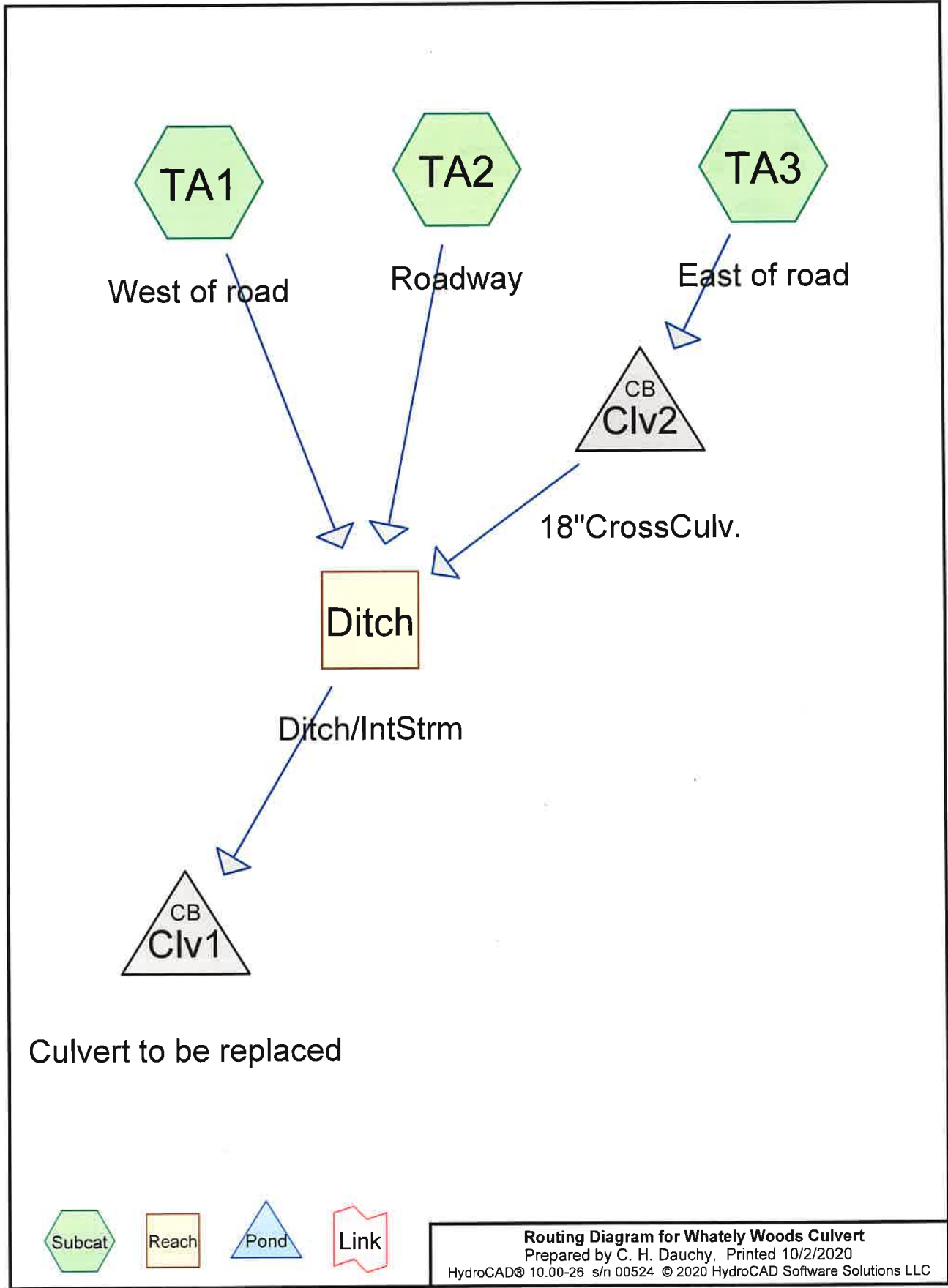
ELEV. FT	TO ELEV. FT	ELEV DROP FT	DIST. FT	SLOPE DESCIP. FT/FT
240	236	4	100	0.040 sheet - meadow
236	203	33	580	0.057 shallow - meadow

