ALTUS ENGINEERING, INC.

Civil
Site Planning
Environmental
Engineering

133 Court Street
Portsmouth, NH
03801-4413

January 18, 2021

Juliet T. H. Walker, Planning Director
City of Portsmouth Municipal Complex
1 Junkins Avenue
Portsmouth, New Hampshire 03801

Re: Application for Subdivision
"Watson's Landing"
Assessor's Map 209, Lot 33
1 Clark Drive
Altus Project No. 5090

Dear Juliet,

On behalf of the Applicant, Fredrick W. Watson Revocable Trust, Robert D. Watson, Trustee, Altus Engineering, Inc. respectfully submits an application for a four-lot residential subdivision located at 1 Clark Drive that we have christened "Watson's Landing". In addition to four home sites, this project entails the construction of a new cul-de-sac from Cutts Street, an upgraded sidewalk connection to the existing pedestrian corridor to Market Street, a new DPW accessway to an existing City sewer easement and associated utilities and drainage infrastructure.

We are requesting a waiver of Subdivision Regulation Section VI.2.A, Lot Arrangement. As shown on the Subdivision Plan Sheet C-2, the lot line between proposed Lots 2 and 3 does not technically meet the intent of the regulation. Although radial to the right of way for approximately 4', the line then jogs approximately 90-degrees to the south east towards the water. This was done with the intent of making the four lots as perpendicular to each other as possible and to make the lots better fit the existing topography of the site. It is our opinion that this allows a more logical layout and provides desirable water frontage to each lot.

A second waiver from the Residential Street Minimum Standards diagram in the Subdivision Regulations is also needed for roadway width. We are proposing 20' on the main roadway and 24' on the cul-de-sac where 32' is required. This is being done to reduce speed, impervious surfaces and runoff as well as construction costs.

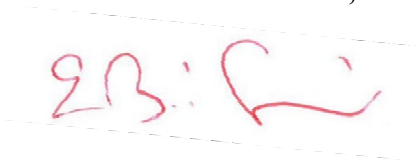
This project also requires two Conditional Use Permits. The first involves impacts to the 100' wetland buffer for demolition of the existing house and pool, construction of the aforementioned sewer accessway and installation of utilities and stormwater facilities. Despite there being no direct wetland impacts, this work will also require a wetland permit from NHDES for disturbance within the State's 100' tidal buffer.

The second Conditional Use Permit is required for a noise sensitive land use (housing with outdoor activity areas) within the Highway Noise Overlay District. In support of this, the Applicant commissioned a noise analysis per Zoning Section 10.675 that shows the entirety of the development is outside the applicable 65 dB sound contour as required. Should you require testimony from the consultant who prepared this work, please let me know and I will arrange to have him available for TAC and/or the Planning Board.

Please call me if you have any questions or need any additional information.

Sincerely,

ALTUS ENGINEERING, INC.



Erik B. Saari
Vice President

ebs/5090-APP-PB-CovLtr-011821

Enclosures

eCopy: Robert Watson
Eric Reuter

THIS DRAWING SET HAS NOT BEEN RELEASED FOR CONSTRUCTION

WATSON'S LANDING
Residential Subdivision

1 Clark Drive
Portsmouth, New Hampshire

Assessor's Parcel 209, Lot 33

ISSUED FOR TAC

Plan Issue Date:

DECEMBER 1, 2020 TAC WORK SESSION
JANUARY 18, 2021 TAC

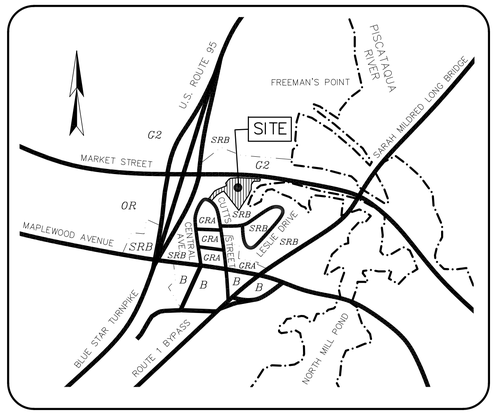
Owner/Applicant:
FREDERICK W. WATSON REVOCABLE TRUST
Robert D. Watson, Trustee
53 Sleepy Hollow Drive
Greenland, NH 03840
(603) 501-0966

Civil Engineer:
ALTUS ENGINEERING, INC.
133 Court Street Portsmouth, NH 03801
(603) 433-2335 www.altus-eng.com

Surveyor:
KNIGHT HILL LAND SURVEYING SERVICES, INC.
c/o David Hislop, LLS
34 Old Post Road
Newington, NH 03801
(603) 436-1330

Soil Scientist/Wetland Scientist:
MICHAEL CUOMO
6 York Pond Road
York, ME 03909
(207) 363-4532

Acoustics Consultant:
REUTER ASSOCIATES, LLC
Eric L. Reuter, FASA, INCE Bd. Cert., Principal
10 Vaughan Mall, Suite 201A
Portsmouth, NH 03801
(603) 430-2081

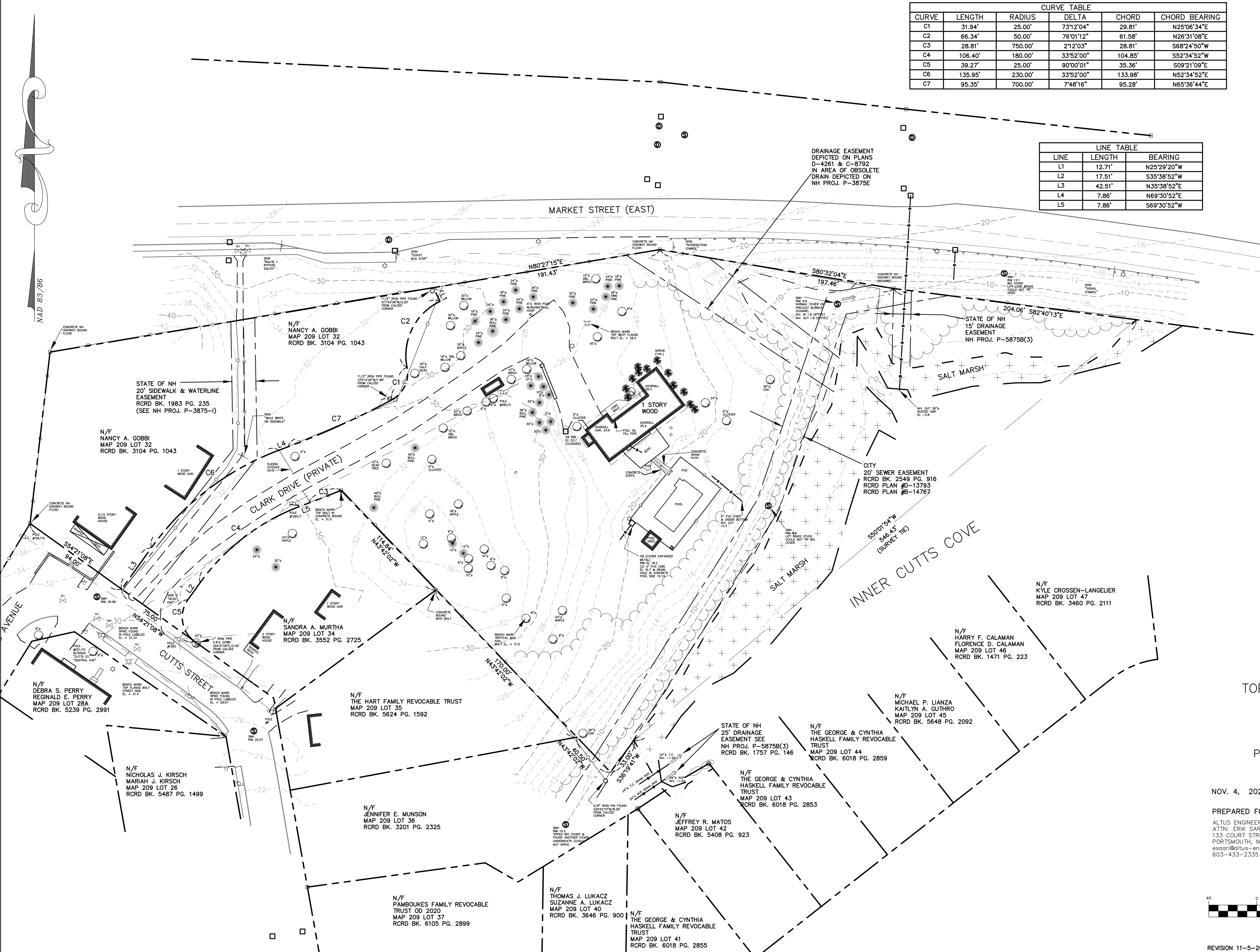


LOCUS NOT TO SCALE

Sheet Index Title	*Sheet No.:*	*Rev.*	*Date*
Topo/Boundary Worksheet (by KHLSS)	1 of 1	0	11/04/20
Demolition Plan	C-1	1	01/18/21
Subdivision Plan	C-2	1	01/18/21
Roadway Plan & Profile	C-3	1	01/18/21
Stormwater Management Plan	C-4	1	01/18/21
Utility Plan	C-5	1	01/18/21
Conditional Use Permit Plan	C-6	0	01/18/21
Detail Sheet	D-1	1	01/18/21
Detail Sheet	D-2	1	01/18/21
Detail Sheet	D-3	1	01/18/21
Detail Sheet	D-4	1	01/18/21

Permit Summary:	*Submitted*	*Received*
NHDES Wetlands Permit	January 27, 2021	
NHDES Shoreland Permit	January 27, 2021	
Notice of Intent	By Contractor	

P5090



CURVE TABLE					
CURVE	LENGTH	RADIUS	DELTA	CHORD	CHORD BEARING
C1	31.94'	25.00'	73°12'04"	29.81'	N25°06'34"E
C2	66.34'	50.00'	76°01'12"	61.58'	N26°31'08"E
C3	28.81'	750.00'	2°12'03"	28.81'	S68°24'50"W
C4	106.40'	180.00'	33°52'00"	104.85'	S52°34'52"W
C5	39.27'	25.00'	90°00'01"	35.36'	S09°21'09"E
C6	135.95'	230.00'	33°52'00"	133.98'	N52°34'52"E
C7	95.35'	700.00'	7°48'16"	95.28'	N65°36'44"E

LINE TABLE		
LINE	LENGTH	BEARING
L1	12.71'	N25°29'20"W
L2	17.51'	S35°38'52"W
L3	42.51'	N35°38'52"E
L4	7.86'	N69°30'52"E
L5	7.86'	S69°30'52"W

GENERAL NOTES:

1.) THE EXISTING DETAILS SHOWN WERE LOCATED BY KNIGHT HILL LAND SURVEYING SERVICES, INC. IN OCTOBER 2020.

2.) ELEVATION DATUM NAVD88 ESTABLISHED FROM CUTTS STREET RECONSTRUCTION BENCH MARK SPIKES FOUND IN POLES ACROSS FROM SUBJECT PROPERTY AS LABELED.
NH STATE PLANE COORDINATE BASE OF CAD DRAWING ESTABLISHED FROM AMBIT ENGINEERING SUBDIVISION PLAN.

3.) OWNER OF RECORD:
FREDERICK W. WATSON REVOCABLE TRUST OF 1998
TAX MAP 209 LOT 33
RECORD DEED:
RCRD BOOK 5200 PG. 1329
LOT AREA TO SALT MARSH: 3.1± ACRES

4.) SUBJECT LOT SUBJECT TO AND BENEFITS FROM AN ELECTRIC AND COMMUNICATIONS SERVICE & MAINTENANCE EASEMENT TO NH ELECTRIC CO. & NEW ENGLAND TELEPHONE & TELEGRAPH CO. PER 1957 DEED BK. 1447 PG. 227. THE DEED HAS NO EASEMENT WIDTH DETAILS.

5.) SUBJECT LOT SUBJECT TO RIGHTS TO THE STATE OF NH TO MAINTAIN SLOPES AND EMBANKMENTS PER 1969 DEED BK. 1957 PG. 146. SEE STATE PLANS PER PLAN REFERENCE 1.

PLAN REFERENCES:

1.) "STATE OF NH DPW FEDERAL AID PROJECT I-95-I(24)14 RIGHT OF WAY PLANS" NH PROJ. P-3875E, NH PROJ. P-3875H-1, NH PROJ. P-3875I, NH PROJ. P-5875B, NH PROJ. P-5875B(2) & NH PROJ. 5875B(3).

2.) "PLAN OF LOTS PORTSMOUTH, NH FOR HERBERT W. POPE" BY JOHN W. DURGIN, REVISED JAN. 1974, RCRD PLAN D-4261.

3.) "LOT LINE REVISION PORTSMOUTH NH FOR HERBERT W. POPE" BY JOHN W. DURGIN ASSOC., DATED JUNE 12, 1979, RCRD PLAN C-8792.

4.) "EASEMENT PLAN OF LAND IN PORTSMOUTH, NH" BY WHITMAN & HOWARD, INC., DATED APRIL 4, 1985, RCRD PLAN D-13793.

5.) "SUBDIVISION PLAN OF LAND IN PORTSMOUTH, NH" BY WHITMAN & HOWARD, INC., DATED OCT. 15, 1985, RCRD PLAN B-14767.

6.) "LOT LINE ADJUSTMENT PLAN 200 CHASE DR. & 373 CUTTS AVE." BY JAMES VERA & ASSOC., DATED 5-23-2013, RCRD PLAN D-38287.

7.) "PLAN OF BERSUM GARDENS FOR MARGO CONST. CO., PORTSMOUTH, NH" BY JOHN W. DURGIN, DATED OCT. 1955, RCRD PLAN 02178.

8.) "PLAN OF LAND PORTSMOUTH NH FOR JOSEPH LAMB" BY JOHN W. DURGIN, DATED DEC. 1968, RCRD PLAN 1303.

9.) "IMPROVEMENTS TO MAPLEWOOD AVE. UTILITY PLAN & PROFILE – CENTRAL & CUTTS FOR PORTSMOUTH DPW" BY GPI, CERTIFIED 1-18-18, SHEETS 52 & 53 OF 184.

TOPO/BOUNDARY WORKSHEET

1 CLARK DRIVE (PRIVATE)

TAX MAP 209 LOT 33

PORTSMOUTH, NEW HAMPSHIRE

COUNTY OF ROCKINGHAM

NOV. 4, 2020 SCALE 1" = 40' PROJECT # 2222PNTS

PREPARED FOR:

ALTUS ENGINEERING, INC.
ATTN: ERIK SARRI, PE.
133 COURT STREET
PORTSMOUTH, NH, 03801
esaari@altus-eng.com
603-433-2335

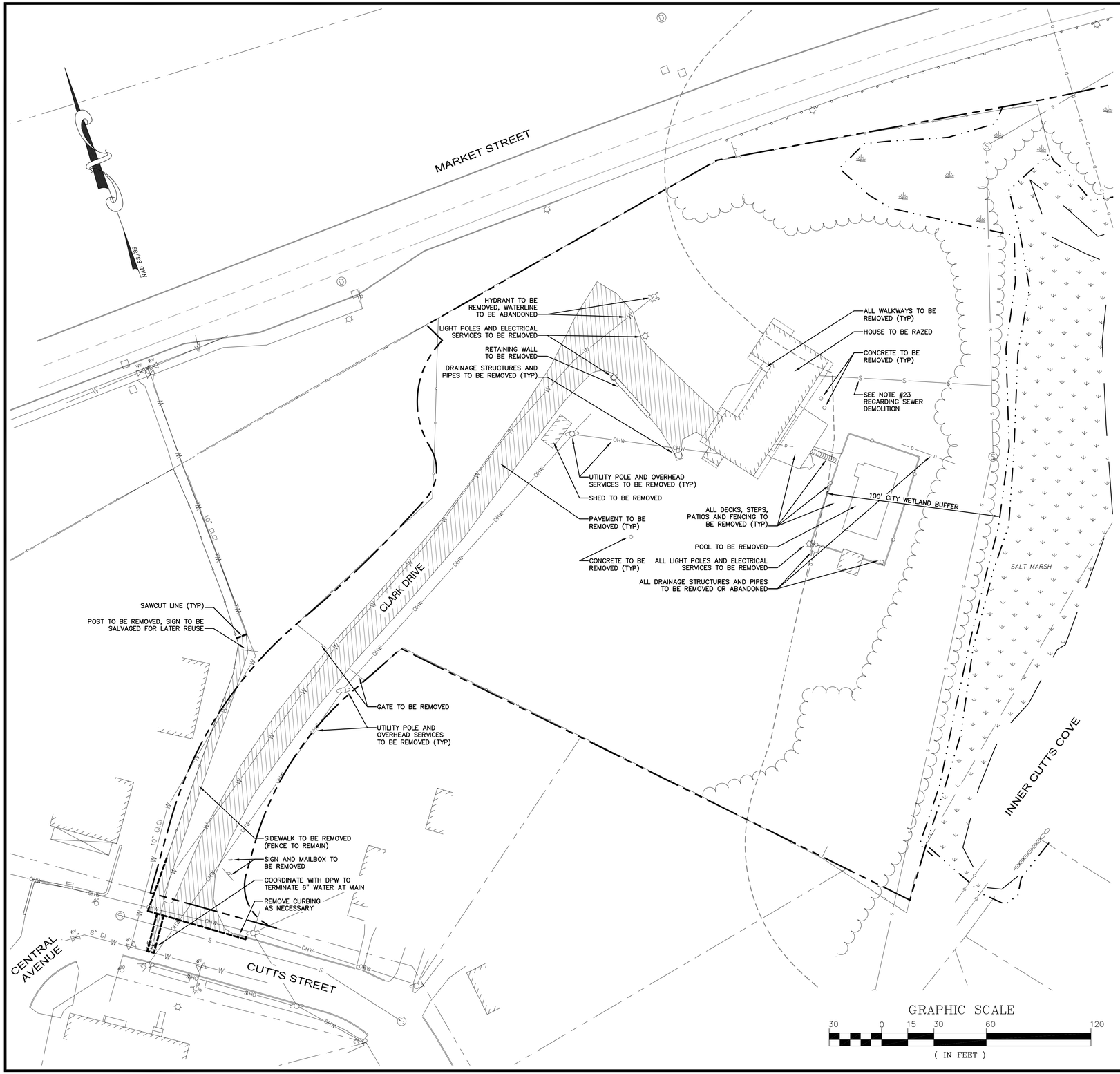
PREPARED BY:

KNIGHT HILL LAND SURVEYING SERVICES, INC.
c/o DAVID HISLOP, LLS
34 OLD POST RD.
NEWINGTON, NH, 03801
dave@khlandsurveying.com
603-436-1330

GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

REVISION 11-5-2020 CHANGE ELEVATION DATUM FROM NGVD29 TO NAVD88



DEMOLITION NOTES

1. CITY DEMOLITION PERMIT REQUIRED PRIOR TO ANY DEMOLITION ACTIVITIES. CONTRACTOR IS NOTIFIED THAT THIS PERMIT PROCESS MAY REQUIRE A 30-DAY LEAD TIME.
2. CONTRACTOR SHALL PRESERVE AND PROTECT ALL EXISTING UTILITIES SCHEDULED TO REMAIN.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TIMELY NOTIFICATION OF ALL PARTIES, CORPORATIONS, COMPANIES, INDIVIDUALS AND STATE AND LOCAL AUTHORITIES OWNING AND/OR HAVING JURISDICTION OVER ANY UTILITIES RUNNING TO, THROUGH OR ACROSS AREAS TO BE DISTURBED BY DEMOLITION AND/OR CONSTRUCTION ACTIVITIES WHETHER OR NOT SAID UTILITIES ARE SUBJECT TO DEMOLITION, RELOCATION, MODIFICATION AND/OR CONSTRUCTION.
4. ALL UTILITY DISCONNECTIONS/DEMOLITIONS/RELOCATIONS SHALL BE COORDINATED BETWEEN THE CONTRACTOR, ALL APPROPRIATE UTILITY COMPANIES, PORTSMOUTH DPW AND ABUTTING PROPERTY OWNERS. UNLESS OTHERWISE SPECIFIED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL RELATED EXCAVATION, TRENCHING AND BACKFILLING.
5. WHERE SPECIFIED TO REMAIN, MANHOLE RIMS, CATCH BASIN GRATES, VALVE COVERS, HANDHOLES, ETC. SHALL BE ADJUSTED TO FINISH GRADE UNLESS OTHERWISE SPECIFIED.
6. SEE EROSION CONTROL PLANS FOR EROSION AND SEDIMENT CONTROL MEASURES THAT SHALL BE IN PLACE PRIOR TO DEMOLITION ACTIVITIES.
7. ALL MATERIALS SCHEDULED FOR DEMOLITION OR REMOVAL ON PRIVATE PROPERTY SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE SPECIFIED.
8. ALL MATERIAL SCHEDULED TO BE REMOVED SHALL BE LEGALLY DISPOSED OF IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS/CODES.
9. WATER: PORTSMOUTH DPW WATER DIVISION, JIM TOW, (603) 427-1530.
10. SEWER: PORTSMOUTH DPW SEWER DIVISION, JIM TOW, (603) 427-1530.
11. TELECOMMUNICATIONS: CONSOLIDATED, JOE CONSIDINE, (603) 427-5525.
12. CABLE: COMCAST, MIKE COLLINS, (603) 679-5695, EXT. 1037.
13. ELECTRICAL: EVERSOURCE, MICHAEL BUSBY, (603) 332-4227, EXT. 5555334.
14. GAS: UNITIL, DAVID BEAULIEU, (603) 294-5144.
15. CONTRACTOR TO CONTACT PORTSMOUTH DPW A MINIMUM OF TWO WEEKS PRIOR TO ANY DEMOLITION TO COORDINATE ALL WORK CONCERNING DISCONNECTION/DEMOLITION OF ANY PROPOSED WATER AND SEWER LINE IMPROVEMENTS.
16. ALL WATER MAIN AND SERVICE DISCONNECTIONS SHALL CONFORM TO PORTSMOUTH DPW STANDARDS.
17. NO BURNING SHALL BE PERMITTED PER LOCAL REGULATIONS.
18. HAZARDOUS MATERIALS ENCOUNTERED DURING DEMOLITION AND CONSTRUCTION ACTIVITIES SHALL BE ABATED IN STRICT ACCORDANCE WITH ALL APPLICABLE STATE AND LOCAL REGULATIONS.
19. AT NO TIME SHALL ANY UTILITY SERVICE OR VEHICULAR ACCESS TO ADJOINING PROPERTIES BE COMPLETELY INTERRUPTED UNLESS A FULL SHUTDOWN IS COORDINATED WITH ALL AFFECTED PARTIES AND UTILITY PROVIDER(S).
20. SHOULD GROUNDWATER BE ENCOUNTERED DURING EXCAVATION, APPROPRIATE BEST MANAGEMENT PRACTICES SHALL BE EMPLOYED TO ENSURE SEDIMENT LADEN WATER IS NOT DISCHARGED INTO THE CITY DRAINAGE SYSTEM. A DISCHARGE PERMIT SHALL BE OBTAINED PRIOR TO DISCHARGING GROUNDWATER.
21. EXISTING HOUSE IS SERVICED BY AN INTERNAL HEATING OIL TANK. REMOVAL AND DISPOSAL OF TANK SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE REGULATIONS.
22. THIS PLAN IS INTENDED TO PROVIDE MINIMUM GUIDELINES FOR THE DEMOLITION OF EXISTING SITE FEATURES. UNLESS OTHERWISE NOTED TO REMAIN, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL BUILDINGS, PAVEMENT, CONCRETE, CURBING, SIGNS, POLES, UTILITIES, FENCES, VEGETATION AND OTHER EXISTING FEATURES AS NECESSARY TO FULLY CONSTRUCT THE PROJECT.
23. EXISTING SEWER SERVICE LOCATION IS APPROXIMATE. CONTRACTOR SHALL PERFORM TEST PITS AND OTHER WORK AS NECESSARY TO LOCATE LINE. SERVICE SHALL BE TERMINATED AT THE MAIN IN ACCORDANCE WITH DPW STANDARDS.

