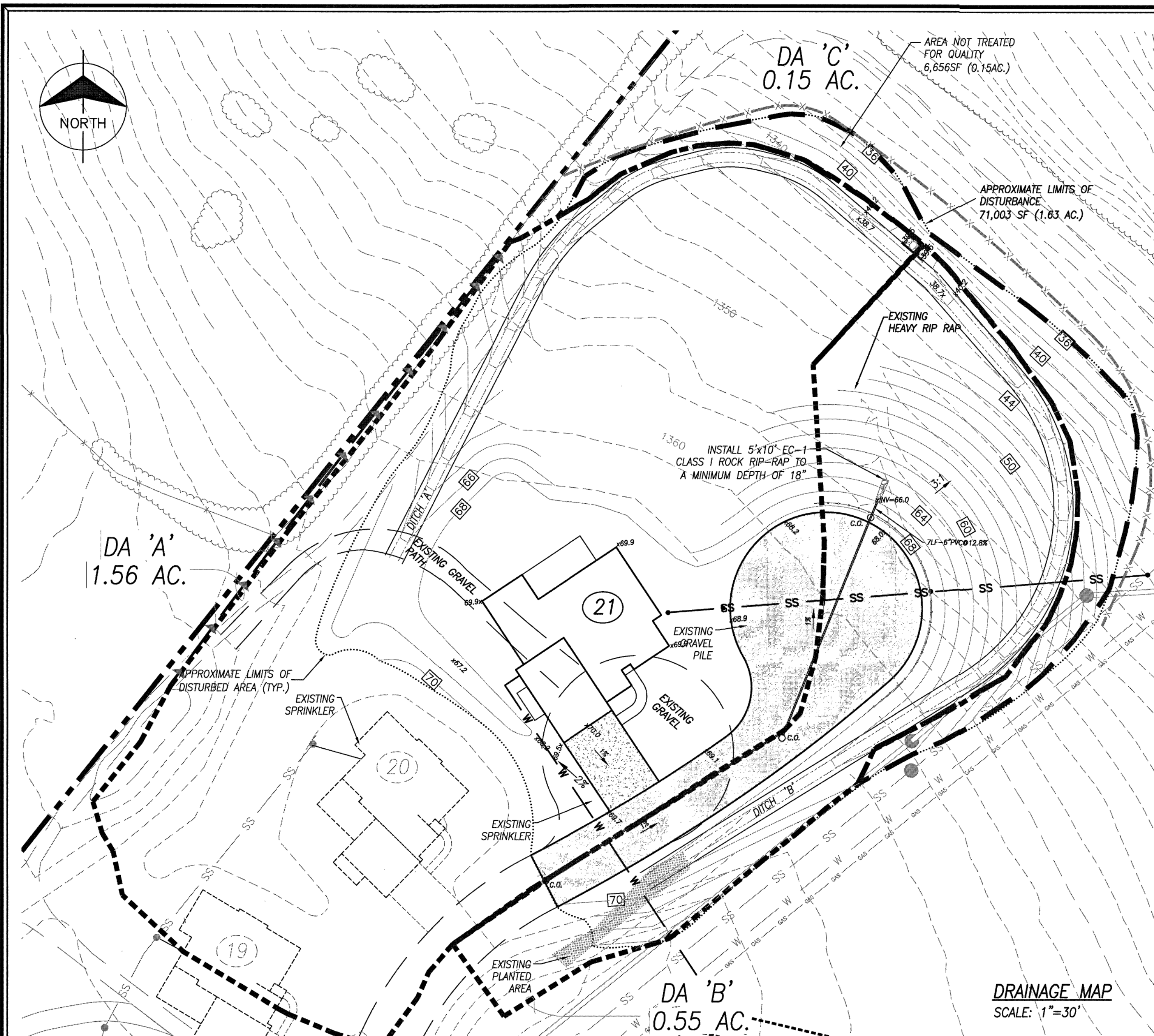




DISTURBED AREAS

D.A. 'A' TOTAL: 1.56 AC.
ROOF 0.13 AC.
ROAD 0.15
TURF 1.28 AC
TOTAL = 1.56 AC.