IMPERV.
AREA (SF)

BUILDINGS AND	
DRIVES FROM	9000 SF
NORTH TO SOUTH	800 SF
TOTAL	9800 SF
ROADWAY	7038 SF
TOTAL IMPERVIOUS	16838

0.22 ACRES unconnected
 0.16 ACRES connected
 0.39 ACRES

TOTAL TRIB AREA	285660 SF	6.56 ACRES	
LESS IMPERV IS MEADOW	268822 SF	6.17 ACRES	
1/3 WET MEADOW	88711 SF	2.04 ACRES	HSGC
BALANCE UPLAND	180111 SF	4.13 ACRES	HSGA



Culvert to be replaced



Routing Diagram for Whately Woods Culvert
 Prepared by C. H. Dauchy, Printed 10/2/2020
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Whately Woods Culvert

Type III 24-hr 100 yr storm Rainfall=7.51"

Prepared by C. H. Dauchy

Printed 10/2/2020

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Summary for Subcatchment TA1: West of road

Runoff = 9.05 cfs @ 12.40 hrs, Volume= 1.413 af, Depth= 1.31"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-48.00 hrs, dt= 0.05
Type III 24-hr 100 yr storm Rainfall=7.51"

Area (ac)	CN	Description
0.380	98	Paved parking, HSG A
1.000	98	Unconnected roofs, HSG A
4.370	30	Woods, Good, HSG A
7.210	39	>75% Grass cover, Good, HSG A
12.960	42	Weighted Average
12.580	41	97.07% Pervious Area
0.380	98	2.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	60	0.0170	0.10		Sheet Flow, Grass: Dense n= 0.240 P2= 3.05"
9.7	1,794	0.0230	3.08		Shallow Concentrated Flow, Along roadside Paved Kv= 20.3 fps
2.2	552	0.0800	4.24		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
22.3	2,406	Total			

Summary for Subcatchment TA2: Roadway

Runoff = 7.56 cfs @ 12.16 hrs, Volume= 0.757 af, Depth= 7.27"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious, Time Span= 0.00-48.00 hrs, dt= 0.05
Type III 24-hr 100 yr storm Rainfall=7.51"

Area (ac)	CN	Description
* 1.250	98	Road
1.250	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	12	0.0200	0.88		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.05"
9.7	1,794	0.0230	3.08		Shallow Concentrated Flow, Along roadside Paved Kv= 20.3 fps
2.2	552	0.0800	4.24		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
12.1	2,358	Total			

Whately Woods Culvert

Type III 24-hr 100 yr storm Rainfall=7.51"

Prepared by C. H. Dauchy

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Summary for Subcatchment TA3: East of road

Runoff = 7.15 cfs @ 12.28 hrs, Volume= 0.887 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. Ul as Pervious, Time Span= 0.00-48.00 hrs, dt= 0.05
Type III 24-hr 100 yr storm Rainfall=7.51"

Area (ac)	CN	Description
0.220	98	Unconnected roofs, HSG A
* 0.160	98	Roadway - connected impervious
4.130	30	Meadow, non-grazed, HSG A
2.040	71	Meadow, non-grazed, HSG C
6.550	47	Weighted Average
6.390	45	97.56% Pervious Area
0.160	98	2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	100	0.0400	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.05"
5.8	580	0.0570	1.67		Shallow Concentrated Flow, shallow through meadow Kv= 7.0 fps
16.9	680	Total			

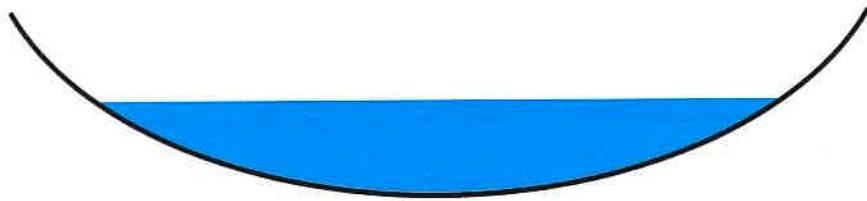
Summary for Reach Ditch: Ditch/IntStrm

Inflow Area = 20.760 ac, 8.62% Impervious, Inflow Depth = 1.77" for 100 yr storm event
Inflow = 20.45 cfs @ 12.29 hrs, Volume= 3.057 af
Outflow = 20.42 cfs @ 12.30 hrs, Volume= 3.057 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.33 fps, Min. Travel Time= 0.3 min
Avg. Velocity= 2.72 fps, Avg. Travel Time= 0.8 min