ALTUS ENGINEERING, INC.
133 Court Street Portsmouth, NH 03801
(603) 433-2335 www.altus-eng.com

STATE OF NEW HAMPSHIRE
ERIC D. WEINRIEB
No. 7634
LICENSED PROFESSIONAL ENGINEER
1/19/21

NOT FOR CONSTRUCTION

ISSUED FOR: TAC

ISSUE DATE: JANUARY 18, 2021

REVISIONS

NO.	DESCRIPTION	BY	DATE
0	TAC WORK SESSION	EBS	12/01/20
1	TAC	EBS	01/18/21

DRAWN BY: EBS
APPROVED BY: EDW
DRAWING FILE: 5090-SITE.dwg

SCALE:
22" x 34" 1" = 30'
11" x 17" 1" = 60'

OWNER:
FREDERICK W. WATSON REVOCABLE TRUST, ROBERT D. WATSON, TRUSTEE
53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

APPLICANT:
FREDERICK W. WATSON REVOCABLE TRUST, ROBERT D. WATSON, TRUSTEE
53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

PROJECT:
WATSON'S LANDING
TAX MAP 209, LOT 33
1 CLARK DRIVE PORTSMOUTH, NH 03801

TITLE:
DEMOLITION PLAN

SHEET NUMBER:
C-1

P5090

PERIMETER CURVE TABLE			
CURVE	LENGTH	RADIUS	DELTA
C1	31.94'	25.00'	73°12'04"
C2	66.34'	50.00'	76°01'12"
C3	28.81'	750.00'	2°12'03"
C4	106.40'	180.00'	33°52'00"
C5	39.27'	25.00'	90°00'01"
C6	135.95'	230.00'	33°52'00"
C7	95.35'	700.00'	7°48'16"

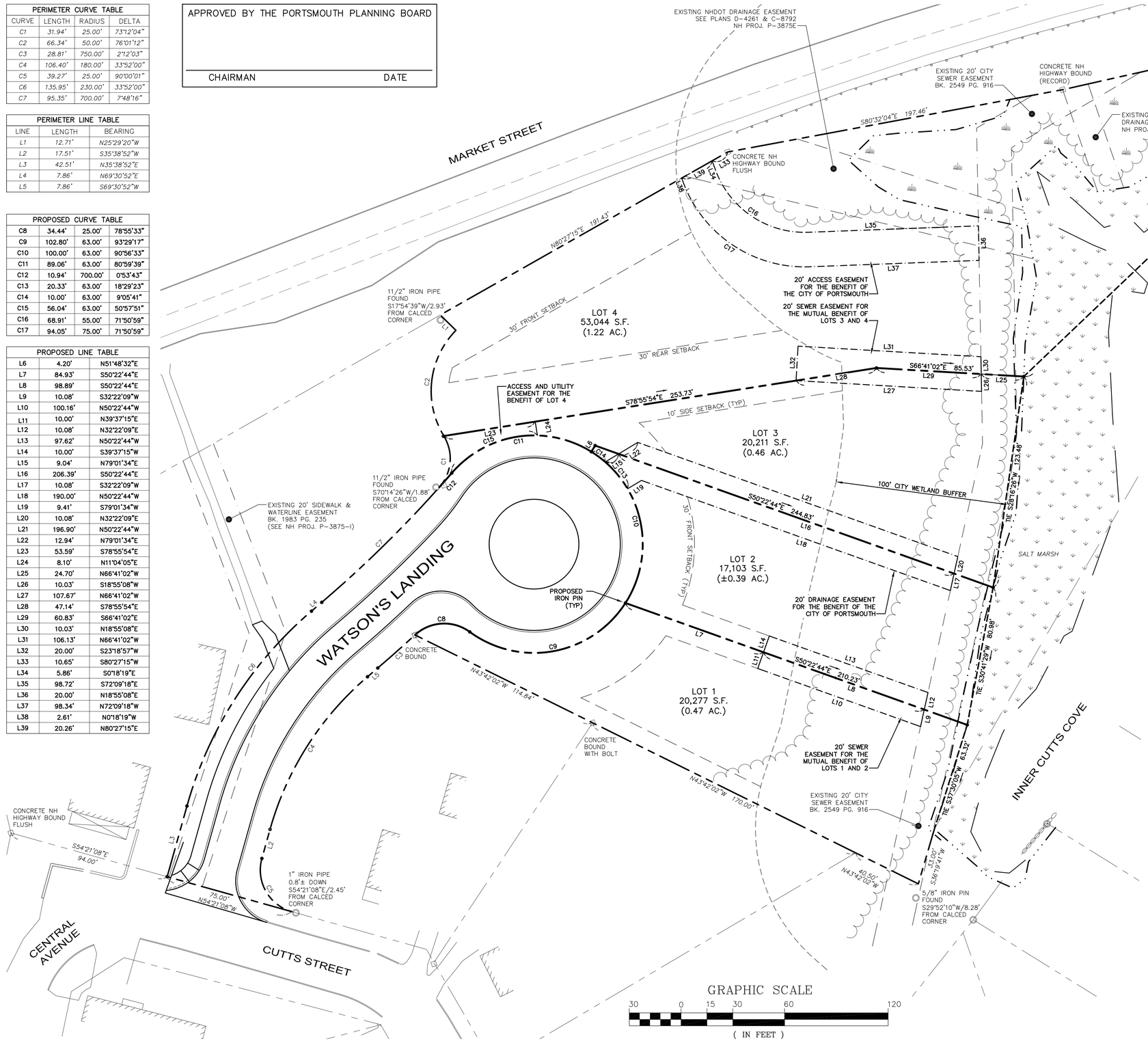
PERIMETER LINE TABLE		
LINE	LENGTH	BEARING
L1	12.71'	N25°29'20"W
L2	17.51'	S35°38'52"W
L3	42.51'	N35°38'52"E
L4	7.86'	N69°30'52"E
L5	7.86'	S69°30'52"W

PROPOSED CURVE TABLE			
C8	34.44'	25.00'	78°55'33"
C9	102.80'	63.00'	93°29'17"
C10	100.00'	63.00'	90°56'33"
C11	89.06'	63.00'	80°59'39"
C12	10.94'	700.00'	0°53'43"
C13	20.33'	63.00'	18°29'23"
C14	10.00'	63.00'	9°05'41"
C15	56.04'	63.00'	50°57'51"
C16	68.91'	55.00'	71°50'59"
C17	94.05'	75.00'	71°50'59"

PROPOSED LINE TABLE		
L6	4.20'	N51°48'32"E
L7	84.93'	S50°22'44"E
L8	98.89'	S50°22'44"E
L9	10.08'	S32°22'09"W
L10	100.16'	N50°22'44"W
L11	10.00'	N39°37'15"E
L12	10.08'	N32°22'09"E
L13	97.62'	N50°22'44"W
L14	10.00'	S39°37'15"W
L15	9.04'	N79°01'34"E
L16	206.39'	S50°22'44"E
L17	10.08'	S32°22'09"W
L18	190.00'	N50°22'44"W
L19	9.41'	S79°01'34"W
L20	10.08'	N32°22'09"E
L21	196.90'	N50°22'44"W
L22	12.94'	N79°01'34"E
L23	53.59'	S78°55'54"E
L24	8.10'	N11°04'05"E
L25	24.70'	N66°41'02"W
L26	10.03'	S18°55'08"W
L27	107.67'	N66°41'02"W
L28	47.14'	S78°55'54"E
L29	60.83'	S66°41'02"E
L30	10.03'	N18°55'08"E
L31	106.13'	N66°41'02"W
L32	20.00'	S23°18'57"W
L33	10.65'	S80°27'15"W
L34	5.86'	S0°18'19"E
L35	98.72'	S72°09'18"E
L36	20.00'	N18°55'08"E
L37	98.34'	N72°09'18"W
L38	2.61'	N0°18'19"W
L39	20.26'	N80°27'15"W

APPROVED BY THE PORTSMOUTH PLANNING BOARD

CHAIRMAN DATE



SUBDIVISION NOTES

1. DESIGN INTENT – THIS PLAN IS INTENDED TO DEPICT A SINGLE-FAMILY RESIDENTIAL SUBDIVISION.
2. THE BASE PLAN USED HERE WAS DEVELOPED FROM "TOPO/ BOUNDARY, WORKSHEET, 1 CLARK DRIVE (PRIVATE)" DATED NOV. 4, 2020 BY KNIGHT HILL LAND SURVEYING SERVICES, INC.
3. PROJECT PARCEL: MAP 209 LOT 33, 135,176 S.F (3.10 ACRES) TO HIGHEST OBSERVABLE TIDE LINE (HOTL).
4. ZONE: SRB (SINGLE RESIDENCE B)
   OVERLAY: FLOOD PLAIN DISTRICT OVERLAY
   HIGHWAY NOISE OVERLAY DISTRICT
5. DIMENSIONAL REQUIREMENTS:

LOT AREA:	15,000 SF
LOT FRONTAGE:	100'
LOT DEPTH:	100'
FRONT YARD:	30'
SIDE YARD:	10'
REAR YARD:	30'
MAX. BUILDING HEIGHT:	35' (SLOPED ROOF)
MAX. BUILDING COVERAGE:	20%
MIN. OPEN SPACE:	40%
WETLAND BUFFER:	100'
WETLAND LIMITED CUT:	50'
WETLAND NO-CUT:	25'

6. PARKING REQUIREMENTS: NR (NO REQUIREMENT)
7. PORTIONS OF THE SITE ARE IN FLOOD HAZARD ZONE AE PER FLOOD INSURANCE RATE MAP (FIRM), ROCKINGHAM COUNTY, NEW HAMPSHIRE, PANEL 259 OF 681, MAP 33015C0259E DATED MAY 17, 2005 (ELEVATION 9') AND PRELIMINARY MAP 33015C0259F DATED JANUARY 29, 2021 (ELEVATION 8').
8. WETLANDS WERE DELINEATED BY MICHAEL CUOMO, NH CERTIFIED SOILS SCIENTIST #006 AND NH CERTIFIED WETLANDS SCIENTIST #004, ON SEPTEMBER 15, 2020.
9. WAIVERS REQUIRED:
   - SUBDIVISION REGULATION "RESIDENTIAL STREET MINIMUM STANDARDS" DIAGRAM TO ALLOW 20' AND 24' OF ROAD WIDTH WHERE 32' IS REQUIRED.
   - SUBDIVISION REGULATION VI.2.A REQUIRED FOR LOT ARRANGEMENT.
10. ZONING SECTION 10.1016 – CONDITIONAL USE PERMIT REQUIRED FOR WORK IN THE CITY WETLAND BUFFER.
11. ZONING SECTION 10.674 – CONDITIONAL USE PERMIT REQUIRED FOR USES WITHIN THE HIGHWAY NOISE OVERLAY DISTRICT.
12. AREA OF DISTURBANCE EXCEEDS 43,560 S.F., COVERAGE UNDER EPA NPDES PHASE II CONSTRUCTION GENERAL PERMIT REQUIRED.
13. AREA OF DISTURBANCE UNDER 50,000 S.F., NHDES ALTERATION OF TERRAIN PERMIT NOT REQUIRED.
14. PORTIONS OF THE SITE ARE IN THE 250' NHDES SHORELAND ZONE. NHDES SHORELAND PERMIT REQUIRED.
15. PORTIONS OF THE SITE ARE IN THE 100' NHDES TIDAL BUFFER. NHDES WETLANDS PERMIT REQUIRED.

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133 Court Street Portsmouth, NH 03801
(603) 433-2335 www.altus-eng.com

ERIC D. WEINRIEB No. 7634 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE
1/19/21

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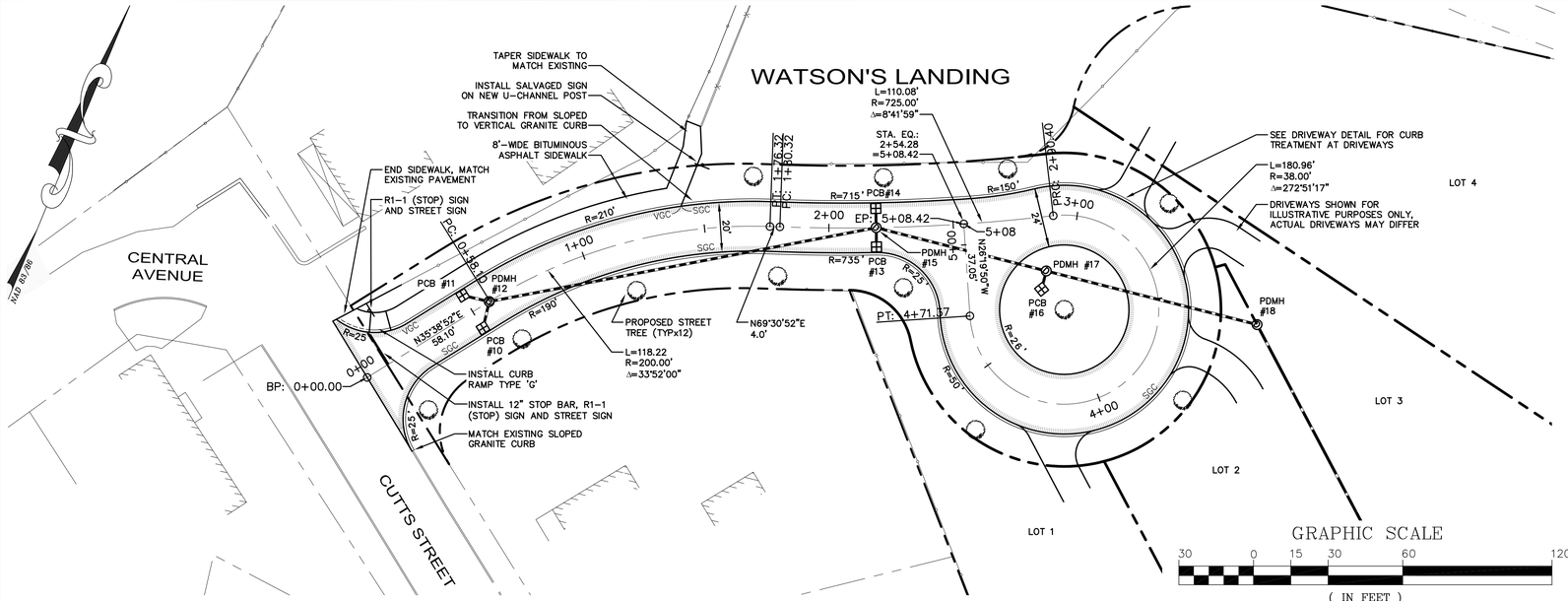
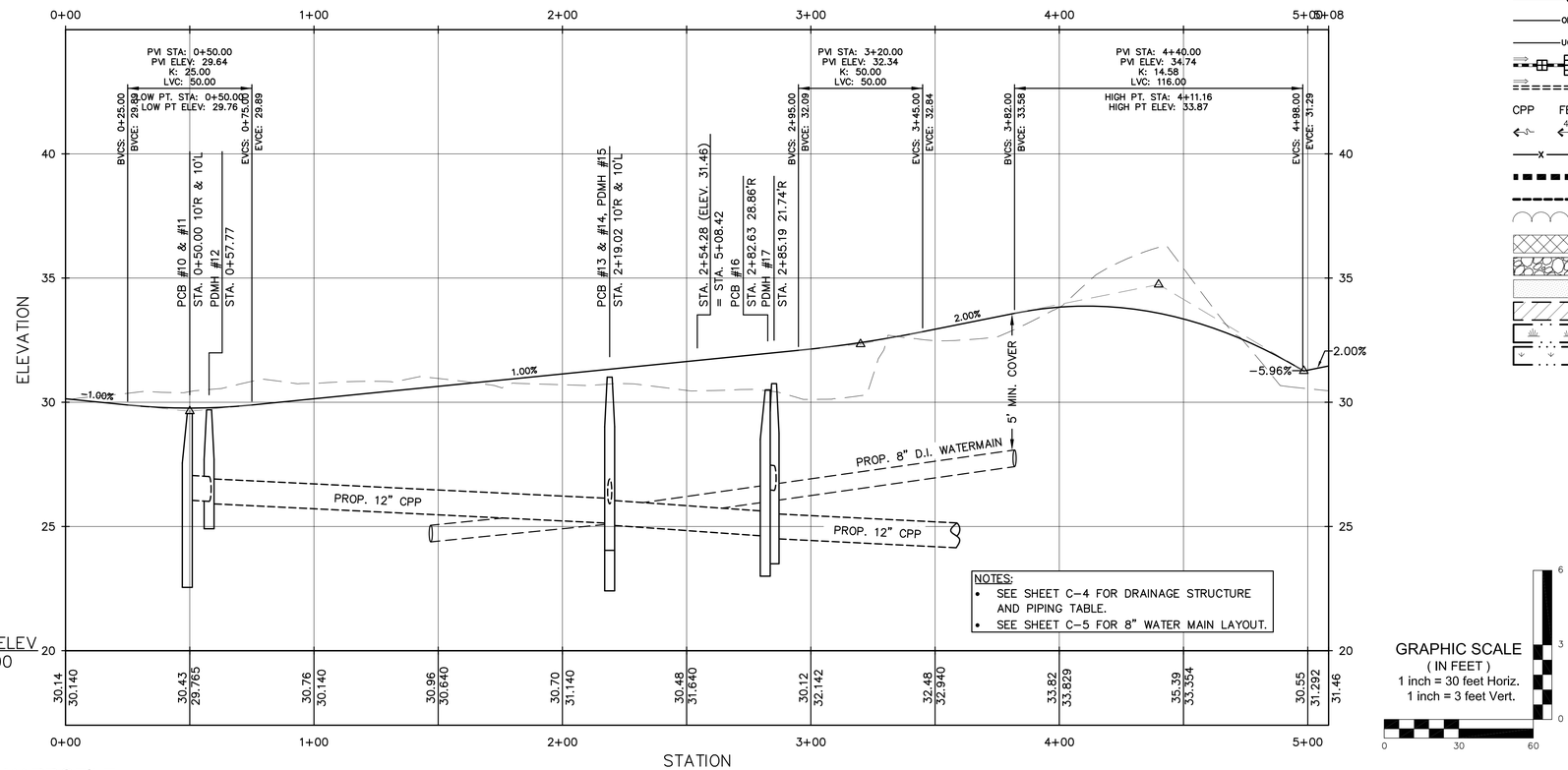
TITLE:
SUBDIVISION PLAN

SHEET NUMBER:
C-2

P5090



ROADWAY PLAN



NOTES:
- SEE SHEET C-4 FOR DRAINAGE STRUCTURE AND PIPING TABLE.
- SEE SHEET C-5 FOR 8" WATER MAIN LAYOUT.

GRAPHIC SCALE
(IN FEET)
1 inch = 30 feet Horiz.
1 inch = 3 feet Vert.
0 30 60
0 3 6

ROADWAY PROFILE

LEGEND

- PROPERTY LINE
- EASEMENT LINE
- BUILDING SETBACK
- 100' CITY WETLAND SETBACK
- 50' CITY WETLAND SETBACK (LIMITED CUT)
- 25' CITY WETLAND SETBACK (NO-CUT)
- 100' STATE TIDAL BUFFER
- STATE SHORELAND SETBACKS
- FRESHWATER WETLAND BOUNDARY
- TIDAL WETLAND BOUNDARY
- ZONE X / ZONE AE FLOODPLAIN
- VGC SGC EXISTING PAVEMENT/CURB
- VGC SGC PROP. PAVEMENT/VERTICAL OR SLOPED GRANITE CURB
- EXISTING/PROPOSED GUARDRAIL
- EXISTING/PROPOSED STOCKADE FENCE
- EXISTING/PROPOSED CHAINLINK FENCE
- 60 EXISTING CONTOUR
- 60 PROPOSED CONTOUR/INTERMEDIATE CONTOUR
- x 100.00 / x 104.00TW 100.00BW PROPOSED SPOT GRADE/TOP & BOTTOM OF WALL
- PROPOSED RETAINING WALL
- W WV EXISTING WATER/CURB STOP/VALVE/HYDRANT
- S S EXISTING SEWER/MANHOLE
- G GV EXISTING GAS/VALVE
- OHW UGU EXIST. OVERHEAD/UNDERGROUND UTILITIES/POLE
- D D EXISTING DRAINAGE/CB/DMH
- W PROPOSED THRUST BLOCK/CURB STOP/VALVE/HYDRANT
- W F PROPOSED DOMESTIC/FIRE WATER SERVICE LINE
- S S PROPOSED SEWER/MANHOLE/CLEANOUT
- FM PROPOSED SEWER FORCEMAIN
- G PROPOSED GAS
- OHW PROPOSED OVERHEAD UTILITIES/UTILITY POLE
- UGE PROPOSED UNDERGROUND ELECTRIC/PHONE/TV
- PROPOSED DRAINAGE (HARD PIPE)/CB/DCB/DMH/FES
- PROPOSED DRAINAGE (PERFORATED PIPE)/CLEANOUT
- CPP FES HDWL CORRUGATED PLASTIC PIPE/FLARED END SECTION/HEADWALL
- 4% PROPOSED GROUND SLOPE/APPROX. GRADE/STONE CHECK DAM
- SILTFENCE/SEDIMENT BARRIER/CONST. FENCE
- STABILIZED CONSTRUCTION EXIT
- PROPOSED SAWCUT
- EXISTING TREE LINE/BRUSH LINE
- PROPOSED EROSION CONTROL BLANKET
- PROPOSED RIPRAP
- PROPOSED RAINGARDEN
- PROPOSED DISTURBANCE IN WETLAND SETBACK
- FRESHWATER WETLAND
- SALTMARSH

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ERIC D. WEINRIEB No. 7634 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE
1/19/21

NOT FOR CONSTRUCTION

ISSUED FOR: TAC

ISSUE DATE: JANUARY 18, 2021

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SCALE:
22" x 34" 1" = 30'
11" x 17" 1" = 60'

OWNER:
FREDERICK W. WATSON REVOCABLE TRUST, ROBERT D. WATSON, TRUSTEE
53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

APPLICANT:
FREDERICK W. WATSON REVOCABLE TRUST, ROBERT D. WATSON, TRUSTEE
53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

PROJECT:
WATSON'S LANDING
TAX MAP 209, LOT 33
1 CLARK DRIVE PORTSMOUTH, NH 03801

TITLE:
ROADWAY PLAN AND PROFILE

SHEET NUMBER:
C-3

P5090

DRAINAGE SCHEDULE

PCB #10
RIM: 29.55
OUT: 26.05 [PDMH #12]
12" CPP L=8'± S=0.0050'/'

PCB #11
RIM: 29.55
OUT: 26.05 [PDMH #12]
12" CPP L=8'± S=0.0050'/'

PDMH #12
RIM: 29.70
IN: 26.01 [PCB #10]
IN: 26.01 [PCB #11]
OUT: 25.91
12" CPP L=155'± S=0.0050'/'

PCB #13
RIM: 31.10
OUT: 27.10 [PDMH #15]
12" CPP L=5'± S=0.0100'/'

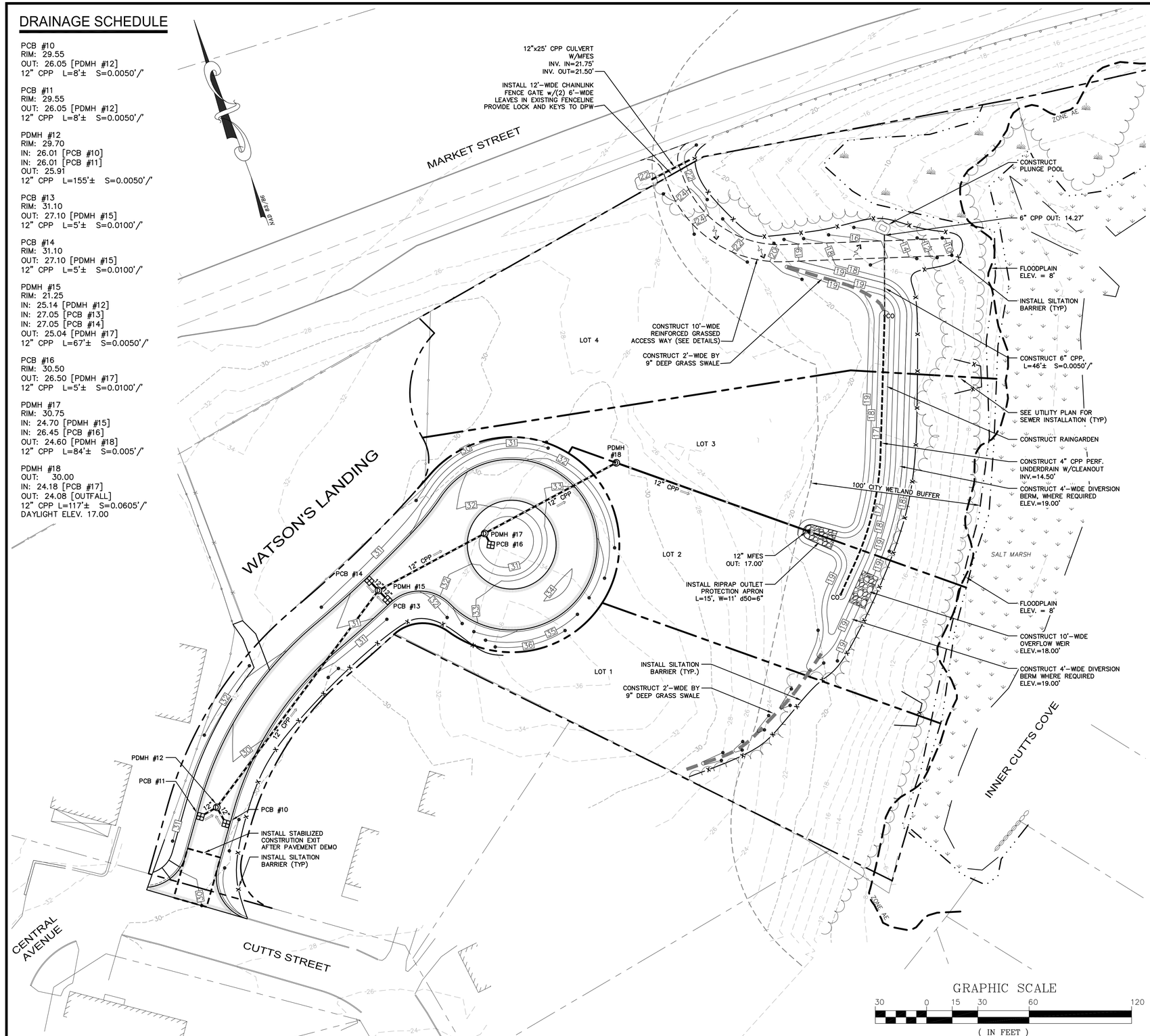
PCB #14
RIM: 31.10
OUT: 27.10 [PDMH #15]
12" CPP L=5'± S=0.0100'/'

PDMH #15
RIM: 21.25
IN: 25.14 [PDMH #12]
IN: 27.05 [PCB #13]
IN: 27.05 [PCB #14]
OUT: 25.04 [PDMH #17]
12" CPP L=67'± S=0.0050'/'

PCB #16
RIM: 30.50
OUT: 26.50 [PDMH #17]
12" CPP L=5'± S=0.0100'/'

PDMH #17
RIM: 30.75
IN: 24.70 [PDMH #15]
IN: 26.45 [PCB #16]
OUT: 24.60 [PDMH #18]
12" CPP L=84'± S=0.005'/'

PDMH #18
OUT: 30.00
IN: 24.18 [PCB #17]
OUT: 24.08 [OUTFALL]
12" CPP L=117'± S=0.0605'/'
DAYLIGHT ELEV. 17.00



GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)

STORMWATER MANANGEMENT NOTES

1. TOTAL AREA OF PROJECT DISTURBANCE: ±47,550 S.F.
2. DO NOT BEGIN CONSTRUCTION UNTIL ALL STATE AND LOCAL PERMITS HAVE BEEN APPLIED FOR AND RECEIVED.
3. CONTRACTOR SHALL OBTAIN A "DIGSAFE" NUMBER AT LEAST 72 HOURS PRIOR TO COMMENCING CONSTRUCTION.
4. ALL CONSTRUCTION SHALL MEET THE MINIMUM CONSTRUCTION STANDARDS OF THE CITY OF PORTSMOUTH AND NHDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION. THE MORE STRINGENT SPECIFICATION SHALL GOVERN.
5. ALL BENCHMARKS AND TOPOGRAPHY SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO INITIATING CONSTRUCTION.
6. UNLESS OTHERWISE AGREED IN WRITING, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING AND MAINTAINING TEMPORARY BENCHMARKS (TBM) AND PERFORMING ALL CONSTRUCTION SURVEY LAYOUT.
7. PRIOR TO CONSTRUCTION, FIELD VERIFY JUNCTIONS, LOCATIONS AND ELEVATIONS/INVERTS OF ALL EXISTING STORMWATER AND UTILITY LINES. PRESERVE AND PROTECT LINES TO BE RETAINED.
8. TEMPORARY INLET PROTECTION MEASURES SHALL BE INSTALLED IN ALL EXISTING AND PROPOSED CATCH BASINS WITHIN 100' OF THE PROJECT SITE WHEN SITE WORK WITHIN CONTRIBUTING AREAS IS ACTIVE OR SAID AREAS HAVE NOT BEEN STABILIZED.
9. PROTECTION OF SUBGRADE: THE CONTRACTOR SHALL BE REQUIRED TO MAINTAIN STABLE, DEWATERED SUBGRADES FOR FOUNDATIONS, PAVEMENT AREAS, UTILITY TRENCHES, AND OTHER AREAS DURING CONSTRUCTION. SUBGRADE DISTURBANCE MAY BE INFLUENCED BY EXCAVATION METHODS, MOISTURE, PRECIPITATION, GROUNDWATER CONTROL, AND CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL TAKE PRECAUTIONS TO PREVENT SUBGRADE DISTURBANCE. SUCH PRECAUTIONS MAY INCLUDE DIVERTING STORMWATER RUNOFF AWAY FROM CONSTRUCTION AREAS, REDUCING TRAFFIC IN SENSITIVE AREAS, AND MAINTAINING AN EFFECTIVE DEWATERING PROGRAM. SOILS EXHIBITING HEAVING OR INSTABILITY SHALL BE OVER EXCAVATED TO MORE COMPETENT BEARING SOIL AND REPLACED WITH FREE DRAINING STRUCTURAL FILL. IF THE EARTHWORK IS PERFORMED DURING FREEZING WEATHER, EXPOSED SUBGRADES ARE SUSCEPTIBLE TO FROST. NO FILL OR UTILITIES SHALL BE PLACED ON FROZEN GROUND. THIS WILL LIKELY REQUIRE REMOVAL OF A FROZEN SOIL CRUST AT THE COMMENCEMENT OF EACH DAY'S OPERATIONS. THE FINAL SUBGRADE ELEVATION WOULD ALSO REQUIRE AN APPROPRIATE DEGREE OF INSULATION AGAINST FREEZING.
10. IF SUITABLE, EXCAVATED MATERIALS SHALL BE PLACED AS FILL WITHIN UPLAND AREAS ONLY AND SHALL NOT BE PLACED WITHIN WETLANDS. PLACEMENT OF BORROW MATERIALS SHALL BE PERFORMED IN A MANNER THAT PREVENTS LONG TERM DIFFERENTIAL SETTLEMENT. EXCESSIVELY WET MATERIALS SHALL BE STOCKPILED AND ALLOWED TO DRAIN BEFORE PLACEMENT. FROZEN MATERIAL SHALL NOT BE USED FOR CONSTRUCTION.
11. ALL CATCH BASIN, MANHOLE AND OTHER DRAINAGE RIMS SHALL BE SET FLUSH WITH OR NO LESS THAN 0.1' BELOW FINISH GRADE. ANY RIM ABOVE SURROUNDING FINISH GRADE SHALL NOT BE ACCEPTED.
12. IN ORDER TO PROVIDE VISUAL CLARITY ON THE PLANS, DRAINAGE AND OTHER UTILITY STRUCTURES MAY NOT BE DRAWN TO SCALE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER SIZING AND LOCATION OF ALL STRUCTURES AND IS DIRECTED TO RESOLVE ANY POTENTIAL DISCREPANCY WITH THE ENGINEER PRIOR TO CONSTRUCTION.
13. ALL CPP PIPE SHALL BE ADS N-12 OR APPROVED EQUAL.
14. PROJECT SUBJECT TO EPA NPDES PHASE II. NOI, SWPPP AND MINIMUM WEEKLY INSPECTIONS REQUIRED.
15. NO EARTHWORK, STUMPING OR GRUBBING SHALL COMMENCE UNTIL ALL APPROPRIATE SEDIMENT AND EROSION CONTROL MEASURES HAVE BEEN INSTALLED. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE PROPERLY MAINTAINED IN GOOD WORKING ORDER FOR THE DURATION OF CONSTRUCTION AND THE SITE IS STABILIZED.
16. SEE DETAIL SHEETS FOR PERTINENT SEDIMENT AND EROSION CONTROL DETAILS AND ADDITIONAL NOTES.
17. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH THE DESIGN STANDARDS AND SPECIFICATIONS SET FORTH IN THE NHDES NH STORMWATER MANUALS, VOL. 1-3, DATED DECEMBER 2008 AS AMENDED.
18. CONTRACTOR SHALL CONTROL DUST BY SPRAYING WATER, SWEEPING PAVED SURFACES, PROVIDING TEMPORARY VEGETATION, AND/OR MULCHING EXPOSED AREAS AND STOCKPILES.
19. THE CONTRACTOR SHALL TAKE WHATEVER MEANS NECESSARY TO PREVENT EROSION, PREVENT SEDIMENT FROM LEAVING THE SITE AND/OR ENTERING WETLANDS AND ENSURE PERMANENT SOIL STABILIZATION.
20. ALL EROSION CONTROL BLANKETS AND FASTENERS SHALL BE BIODEGRADEABLE.
21. ALL SWALES AND DETENTION PONDS SHALL BE STABILIZED PRIOR TO DIRECTING RUNOFF TO THEM.
22. ALL DISTURBED AREAS NOT TO BE PAVED OR OTHERWISE TREATED SHALL RECEIVE SIX (6") INCHES OF COMPACTED LOAM, LIMESTONE, FERTILIZER, SEED, AND MULCH USING APPROPRIATE SOIL STABILIZATION TECHNIQUES.
23. UPON COMPLETION OF CONSTRUCTION, ALL DRAINAGE INFRASTRUCTURE SHALL BE CLEANED OF ALL DEBRIS AND SEDIMENT AND ALL TEMPORARY EROSION AND SEDIMENT CONTROLS REMOVED AND ANY AREAS DISTURBED BY THE REMOVAL SMOOTHED AND REVEGETATED.