D.A. 'B' TOTAL: 0.55 AC.
ROOF 0.00 AC
ROAD 0.12 AC
TURF 0.43 AC
TOTAL = 0.55 AC.

ALL AREAS TOTAL: 2.11 AC.
ROOF 0.13 AC
ROAD 0.27 AC
TURF 1.71 AC
TOTAL = 2.11 AC.

NOT INCLUDED IN QUALITY CALCULATIONS

D.A. 'C' TOTAL: 0.15 AC.
TURF 0.15 AC
TOTAL = 0.15 AC.

DRAINAGE MAP

SCALE: 1"=30'

WATER QUALITY

Virginia Runoff Reduction Method Worksheet

DEQ Virginia Runoff Reduction Method Re-Development Compliance Spreadsheet - Version 3.0

BMP Design Specifications List: 2013 Draft Stds & Specs

Site Summary

Total Rainfall (in):	43
Total Disturbed Acreage:	1.66

Site Land Cover Summary

Pre-Development Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	% of Total
Forest/Open (acres)	0.00	0.00	0.00	0.00	0.00	0
Managed Turf (acres)	0.00	0.00	1.96	0.00	1.96	93
Impervious Cover (acres)	0.00	0.00	0.15	0.00	0.15	7
					2.11	100

Post-Development Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	% of Total
Forest/Open (acres)	0.00	0.00	0.00	0.00	0.00	0
Managed Turf (acres)	0.00	0.00	1.71	0.00	1.71	81
Impervious Cover (acres)	0.00	0.00	0.40	0.00	0.40	19
					2.11	100

Site Tn and Land Cover Nutrient Loads

	Final Post-Development (Post-Development & New Impervious)	Post- ReDevelopment	Post- Development (New Impervious)	Adjusted Pre- ReDevelopment
Site Rv	0.36	0.28	0.95	0.28
Treatment Volume (ft ³)	2,745	1,883	862	1,883
TP Load (lb/yr)	1.72	1.18	0.54	1.18

Pre- ReDevelopment TP Load per acre (lb/acre/yr)	Final Post-Development TP Load per acre (lb/acre/yr)	Post-Development TP Load per acre (lb/acre/yr)
0.64	0.82	0.64

Total TP Load Reduction Required (lb/yr)	0.68	0.24	0.44
--	------	------	------

	Final Post-Development Load (Post-Development & New Impervious)	Pre- ReDevelopment
TN Load (lb/yr)	12.34	9.36

Site Compliance Summary

Maximum % Reduction Required Below Pre-Development Load	20%
--	-----

Total Runoff Volume Reduction (ft ³)	952
Total TP Load Reduction Achieved (lb/yr)	0.75
Total TN Load Reduction Achieved (lb/yr)	5.68
Remaining Post Development TP Load (lb/yr)	0.97
Remaining TP Load Reduction (lb/yr) Required	0.00

** TARGET TP REDUCTION EXCEEDED BY 0.06 LB/YEAR **

Channel Report

Hydroware Express Estimation for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Jul 6 2015

Ditch A - Q2

Trapezoidal		Highlighted	
Bottom Width (ft)	= 4.00	Depth (ft)	= 0.18
Side Slopes (z:1)	= 2.00, 2.00	Q (cfs)	= 3.800
Total Depth (ft)	= 1.00	Area (sqft)	= 0.78
Invert Elev (ft)	= 1344.10	Velocity (ft/s)	= 4.64
Slope (%)	= 17.00	Wetted Perim (ft)	= 4.80
N-Value	= 0.035	Crit Depth, Yc (ft)	= 0.29
		Top Width (ft)	= 4.72
		EGL (ft)	= 0.54
Calculations			
Compute by:	Known Q		
Known Q (cfs)	= 3.80		

Channel Report

Hydroware Express Estimation for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Jul 6 2015