Peak Storage= 349 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.78'
Bank-Full Depth= 1.50' Flow Area= 7.5 sf, Capacity= 82.94 cfs

7.50' x 1.50' deep Parabolic Channel, n= 0.040 Earth, cobble bottom, clean sides
Length= 125.0' Slope= 0.1004 '/
Inlet Invert= 202.00', Outlet Invert= 189.45'



Whately Woods Culvert

Prepared by C. H. Dauchy

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Type III 24-hr 100 yr storm Rainfall=7.51"

Printed 10/2/2020

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Summary for Pond Clv1: Culvert to be replaced

Inflow Area = 20.760 ac, 8.62% Impervious, Inflow Depth = 1.77" for 100 yr storm event
Inflow = 20.42 cfs @ 12.30 hrs, Volume= 3.057 af
Outflow = 20.42 cfs @ 12.30 hrs, Volume= 3.057 af, Atten= 0%, Lag= 0.0 min
Primary = 20.42 cfs @ 12.30 hrs, Volume= 3.057 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 192.27' @ 12.30 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	189.45'	24.0" Round Culvert L= 20.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 189.45' / 188.59' S= 0.0430 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=20.41 cfs @ 12.30 hrs HW=192.27' (Free Discharge)
↑1=Culvert (Inlet Controls 20.41 cfs @ 6.50 fps)

Summary for Pond Clv2: 18"CrossCulv.

Inflow Area = 6.550 ac, 2.44% Impervious, Inflow Depth = 1.63" for 100 yr storm event
Inflow = 7.15 cfs @ 12.28 hrs, Volume= 0.887 af
Outflow = 7.15 cfs @ 12.28 hrs, Volume= 0.887 af, Atten= 0%, Lag= 0.0 min
Primary = 7.15 cfs @ 12.28 hrs, Volume= 0.887 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 205.88' @ 12.28 hrs
Flood Elev= 206.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	204.00'	18.0" Round Culvert L= 68.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.00' / 202.00' S= 0.0294 '/ Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf

Primary OutFlow Max=7.10 cfs @ 12.28 hrs HW=205.87' (Free Discharge)
↑1=Culvert (Inlet Controls 7.10 cfs @ 4.02 fps)

Whately Woods Culvert

Type III 24-hr 2 yr storm Rainfall=3.05"

Prepared by C. H. Dauchy

Printed 10/2/2020

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. UI as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment TA1: West of road

Runoff Area=12.960 ac 2.93% Impervious Runoff Depth=0.08"
Flow Length=2,406' Tc=22.3 min CN=41/98 Runoff=0.73 cfs 0.091 af

Subcatchment TA2: Roadway

Runoff Area=1.250 ac 100.00% Impervious Runoff Depth=2.82"
Flow Length=2,358' Tc=12.1 min CN=0/98 Runoff=3.03 cfs 0.294 af

Subcatchment TA3: East of road

Runoff Area=6.550 ac 2.44% Impervious Runoff Depth=0.10"
Flow Length=680' Tc=16.9 min CN=45/98 Runoff=0.34 cfs 0.053 af

Reach Ditch: Ditch/IntStrm

Avg. Flow Depth=0.36' Max Vel=4.46 fps Inflow=3.94 cfs 0.438 af
n=0.040 L=125.0' S=0.1004 '/' Capacity=82.94 cfs Outflow=3.90 cfs 0.438 af

Pond Clv1: Culvert to be replaced

Peak Elev=190.29' Inflow=3.90 cfs 0.438 af
24.0" Round Culvert n=0.013 L=20.0' S=0.0430 '/' Outflow=3.90 cfs 0.438 af

Pond Clv2: 18"CrossCulv.