P5090

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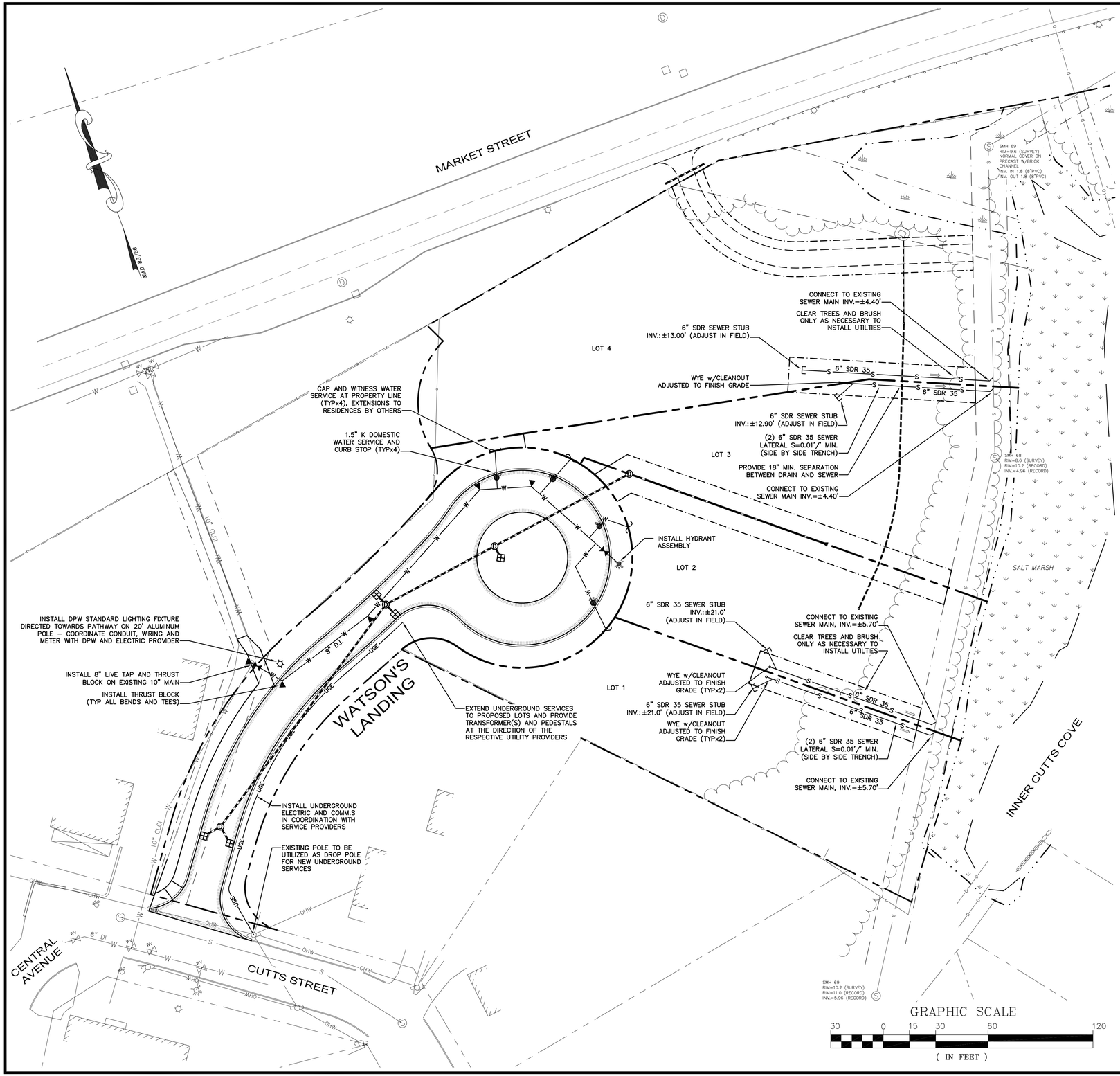
PROJECT:
WATSON'S LANDING
TAX MAP 209, LOT 33
1 CLARK DRIVE PORTSMOUTH, NH 03801

TITLE:
STORMWATER MANAGEMENT PLAN

SHEET NUMBER:
C-4



UTILITY NOTES

1. THE LOCATION OF ALL EXISTING UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE AND ARE BASED UPON THE FIELD LOCATION OF ALL VISIBLE STRUCTURES (IE. CATCH BASINS, MANHOLES, WATER GATES, ETC.) AND INFORMATION COMPILED FROM PLANS PROVIDED BY UTILITY PROVIDERS AND GOVERNMENTAL AGENCIES. AS SUCH, THEY ARE NOT INCLUSIVE AS OTHER UTILITIES AND UNDERGROUND STRUCTURES THAT ARE NOT SHOWN ON THE PLANS MAY EXIST. THE ENGINEER, SURVEYOR AND OWNER ACCEPT NO RESPONSIBILITY FOR POTENTIAL INACCURACIES IN THE PLAN AND/OR UNFORESEEN CONDITIONS. THE CONTRACTOR SHALL NOTIFY, IN WRITING, SAID AGENCIES, UTILITY PROVIDERS, CITY OF PORTSMOUTH DPW AND OWNER'S AUTHORIZED REPRESENTATIVE AND CALL DIG SAFE AT 1 (800) DIG-SAFE AT LEAST SEVENTY-TWO (72) HOURS PRIOR TO ANY EXCAVATION WORK.
2. PRIOR TO CONSTRUCTION, IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE AND FIELD VERIFY JUNCTIONS, LOCATIONS AND ELEVATIONS/INVERTS OF ALL EXISTING AND PROPOSED STORMWATER AND UTILITY LINES. CONFLICTS SHALL BE ANTICIPATED AND ALL EXISTING LINES TO BE RETAINED SHALL BE PROTECTED. ANY DAMAGE DONE TO EXISTING UTILITIES SHALL BE REPAIRED AND, IF NECESSARY, EXISTING UTILITIES SHALL BE RELOCATED AT NO EXTRA COST TO THE OWNER. ALL CONFLICTS SHALL BE RESOLVED WITH THE INVOLVEMENT OF THE ENGINEER, DPW AND APPROPRIATE UTILITIES.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE POSTING OF ALL BONDS AND PAYMENT OF ALL TAP, TIE-IN AND CONNECTION FEES.
4. ALL ROAD/LANE CLOSURES OR OTHER TRAFFIC INTERRUPTIONS SHALL BE COORDINATED WITH THE PORTSMOUTH POLICE DEPARTMENT AND DPW AT LEAST TWO WEEKS PRIOR TO COMMENCING RELATED CONSTRUCTION.
5. ALL CONSTRUCTION SHALL MEET THE MINIMUM CONSTRUCTION STANDARDS OF THE CITY OF PORTSMOUTH AND NHDOT STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES, LATEST EDITION. THE MORE STRINGENT SPECIFICATION SHALL GOVERN.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRENCHING, BEDDING, BACKFILL & COMPACTION FOR ALL UTILITY TRENCHING IN ADDITION TO ALL CONDUIT INSTALLATION AND COORDINATION OF ALL REQUIRED INSPECTIONS.
7. ALL TRENCHING, PIPE LAYING AND BACKFILLING SHALL CONFORM TO FEDERAL OSHA AND CITY REGULATIONS.
8. FINAL UTILITY LOCATIONS TO BE COORDINATED BETWEEN THE ARCHITECT, CONTRACTOR, APPROPRIATE UTILITY COMPANIES AND THE PORTSMOUTH DPW.
9. WATER: PORTSMOUTH DPW WATER DIVISION, JIM TOW, (603) 427-1530.
10. SEWER: PORTSMOUTH DPW SEWER DIVISION, JIM TOW, (603) 427-1530.
11. TELECOMMUNICATIONS: CONSOLIDATED, JOE CONSIDINE, (603) 427-5525.
12. CABLE: COMCAST, MIKE COLLINS, (603) 679-5695, EXT. 1037.
13. ELECTRICAL: EVERSOURCE, MICHAEL BUSBY, (603) 332-4227, EXT. 5555334. ALL ELECTRIC CONDUIT INSTALLATION SHALL BE INSPECTED BY EVERSOURCE PRIOR TO BACKFILL, 48-HOUR MINIMUM NOTICE REQUIRED.
14. GAS: UNITIL, DAVID BEAULIEU, (603) 294-5144.
15. DETECTABLE WARNING TAPE SHALL BE PLACED OVER THE ENTIRE LENGTH OF ALL BURIED UTILITIES, COLORS PER THE RESPECTIVE UTILITY PROVIDERS.
16. ALL WATER MAIN AND SERVICE INSTALLATIONS SHALL BE CONSTRUCTED AND TESTED PER PORTSMOUTH DPW STANDARDS AND SPECIFICATIONS. ALL OTHER UTILITIES SHALL BE TO THE STANDARDS AND SPECIFICATIONS OF THE RESPECTIVE UTILITY PROVIDERS.
17. WHERE WATER LINES CROSS, RUN ADJACENT TO OR ARE WITHIN 5' OF STORM DRAINAGE PIPES OR STRUCTURES, 2"-THICK CLOSED CELL RIGID BOARD INSULATION SHALL BE INSTALLED FOR FROST PROTECTION.
18. PER PORTSMOUTH DPW SPECIFICATIONS, ALL NEW DUCTILE IRON WATERLINES SHALL BE WRAPPED WITH A WATER TIGHT POLYETHYLENE WRAPPING FOR THEIR FULL LENGTH, ALL DOMESTIC WATER SERVICES SHALL BE PROVIDED WITH BACKFLOW PREVENTERS AND ALL JOINTS SHALL HAVE THREE (3) WEDGES PER JOINT.
19. WATER AND SANITARY SEWER LINES SHALL BE LOCATED AT LEAST 10' HORIZONTALLY FROM EACH OTHER. WHERE CROSSING, 18" MINIMUM VERTICAL CLEARANCE SHALL BE PROVIDED WITH WATER INSTALLED OVER SEWER.
20. CONTRACTOR SHALL HAVE A SITE SURVEY CONDUCTED BY A RADIO COMMUNICATIONS CARRIER APPROVED BY THE CITY'S COMMUNICATION DIVISION. THE RADIO COMMUNICATIONS CARRIER MUST BE FAMILIAR AND CONVERSANT WITH THE POLICE AND RADIO CONFIGURATION. IF THE SITE SURVEY INDICATES IT IS NECESSARY TO INSTALL A SIGNAL REPEATER EITHER ON OR NEAR THE PROPOSED PROJECT, THOSE COSTS SHALL BE THE RESPONSIBILITY OF THE PROPERTY OWNER. THE APPLICANT SHALL BE REQUIRED TO PAY FOR THE SITE SURVEY WHETHER OR NOT THE SURVEY INDICATES A REPEATER IS NECESSARY. THE OWNER SHALL COORDINATE WITH THE SUPERVISOR OF RADIO COMMUNICATIONS FOR THE CITY. THE SURVEY SHALL BE COMPLETED AND THE REPEATER, IF DETERMINED IT IS REQUIRED, SHALL BE INSTALLED PRIOR TO THE ISSUANCE OF CERTIFICATE OF OCCUPANCY.
21. CONTRTACTOR SHALL PROVIDE DPW WITH DETAILS OF TEMPORARY & PERMANENT GROUNDWATER DEWATERING DESIGN IF NECESSARY.

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APPLICANT:
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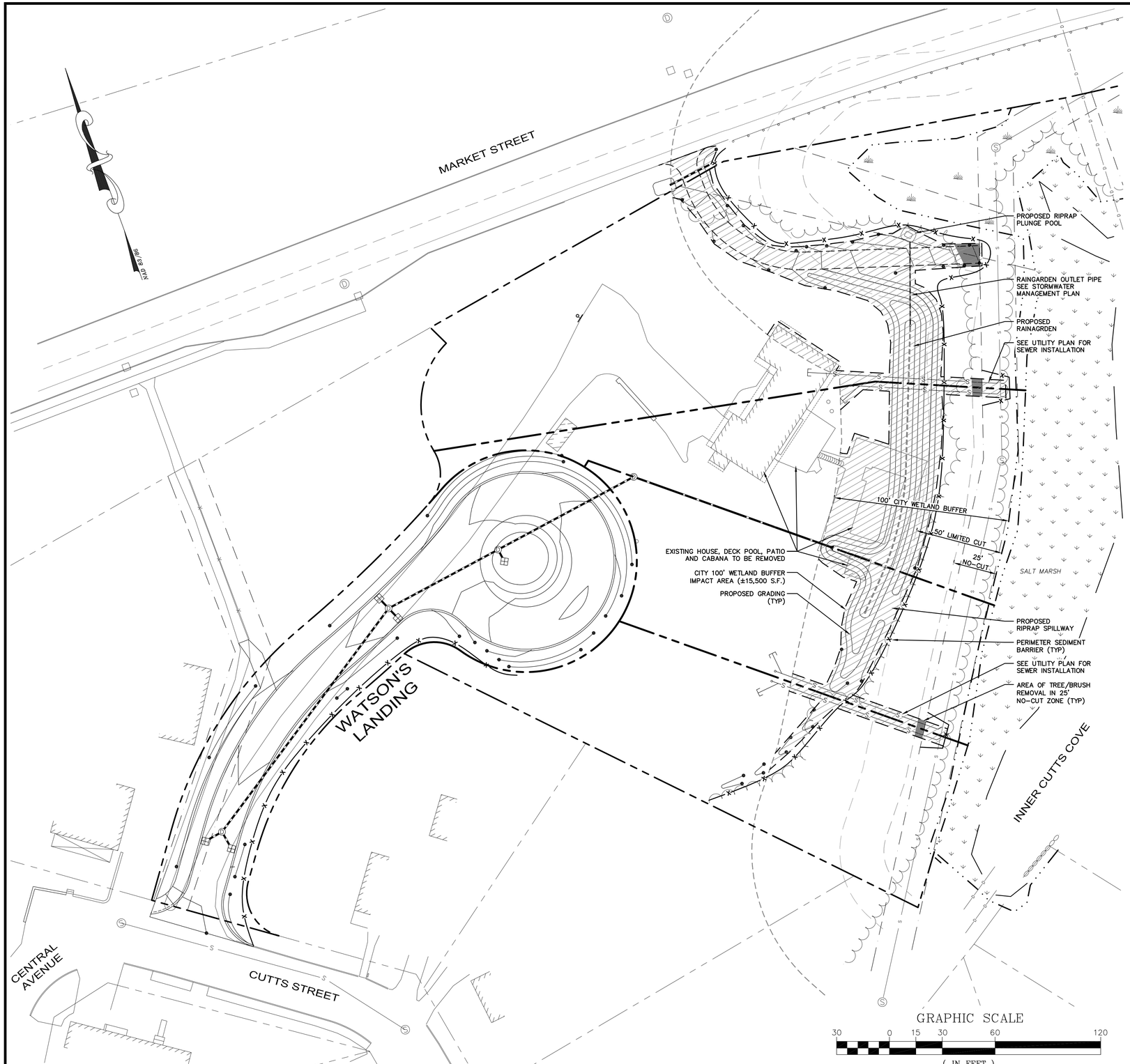
53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

PROJECT:
WATSON'S LANDING
TAX MAP 209, LOT 33
1 CLARK DRIVE PORTSMOUTH, NH 03801

TITLE:
UTILITY PLAN

SHEET NUMBER:
C-5

P5090



CONDITIONAL USE PERMIT NOTES

1. ZONING SECTION 10.1016 – CONDITIONAL USE PERMIT REQUIRED FOR EARTH DISTURBANCE IN THE 100' CITY WETLAND BUFFER.
2. PROJECT PARCEL: MAP 209 LOT 33, 135,176 S.F (3.10 ACRES) TO HIGHEST OBSERVABLE TIDE LINE (HOTL).
3. WETLAND AREA ON LOT: ±16,397 S.F. (±0.38 ACRES)
4. 100' WETLAND BUFFER ANALYSIS:
   LAWN: ±23,540
   BRUSH/WOODLAND: ±20,735 S.F.
   IMPERVIOUS: ±3,326 S.F.
   TOTAL BUFFER: ±47,601 S.F. (±1.09 ACRES)
5. AREA OF 100' WETLAND BUFFER IMPACT:
   ONSITE: ±15,125 S.F.
   OFFSITE: ±375 S.F. (MARKET STREET RIGHT OF WAY)
   TOTAL: ±15,500 S.F. (±0.36 ACRES)
6. AREA OF TREE/BRUSH REMOVAL IN BUFFER:
   0–25': ±252 S.F.
   25'–50': ±252 S.F.
   50'–100': ±756 S.F.
   TOTAL: ±1,260 S.F.
7. PROPOSED IMPERVIOUS SURFACES IN BUFFER: 0 S.F.
8. PROPOSED WETLAND IMPACT: 0 S.F.
9. WETLANDS WERE DELINEATED BY MICHAEL CUOMO, NH CERTIFIED SOILS SCIENTIST #006 AND NH CERTIFIED WETLANDS SCIENTIST #004, ON SEPTEMBER 15, 2020.
10. CONSTRUCTION ACTIVITIES SHALL BE MANAGED IN STRICT ACCORDANCE WITH NH RSA 430:53 AND AGR 3800 RELATIVE TO INVASIVE SPECIES. NO INVASIVE SPECIES SHALL BE INSTALLED ON THE PROJECT SITE FOR ANY REASON.

LEGEND

- PROPERTY LINE
- EASEMENT LINE
- 100' CITY WETLAND SETBACK
- 50' CITY WETLAND SETBACK (LIMITED CUT)
- 25' CITY WETLAND SETBACK (NO–CUT)
- 100' STATE TIDAL BUFFER
- FRESHWATER WETLAND BOUNDARY
- TIDAL WETLAND BOUNDARY
- VGC SGC EXISTING PAVEMENT/CURB
- S Ⓢ EXISTING SEWER/MANHOLE
- SILTFENCE/SEDIMENT BARRIER/CONST. FENCE
- EXISTING TREE LINE/BRUSH LINE
- PROPOSED DISTURBANCE IN WETLAND BUFFER
- FRESHWATER WETLAND
- SALTMARSH

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53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

PROJECT:
WATSON'S LANDING
TAX MAP 209, LOT 33
1 CLARK DRIVE PORTSMOUTH, NH 03801

TITLE:
CONDITIONAL USE PERMIT PLAN

SHEET NUMBER:
C-6

P5090

SEDIMENT AND EROSION CONTROL NOTES

PROJECT NAME AND LOCATION

1 CLARK DRIVE
PORTSMOUTH, NEW HAMPSHIRE
TAX MAP 209 LOT 33

LATITUDE: 43.084° N
LONGITUDE: 70.771° W

OWNER/APPLICANT:

FREDERICK W. WATSON REVOCABLE TRUST, ROBERT D. WATSON, TRUSTEE
53 SLEEPY HOLLOW DRIVE
GREENLAND, NH 03840

DESCRIPTION

The project consists of the demolition of a single family residence and creation of a 4–lot subdivision along with a public cul–de–sac and associated site improvements.

DISTURBED AREA

The total area to be disturbed for the development is approximately ±47,550 S.F. (±1.09 acres). USEPA NPDES Phase II compliance required.

PROJECT PHASING

The proposed road and associated utilities will be completed in one phase. Construction of individual house lots to be done later at the owner's discretion.

NAME OF RECEIVING WATER

The site drains over land to Inner Cutts Cove and eventually the Piscataqua River.

SEQUENCE OF MAJOR ACTIVITIES

1. Install temporary erosion control measures including perimeter controls, stabilized construction entrance and inlet sediment filters as noted on the plan. All temporary erosion control measures shall be maintained in good working condition for the duration of the project.
2. Remove landscaping, strip loam and stockpile.
3. Demolish existing site features, single family residence, utilities, etc. as shown on Demolition Plan.
4. Rough grade site including placement of borrow materials.
5. Construct building and associated improvements.
6. Construct drainage structures, culverts, utilities & sidewalk base course materials.
7. Install base course paving & curbing.
8. Install top course paving and sidewalks.
9. Loam (6" min) and seed all disturbed areas not paved or otherwise stabilized.
10. When all construction activity is complete and site is stabilized, remove all temporary erosion control measures and any sediment that has been trapped by these devices.
11. House construction on individual lots will be done by others subsequent to roadway construction.

TEMPORARY EROSION & SEDIMENT CONTROL AND STABILIZATION PRACTICES

All work shall be in accordance with state and local permits. Work shall conform to the practices described in the "New Hampshire Stormwater Manual, Volumes 1 – 3", issued December 2008, as amended. As indicated in the sequence of Major Activities, perimeter controls shall be installed prior to commencing any clearing or grading of the site. Structural controls shall be installed concurrently with the applicable activity. Once construction activity ceases permanently in an area and permanent measures are established, perimeter controls shall be removed.

During construction, runoff will be diverted around the site with stabilized channels where possible. Sheet runoff from the site shall be filtered through appropriate perimeter controls. All storm drain inlets shall be provided with inlet protection measures.

Temporary and permanent vegetation and mulching is an integral component of the erosion and sedimentation control plan. All areas shall be inspected and maintained until vegetative cover is established. These control measures are essential to erosion prevention and also reduce costly rework of graded and shaped areas.

Temporary vegetation shall be maintained in these areas until permanent seeding is applied. Additionally, erosion and sediment control measures shall be maintained until permanent vegetation is established.

INSTALLATION, MAINTENANCE AND INSPECTION PROCEDURES FOR TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

A. GENERAL

These are general inspection and maintenance practices that shall be used to implement the plan:

1. The smallest practical portion of the site shall be denuded at one time.
2. All control measures shall be inspected at least once each week and following any storm event of 0.5 inches or greater.
3. All measures shall be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours.
4. Built–up sediment shall be removed from perimeter barriers when it has reached one–third the height of the barrier or when "bulges" occur.
5. All diversion dikes shall be inspected and any breaches promptly repaired.
6. Temporary seeding and planting shall be inspected for bare spots, washouts, and unhealthy growth.
7. The owner's authorized engineer shall inspect the site on a periodic basis to review compliance with the Plans.
8. An area shall be considered stable if one of the following has occurred:
   a. Base coarse gravels have been installed in areas to be paved;
   b. A minimum of 85% vegetated growth as been established;
   c. A minimum of 3 inches of non–erosive material such as stone of riprap has been installed; – or –
   d. Erosion control blankets have been properly installed.
9. The length of time of exposure of area disturbed during construction shall not exceed 45 days.

B. MULCHING

Mulch shall be used on highly erodible soils, on critically eroding areas, on areas where conservation of moisture will facilitate plant establishment, and where shown on the plans.

1. Timing – In order for mulch to be effective, it must be in place prior to major storm events. There are two (2) types of standards which shall be used to assure this:
   a. Apply mulch prior to any storm event. This is applicable when working within 100 feet of wetlands. It will be necessary to closely monitor weather predictions, usually by contacting the National Weather Service in Concord, to have adequate warning of significant storms.
   b. Required Mulching within a specified time period. The time period can range from 21 to 28 days of inactivity on a area, the length of time varying with site conditions. Professional judgment shall be used to evaluate the interaction of site conditions (soil erodibility, season of year, extent of disturbance, proximity to sensitive resources, etc.) and the potential impact of erosion on adjacent areas to choose an appropriate time restriction.
2. Guidelines for Winter Mulch Application –

Type	Rate per 1,000 s.f.	Use and Comments
Hay or Straw	70 to 90 lbs.	Must be dry and free from mold. May be used with plantings.
Wood Chips or Bark Mulch	460 to 920 lbs.	Used mostly with trees and shrub plantings.
Jute and Fibrous Matting (Erosion Blanket	As per manufacturer Specifications	Used in slope areas, water courses and other Control areas.
Crushed Stone 1/4" to 1–1/2" dia.	Spread more than 1/2" thick	Effective in controlling wind and water erosion.
Erosion Control Mix	2" thick (min)	* The organic matter content is between 80 and 100%, dry weight basis. * Particle size by weight is 100% passing a 6"screen and a minimum of 70 %, maximum of 85%, passing a 0.75" screen. *The organic portion needs to be fibrous and elongated. *Large portions of silts, clays or fine sands are not acceptable in the mix. * Soluble salts content is less than 4.0 mmhos/cm. *The pH should fall between 5.0 and 8.0.

3. Maintenance – All mulches must be inspected periodically, in particular after rainstorms, to check for rill erosion. If less than 90% of the soil surface is covered by mulch, additional mulch shall be immediately applied.