Ditch A - Q10

Trapezoidal		Highlighted	
Bottom Width (ft)	= 4.00	Depth (ft)	= 0.36
Side Slopes (z:1)	= 2.00, 2.00	Q (cfs)	= 4.500
Total Depth (ft)	= 1.00	Area (sqft)	= 1.70
Invert Elev (ft)	= 1344.10	Velocity (ft/s)	= 2.65
Slope (%)	= 2.00	Wetted Perim (ft)	= 5.61
N-Value	= 0.035	Crit Depth, Yc (ft)	= 0.33
		Top Width (ft)	= 5.44
		EGL (ft)	= 0.47
Calculations			
Compute by:	Known Q		
Known Q (cfs)	= 4.50		

Channel Report

Hydroware Express Estimation for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Jul 6 2015

Ditch B - Q2

Trapezoidal		Highlighted	
Bottom Width (ft)	= 4.00	Depth (ft)	= 0.09
Side Slopes (z:1)	= 2.00, 2.00	Q (cfs)	= 1.300
Total Depth (ft)	= 1.00	Area (sqft)	= 0.38
Invert Elev (ft)	= 1344.10	Velocity (ft/s)	= 3.46
Slope (%)	= 20.00	Wetted Perim (ft)	= 4.40
N-Value	= 0.035	Crit Depth, Yc (ft)	= 0.15
		Top Width (ft)	= 4.38
		EGL (ft)	= 0.28
Calculations			
Compute by:	Known Q		
Known Q (cfs)	= 1.30		

Channel Report

Hydroware Express Estimation for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Jul 6 2015

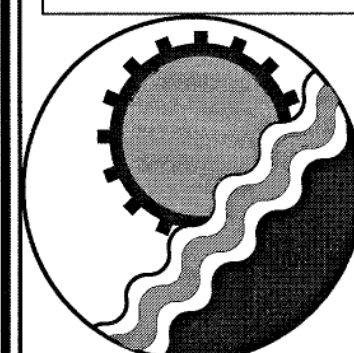
Ditch B - Q2

Trapezoidal		Highlighted	
Bottom Width (ft)	= 4.00	Depth (ft)	= 0.20
Side Slopes (z:1)	= 2.00, 2.00	Q (cfs)	= 1.600
Total Depth (ft)	= 1.00	Area (sqft)	= 0.88
Invert Elev (ft)	= 1344.10	Velocity (ft/s)	= 1.82
Slope (%)	= 2.00	Wetted Perim (ft)	= 4.89
N-Value	= 0.035	Crit Depth, Yc (ft)	= 0.17
		Top Width (ft)	= 4.80
		EGL (ft)	= 0.25
Calculations			
Compute by:	Known Q		
Known Q (cfs)	= 1.60		

DITCH DRAINAGE AREA ANALYSIS

C _{impervious} =	0.90
C _{pervious} =	0.33
b =	5.34
h ₁₀ =	6.22

Structure	A _{impervious}	A _{pervious}	A _{total}	C _{weighted}	Q ₂	Q ₁₀
Ditch A	0.28	1.41	1.69	0.42	3.8	4.5
Ditch B	0.12	0.43	0.55	0.45	1.3	1.6

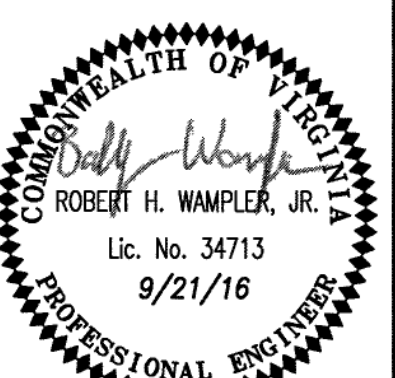


ENGINEERING CONCEPTS, INC.

20 S. ROANOKE ST., PO BOX 619
FINCASTE, VIRGINIA 24090
540.473.1253 FAX: 540.473.1254

Drawn BRF
Designed ECI
Checked RHW
Approved RHW

DRAINAGE MAP
COTTAGE ADDITION - 21
"THE GLEBE"
BOTETOURT COUNTY - VIRGINIA



SCALE: 1"=30'
DATE: SEP. 21, 2016
PROJECT: 16064
C5