Peak Elev=204.29' Inflow=0.34 cfs 0.053 af
18.0" Round Culvert n=0.025 L=68.0' S=0.0294 '/' Outflow=0.34 cfs 0.053 af

Whately Woods Culvert

Type III 24-hr 25 yr storm Rainfall=5.85"

Prepared by C. H. Dauchy

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv. U1 as Pervious
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentTA1: West of road Runoff Area=12.960 ac 2.93% Impervious Runoff Depth=0.66"
Flow Length=2,406' Tc=22.3 min CN=41/98 Runoff=3.29 cfs 0.711 af

SubcatchmentTA2: Roadway Runoff Area=1.250 ac 100.00% Impervious Runoff Depth=5.61"
Flow Length=2,358' Tc=12.1 min CN=0/98 Runoff=5.88 cfs 0.585 af

SubcatchmentTA3: East of road Runoff Area=6.550 ac 2.44% Impervious Runoff Depth=0.86"
Flow Length=680' Tc=16.9 min CN=45/98 Runoff=2.95 cfs 0.470 af

Reach Ditch: Ditch/IntStrm Avg. Flow Depth=0.55' Max Vel=5.86 fps Inflow=9.65 cfs 1.766 af
n=0.040 L=125.0' S=0.1004 '/' Capacity=82.94 cfs Outflow=9.64 cfs 1.766 af

Pond Clv1: Culvert to be replaced Peak Elev=190.87' Inflow=9.64 cfs 1.766 af
24.0" Round Culvert n=0.013 L=20.0' S=0.0430 '/' Outflow=9.64 cfs 1.766 af

Pond Clv2: 18"CrossCulv. Peak Elev=204.92' Inflow=2.95 cfs 0.470 af
18.0" Round Culvert n=0.025 L=68.0' S=0.0294 '/' Outflow=2.95 cfs 0.470 af

Whately Woods Culvert

Type III 24-hr 2 yr storm Rainfall=3.05"

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Summary for Pond Clv1: Culvert to be replaced

Inflow Area = 20.760 ac, 8.62% Impervious, Inflow Depth = 0.25" for 2 yr storm event
 Inflow = 3.90 cfs @ 12.19 hrs, Volume= 0.438 af
 Outflow = 3.90 cfs @ 12.19 hrs, Volume= 0.438 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.90 cfs @ 12.19 hrs, Volume= 0.438 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 190.29' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	189.45'	24.0" Round Culvert L= 20.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 189.45' / 188.59' S= 0.0430 1' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=3.87 cfs @ 12.19 hrs HW=190.29' (Free Discharge)
 ↑1=Culvert (Inlet Controls 3.87 cfs @ 3.11 fps)

Whately Woods Culvert

Type III 24-hr 25 yr storm Rainfall=5.85"