C. PERMANENT SEEDING –

1. Bedding – stones larger than $1\frac{1}{2}$", trash, roots, and other debris that will interfere with seeding and future maintenance of the area should be removed. Where feasible, the soil should be tilled to a depth of 5" to prepare a seedbed and mix fertilizer into the soil.
2. Fertilizer – lime and fertilizer should be applied evenly over the area prior to or at the time of seeding and incorporated into the soil. Kinds and amounts of lime and fertilizer should be based on an evaluation of soil tests. When a soil test is not available, the following minimum amounts should be applied:

   Agricultural Limestone @ 100 lbs. per 1,000 s.f.
   10–20–20 fertilizer @ 12 lbs. per 1,000 s.f.

3. Seed Mixture (recommended):

Type	Lbs. / Acre	Lbs. / 1,000 sf
Tall Fescue	24	0.55
Creeping Red Fescue	24	0.55
Total	48	1.10

Seed Mixture (For slope embankments):
Grass Seed: Provide fresh, clean, new–crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide seed mixture composed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified:

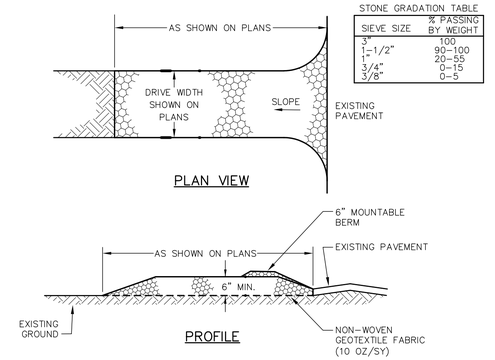
Type	Min. Purity (%)	Min. Germination (%)	Kg./Hectare (Lbs/Acre)
Creeping Red Fescue (c)	96	85	45 (40)
Perennial Rye Grass (a)	98	90	35 (30)
Redtop	95	80	5 (5)
Alsike Clover	97	90(e)	5 (5)
		Total	90 (80)

   a. Ryegrass shall be a certified fine–textured variety such as Pennfine, Fiesta, Yorktown, Diplomat, or equal.
   b. Fescue varieties shall include – Creeping Red and/or Hard Reliant, Scaldis, Koket, or Jamestown.

4. Sodding – sodding is done where it is desirable to rapidly establish cover on a disturbed area. Sodding an area may be substituted for permanent seeding procedures anywhere on site. Bed preparation, fertilizing, and placement of sod shall be performed according to the S.C.S. Handbook. Sodding is recommended for steep sloped areas, areas immediately adjacent to sensitive water courses, easily erodible soils (fine sand/silt), etc.

WINTER CONSTRUCTION NOTES

1. All proposed vegetated areas which do not exhibit a minimum of 85% vegetative growth by October 15th, or which are disturbed after October 15th, shall be stabilized by seeding and installing erosion control blankets on slopes greater than 3:1, and elsewhere seeding and placing 3 to 4 tons of mulch per acre, secured with anchored netting. The installation of erosion control blankets or mulch and netting shall not occur over accumulated snow or on frozen ground and shall be completed in advance of thaw or spring melt events;
2. All ditches or swales which do not exhibit a minimum of 85% vegetative growth by October 15th, or which are disturbed after October 15th, shall be stabilized temporarily with stone or erosion control blankets appropriate for the design flow conditions; and
3. After November 15th, incomplete road or parking surfaces where work has stopped for the winter season shall be protected with a minimum of 3 inches of crushed gravel per NHDOT Item 304.3.



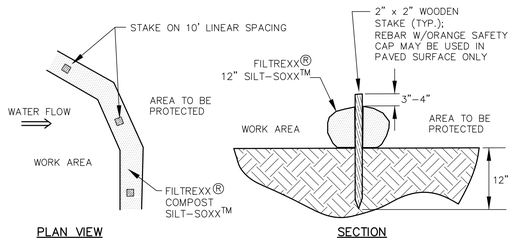
STONE GRADATION TABLE

SIEVE SIZE	% PASSING BY WEIGHT
3"	100
1–1/2"	90–100
1"	20–55
3/4"	0–15
3/8"	0–5

CONSTRUCTION SPECIFICATIONS

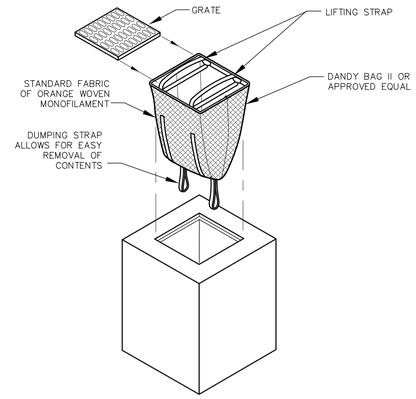
1. STONE SIZE – NHDOT STANDARD STONE SIZE #4 – SECTION 703 OF NHDOT STANDARD.
2. LENGTH – DETAILED ON PLANS (50 FOOT MINIMUM).
3. THICKNESS – SIX (6) INCHES (MINIMUM).
4. WIDTH – FULL DRIVE WIDTH UNLESS OTHERWISE SPECIFIED.
5. FILTER FABRIC – MIRAFI 600X OR EQUAL APPROVED BY ENGINEER.
6. SURFACE WATER CONTROL – ALL SURFACE WATER THAT IS FLOWING TO OR DIVERTED TOWARD THE CONSTRUCTION ENTRANCE SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A BERM WITH 5:1 SLOPES THAT CAN BE CROSSED BY VEHICLES MAY BE SUBSTITUTED FOR THE PIPE.
7. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY. THIS WILL REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. WHEELS SHALL BE CLEANED TO REMOVE MUD PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS–OF–WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. STABILIZED CONSTRUCTION EXITS SHALL BE INSTALLED AT ALL ENTRANCES TO PUBLIC RIGHTS–OF–WAY, AT LOCATIONS SHOWN ON THE PLANS, AND/OR WHERE AS DIRECTED BY THE ENGINEER.

STABILIZED CONSTRUCTION EXIT — NOT TO SCALE



NOTES:
1. SILTSOXX MAY BY USED IN PLACE OF SILT FENCE OR OTHER SEDIMENT BARRIERS.
2. ALL MATERIAL TO MEET FILTREXX SPECIFICATIONS.
3. SILTSOXX COMPOST/SOIL/ROCK/SEED FILL MATERIAL SHALL BE ADJUSTED AS NECESSARY TO MEET THE REQUIREMENTS OF THE SPECIFIC APPLICATION.
4. ALL SEDIMENT TRAPPED BY SILTSOXX SHALL BE DISPOSED OF PROPERLY.

TUBULAR SEDIMENT BARRIER — NOT TO SCALE



INSTALLATION AND MAINTENANCE:

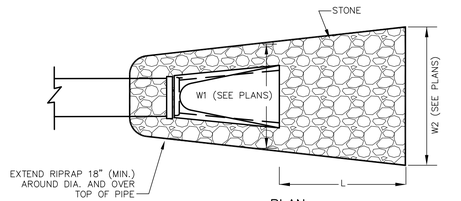
INSTALLATION: REMOVE THE GRATE FROM CATCH BASIN. IF USING OPTIONAL OIL ABSORBENTS; PLACE ABSORBENT PILLOW IN UNIT. STAND GRATE ON END. MOVE THE TOP LIFTING STRAPS OUT OF THE WAY AND PLACE THE GRATE INTO CATCH BASIN INSERT SO THE GRATE IS BELOW THE TOP STRAPS AND ABOVE THE LOWER STRAPS. HOLDING THE LIFTING DEVICES, INSERT THE GRATE INTO THE INLET.

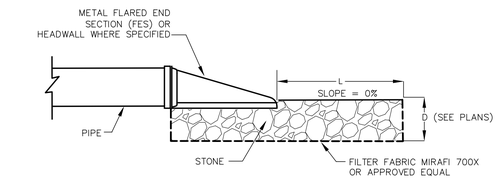
MAINTENANCE: REMOVE ALL ACCUMULATED SEDIMENT AND DEBRIS FROM VICINITY OF THE UNIT AFTER EACH STORM EVENT. AFTER EACH STORM EVENT AND AT REGULAR INTERVALS, LOOK INTO THE CATCH BASIN INSERT. IF THE CONTAINMENT AREA IS MORE THAN 1/3 FULL OF SEDIMENT, THE UNIT MUST BE EMPTIED. TO EMPTY THE UNIT, LIFT THE UNIT OUT OF THE INLET USING THE LIFTING STRAPS AND REMOVE THE GRATE. IF USING OPTIONAL ABSORBENTS; REPLACE ABSORBENT WHEN NEAR SATURATION.

UNACCEPTABLE INLET PROTECTION METHOD:

A SIMPLE SHEET OF GEOTEXTILE UNDER THE GRATE IS NOT ACCEPTABLE.

STORM DRAIN INLET PROTECTION — NOT TO SCALE





SECTION

MAINTENANCE

THE OUTLET PROTECTION SHOULD BE CHECKED AT LEAST ANNUALLY AND AFTER EVERY MAJOR STORM. IF THE RIPRAP HAS BEEN DISPLACED, UNDERMINED OR DAMAGED, IT SHOULD BE REPAIRED IMMEDIATELY. THE CHANNEL IMMEDIATELY BELOW THE OUTLET SHOULD BE CHECKED TO SEE THAT EROSION IS NOT OCCURRING. THE DOWNSTREAM CHANNEL SHOULD BE KEPT CLEAR OF OBSTRUCTIONS SUCH AS FALLEN TREES, DEBRIS, AND SEDIMENT THAT COULD CHANGE FLOW PATTERNS AND/OR TAILWATER DEPTHS ON THE PIPES. REPAIRS MUST BE CARRIED OUT IMMEDIATELY TO AVOID ADDITIONAL DAMAGE TO THE OUTLET PROTECTION APRON.

CONSTRUCTION SPECIFICATIONS

1. THE SUBGRADE FOR THE FILTER MATERIAL, GEOTEXTILE FABRIC, AND RIPRAP SHALL BE PREPARED TO THE LINES AND GRADES SHOWN ON THE PLANS.
2. THE ROCK OR GRAVEL USED FOR FILTER OR RIPRAP SHALL CONFORM TO THE SPECIFIED GRADATION.
3. GEOTEXTILE FABRICS SHALL BE PROTECTED FROM PUNCTURE OR TEARING DURING THE PLACEMENT OF THE ROCK RIPRAP. DAMAGED AREAS IN THE FABRIC SHALL BE REPAIRED BY PLACING A PIECE OF FABRIC OVER THE DAMAGED AREA OR BY COMPLETE REPLACEMENT OF THE FABRIC. ALL OVERLAPS REQUIRED FOR JOINING TWO PIECES OF FABRIC SHALL BE A MINIMUM OF 12 INCHES.
4. STONE FOR THE RIP RAP MAY BE PLACED BY EQUIPMENT AND SHALL BE CONSTRUCTED TO THE FULL LAYER THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO PREVENT SEGREGATION OF THE STONE SIZES.

RIPRAP OUTLET PROTECTION — NOT TO SCALE

P5090

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STATE OF NEW HAMPSHIRE
ERIC D. WEINRIEB
No. 7634
LICENSED
PROFESSIONAL ENGINEER
1/19/21

NOT FOR CONSTRUCTION

ISSUED FOR: TAC

ISSUE DATE: JANUARY 18, 2021

REVISIONS

NO.	DESCRIPTION	BY	DATE
0	TAC WORK SESSION	EBS	12/01/20
1	TAC	EBS	1/18/21

DRAWN BY: EBS
APPROVED BY: EDW
DRAWING FILE: 5090–DETAILS.dwg

SCALE: 22" x 34" NOT TO SCALE

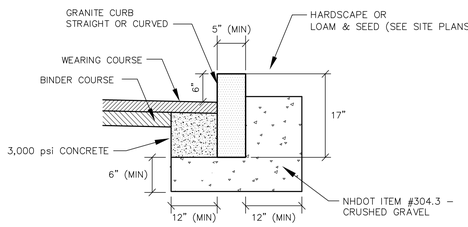
OWNER:
FREDERICK W. WATSON REVOCABLE TRUST, ROBERT D. WATSON, TRUSTEE
53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

APPLICANT:
FREDERICK W. WATSON REVOCABLE TRUST, ROBERT D. WATSON, TRUSTEE
53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

PROJECT:
WATSON'S LANDING
TAX MAP 209, LOT 33
1 CLARK DRIVE PORTSMOUTH, NH 03801

TITLE: DETAILS SHEET

SHEET NUMBER: D-1

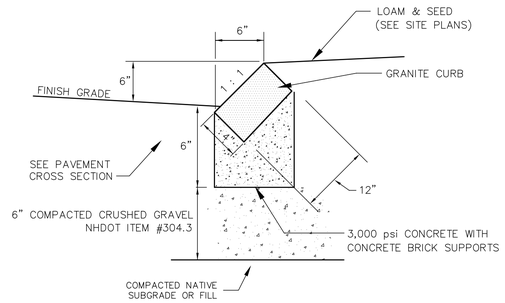


NOTES:

1. SEE PLANS FOR CURB LOCATION.
2. ADJOINING STONES SHALL HAVE THE SAME OR APPROXIMATELY THE SAME LENGTH.
3. MINIMUM LENGTH OF CURB STONES = 3'
4. MAXIMUM LENGTH OF CURB STONES = 10'
5. MAXIMUM LENGTH OF STRAIGHT CURB STONES LAID ON CURVES – SEE CHART.
6. CURB ENDS TO ROUNDED AND BATTERED FACES TO BE CUT WHEN CALLED FOR ON THE PLANS.

RADIUS	MAX. LENGTH
21'	3'
22'–28'	4'
29'–35'	5'
36'–42'	6'
43'–49'	7'
50'–56'	8'
57'–60'	9'
OVER 60'	10'

VERTICAL GRANITE CURB NOT TO SCALE

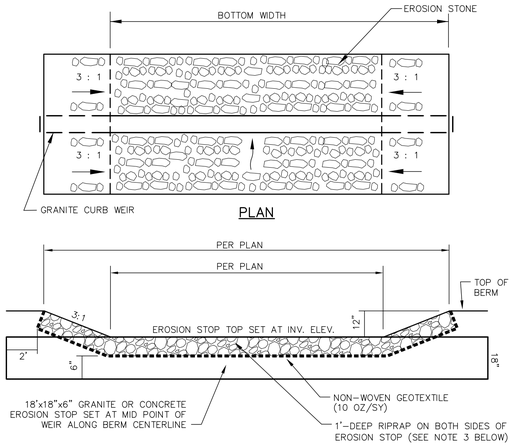


NOTES

1. SEE SITE PLAN FOR LIMITS OF CURBING
2. ADJOINING STONES OF STRAIGHT CURB LAID ON CURVES SHALL HAVE THE SAME OR APPROXIMATELY THE SAME LENGTH
3. MINIMUM LENGTH OF STRAIGHT CURB STONES = 18"
4. MAXIMUM LENGTH OF STRAIGHT CURB STONES = 8'
5. MAXIMUM LENGTH OF STRAIGHT CURB STONES LAID ON CURVES – SEE CHART

RADIUS FOR STONES WITH SQUARE JOINTS	MAXIMUM LENGTH
16'–28'	1'–6"
29'–41'	2'
42'–55'	3'
56'–68'	4'
69'–82'	5'
83'–96'	6'
97'–110'	7'
OVER 110'	8'

SLOPED GRANITE CURB NOT TO SCALE

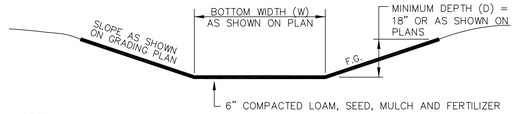


1. CONSTRUCT EMERGENCY OVERFLOW WEIR TO THE WIDTHS AND LENGTHS SHOWN ON THE PLAN.
2. THE SUBGRADE FOR THE GEOTEXTILE FABRIC AND RIPRAP SHALL BE PREPARED TO LINES AND GRADES SHOWN ON THE PLANS.
3. UNLESS OTHERWISE SPECIFIED OR DIRECTED, RIPRAP USED FOR THE EMERGENCY OVERFLOW WEIR SHALL MEET THE FOLLOWING GRADATION:

SIZE	PERCENT PASSING BY WEIGHT
4"	90–100
2"	0–15

4. GEOTEXTILE FABRICS SHALL BE PROTECTED FROM PUNCTURE OR TEARING DURING THE PLACEMENT OF THE EROSION STONE. DAMAGED AREAS IN THE FABRIC SHALL BE REPAIRED BY PLACING A PIECE OF FABRIC OVER THE DAMAGED AREA OR BY COMPLETE REPLACEMENT OF THE FABRIC. ALL OVERLAPS REQUIRED FOR REPAIRS OR JOINING TWO PIECES OF FABRIC SHALL BE A MINIMUM OF 18 INCHES.
5. THE EROSION STONE MAY BE PLACED BY EQUIPMENT AND SHALL BE CONSTRUCTED TO THE FULL LAYER THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO PREVENT SEGREGATION OF THE STONE SIZES.

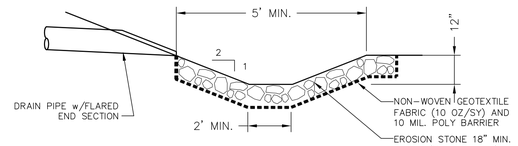
RIPRAP SPILLWAY / OVERFLOW WEIR NOT TO SCALE



NOTES

1. THE FOUNDATION AREA OF THE SWALE SHALL BE CLEARED AND GRUBBED OF ALL TREES, BRUSH, STUMPS, AND OTHER OBJECTIONABLE MATERIAL.
2. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE AND CROSS SECTION AS REQUIRED TO MEET THE DESIGN CRITERIA AND BE FREE OF IRREGULARITIES.
3. EARTH FILLS REQUIRED TO MEET SUBGRADE REQUIREMENTS BECAUSE OF OVER EXCAVATION OR TOPOGRAPHY SHALL BE COMPACTED TO THE SAME DENSITY AS THE SURROUNDING SOIL TO PREVENT UNEQUAL SETTLEMENT THAT COULD CAUSE DAMAGE TO THE COMPLETED SWALE.
4. VEGETATION SHALL BE ESTABLISHED IN THE SWALE OR AN EROSION CONTROL MATTING INSTALLED PRIOR TO DIRECTING STORMWATER TO IT.
5. MAINTENANCE OF THE VEGETATION IS EXTREMELY IMPORTANT IN ORDER TO PREVENT RILLING, EROSION, AND FAILURE OF THE SWALE. MOWING SHALL BE DONE FREQUENTLY ENOUGH TO CONTROL ENCROACHMENT OF WEEDS AND WOODY VEGETATION AND TO KEEP GRASSES IN A VIGOROUS CONDITION. THE VEGETATION SHALL NOT BE MOWED TOO CLOSELY SO AS TO REDUCE THE EROSION RESISTANCE IN THE SWALE.
6. THE SWALE SHOULD BE INSPECTED PERIODICALLY AND AFTER ANY STORM GREATER THAN 0.5" OF RAINFALL IN 24 HOURS TO DETERMINE ITS CONDITION. RILLS AND DAMAGED AREAS SHOULD BE PROMPTLY REPAIRED AND REVEGETATED AS NECESSARY TO PREVENT FURTHER DETERIORATION.

VEGETATED SWALE NOT TO SCALE



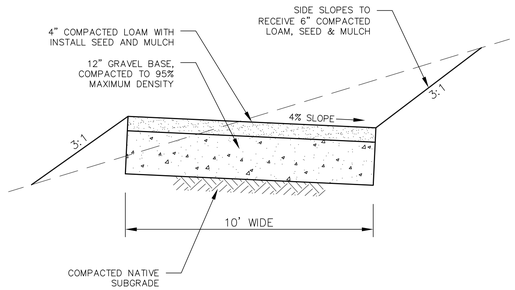
NOTES

1. CONSTRUCT PLUNGE POOL TO THE WIDTHS AND LENGTHS SHOWN ON THE PLAN.
2. THE SUBGRADE FOR THE GEOTEXTILE FABRIC AND RIPRAP SHALL BE PREPARED TO ACCOUNT FOR THE DEPTH OF RIPRAP.
3. EROSION STONE USED FOR THE PLUNGE POOL SHALL MEET THE FOLLOWING GRADATION:

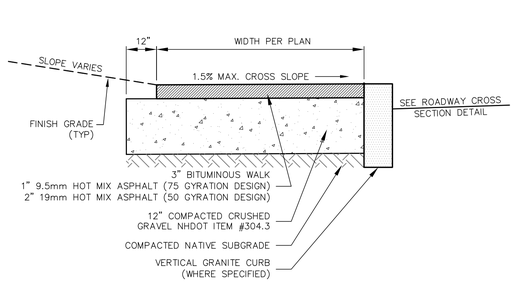
SIZE	PERCENT PASSING BY WEIGHT
18"	100
12"	90–100
4"	0–15

4. GEOTEXTILE FABRICS SHALL BE PROTECTED FROM PUNCTURE OR TEARING DURING THE PLACEMENT OF THE EROSION STONE. DAMAGED AREAS IN THE FABRIC SHALL BE REPAIRED BY PLACING A PIECE OF FABRIC OVER THE DAMAGED AREA OR BY COMPLETE REPLACEMENT OF THE FABRIC. ALL OVERLAPS REQUIRED FOR REPAIRS OR JOINING TWO PIECES OF FABRIC SHALL BE A MINIMUM OF 18".
5. THE EROSION STONE MAY BE PLACED BY EQUIPMENT AND SHALL BE CONSTRUCTED TO THE FULL LAYER THICKNESS IN ONE OPERATION AND IN SUCH A MANNER AS TO PREVENT SEGREGATION OF THE STONE SIZES.

PLUNGE POOL NOT TO SCALE



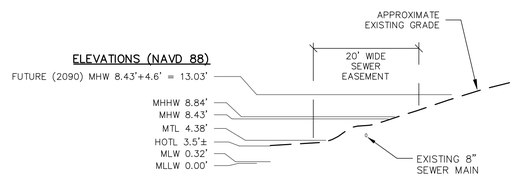
REINFORCED GRASS ACCESSWAY NOT TO SCALE



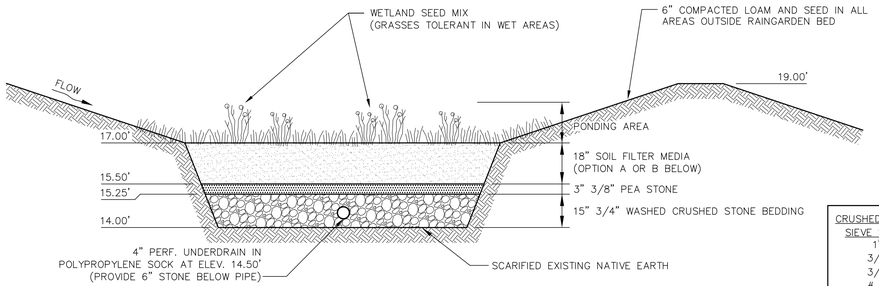
BITUMINOUS SIDEWALK NOT TO SCALE

NOTES:

1. ALL TIDAL DATA FROM NOAA.
2. HOTL FROM WETLANDS MAPPING.
3. FUTURE SEA LEVEL RISE PER NH COASTAL FLOOD RISK STUDY.



TYPICAL SHORELAND CROSS SECTION NOT TO SCALE



NOTES

1. WHEN CONTRACTOR EXCAVATES RAIN GARDEN AREA TO SUBGRADE, DESIGN ENGINEER SHALL PERFORM SUBSURFACE EVALUATION PRIOR TO THE PLACEMENT OF ANY SELECT MATERIAL OR OTHER BACKFILL.
2. SOIL FILTER MEDIA SHALL EITHER OPTION A OR OPTION B AT CONTRACTOR'S DISCRETION.
3. DO NOT PLACE RAINGARDEN INTO SERVICE UNTIL IT HAS BEEN PLANTED AND ITS CONTRIBUTING AREAS STABILIZED.
4. DO NOT DISCHARGE SEDIMENT–LADEN WATERS FROM CONSTRUCTION ACTIVITIES TO THE RAINGARDEN DURING ANY STAGE OF CONSTRUCTION.
5. DO NOT TRAFFIC EXPOSED SURFACES OF RAINGARDEN WITH CONSTRUCTION EQUIPMENT. IF FEASIBLE, PERFORM EXCAVATION ACTIVITIES WITH EQUIPMENT POSITIONED OUTSIDE THE LIMITS OF THE BASIN.

MAINTENANCE REQUIREMENTS

- SYSTEMS SHOULD BE INSPECTED AT LEAST TWICE ANNUALLY, AND FOLLOWING ANY RAINFALL EXCEEDING 2.5 INCHES IN A 24–HOUR PERIOD, WITH MAINTENANCE OR REHABILITATION CONDUCTED AS A WARRANTED BY SUCH INSPECTION.
- PRETREATMENT MEASURES SHOULD BE INSPECTED AT LEAST TWICE ANNUALLY, AND CLEANED OF ACCUMULATED SEDIMENT AS WARRANTED BY INSPECTION, BUT NO LESS THAN ONCE ANNUALLY.
- AT LEAST ONCE ANNUALLY, SYSTEM SHOULD BE INSPECTED FOR DRAWDOWN TIME. IF BIORETENTION SYSTEM DOES NOT DRAIN WITHIN 72–HOURS FOLLOWING A RAINFALL EVENT, THEN A QUALIFIED PROFESSIONAL SHOULD ASSESS THE CONDITION OF THE FACILITY TO DETERMINE MEASURES REQUIRED TO RESTORE FILTRATION FUNCTION OR INFILTRATION FUNCTION (AS APPLICABLE), INCLUDING BUT NOT LIMITED TO REMOVAL OF ACCUMULATED SEDIMENTS OR RECONSTRUCTION OF THE FILTER MEDIA.
- VEGETATION SHOULD BE INSPECTED AT LEAST ANNUALLY, AND MAINTAINED IN HEALTHY CONDITION, INCLUDING, WEED WHACKING, REMOVAL, AND REPLACEMENT OF DEAD OR DISEASED VEGETATION, AND REMOVAL OF INVASIVE SPECIES.

DESIGN REFERENCES

- UNH STORMWATER CENTER
- EPA (1999A)
- NEW HAMPSHIRE STORMWATER MANAGEMENT MANUAL, VOLUME 2, DECEMBER 2008 AS AMENDED.