Prepared by C. H. Dauchy

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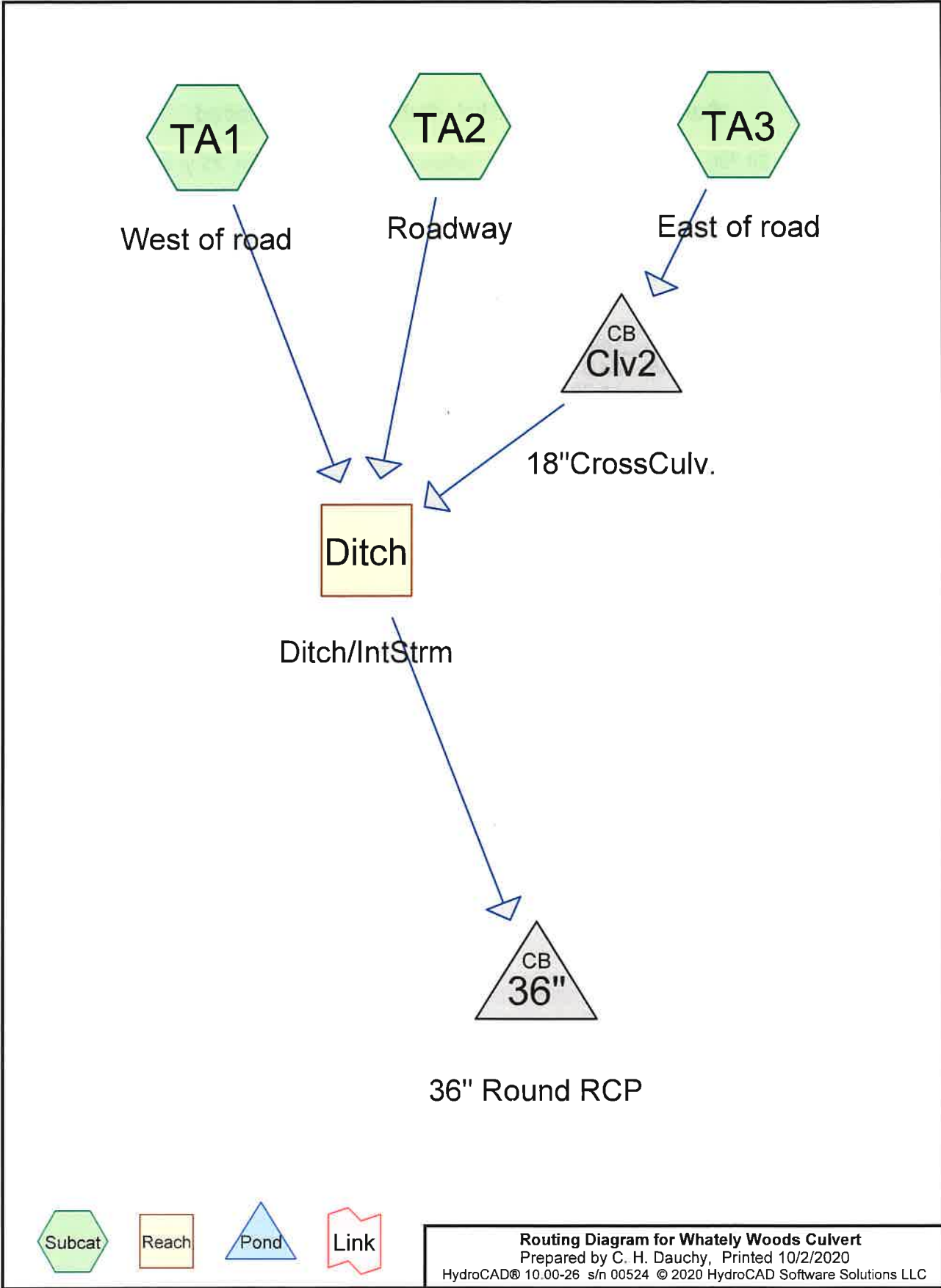
Summary for Pond Clv1: Culvert to be replaced

Inflow Area = 20.760 ac, 8.62% Impervious, Inflow Depth = 1.02" for 25 yr storm event
 Inflow = 9.64 cfs @ 12.26 hrs, Volume= 1.766 af
 Outflow = 9.64 cfs @ 12.26 hrs, Volume= 1.766 af, Atten= 0%, Lag= 0.0 min
 Primary = 9.64 cfs @ 12.26 hrs, Volume= 1.766 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 190.87' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	189.45'	24.0" Round Culvert L= 20.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 189.45' / 188.59' S= 0.0430 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=9.61 cfs @ 12.26 hrs HW=190.86' (Free Discharge)
 ←1=Culvert (Inlet Controls 9.61 cfs @ 4.05 fps)



Whately Woods Culvert

Type III 24-hr 2 yr storm Rainfall=3.05"

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Summary for Pond 36": 36" Round RCP

Inflow Area = 20.760 ac, 8.62% Impervious, Inflow Depth = 0.25" for 2 yr storm event
 Inflow = 3.90 cfs @ 12.19 hrs, Volume= 0.438 af
 Outflow = 3.90 cfs @ 12.19 hrs, Volume= 0.438 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.90 cfs @ 12.19 hrs, Volume= 0.438 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 190.55' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	189.72'	36.0" Round RCP_Round 36" L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 189.72' / 188.25' S= 0.0367'/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=3.87 cfs @ 12.19 hrs HW=190.55' (Free Discharge)
 ↑1=RCP_Round 36" (Inlet Controls 3.87 cfs @ 2.44 fps)

Whately Woods Culvert

Type III 24-hr 25 yr storm Rainfall=5.85"

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Summary for Pond 36": 36" Round RCP

Inflow Area = 20.760 ac, 8.62% Impervious, Inflow Depth = 1.02" for 25 yr storm event
 Inflow = 9.64 cfs @ 12.26 hrs, Volume= 1.766 af
 Outflow = 9.64 cfs @ 12.26 hrs, Volume= 1.766 af, Atten= 0%, Lag= 0.0 min
 Primary = 9.64 cfs @ 12.26 hrs, Volume= 1.766 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 191.07' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	189.72'	36.0" Round RCP_Round 36" L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 189.72' / 188.25' S= 0.0367 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=9.61 cfs @ 12.26 hrs HW=191.07' (Free Discharge)
 ↑1=RCP_Round 36" (Inlet Controls 9.61 cfs @ 3.12 fps)

Whately Woods Culvert

Type III 24-hr 100 yr storm Rainfall=7.51"

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Summary for Pond 36": 36" Round RCP

Inflow Area = 20.760 ac, 8.62% Impervious, Inflow Depth = 1.77" for 100 yr storm event
 Inflow = 20.42 cfs @ 12.30 hrs, Volume= 3.057 af
 Outflow = 20.42 cfs @ 12.30 hrs, Volume= 3.057 af, Atten= 0%, Lag= 0.0 min
 Primary = 20.42 cfs @ 12.30 hrs, Volume= 3.057 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 191.81' @ 12.30 hrs

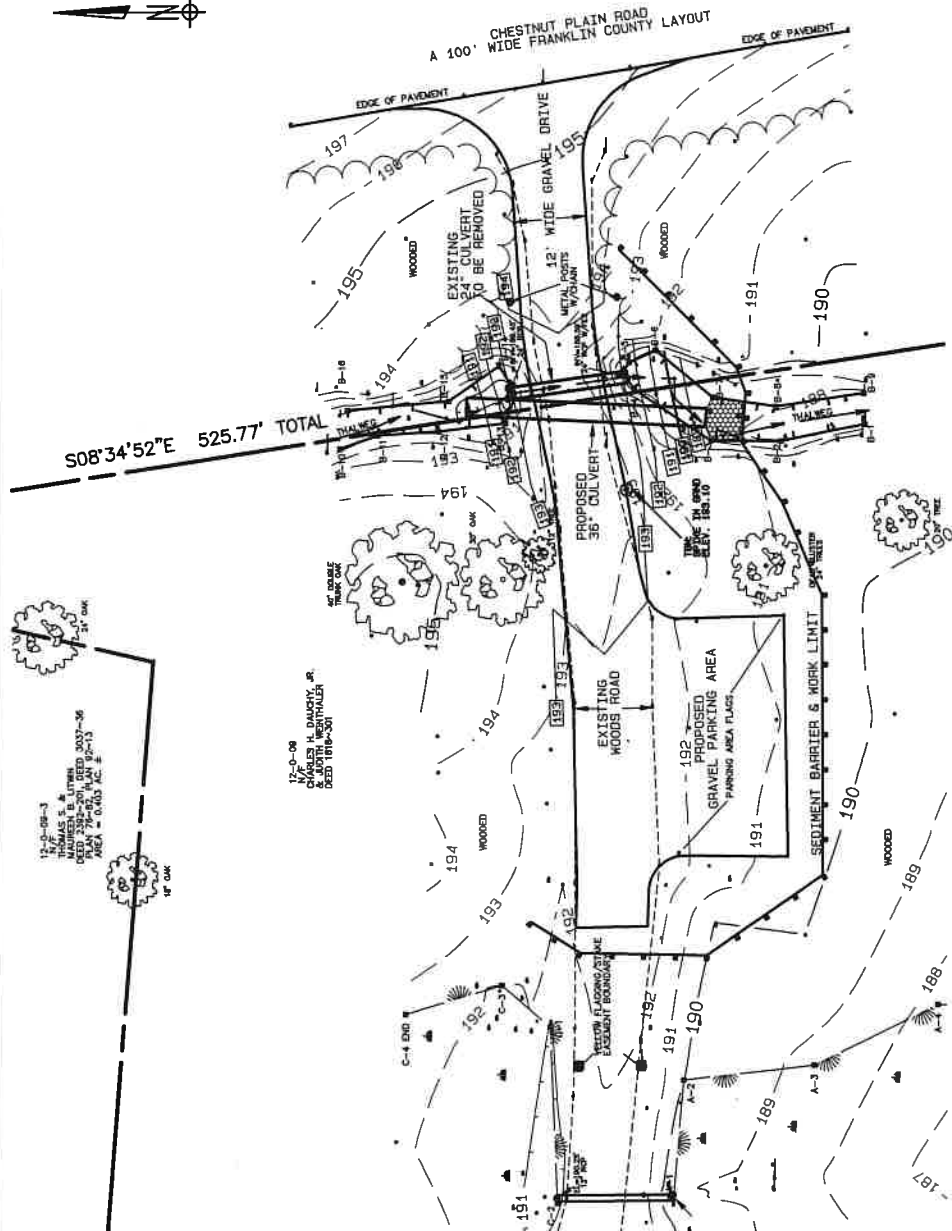
Device	Routing	Invert	Outlet Devices
#1	Primary	189.72'	36.0" Round RCP_Round 36" L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 189.72' / 188.25' S= 0.0367 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=20.41 cfs @ 12.30 hrs HW=191.81' (Free Discharge)
 ↳1=RCP_Round 36" (Inlet Controls 20.41 cfs @ 3.88 fps)