CRUSHED STONE BEDDING *	
SIEVE SIZE	% PASSING BY WEIGHT
1"	100
3/4"	90 – 100
3/8"	20 – 55
# 4	0 –10
# 8	0 – 5

* EQUIVALENT TO STANDARD STONE SIZE #67 – SECTION 703 OF NHDOT NHDOT STANDARD SPECIFICATIONS

FILTER MEDIA MIXTURES			
Component Material	Percent of Mixture by Volume	Gradation of material	
		Sieve No.	Percent by Weight Passing Standard Sieve
Filter Media Option A			
ASTM C–33 concrete sand	50 to 55		
Loamy sand topsoil, with fines as indicated	20 to 30	200	15 to 25
Moderately fine shredded bark or wood fiber mulch, with fines as indicated	20 to 30	200	< 5
Filter Media Option B			
Moderately fine shredded bark or wood fiber mulch, with fines as indicated	20 to 30	200	< 5
Loamy coarse sand	70 to 80	10	85 to 100
		20	70 to 100
		60	15 to 40
		200	8 to 15

TYPICAL RAINGARDEN NOT TO SCALE

P5090

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STATE OF NEW HAMPSHIRE
ERIC D. WEINRIEB
No. 7634
LICENSED PROFESSIONAL ENGINEER
1/19/21

NOT FOR CONSTRUCTION

ISSUED FOR: TAC

ISSUE DATE: JANUARY 18, 2021

REVISIONS

NO.	DESCRIPTION	BY	DATE
0	TAC WORK SESSION	EBS	12/01/20
1	TAC	EBS	1/18/21

DRAWN BY: EBS
APPROVED BY: EDW
DRAWING FILE: 5090–DETAILS.dwg

SCALE: 22" x 34" NOT TO SCALE

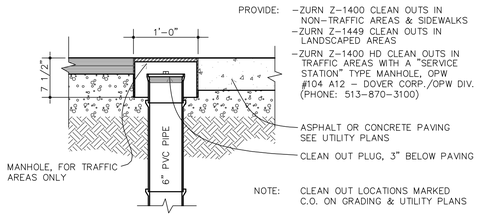
OWNER:
FREDERICK W. WATSON REVOCABLE TRUST, ROBERT D. WATSON, TRUSTEE
53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

APPLICANT:
FREDERICK W. WATSON REVOCABLE TRUST, ROBERT D. WATSON, TRUSTEE
53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

PROJECT:
WATSON'S LANDING
TAX MAP 209, LOT 33
1 CLARK DRIVE PORTSMOUTH, NH 03801

TITLE:
DETAILS SHEET

SHEET NUMBER:
D-2



CLEANOUT DETAIL

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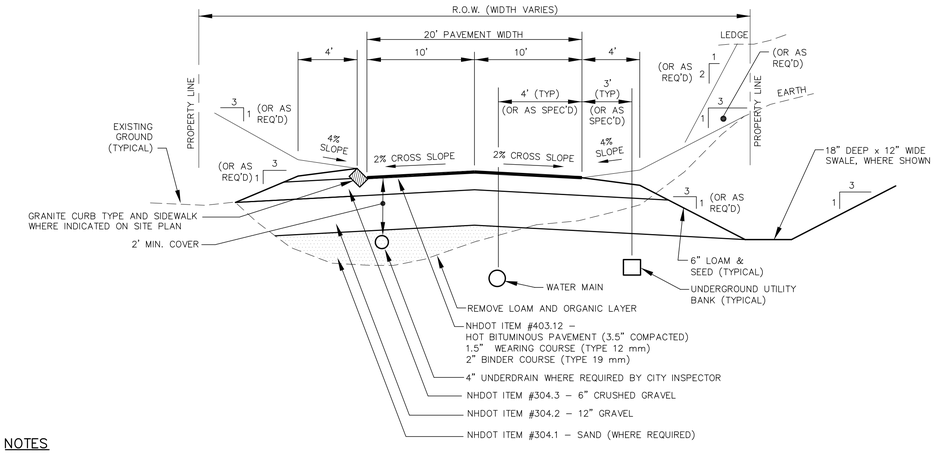
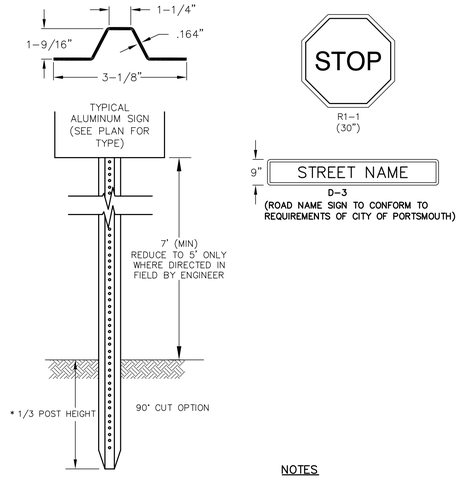


NOTES

1. EACH GRAVEL BASE COURSE TO BE CONSTRUCTED AT THE PAVEMENT CROSS SLOPE.
2. REMOVE LEDGE 18" BELOW LOWEST WORK BEING INSTALLED.
3. COMPACT ALL MATERIALS TO 95% STANDARD PROCTOR.
4. REMOVE ALL LOAM, CLAY, MUCK, ORGANIC, YIELDING OR OTHERWISE UNSTABLE MATERIAL TO A MINIMUM OF 20" BELOW THE FINISHED GRADE AND INSTALL COMPACTED SAND (OR GRAVEL BORROW APPROVED BY THE ENGINEER) TO SUBGRADE AS NECESSARY.
5. THE OVER–EXCAVATION OF UNSUITABLE MATERIAL BEYOND THAT SPECIFIED ABOVE, THE INSTALLATION OF UNDERDRAINAGE, AND/OR THE INSTALLATION OF GEOTEXTILE FABRIC SHALL BE PROVIDED UPON DETERMINATION OF THE DEPARTMENT OF PUBLIC WORKS.
6. SUBGRADE SHALL BE FREE OF VOIDS THAT ALLOW MOVEMENT AND/OR SETTLEMENT OF MATERIALS.
7. SUBGRADE SHALL BE PROOF–ROLLED WITH A FULLY LOADED DUMP TRUCK PRIOR TO PLACEMENT OF SELECT GRAVELS. PROOF–ROLLING SHALL BE WITNESSED AND APPROVED BY THE ENGINEER.

TYPICAL ROADWAY CROSS SECTION

NOT TO SCALE



* IN LEDGE DRILL & GROUT TO A MIN OF 2'

LENGTH: AS REQUIRED

WEIGHT PER LINEAR FOOT: 2.50 LBS (MIN.)

HOLES: 3/8" DIAMETER, 1" C–C FULL LENGTH

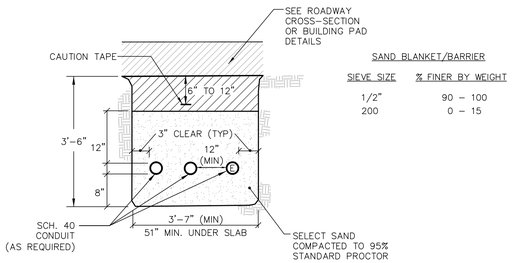
STEEL: SHALL CONFORM TO ASTM A–499 (GRADE 60) OR ASTM A–576 (GRADE 1070 – 1080)

NOTES

1. ALL SIGNS SHALL MEET THE REQUIREMENTS OF AND BE INSTALLED AS INDICATED IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.

SIGN DETAILS

NOT TO SCALE



SAND BLANKET/BARRIER

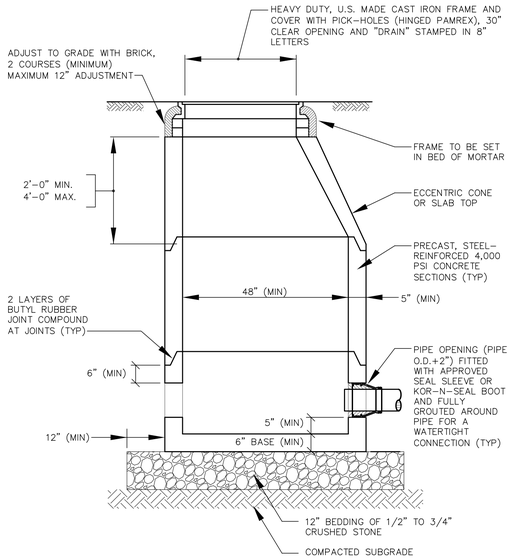
SIEVE SIZE	% FINER BY WEIGHT
1/2"	90 – 100
200	0 – 15

NOTES

1. ALL CONDUIT IS TO BE SCHEDULE 40 PVC, ELECTRICAL GRADE, GRAY IN COLOR AND INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS. A 10–FOOT HORIZONTAL SECTION OF RIGID GALVANIZED STEEL CONDUIT WILL BE REQUIRED AT EACH SWEEP, UNLESS IN THE OPINION OF THE SERVICE PROVIDER DESIGNER, THE SWEEP–PVC JOINT IS NOT SUBJECT TO FAILURE DURING PULLING OF THE CABLE. ALL JOINTS ARE TO BE WATERTIGHT.
2. ALL 90 DEGREE SWEEPS WILL BE MADE WITH RIGID GALVANIZED STEEL WITH A MINIMUM RADIUS OF 36 INCHES FOR PRIMARY CABLES AND 24 INCHES FOR SECONDARY CABLES.
3. BACKFILL MAY BE MADE WITH EXCAVATED MATERIAL OR COMPARABLE, UNLESS MATERIAL IS DEEMED UNSUITABLE BY SERVICE PROVIDER. BACKFILL SHALL BE FREE OF FROZEN LUMPS, ROCKS, DEBRIS, AND RUBBISH. ORGANIC MATERIAL SHALL NOT BE USED AS BACKFILL. BACKFILL SHALL BE IN 6–INCH LAYERS AND THOROUGHLY COMPACTED.
4. A SUITABLE PULLING STRING, CAPABLE OF 300 POUNDS OF PULL, MUST BE INSTALLED IN THE CONDUIT BEFORE SERVICE PROVIDER IS NOTIFIED TO INSTALL CABLE. THE STRING SHOULD BE BLOWN INTO THE CONDUIT AFTER THE RUN IS ASSEMBLED TO AVOID BONDING THE STRING TO THE CONDUIT. A MINIMUM OF TWENTY–FOUR (24") INCHES OF ROPE SLACK SHALL REMAIN AT THE END OF EACH DUCT. PULL ROPE SHALL BE INSTALLED IN ALL CONDUIT FOR FUTURE PULLS. PULL ROPE SHALL BE NYLON ROPE HAVING A MINIMUM TENSILE STRENGTH OF THREE HUNDRED (300#) LBS.
5. SERVICE PROVIDER SHALL BE GIVEN THE OPPORTUNITY TO INSPECT ALL CONDUIT PRIOR TO BACKFILL. THE CONTRACTOR IS RESPONSIBLE FOR ALL REPAIRS SHOULD SERVICE PROVIDER BE UNABLE TO INSTALL ITS CABLE IN A SUITABLE MANNER.
6. TYPICAL CONDUIT SIZES ARE 3–INCH FOR SINGLE PHASE PRIMARY AND SECONDARY VOLTAGE CABLES, 4–INCH FOR THREE PHASE SECONDARY, AND 5–INCH FOR THREE PHASE PRIMARY. HOWEVER, SERVICE PROVIDERS MAY REQUIRE DIFFERENT NUMBERS, TYPES AND SIZES OF CONDUIT THAN THOSE SHOWN HERE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL CONDUIT SIZES, TYPES AND NUMBERS WITH EACH SERVICE PROVIDER PRIOR TO ORDERING THEM.
7. ROUTING OF CONDUIT, LOCATION OF MANHOLES, TRANSFORMERS, CABINETS, HANDHOLES, ETC., SHALL BE DETERMINED BY SERVICE PROVIDER DESIGN PERSONNEL. THE CONTRACTOR SHALL COORDINATE WITH ALL SERVICE PROVIDERS PRIOR TO THE INSTALLATION OF ANY CONDUIT.
8. ALL CONDUIT INSTALLATIONS MUST CONFORM TO THE CURRENT EDITION OF THE NATIONAL ELECTRIC SAFETY CODE, STATE AND LOCAL CODES AND ORDINANCES, AND WHERE APPLICABLE, THE NATIONAL ELECTRIC CODE. WHERE REQUIRED BY UTILITY PROVIDER, CONDUIT SHALL BE SUPPORTED IN PLACE USING PIPE STANCHIONS PLACED EVERY FIVE (5') FEET ALONG THE CONDUIT RUN.
9. UNDER A BUILDING SLAB THE CONDUIT SHALL BE ENCASED IN 8" OF CONCRETE ON ALL SIDES.
10. ALL CONDUIT TERMINATIONS SHALL BE CAPPED TO PREVENT DEBRIS FROM ENTERING CONDUIT.

ELECTRIC / COMMUNICATION TRENCH

NOT TO SCALE

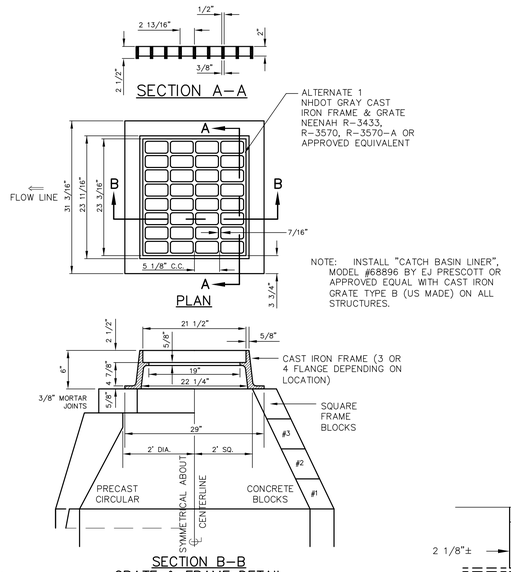


NOTES

1. ALL SECTIONS SHALL BE CONCRETE CLASS AA (4000 psi).
2. CIRCUMFERENTIAL REINFORCEMENT SHALL BE 0.12 SQ.IN. PER LINEAR FT. IN ALL SECTIONS AND SHALL BE PLACED IN THE CENTER THIRD OF THE WALL.
3. THE TONGUE OR GROOVE OF THE JOINT SHALL CONTAIN ONE LINE OF CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.12 SQ. IN. PER LINEAR FT.
4. RISERS OF 1', 2', 3' & 4' CAN BE USED TO REACH DESIRED DEPTH.
5. ALL MANHOLE STRUCTURES SHALL BE DESIGNED FOR H20 LOADING.
6. USE H–20 LOADING SLAB TOP SECTION IN LIEU OF ECCENTRIC TOP WHERE PIPE INVERT IS WITHIN 4 FT OF GRADE.
7. MANHOLE STEPS ARE NOT PERMITTED.

DRAIN MANHOLE DETAIL (PDMH)

NOT TO SCALE



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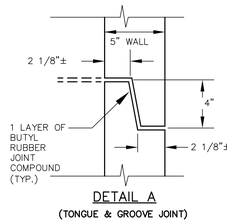
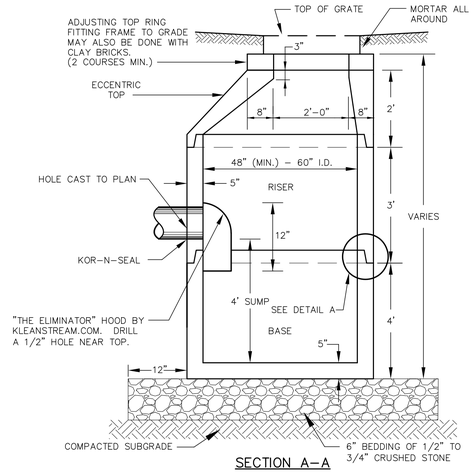
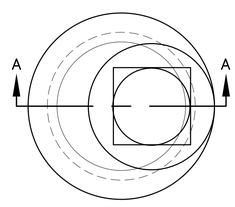
5. THE STRUCTURES SHALL BE DESIGNED FOR H20 LOADING.
6. USE H20 LOADING SLAB TOP SECTION IN LIEU OF ECCENTRIC TOP WHERE PIPE INVERT IS WITHIN 4' OF FINISH GRADE.
7. FRAME AND GRATE DIMENSIONS ARE TYPICAL BUT MAY VARY BASED ON PRODUCT SELECTED OR EQUIVALENT APPROVED BY THE ENGINEER.

DEEP SUMP CATCH BASIN







NOT TO SCALE

P5090

ALTUS ENGINEERING, INC.
133 Court Street Portsmouth, NH 03801
(603) 433–2335 www.altus–eng.com

STATE OF NEW HAMPSHIRE
ERIC D. WEINRIEB
No. 7634
LICENSED PROFESSIONAL ENGINEER
1/19/21

NOT FOR CONSTRUCTION

ISSUED FOR: TAC

ISSUE DATE: JANUARY 18, 2021

REVISIONS

NO.	DESCRIPTION	BY	DATE
0	TAC WORK SESSION	EBS	12/01/20
1	TAC	EBS	1/18/21

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APPROVED BY: EDW
DRAWING FILE: 5090–DETAILS.dwg

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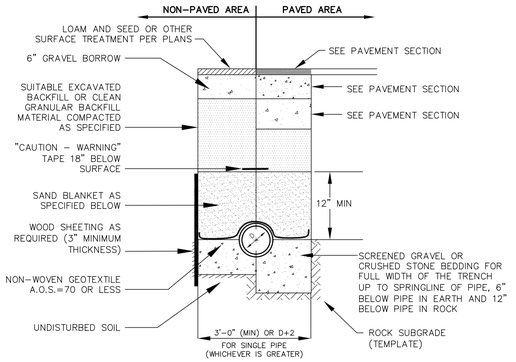
1 CLARK DRIVE PORTSMOUTH, NH 03801

TITLE:
DETAILS SHEET

SHEET NUMBER:
D-3



NOTES

1. BACKFILL MATERIAL BELOW PAVED OR CONCRETE AREAS, BEDDING MATERIAL, AND SAND BLANKET SHALL BE COMPACTED TO NOT LESS THAN 95% OF AASHTO T 99, METHOD C. SUITABLE BACKFILL MATERIAL BELOW LOAM AREAS SHALL BE COMPACTED TO NOT LESS THAN 90% OF AASHTO T 99, METHOD C.
2. INSULATE GRAVITY SEWER AND FORCEMAINS WHERE THERE IS LESS THAN 5'–0" OF COVER WITH 2" THICK CLOSED CELL RIGID BOARD INSULATION, 18" ON EACH SIDE OF PIPE.
3. MAINTAIN 12" MINIMUM HORIZONTAL SEPARATION AND WIDEN TRENCH ACCORDINGLY IF MULTIPLE PIPES ARE IN TRENCH.

SAND BLANKET/BARRIER

SIEVE SIZE	% FINER BY WEIGHT
1/2"	90 – 100
200	0 – 15

SCREENED GRAVEL OR CRUSHED STONE BEDDING*

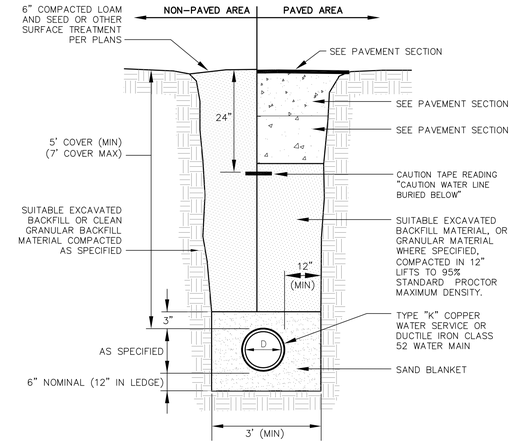
SIEVE SIZE	% PASSING BY WEIGHT
1"	100
3/4"	90 – 100
3/8"	20 – 55
# 4	0 – 10
# 8	0 – 5

* EQUIVALENT TO STANDARD STONE SIZE #67 – SECTION 703 OF NHDOT STANDARD SPECIFICATIONS

STANDARD TRENCH NOTES

1. ORDERED EXCAVATION OF UNSUITABLE MATERIAL BELOW GRADE: BACKFILL AS STATED IN THE TECHNICAL SPECIFICATIONS OR AS SHOWN ON THE DRAWING.
2. BEDDING: SCREENED GRAVEL AND/OR CRUSHED STONE FREE FROM CLAY, LOAM, ORGANIC MATTER AND MEETING THE GRADATION SHOWN IN THE TRENCH DETAIL. WHERE ORDERED BY THE ENGINEER TO STABILIZE THE BASE, SCREENED GRAVEL OR CRUSHED STONE 1–1/2 INCH TO 1/2 INCH SHALL BE USED.
3. SAND BLANKET: CLEAN SAND FREE FROM ORGANIC MATTER MEETING THE GRADATION SHOWN IN THE TRENCH DETAIL. BLANKET MAY BE REPLACED WITH BEDDING MATERIAL FOR CAST–IRON, DUCTILE IRON, AND REINFORCED CONCRETE PIPE PROVIDED THAT NO STONE LARGER THAN 2" IS IN CONTACT WITH THE PIPE AND THE GEOTEXTILE IS RELOCATED ACCORDINGLY.
4. SUITABLE MATERIAL: IN ROADS, ROAD SHOULDERS, WALKWAYS AND TRAVELED WAYS, SUITABLE MATERIAL FOR TRENCH BACKFILL SHALL BE THE NATURAL MATERIAL EXCAVATED DURING THE COURSE OF CONSTRUCTION, BUT SHALL EXCLUDE DEBRIS, PIECES OF PAVEMENT, ORGANIC MATTER, TOP SOIL, ALL WET OR SOFT MUCK, PEAT, OR CLAY, ALL EXCAVATED LEDGE MATERIAL, ALL ROCKS OVER 6 INCHES IN LARGEST DIMENSION, AND ANY MATERIAL WHICH, AS DETERMINED BY THE ENGINEER, WILL NOT PROVIDE SUFFICIENT SUPPORT OR MAINTAIN THE COMPLETED CONSTRUCTION IN A STABLE CONDITION. IN CROSS COUNTRY CONSTRUCTION, SUITABLE MATERIAL SHALL BE AS DESCRIBED ABOVE, EXCEPT THAT THE ENGINEER MAY PERMIT THE USE OF TOP SOIL, LOAM, MUCK, OR PEAT, IF SATISFIED THAT THE COMPLETED CONSTRUCTION WILL BE ENTIRELY STABLE AND PROVIDED THAT EASY ACCESS TO THE SEWER FOR MAINTENANCE AND POSSIBLE RECONSTRUCTION WILL BE PRESERVED.
5. BASE COURSE AND PAVEMENT SHALL MEET THE REQUIREMENTS OF THE NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION'S LATEST EDITION OF THE STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES – DIVISIONS 300 AND 400 RESPECTIVELY.
6. SHEETING, IF REQUIRED: WHERE SHEETING IS PLACED ALONGSIDE THE PIPE AND EXTENDS BELOW MID–DIAMETER, IT SHALL BE CUT OFF AND LEFT IN PLACE TO AN ELEVATION 1 FOOT ABOVE THE TOP OF PIPE. WHERE SHEETING IS ORDERED BY THE ENGINEER TO BE LEFT IN PLACE, IT SHALL BE CUT OFF AT LEAST 3 FEET BELOW FINISHED GRADE, BUT NOT LESS THAT 1 FOOT ABOVE THE TOP OF THE PIPE.
7. W = MAXIMUM ALLOWABLE TRENCH WIDTH TO A PLANE 12 INCHES ABOVE THE PIPE. FOR PIPES 15 INCHES NOMINAL DIAMETER OR LESS, W SHALL BE NO MORE THAN 36 INCHES. FOR PIPES GREATER THAN 15 INCHES IN NOMINAL DIAMETER, W SHALL BE 24 INCHES PLUS PIPE OUTSIDE DIAMETER (O.D.) ALSO, W SHALL BE THE PAYMENT WIDTH FOR LEDGE EXCAVATION AND FOR ORDERED EXCAVATION BELOW GRADE.
8. FOR CROSS COUNTRY CONSTRUCTION, BACKFILL, FILL AND/OR LOAM SHALL BE MOUNDED TO A HEIGHT OF 6 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
9. CONCRETE FOR ENCASEMENT SHALL CONFORM TO THE NEW HAMPSHIRE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS STANDARD SPECIFICATION REQUIREMENTS FOR CLASS A (3000#)
   CONCRETE AS FOLLOWS:
   CEMENT: 6.0 BAGS PER CUBIC YARD
   WATER: 5.75 GALLONS PER BAG
   CEMENT MAXIMUM SIZE OF AGGREGATE: 1 INCH
   CONCRETE ENCASEMENT IS NOT ALLOWED FOR PVC PIPE.
10. CONCRETE FULL ENCASEMENT: IF FULL ENCASEMENT IS UTILIZED, DEPTH OF CONCRETE BELOW PIPE SHALL BE 1/4 I.D. (4" MINIMUM). BLOCK SUPPORT SHALL BE SOLID CONCRETE BLOCKS.
11. NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES DESIGN STANDARDS REQUIRE TEN FEET (10') SEPARATION BETWEEN WATER AND SEWER. REFER TO TOWN'S STANDARD SPECIFICATIONS FOR METHODS OF PROTECTION IN AREAS THAT CANNOT MEET THESE REQUIREMENTS.

DRAINAGE, SEWER & FORCEMAIN TRENCH NOT TO SCALE



SAND BLANKET/BARRIER

SIEVE SIZE	% FINER BY WEIGHT
1/2"	90 – 100
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NOTES

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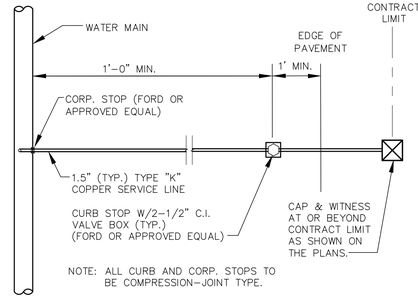
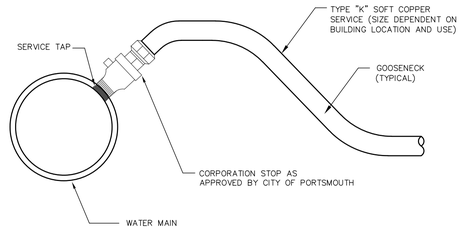
2. DUCTILE IRON WATER MAINS SHALL BE POLY WRAPPED.FOR THEIR ENTIRE LENGTH.
3. WATER MAINS SHALL HAVE 3 WEDGES PER JOINT.

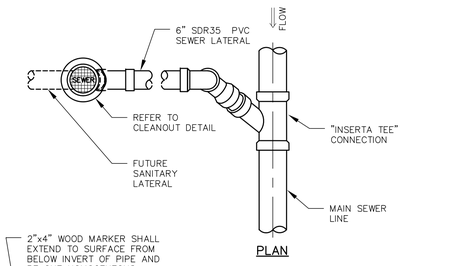
WATER MAIN TRENCH NOT TO SCALE



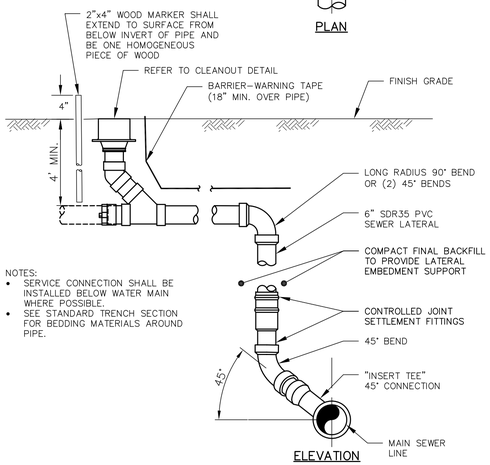
NOTE: ALL MATERIALS AND SPECIFICATIONS SHALL CONFORM TO CITY OF PORTSMOUTH WATER DEPARTMENT STANDARDS AND REQUIREMENTS. VERIFY PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITIES.



WATER SERVICE CONNECTION NOT TO SCALE



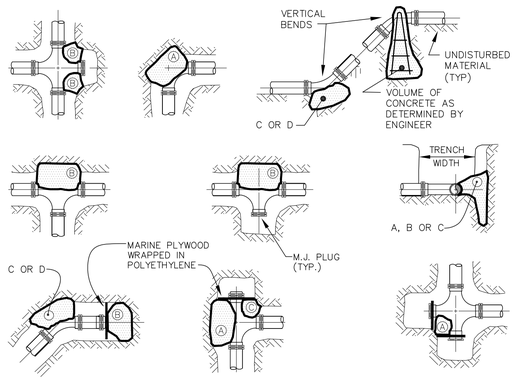
PLAN



NOTES:
- SERVICE CONNECTION SHALL BE INSTALLED BELOW WATER MAIN WHERE POSSIBLE.
- SEE STANDARD TRENCH SECTION FOR BEDDING MATERIALS AROUND PIPE.

ELEVATION

DEEP SEWER SERVICE CONNECTION NOT TO SCALE

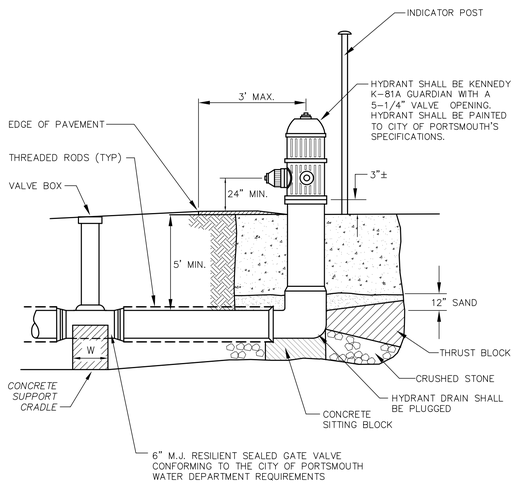


TEST PRESSURE = 150 psi	SQUARE FEET OF CONCRETE THRUST BLOCKING BEARING ON UNDISTURBED MATERIAL					
	REACTION TYPE	PIPE SIZE 4"	6"	8"	10"	12"
	A 90°	0.89	2.19	3.82	11.14	17.24
	B 180°	0.65	1.55	2.78	8.38	12.00
	C 45°	0.48	1.19	2.12	6.02	9.32
	D 22–1/2°	0.25	0.60	1.06	3.08	4.74
	E 11–1/4°	0.13	0.30	0.54	1.54	2.38

NOTES

1. POUR THRUST BLOCKS AGAINST UNDISTURBED MATERIAL. WHERE TRENCH WALL HAS BEEN DISTURBED, EXCAVATE LOOSE MATERIAL AND EXTEND THRUST BLOCK TO UNDISTURBED MATERIAL.
2. NO JOINTS SHALL BE COVERED WITH CONCRETE. POLYETHYLENE (6 MIL) SHALL BE PLACED AROUND FITTINGS PRIOR TO CONCRETE PLACEMENT.
3. ON BENDS AND TEES, EXTEND THRUST BLOCKS FULL LENGTH OF FITTING.
4. PLACE BOARD IN FRONT OF ALL PLUGS BEFORE POURING THRUST BLOCKS. WHERE M.J. PIPE IS USED, M.J. PLUG WITH RETAINER GLAND MAY BE SUBSTITUTED FOR END BLOCKINGS.

THRUST BLOCKING NOT TO SCALE

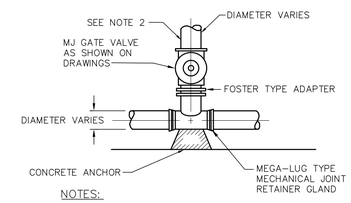


D (IN)	W (IN)
4	5
6	5
8	9

NOTES

1. HYDRANT INSTALLATION AND OPERATION TO CONFORM TO REGULATIONS OF THE CITY OF PORTSMOUTH WATER & FIRE DEPARTMENTS.
2. GATE VALVES & HYDRANTS TO OPEN RIGHT (CLOCKWISE).

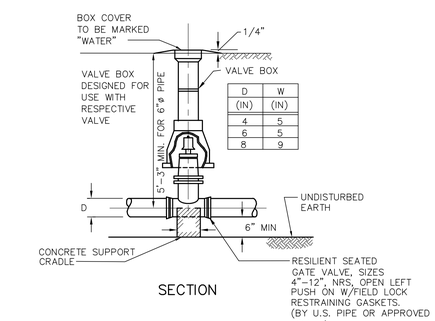
FIRE HYDRANT NOT TO SCALE



NOTES:

1. GATE VALVES SHALL OPEN RIGHT, PER CITY STANDARDS.
2. BRANCH PIPING SHALL BE MECHANICALLY RESTRAINED AS NOTED UNDER THRUST BLOCK DETAIL REQUIREMENTS.

TEE & GATE VALVE ASSEMBLY DETAIL NOT TO SCALE



D (IN)	W (IN)
4	5
6	5
8	9

SECTION

WATER VALVE DETAIL NOT TO SCALE

P5090

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133 Court Street Portsmouth, NH 03801
(603) 433-2335 www.altus-eng.com

ERIC D. WEINRIEB No. 7634 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE
1/19/21

NOT FOR CONSTRUCTION

ISSUED FOR: TAC

ISSUE DATE: JANUARY 18, 2021

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DETAILS SHEET

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City of Portsmouth, New Hampshire

Subdivision Application Checklist

This subdivision application checklist is a tool designed to assist the applicant in the planning process and for preparing the application for Planning Board review. A pre-application conference with a member of the planning department is strongly encouraged as additional project information may be required depending on the size and scope. The applicant is cautioned that this checklist is only a guide and is not intended to be a complete list of all subdivision review requirements. Please refer to the Subdivision review regulations for full details.

Applicant Responsibilities (Section III.C): Applicable fees are due upon application submittal along with required number of copies of the Preliminary or final plat and supporting documents and studies. Please consult with Planning staff for submittal requirements.

Owner: Fredrick W. Watson Revocable Trust, Robert D. Watson, Trustee Date Submitted: _____

Applicant: Same

Phone Number: (603) 501-0966 E-mail: rdpawnh@comcast.net

Site Address 1: 1 Clark Drive Map: 209 Lot: 33

Site Address 2: _____ Map: _____ Lot: _____

Application Requirements			
☑	**Required Items for Submittal**	**Item Location (e.g. Page or Plan Sheet/Note #)**	**Waiver Requested**
☒	Completed Application form. **(III.C.2-3)**	Viewpoint	N/A
☒	All application documents, plans, supporting documentation and other materials provided in digital Portable Document Format (PDF). **(III.C.4)**	Viewpoint	N/A

Requirements for Preliminary/Final Plat				
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Required for Preliminary / Final Plat**	**Waiver Requested**
☒	Name and address of record owner, any option holders, descriptive name of subdivision, engineer and/or surveyor or name of person who prepared the plat. **(Section IV.1/V.1)**	Sheet C-2, Title Block	☑ Preliminary Plat ☑ Final Plat	N/A

Requirements for Preliminary/Final Plat				
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Required for Preliminary / Final Plat**	**Waiver Requested**
☒	**Preliminary Plat** Names and addresses of all adjoining property owners. **(Section IV.2)** **Final Plat** Names and addresses of all abutting property owners, locations of buildings within one hundred (100) feet of the parcel, and any new house numbers within the subdivision. **(Section V.2)**	Sheet C-2	☑ Preliminary Plat ☑ Final Plat	N/A
☒	North point, date, and bar scale. **(Section IV.3/V3)**	Required on all Plan Sheets	☑ Preliminary Plat ☑ Final Plat	N/A
☒	Zoning classification and minimum yard dimensions required. **(Section IV.4/V.4)**	Sheet C-2, Notes 4 & 5	☑ Preliminary Plat ☑ Final Plat	N/A
☒	**Preliminary Plat** Scale (not to be smaller than one hundred (100) feet = 1 inch) and location map (at a scale of 1" = 1000'). **(Section IV.5)** **Final Plat** Scale (not to be smaller than 1"=100'), Location map (at a scale of 1"=1,000') showing the property being subdivided and its relation to the surrounding area within a radius of 2,000 feet. Said location map shall delineate all streets and other major physical features that my either affect or be affected by the proposed development. **(Section V.5)**	Cover Sheet, Sheet 1 of 1, Sheet C-2	☑ Preliminary Plat ☑ Final Plat	N/A
☒	Location and approximate dimensions of all existing and proposed property lines including the entire area proposed to be subdivided, the areas of proposed lots, and any adjacent parcels in the same ownership. **(Section IV.6)**	Sheet C-2	☑ Preliminary Plat ☑ Final Plat	
☒	Dimensions and areas of all lots and any and all property to be dedicated or reserved for schools, parks, playgrounds, or other public purpose. Dimensions shall include radii and length of all arcs and calculated bearing for all straight lines. **(Section V.6/ IV.7)**	Sheet C-2	☑ Preliminary Plat ☑ Final Plat	N/A
☒	Location, names, and present widths of all adjacent streets, with a designation as to whether public or private and approximate location of existing utilities to be used. Curbs and sidewalks shall be shown. **(Section IV.8/V.7)**	Sheets C-2 & C-5	☑ Preliminary Plat ☑ Final Plat	

Requirements for Preliminary/Final Plat				
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Required for Preliminary / Final Plat**	**Waiver Requested**
☒	Location of significant physical features, including bodies of water, watercourses, wetlands, railroads, important vegetation, stone walls and soils types that my influence the design of the subdivision. **(Section IV.9/V.8)**	Sheet 1 of 1	☑ Preliminary Plat ☑ Final Plat	
☒	**Preliminary Plat** Proposed locations, widths and other dimensions of all new streets and utilities, including water mains, storm and sanitary sewer mains, catch basins and culverts, street lights, fire hydrants, sewerage pump stations, etc. **(Section IV.10)** **Final Plat** Proposed locations and profiles of all proposed streets and utilities, including water mains, storm and sanitary sewer mains, catchbasins and culverts, together with typical cross sections. Profiles shall be drawn to a horizontal scale of 1"=50' and a vertical scale of 1"=5', showing existing centerline grade, existing left and right sideline grades, and proposed centerline grade. **(Section V.9)**	Sheets C-3, C-4 & C-5	☑ Preliminary Plat ☑ Final Plat	
☒	When required by the Board, the plat shall be accompanied by profiles of proposed street grades, including extensions for a reasonable distance beyond the subject land; also grades and sizes of proposed utilities. **(Section IV.10)**	Sheets C-3 & C-5	☑ Preliminary Plat ☑ Final Plat	
☒	Base flood elevation (BFE) for subdivisions involving greater than five (5) acres or fifty (50) lots. **(Section IV.11)**	Sheet C-2 Note 7 & Sheet C-4	☑ Preliminary Plat ☑ Final Plat	
☐	For subdivisions of five (5) lots or more, or at the discretion of the Board otherwise, the preliminary plat shall show contours at intervals no greater than two (2) feet. Contours shall be shown in dotted lines for existing natural surface and in solid lines for proposed final grade, together with the final grade elevations shown in figures at all lot corners. If existing grades are not to be changed, then the contours in these areas shall be solid lines. **(Section IV.12/ V.12)**	N/A (<5 lots)	☑ Preliminary Plat ☑ Final Plat	

Requirements for Preliminary/Final Plat				
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Required for Preliminary / Final Plat**	**Waiver Requested**
☒	Dates and permit numbers of all necessary permits from governmental agencies from which approval is required by Federal or State law. **(Section V.10)**	Sheet C-2	☐ Preliminary Plat ☑ Final Plat	
☐	For subdivisions involving greater than five (5) acres or fifty (50) lots, the final plat shall show hazard zones and shall include elevation data for flood hazard zones. **(Section V.11)**	N/A (<5 acres)	☐ Preliminary Plat ☑ Final Plat	
☒	Location of all permanent monuments. **(Section V.12)**	Sheet C-2	☐ Preliminary Plat ☑ Final Plat	

General Requirements[1]			
☑	**Required Items for Submittal**	**Item Location (e.g. Page/line or Plan Sheet/Note #)**	**Waiver Requested**
☒	**1. Basic Requirements: (VI.1)**		
☒	a. Conformity to Official Plan or Map	Sheet C-2, Note #7	
☒	b. Hazards	Sheet C-3	
☒	c. Relation to Topography	N/A	
☐	d. Planned Unit Development		
☒	**2. Lots: (VI.2)**		
☐	a. Lot Arrangement	Waiver	VI.2.A
☒	b. Lot sizes	Sheet C-2	
☐	c. Commercial and Industrial Lots	N/A	
☒	**3. Streets: (VI.3)**		
☒	a. Relation to adjoining Street System	Sheet C-3	
☒	b. Street Rights-of-Way	Sheet C-3	
☒	c. Access	Sheet C-3	
☐	d. Parallel Service Roads	N/A	
☒	e. Street Intersection Angles	Sheet C-3	
☐	f. Merging Streets	N/A	
☒	g. Street Deflections and Vertical Alignment	Sheet C-3	
☐	h. Marginal Access Streets	N/A	
☒	i. Cul-de-Sacs	Sheet C-3	
☒	j. Rounding Street Corners	Sheet C-3	
☒	k. Street Name Signs	Sheet C-3	
☒	l. Street Names	Sheet C-3	
☐	m. Block Lengths	N/A	
☐	n. Block Widths	N/A	
☒	o. Grade of Streets	Sheet C-3	
☐	p. Grass Strips	N/A	
☒	**4. Curbing: (VI.4)**	Sheets C-3 & C-4	
☒	**5. Driveways: (VI.5)**	Sheet C-3	
☒	**6. Drainage Improvements: (VI.6)**	Sheets C-3 & C-4	
☒	**7. Municipal Water Service: (VI.7)**	Sheet C-5	
☒	**8. Municipal Sewer Service: (VI.8)**	Sheet C-5	
☒	**9. Installation of Utilities: (VI.9)**		
☒	a. All Districts	Sheet D-4	
☒	b. Indicator Tape	Trench Details	
☐	**10. On-Site Water Supply: (VI.10)**	N/A	
☐	**11. On-Site Sewage Disposal Systems: (VI.11)**	N/A	
☒	**12. Open Space: (VI.12)**		
☒	a. Natural Features	Sheet C-4	
☐	b. Buffer Strips	N/A	
☐	c. Parks	N/A	
☒	d. Tree Planting	Sheet C-4	
☐	**13. Flood Hazard Areas: (VI.13)**		
☐	a. Permits	N/A	
☐	b. Minimization of Flood Damage	N/A	
☐	c. Elevation and Flood-Proofing Records	N/A	
☐	d. Alteration of Watercourses	N/A	
☒	**14. Erosion and Sedimentation Control (VI.14)**	Sheet C-4	

☑	Required Items for Submittal	Item Location (e.g. Page/line or Plan Sheet/Note #)	Waiver Requested
☒	**15. Easements (VI.15)**	Sheet C-2	
☒	a. Utilities		
☒	b. Drainage		
☒	**16. Monuments: (VI.16)**		
☒	**17. Benchmarks: (VI.17)**		
☒	**18. House Numbers (VI.18)**		

Design Standards			
	Required Items for Submittal	Indicate compliance and/or provide explanation as to alternative design	Waiver Requested
☒	**1. Streets have been designed according to the design standards required under Section (VII.1).** a. Clearing b. Excavation c. Rough Grade and Preparation of Sub-Grade d. Base Course e. Street Paving f. Side Slopes g. Approval Specifications h. Curbing i. Sidewalks j. Inspection and Methods	Compliant	
☒	**2. Storm water Sewers and Other Drainage Appurtenances have been designed according to the design standards required under Section (VII.2).** a. Design b. Standards of Construction	Compliant	
☒	**3. Sanitary Sewers have been designed according to the design standards required under Section (VII.3).** a. Design b. Lift Stations c. Materials d. Construction Standards	Compliant	
☒	**4. Water Mains and Fire Hydrants have been designed according to the design standards required under Section (VII.4).** a. Connections to Lots b. Design and Construction c. Materials d. Notification Prior to Construction	Compliant	

Applicant's/Representative's Signature: _____ **Date:** 01/18/21

Erik Saari, Agent

[1] See City of Portsmouth, NH Subdivision Rules and Regulations for details.

Reuter Associates LLC
CONSULTANTS IN ACOUSTICS

10 Vaughan Mall, Suite 201A
Portsmouth, NH 03801
603-430-2081

August 26, 2020

Erik Saari
Altus Engineering
133 Court St.
Portsmouth, NH 03801

SUBJECT: One Clark Drive – Highway Noise Overlay District Analysis

Dear Erik,

At your request, I have conducted a study of traffic noise levels at One Clark Drive in Portsmouth. This site lies within the City of Portsmouth's Highway Noise Overlay District, Section 10.670 of the Zoning Ordinance. As such, any redevelopment of the site is subject to both interior and exterior traffic noise level limits.

Sound Level Limits

Section 10.673 provides hourly-average limits for the interior of a dwelling (45 dBA) and outdoor activity areas (65 dBA), based on the "Loudest Traffic Hour Sound Level". Typical residential construction provides 20 dB of sound attenuation between the exterior and interior without any special insulation or glazing, making these limits effectively equivalent.

Analysis

The study was conducted in accordance with 10.675 Noise Analysis. Each subsection is addressed below:

(1) Description of the proposed development

> The development will include demolition of the existing single-family structure and subdivision of the parcel into four house lots.

(2) A narrative description of the proposed site configuration and any proposed noise mitigation measures.

> As indicated above, four house lots will be created. No noise mitigation is necessary or proposed.

(3) A diagram showing the proposed site configuration including the location of noise sensitive land uses and any proposed noise mitigation measures.

> Figure 1, attached, depicts the proposed subdivision. The four lots should be considered noise sensitive land uses. No noise mitigation is necessary or proposed.

(4) Unadjusted 60, 65 and 70 dBA noise contours for the loudest traffic hour sound levels shown as an overlay on the site diagram. Noise contours must be developed using the FHWA Transportation Noise Model (or a replacement model that has been approved by the FHWA).

A computer model of the site was constructed in SoundPlan. Calculations were conducted using the required FHWA TNM 2.5 engine. Traffic count data for the relevant section of I-95 were obtained from the NHDOT database, as presented in the attached Figure 2.

As "loudest hour" is not a standard traffic noise metric (average hour and peak hour are typical), the DHV-30 value was used as a conservative surrogate. This design hour volume represents the 30th-highest volume hour of the year. As no DHV-30 value was published for 2019, the 2018 value was scaled proportionally according to the overall increase in volume from 2018 to 2019. Counts used in the model were 8830 automobiles and 768 heavy trucks, divided evenly across the northbound and southbound lanes.

Figure 1, attached, depicts the 60-, 65- and 70-dBA noise level contours.

To confirm that the DHV-30 data reasonably represent the loudest hour, monitoring was conducted at the site for several days, including both weekdays and a weekend. The monitor location is also indicated on Figure 1. The measured data are presented in the attached Figure 3. The loudest hours at this location were all 60 dBA. The TNM model when evaluated at this location estimates a sound level of 59.3 dBA. This is a negligible difference and satisfactorily validates the model.

The entire development is outside of the 65-dBA contour. Any portion of the site may be used for outdoor activities and dwellings of typical design and construction may exist at any location on any of the parcels.

(5) [not applicable]

Summary

The proposed redevelopment of One Clark Drive will meet the requirements of the Highway Noise Overlay District without noise mitigation.

Please feel free to contact me with any questions.

Sincerely,

Eric L. Reuter, FASA, INCE Bd. Cert.
Principal

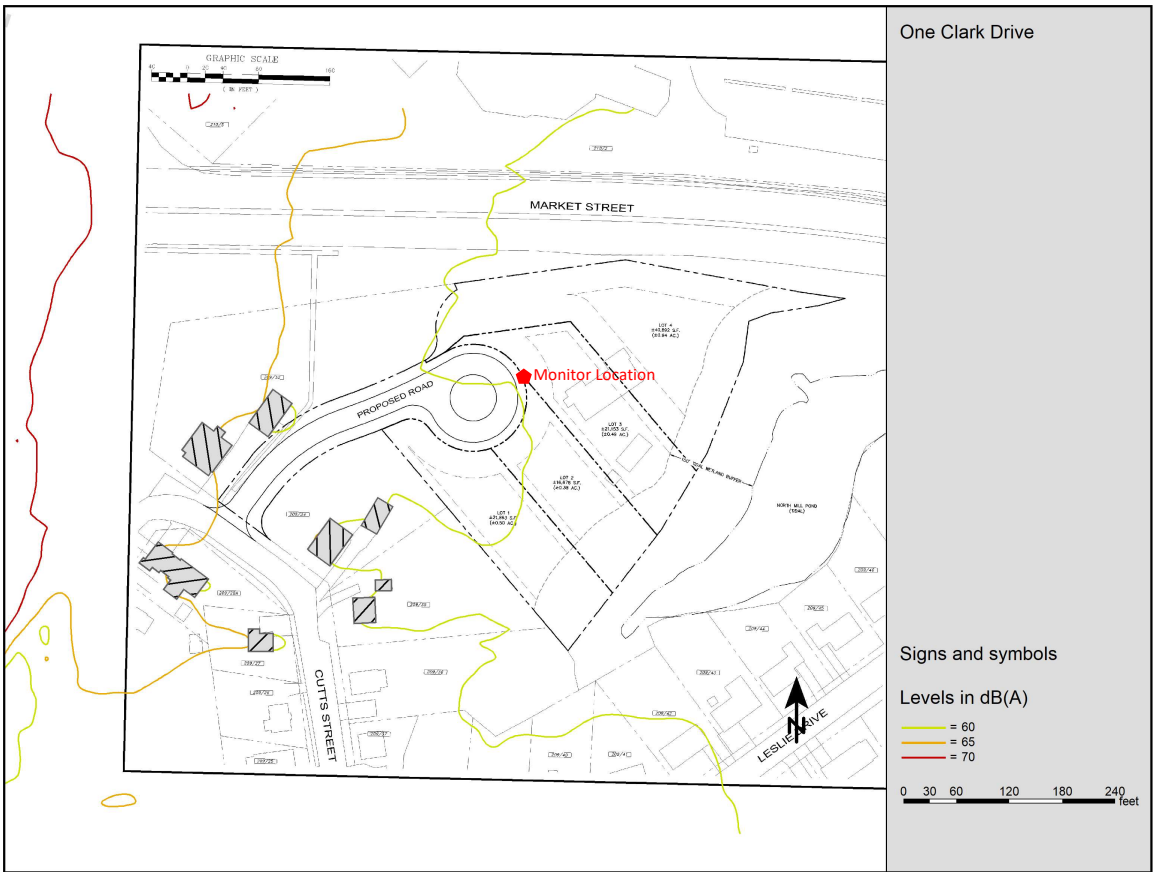


Figure 1 – Site Plan and Noise Contours

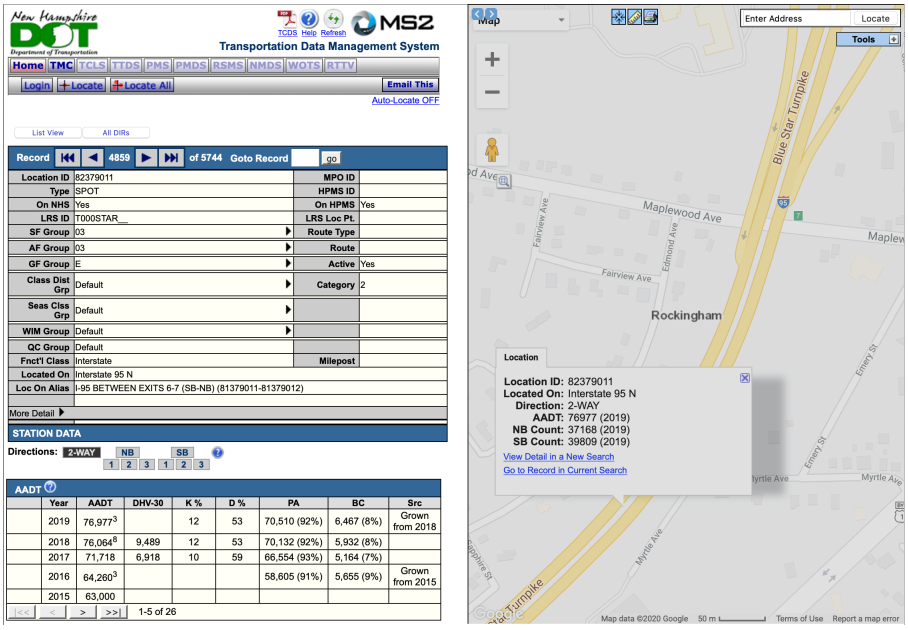


Figure 2 – NHDOT Traffic Data

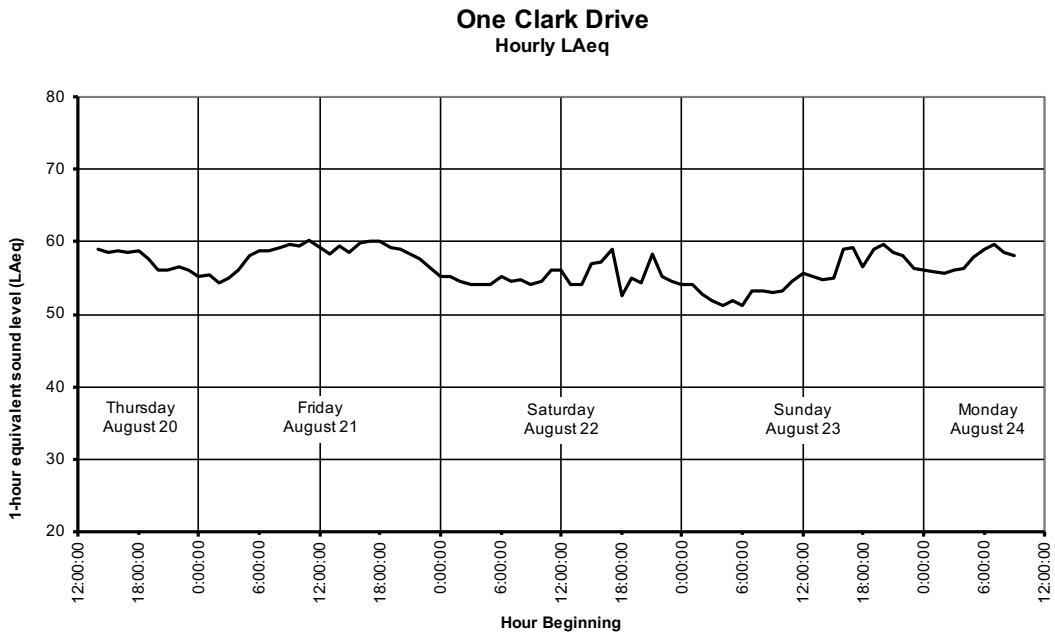


Figure 3 – Measured Data

DRAINAGE ANALYSIS

FOR

Site Development
of
Watson's Landing Residential Subdivision

1 Clark Drive
Portsmouth, NH

Tax Map 209, Lot 33

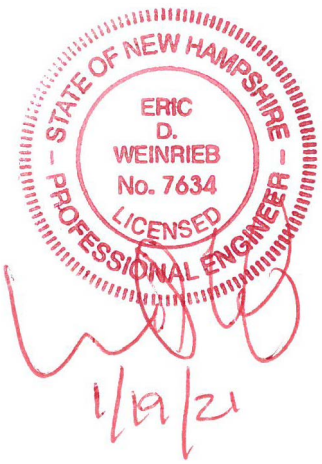
January 18, 2021

Prepared For:

Frederick W. Watson Revocable Trust
Robert D. Watson, Trustee
53 Sleepy Hollow Drive
Greenland, NH 03840

Prepared By:

ALTUS ENGINEERING, INC.
133 Court Street
Portsmouth, NH 03801
Phone: (603) 433-2335



ALTUS ENGINEERING, INC.

Table of Contents

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Section 1

Narrative

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PROJECT DESCRIPTION

The Frederick W. Watson Revocable Trust is proposing to subdivide an existing residential lot located at 1 Clark Drive in Portsmouth, NH. The property is identified as Assessor's Map 209, Lot 33, is approximately 3.1 (+/-) acres in size and is located in the City's Single Residence B (SRB) district. The site currently has a single-family residence, pool, and private roadway surrounded by a large lawn area with limited woodlands.

The proposed project will raze the existing house, construct an approximately 325' long public cul-de-sac and create four single-family residential lots serviced by municipal water and sewer.

Runoff from the development will be directed to a 170-foot long rain garden to provide stormwater treatment. The stormwater management system proposed for the site will reduce peak flows and treat site runoff prior to discharging to Inner Cutts Cove, a tidal water adjacent to the site

Site Soils

The NRCS indicates that the subject property consists of several primary soil classifications:

799 – Urban-Land-Canton complex, HSG C

Pre-Development (Existing Conditions)

The pre-development site conditions reflect the existing conditions of the site, which include the existing house, pool and private roadway. The current site primarily discharges radially to the east and southeast to Inner Cutts Cove, identified as Point of Analysis #1 (POA #1). The Pre-Development analysis models the existing site conditions for the point of analysis.