CONSTRUCTION PROCEDURES FOR EROSION AND SEDIMENT CONTROL.

1. NO SITE ALTERATION SHALL PROCEED UNTIL ANY NOTIFICATION AND PRELIMINARY PERMITS OF THE COMMISSIONER OF ENVIRONMENTAL CONSERVATION ARE OBTAINED.
2. BRUSH AND SMALL TREES ALLOWED TO FACILITATE INSTALLATION OF BARRIER ACROSS STREAM SHALL BE FILTREX FILTER SOCK OR EQUIVALENT.
3. ROWS HIGH AND SECURELY STAKED.
4. PROVIDE EROSION PROTECTION OF EXISTING CULVERT AND INSTALLATION OF REPLACEMENT WITH REMOVAL OF EXISTING CULVERT AND INSTALLATION OF REPLACEMENT FROM STREAM AS SOON AS CULVERT IS OPERABLE.
5. INSTALLED WITH BARRIERS AT SUPPLIES NEAR COMMERCIAL INCLUDES LEGUMES, DORMANT SEEDING WITH MULCH MAY BE REQUIRED.
6. DRIVEWAY AND PARKING, DISTURBED AREAS AROUND DRIVE AND PARKING.
7. REMOVE SEDIMENT BARRIERS AS SOON AS SITE IS STABILIZED.

- LEGEND**
- EXISTING CONTOURS
 - PROPOSED CONTOURS
 - WETLAND EDGE
 - MEAN ANNUAL HIGH WATER BANK OF INTERMITTENT STREAM
 - PROPERTY/LOT LINE
 - SEDIMENT BARRIER/MORK LIMIT
 - STREAM THALWEG



DATE:	10/2/20	SHEET 1 OF 2
NO.		
DATE	REVISIONS	

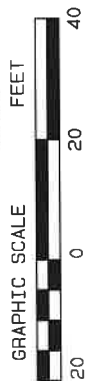
PROPOSED CULVERT REPLACEMENT AND GRAVEL PARKING AREA
WHALEY WOODS
WHALEY, MA

for
THE KESTREL LAND TRUST

PREPARED BY
CHARLES H. DAUCHY
ENVIRONMENTAL CONSULTANT
 26 SANCTUARY LANE
 HOPKINTON, MA 01748
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 email: dauchy.ch@gmail.com