The grades and elevations shown on the plans are based on the site survey completed by Knight Hill Surveying Services, Inc. and included in the plan set as Topo/Boundary Worksheet. The study pre-development area was analyzed as one (1) watershed, which discharges to POA #1 as identified above.

Post-Development (Proposed Site Design)

The existing house, patio and pool will be razed and a new roadway with associated site improvements will constructed. The remainder of the lot will be subdivided into four (4) single-family house lots to be developed by others.

The proposed stormwater system is depicted on the attached Post-Development Watershed Plan. For the post development analysis, the site was divided into seven (7) watershed areas to more accurately depict the post-development conditions. The same point of analysis used in the Pre-Development model (POA #1) was used for comparison of the Pre and Post development conditions.

The Post-Development Watershed Plan illustrates the proposed stormwater management system. The single Pre-Development subcatchment has been divided into smaller areas to emulate the proposed grading and stormwater management system proposed for construction. Site topography, existing features, proposed site improvements, proposed grading, drainage and erosion control measures are shown on the accompanying plans. Recommended erosion control measures are based upon the December 2008 edition of the "*New Hampshire Stormwater Manual Volumes 1 through 3*" prepared by NHDES and Comprehensive Environmental, Inc. as amended.

CALCULATION METHODS

The drainage study was completed using the USDA SCS TR-20 Method within the HydroCAD Stormwater Modeling System. Reservoir routing was performed with the Dynamic Storage Indication method with automated calculation of tailwater conditions. A Type III 24-hour rainfall distribution was utilized in analyzing the data for the 2, 10, 25 and 50 year - 24-hour storm events using rainfall data provided by the Northeast Regional Climate Center (NRCC). As the project site lies within a Coastal and Great Bay Community identified by NHDES Alteration of Terrain, all rainfall amounts were increased by 15% to account for potential future increases in rainfall due to climate change.

Disclaimer

Altus Engineering, Inc. notes that stormwater modeling is limited in its capacity to precisely predict peak rates of runoff and flood elevations. Results should not be considered to represent actual storm events due to the number of variables and assumptions involved in the modeling effort. Surface roughness coefficients (n), entrance loss coefficients (ke), velocity factors (kv) and times of concentration (Tc) are based on subjective field observations and engineering judgment using available data. For design purposes, curve numbers (Cn) describe the average conditions. However, curve numbers will vary from storm to storm depending on the antecedent runoff conditions (ARC) including saturation and frozen ground. Also, higher water elevations than predicted by modeling could occur if drainage channels, closed drain systems or culverts are not maintained and/or become blocked by debris before and/or during a storm event as this will impact flow capacity of the structures. Structures should be re-evaluated if future changes occur within relevant drainage areas in order to assess any required design modifications.

Drainage Analysis

A complete summary of the drainage model is included in the appendix of this report. The following table compares pre- and post-development peak rates at the Point of Analysis identified on the plans for the 2, 10, 25, and 50-year storm events:

Stormwater Modeling Summary
Peak Q (cfs) for Type III 24-Hour Storm Events

*Rainfall Intensities Reflect 15% Increase per AoT	**2-Yr Storm (3.69 inch)**	**10-Yr Storm (5.60 inch)**	**25-Yr Storm (7.10 inch)**	**50-Yr Storm (8.50 inch)**
POA #1				
Pre	4.56	9.41	13.45	17.29
Post	4.22	8.87	12.63	16.20
Change	**-0.34**	**-0.54**	**-0.82**	**-1.09**

As the above table demonstrates, the proposed peak rates of runoff will be decreased from the existing conditions for all analyzed storm events.

CONCLUSION

This proposed site development of Watson's Landing subdivision off of Clark Drive in Portsmouth, NH will have minimal adverse effect on abutting properties and infrastructure as a result of stormwater runoff or siltation. Post-construction peak rates of runoff from the site will be lower than the existing conditions for all analyzed storm events. The new stormwater management system will also provide appropriate treatment of runoff from the entirety of the proposed impervious area. Appropriate steps will be taken to properly mitigate erosion and sedimentation through the use of temporary and permanent Best Management Practices for sediment and erosion control, including deep sump catch basins with grease hoods, vegetated swales and a raingarden.

Section 2

Aerial Photo and USGS Map

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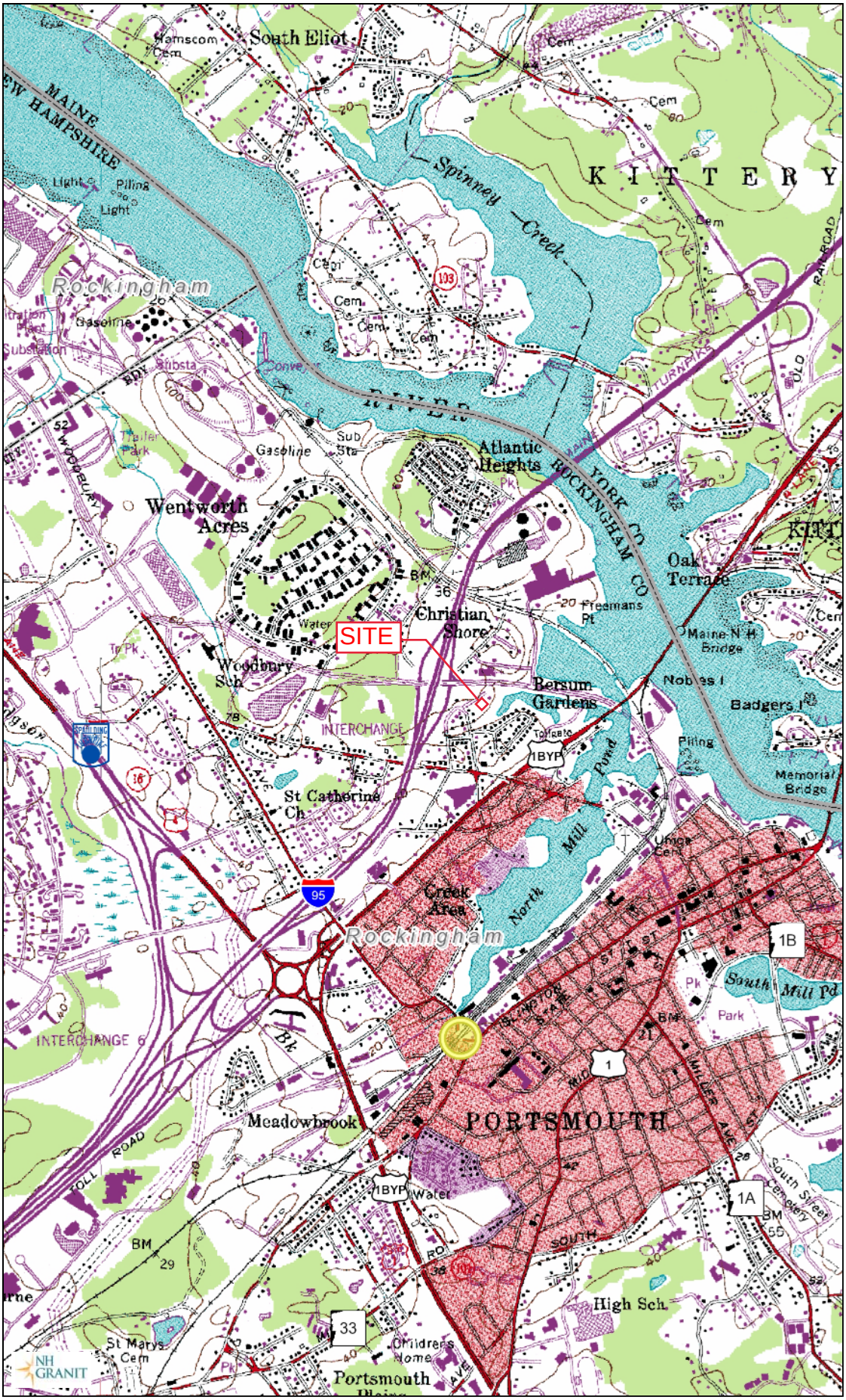
Blue Star Turnpike
95
George H
LaBarre Galleries
Collectibles store
Chase Dr
Chase Dr
Chase Dr
Chase Dr
Connect
Community Church
Market St
Market St
Market St
Market St
Market St
Market St
Clark Dr
Cutts St
Central Ave
Central Ave
Cutts St
Central Ave
Leslie Dr
Leslie Dr
Leslie Dr
Leslie Dr
Leslie Dr
Leslie Dr
Leslie Dr
Beechwood St
Cutts St
Ashland St
Google

Map by NH GRANIT



Legend

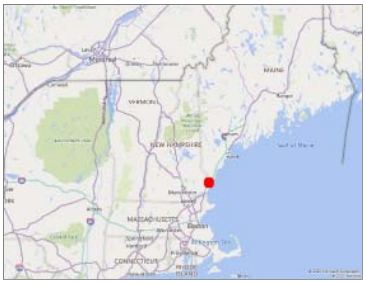
- State
- County
- City/Town

Map Scale

1: 24,000

Map Generated: 12/23/2020

Notes



Section 3

Drainage Calculations

Pre-Development
2-Year, 24-Hour Summary
10-Year, 24-Hour Complete
25-Year, 24-Hour Summary
50-Year, 24-Hour Summary

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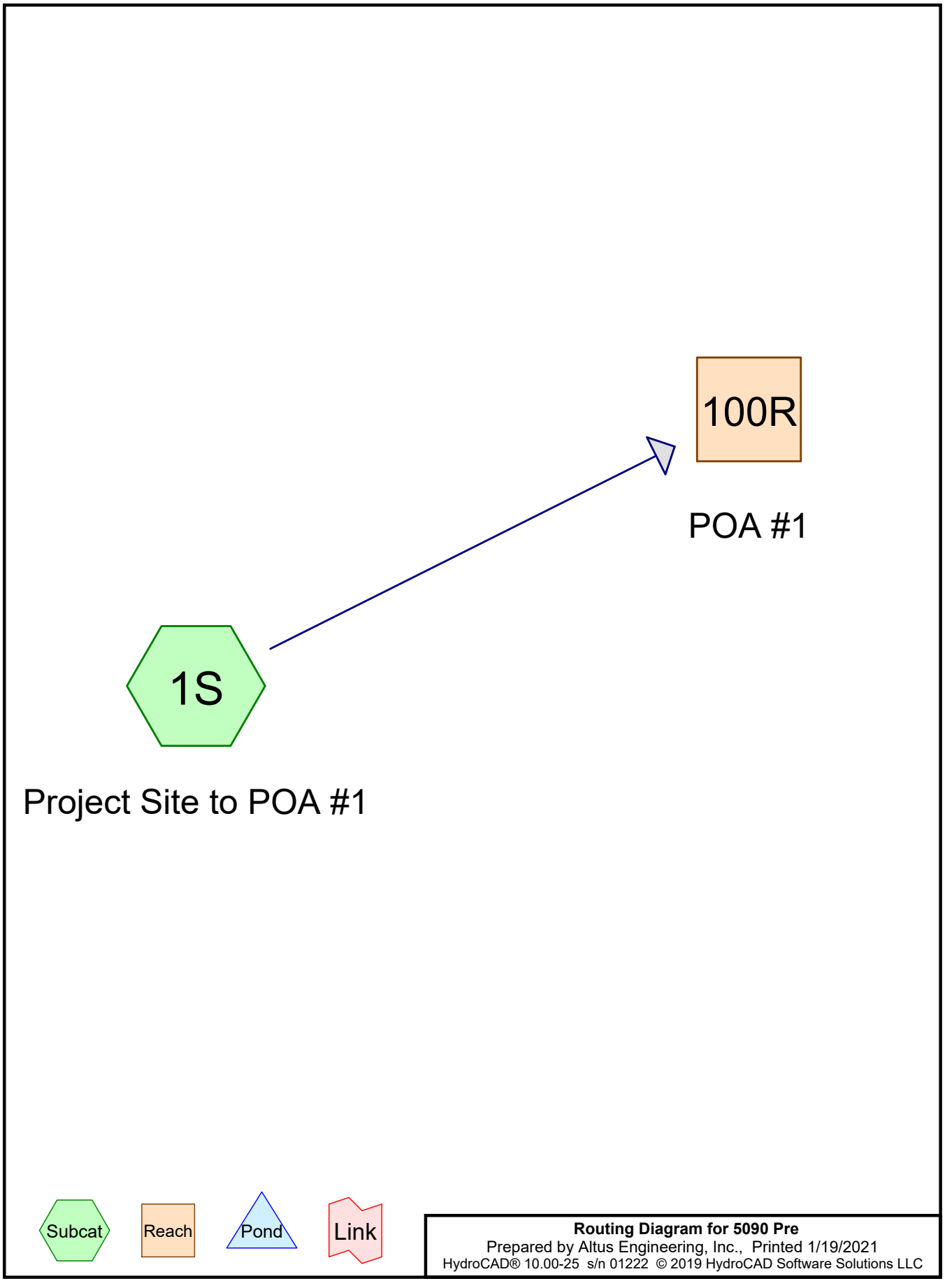


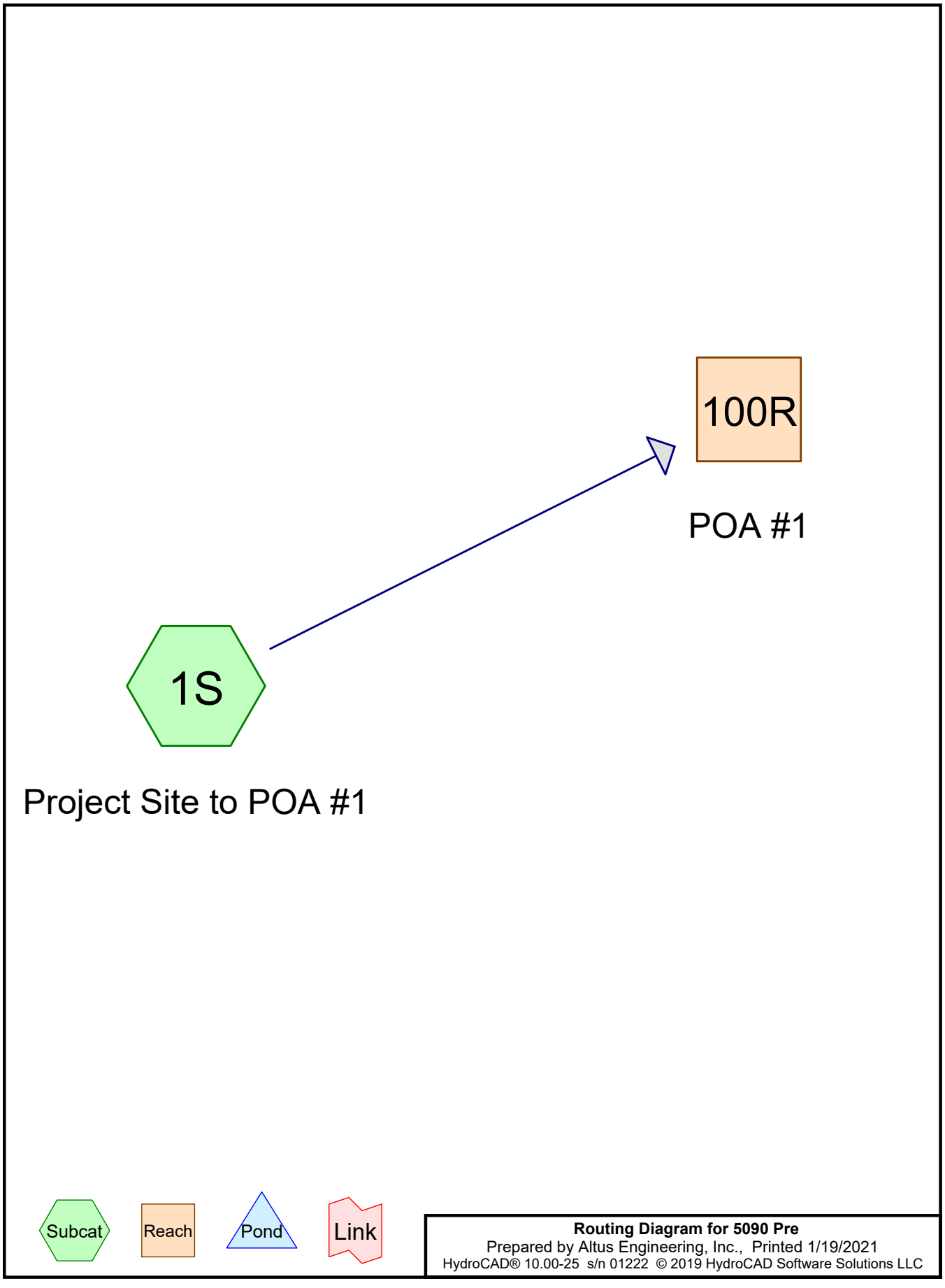
Routing Diagram for 5090 Pre
Prepared by Altus Engineering, Inc., Printed 1/19/2021

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Project Site to POA #1 Runoff Area=151,238 sf 12.17% Impervious Runoff Depth=1.50"
Flow Length=550' Tc=14.6 min CN=76 Runoff=4.56 cfs 0.435 af

Reach 100R: POA #1 Avg. Flow Depth=0.22' Max Vel=1.65 fps Inflow=4.56 cfs 0.435 af
n=0.025 L=1.0' S=0.0100 '/' Capacity=120.83 cfs Outflow=4.56 cfs 0.435 af

Total Runoff Area = 3.472 ac Runoff Volume = 0.435 af Average Runoff Depth = 1.50"
87.83% Pervious = 3.049 ac 12.17% Impervious = 0.422 ac



Routing Diagram for 5090 Pre
Prepared by Altus Engineering, Inc., Printed 1/19/2021

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.116	74	>75% Grass cover, Good, HSG C (1S)
0.346	98	Paved parking, HSG C (1S)
0.076	98	Roofs, HSG C (1S)
0.933	70	Woods, Good, HSG C (1S)
3.472	**76**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
3.472	HSG C	1S
0.000	HSG D	
0.000	Other	
3.472		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	2.116	0.000	0.000	2.116	>75% Grass cover, Good	1S
0.000	0.000	0.346	0.000	0.000	0.346	Paved parking	1S
0.000	0.000	0.076	0.000	0.000	0.076	Roofs	1S
0.000	0.000	0.933	0.000	0.000	0.933	Woods, Good	1S
0.000	**0.000**	**3.472**	**0.000**	**0.000**	**3.472**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Project Site to POA #1 Runoff Area=151,238 sf 12.17% Impervious Runoff Depth=3.04"
Flow Length=550' Tc=14.6 min CN=76 Runoff=9.41 cfs 0.879 af

Reach 100R: POA #1 Avg. Flow Depth=0.31' Max Vel=2.07 fps Inflow=9.41 cfs 0.879 af
n=0.025 L=1.0' S=0.0100 '/' Capacity=120.83 cfs Outflow=9.41 cfs 0.879 af

Total Runoff Area = 3.472 ac Runoff Volume = 0.879 af Average Runoff Depth = 3.04"
87.83% Pervious = 3.049 ac 12.17% Impervious = 0.422 ac

Summary for Subcatchment 1S: Project Site to POA #1

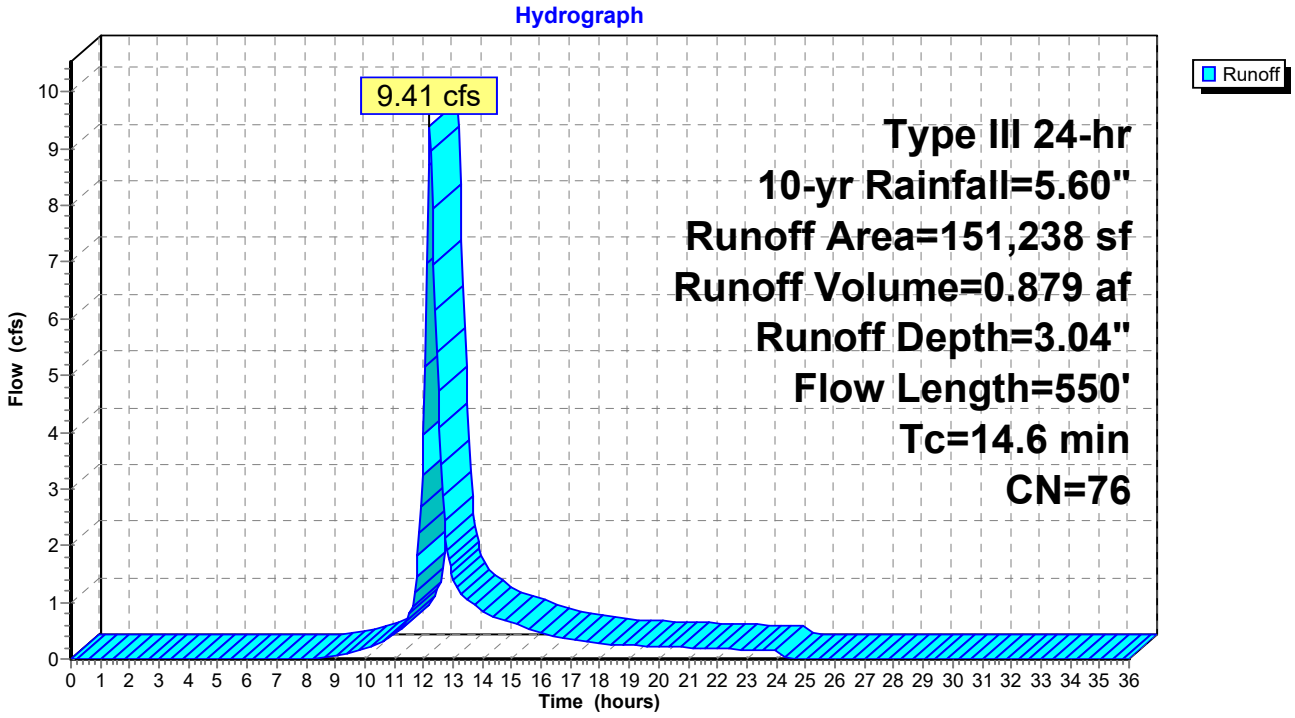
Runoff = 9.41 cfs @ 12.21 hrs, Volume= 0.879 af, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.60"

Area (sf)	CN	Description
15,072	98	Paved parking, HSG C
3,330	98	Roofs, HSG C
40,658	70	Woods, Good, HSG C
92,178	74	>75% Grass cover, Good, HSG C
151,238	76	Weighted Average
132,836		87.83% Pervious Area
18,402		12.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0400	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.69"
6.5	320	0.0030	0.82		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.2	130	0.1400	1.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.6	550	Total			

Subcatchment 1S: Project Site to POA #1



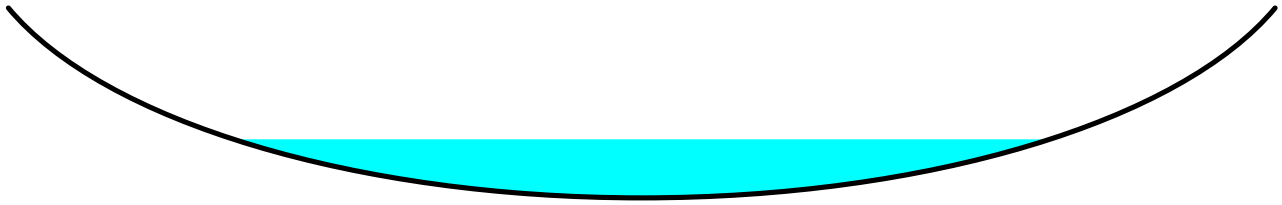
Summary for Reach 100R: POA #1

Inflow Area = 3.472 ac, 12.17% Impervious, Inflow Depth = 3.04" for 10-yr event
Inflow = 9.41 cfs @ 12.21 hrs, Volume= 0.879 af
Outflow = 9.41 cfs @ 12.21 hrs, Volume= 0.879 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.07 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.75 fps, Avg. Travel Time= 0.0 min

Peak Storage= 5 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 1.00' Flow Area= 26.7 sf, Capacity= 120.83 cfs

40.00' x 1.00' deep Parabolic Channel, n= 0.025 Earth, clean & winding
Length= 1.0' Slope= 0.0100 '/'
Inlet Invert= 1.00', Outlet Invert= 0.99'



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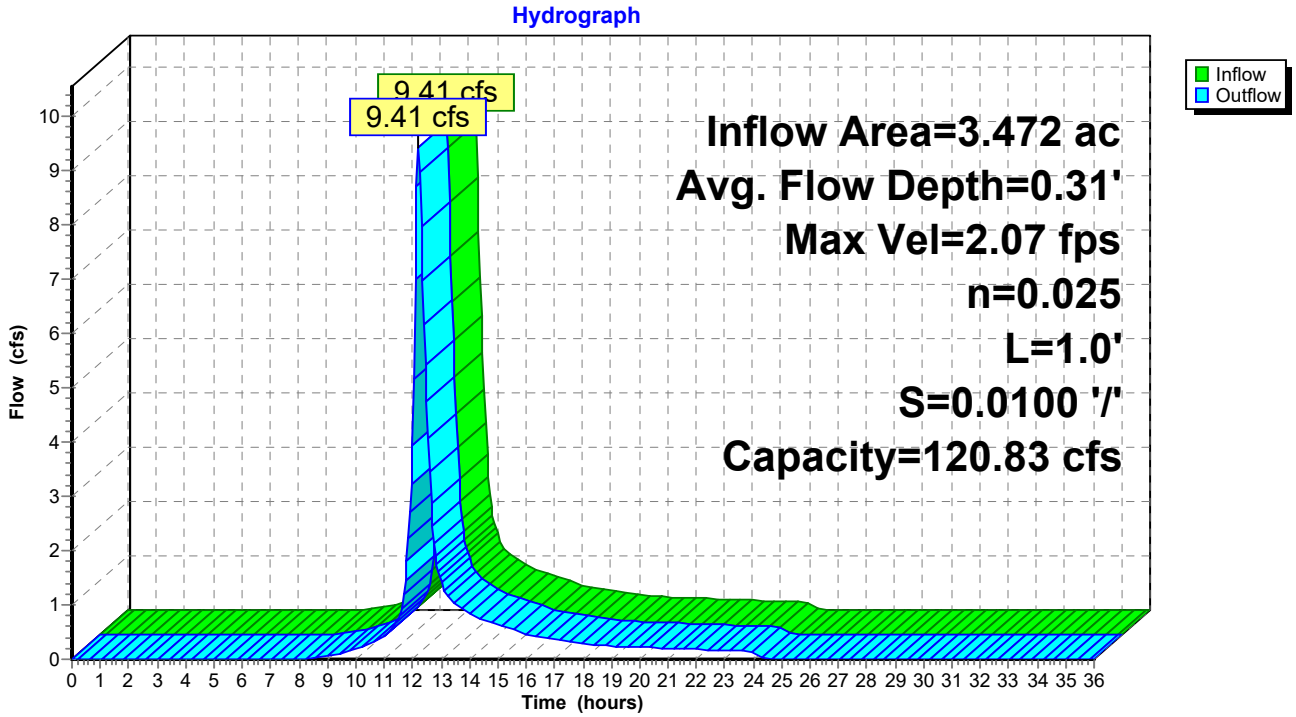
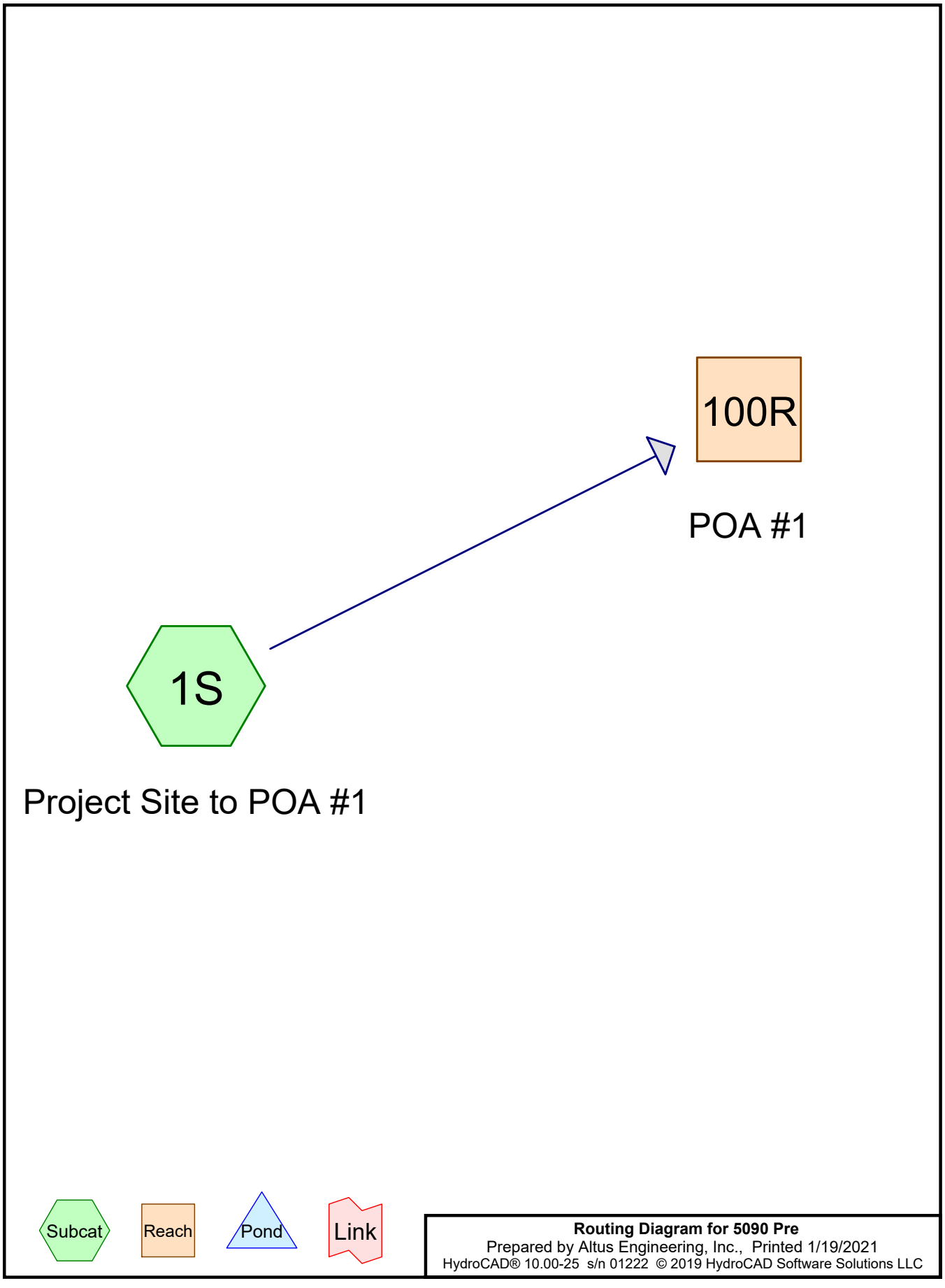
Reach 100R: POA #1