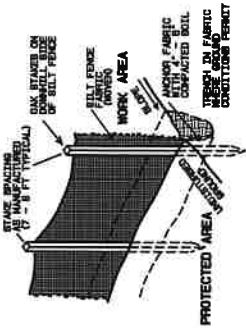
10/2/20
 David Vreeland



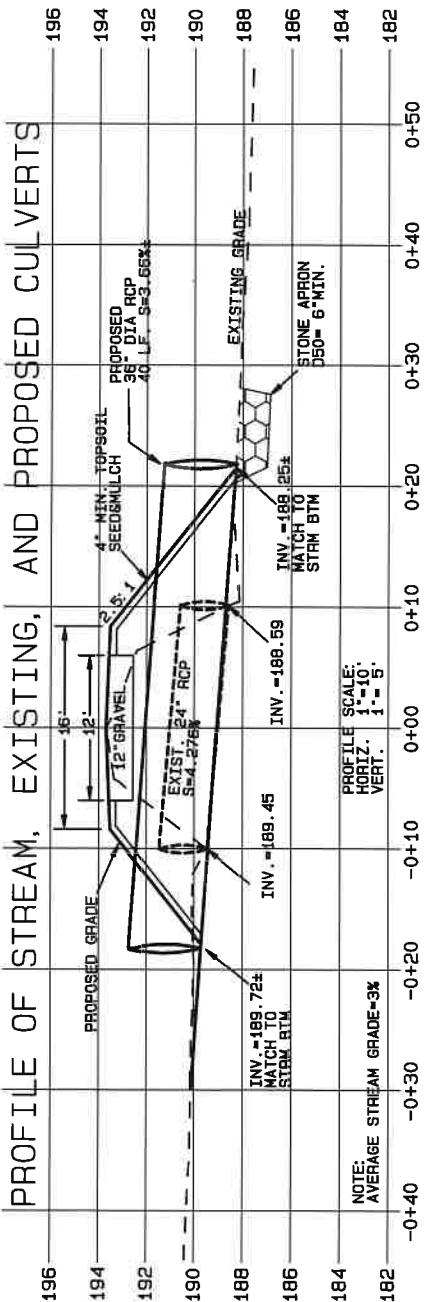
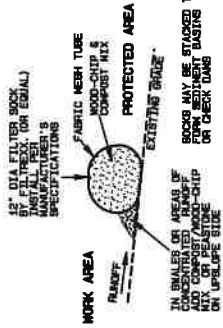
SOURCES:
 WETLAND BOUNDARY AND BANK DELINEATED BY C. H. DAUCHY, ENVIRONMENTAL CONSULTANT. SURVEY OF PL. FLASS AND TOPOGRAPHY BY C. H. DAUCHY. PLAN COMPILED BY C. H. DAUCHY.

SEDIMENT BARRIER ALTERNATIVES
CONTRACTOR'S OPTION

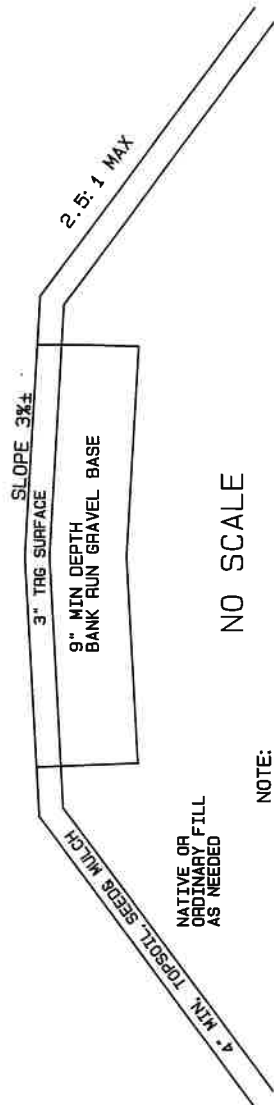
TYPICAL SILT FENCE INSTALLATION



TYPICAL FILTER SOCK INSTALLATION



TYPICAL SECTION OF DRIVE AND PARKING



NO SCALE

NOTE:
DEPTH AND TYPE OF DRIVEWAY AND PARKING GRAVEL
AND TOP COURSE MAY BE MODIFIED WITH APPROVAL
OF THE KESTREL LAND TRUST.



David Vreeland
10/2/20

DATE: 10/2/20	SHEET 2 OF 2
NO.	REV/DESCRIPTION

PROPOSED CULVERT REPLACEMENT
AND GRAVEL PARKING AREA
WHATELY MOORS
WHATELY, MA

FOR
THE KESTREL LAND TRUST

PREPARED BY

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