Routing Diagram for 5090 Pre
Prepared by Altus Engineering, Inc., Printed 1/19/2021

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Project Site to POA #1 Runoff Area=151,238 sf 12.17% Impervious Runoff Depth=4.35"
Flow Length=550' Tc=14.6 min CN=76 Runoff=13.45 cfs 1.258 af

Reach 100R: POA #1 Avg. Flow Depth=0.36' Max Vel=2.31 fps Inflow=13.45 cfs 1.258 af
n=0.025 L=1.0' S=0.0100 '/' Capacity=120.83 cfs Outflow=13.45 cfs 1.258 af

Total Runoff Area = 3.472 ac Runoff Volume = 1.258 af Average Runoff Depth = 4.35"
87.83% Pervious = 3.049 ac 12.17% Impervious = 0.422 ac

Section 4

Drainage Calculations

Post-Development
2-Year, 24-Hour Summary
10-Year, 24-Hour Complete
25-Year, 24-Hour Summary
50-Year, 24-Hour Summary

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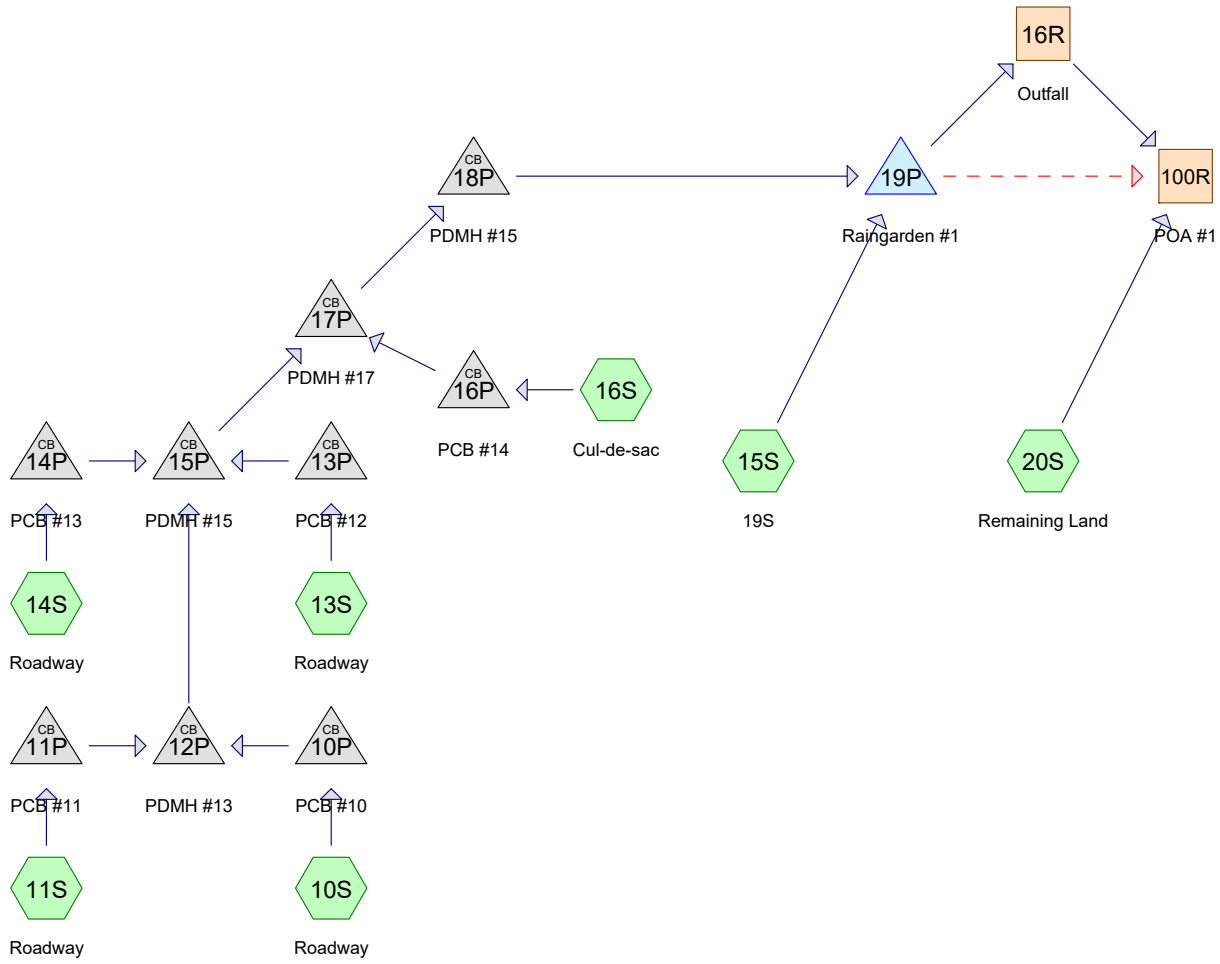
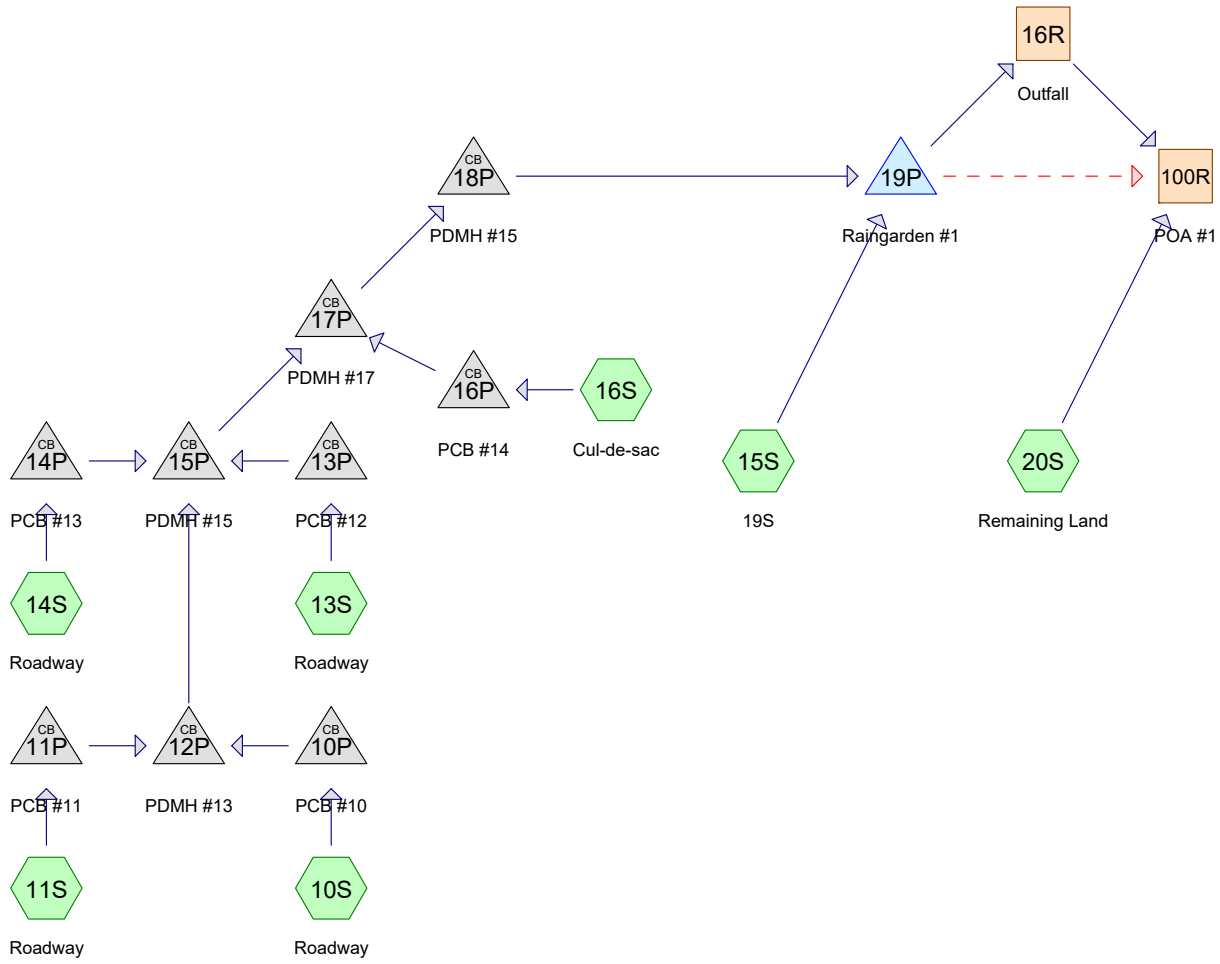


Subcat Reach Pond Link

Routing Diagram for 5090 Post
Prepared by Altus Engineering, Inc., Printed 1/19/2021



Subcat Reach Pond Link

Routing Diagram for 5090 Post
Prepared by Altus Engineering, Inc., Printed 1/19/2021

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: Roadway Runoff Area=4,876 sf 59.56% Impervious Runoff Depth=2.44"
Tc=6.0 min CN=88 Runoff=0.31 cfs 0.023 af

Subcatchment 11S: Roadway Runoff Area=6,718 sf 62.13% Impervious Runoff Depth=2.53"
Tc=6.0 min CN=89 Runoff=0.44 cfs 0.033 af

Subcatchment 13S: Roadway Runoff Area=3,183 sf 56.17% Impervious Runoff Depth=2.35"
Tc=6.0 min CN=87 Runoff=0.20 cfs 0.014 af

Subcatchment 14S: Roadway Runoff Area=2,407 sf 100.00% Impervious Runoff Depth=3.46"
Tc=6.0 min CN=98 Runoff=0.19 cfs 0.016 af

Subcatchment 15S: 19S Runoff Area=77,120 sf 20.03% Impervious Runoff Depth=1.71"
Flow Length=480' Tc=17.3 min CN=79 Runoff=2.51 cfs 0.253 af

Subcatchment 16S: Cul-de-sac Runoff Area=4,819 sf 55.95% Impervious Runoff Depth=2.35"
Tc=6.0 min CN=87 Runoff=0.30 cfs 0.022 af

Subcatchment 20S: Remaining Land Runoff Area=52,115 sf 0.00% Impervious Runoff Depth=1.19"
Flow Length=175' Tc=8.5 min CN=71 Runoff=1.41 cfs 0.118 af

Reach 16R: Outfall Avg. Flow Depth=0.08' Max Vel=0.76 fps Inflow=0.11 cfs 0.125 af
n=0.100 L=75.0' S=0.1200 '/' Capacity=4.89 cfs Outflow=0.11 cfs 0.125 af

Reach 100R: POA #1 Avg. Flow Depth=0.21' Max Vel=1.61 fps Inflow=4.22 cfs 0.455 af
n=0.025 L=1.0' S=0.0100 '/' Capacity=120.83 cfs Outflow=4.22 cfs 0.455 af

Pond 10P: PCB #10 Peak Elev=26.39' Inflow=0.31 cfs 0.023 af
12.0" Round Culvert n=0.013 L=8.0' S=0.0050 '/' Outflow=0.31 cfs 0.023 af

Pond 11P: PCB #11 Peak Elev=26.46' Inflow=0.44 cfs 0.033 af
12.0" Round Culvert n=0.013 L=8.0' S=0.0050 '/' Outflow=0.44 cfs 0.033 af

Pond 12P: PDMH #13 Peak Elev=26.42' Inflow=0.75 cfs 0.055 af
12.0" Round Culvert n=0.013 L=155.0' S=0.0050 '/' Outflow=0.75 cfs 0.055 af

Pond 13P: PCB #12 Peak Elev=27.35' Inflow=0.20 cfs 0.014 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.20 cfs 0.014 af

Pond 14P: PCB #13 Peak Elev=27.35' Inflow=0.19 cfs 0.016 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.19 cfs 0.016 af

Pond 15P: PDMH #15 Peak Elev=25.69' Inflow=1.14 cfs 0.086 af
12.0" Round Culvert n=0.013 L=67.0' S=0.0051 '/' Outflow=1.14 cfs 0.086 af

Pond 16P: PCB #14 Peak Elev=26.81' Inflow=0.30 cfs 0.022 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.30 cfs 0.022 af

Pond 17P: PDMH #17 Peak Elev=25.35' Inflow=1.44 cfs 0.107 af
12.0" Round Culvert n=0.013 L=84.0' S=0.0050 '/' Outflow=1.44 cfs 0.107 af

Pond 18P: PDMH #15 Peak Elev=24.72' Inflow=1.44 cfs 0.107 af
12.0" Round Culvert n=0.013 L=117.0' S=0.0605 '/' Outflow=1.44 cfs 0.107 af

Pond 19P: Raingarden #1 Peak Elev=18.25' Storage=3,515 cf Inflow=3.28 cfs 0.360 af
Primary=0.11 cfs 0.125 af Secondary=3.08 cfs 0.212 af Outflow=3.18 cfs 0.337 af

Total Runoff Area = 3.472 ac Runoff Volume = 0.479 af Average Runoff Depth = 1.65"
80.55% Pervious = 2.797 ac 19.45% Impervious = 0.675 ac

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.863	74	>75% Grass cover, Good, HSG C (10S, 11S, 13S, 15S, 16S, 20S)
0.427	98	Paved parking, HSG C (10S, 11S, 13S, 14S, 15S, 16S)
0.248	98	Roofs, HSG C (11S, 15S)
0.933	70	Woods, Good, HSG C (20S)
3.472	**78**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
3.472	HSG C	10S, 11S, 13S, 14S, 15S, 16S, 20S
0.000	HSG D	
0.000	Other	
3.472		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	1.863	0.000	0.000	1.863	>75% Grass cover, Good	10S, 11S, 13S, 15S, 16S, 20S
0.000	0.000	0.427	0.000	0.000	0.427	Paved parking	10S, 11S, 13S, 14S, 15S, 16S
0.000	0.000	0.248	0.000	0.000	0.248	Roofs	11S, 15S
0.000	0.000	0.933	0.000	0.000	0.933	Woods, Good	20S
0.000	**0.000**	**3.472**	**0.000**	**0.000**	**3.472**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: Roadway Runoff Area=4,876 sf 59.56% Impervious Runoff Depth=4.24"
Tc=6.0 min CN=88 Runoff=0.53 cfs 0.040 af

Subcatchment 11S: Roadway Runoff Area=6,718 sf 62.13% Impervious Runoff Depth=4.35"
Tc=6.0 min CN=89 Runoff=0.74 cfs 0.056 af

Subcatchment 13S: Roadway Runoff Area=3,183 sf 56.17% Impervious Runoff Depth=4.14"
Tc=6.0 min CN=87 Runoff=0.34 cfs 0.025 af

Subcatchment 14S: Roadway Runoff Area=2,407 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.30 cfs 0.025 af

Subcatchment 15S: 19S Runoff Area=77,120 sf 20.03% Impervious Runoff Depth=3.32"
Flow Length=480' Tc=17.3 min CN=79 Runoff=4.91 cfs 0.491 af

Subcatchment 16S: Cul-de-sac Runoff Area=4,819 sf 55.95% Impervious Runoff Depth=4.14"
Tc=6.0 min CN=87 Runoff=0.51 cfs 0.038 af

Subcatchment 20S: Remaining Land Runoff Area=52,115 sf 0.00% Impervious Runoff Depth=2.58"
Flow Length=175' Tc=8.5 min CN=71 Runoff=3.22 cfs 0.257 af

Reach 16R: Outfall Avg. Flow Depth=0.09' Max Vel=0.78 fps Inflow=0.12 cfs 0.138 af
n=0.100 L=75.0' S=0.1200 '/' Capacity=4.89 cfs Outflow=0.12 cfs 0.138 af

Reach 100R: POA #1 Avg. Flow Depth=0.30' Max Vel=2.03 fps Inflow=8.87 cfs 0.907 af
n=0.025 L=1.0' S=0.0100 '/' Capacity=120.83 cfs Outflow=8.87 cfs 0.907 af

Pond 10P: PCB #10 Peak Elev=26.50' Inflow=0.53 cfs 0.040 af
12.0" Round Culvert n=0.013 L=8.0' S=0.0050 '/' Outflow=0.53 cfs 0.040 af

Pond 11P: PCB #11 Peak Elev=26.59' Inflow=0.74 cfs 0.056 af
12.0" Round Culvert n=0.013 L=8.0' S=0.0050 '/' Outflow=0.74 cfs 0.056 af

Pond 12P: PDMH #13 Peak Elev=26.60' Inflow=1.27 cfs 0.095 af
12.0" Round Culvert n=0.013 L=155.0' S=0.0050 '/' Outflow=1.27 cfs 0.095 af

Pond 13P: PCB #12 Peak Elev=27.44' Inflow=0.34 cfs 0.025 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.34 cfs 0.025 af

Pond 14P: PCB #13 Peak Elev=27.41' Inflow=0.30 cfs 0.025 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.30 cfs 0.025 af

Pond 15P: PDMH #15 Peak Elev=25.94' Inflow=1.90 cfs 0.145 af
12.0" Round Culvert n=0.013 L=67.0' S=0.0051 '/' Outflow=1.90 cfs 0.145 af

Pond 16P: PCB #14 Peak Elev=26.92' Inflow=0.51 cfs 0.038 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.51 cfs 0.038 af

Pond 17P: PDMH #17 Peak Elev=25.68' Inflow=2.41 cfs 0.183 af
12.0" Round Culvert n=0.013 L=84.0' S=0.0050 '/' Outflow=2.41 cfs 0.183 af

Pond 18P: PDMH #15 Peak Elev=24.98' Inflow=2.41 cfs 0.183 af
12.0" Round Culvert n=0.013 L=117.0' S=0.0605 '/' Outflow=2.41 cfs 0.183 af

Pond 19P: Raingarden #1 Peak Elev=18.38' Storage=3,949 cf Inflow=6.20 cfs 0.674 af
Primary=0.12 cfs 0.138 af Secondary=6.00 cfs 0.512 af Outflow=6.12 cfs 0.650 af

Total Runoff Area = 3.472 ac Runoff Volume = 0.931 af Average Runoff Depth = 3.22"
80.55% Pervious = 2.797 ac 19.45% Impervious = 0.675 ac

Summary for Subcatchment 10S: Roadway

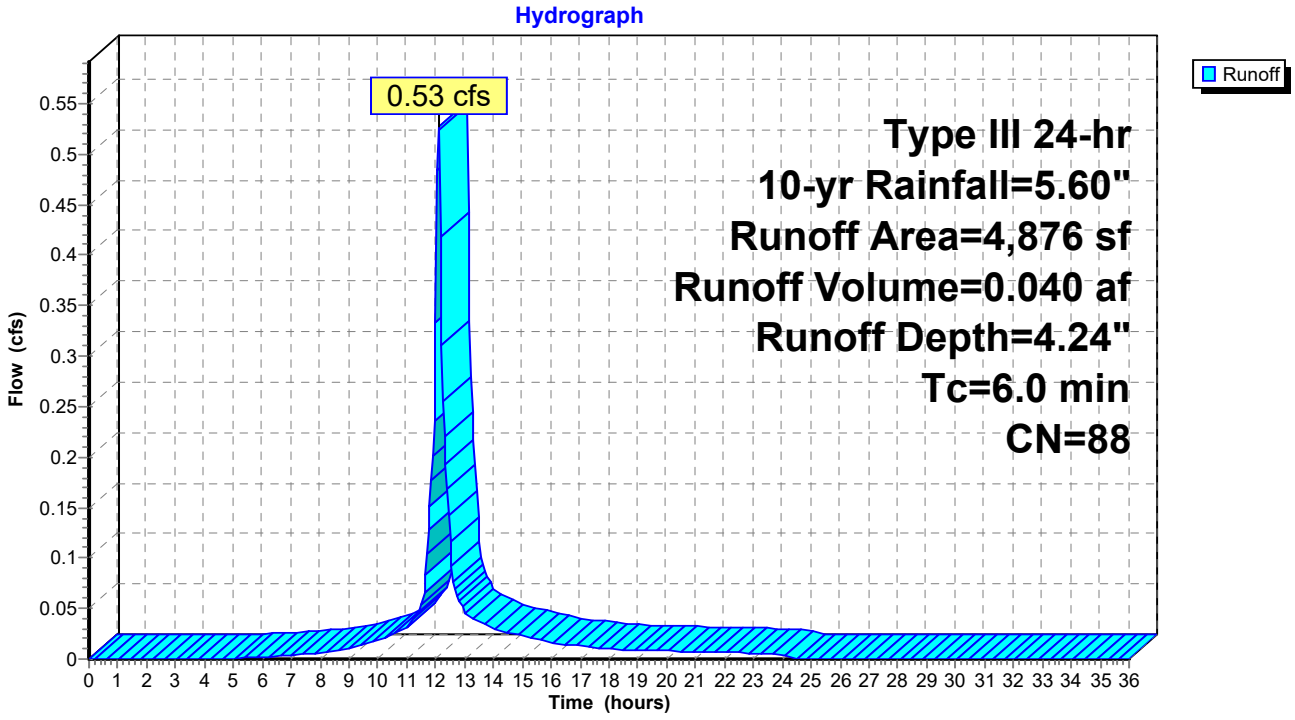
Runoff = 0.53 cfs @ 12.09 hrs, Volume= 0.040 af, Depth= 4.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.60"

Area (sf)	CN	Description
2,904	98	Paved parking, HSG C
0	98	Roofs, HSG C
1,972	74	>75% Grass cover, Good, HSG C
4,876	88	Weighted Average
1,972		40.44% Pervious Area
2,904		59.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 10S: Roadway



Summary for Subcatchment 11S: Roadway

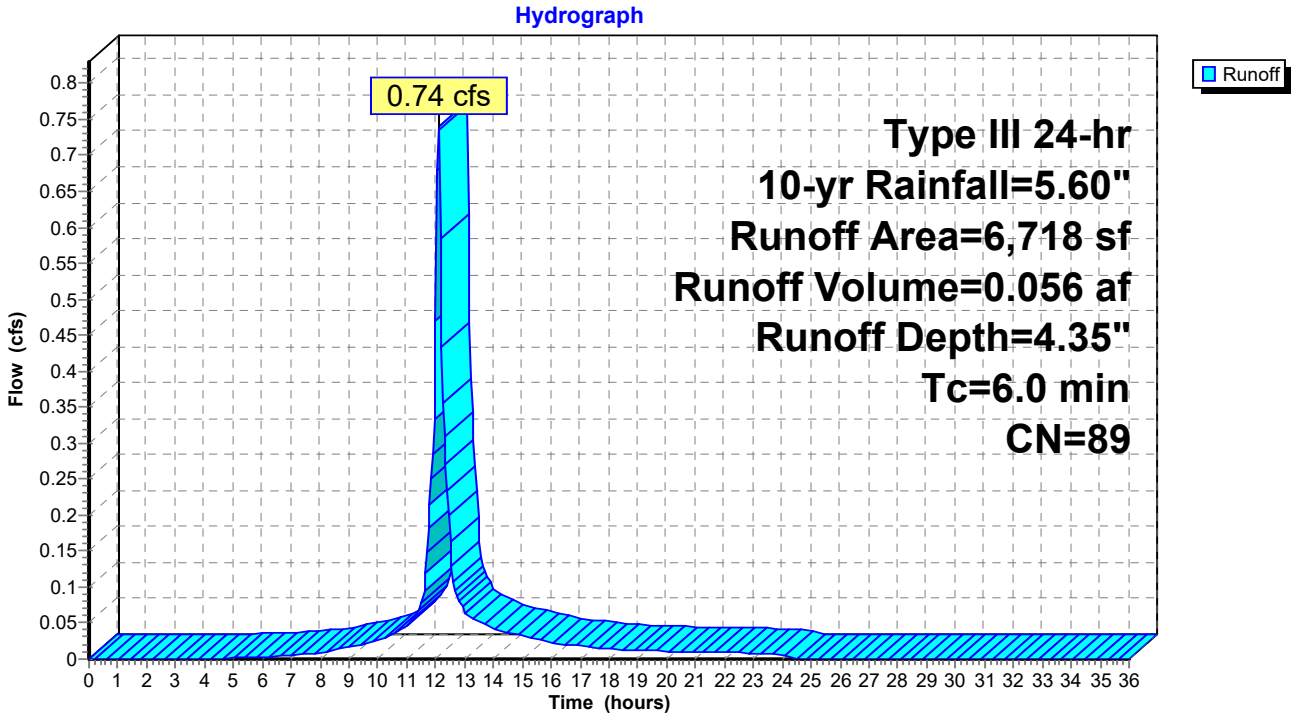
Runoff = 0.74 cfs @ 12.09 hrs, Volume= 0.056 af, Depth= 4.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.60"

Area (sf)	CN	Description
3,359	98	Paved parking, HSG C
815	98	Roofs, HSG C
2,544	74	>75% Grass cover, Good, HSG C
6,718	89	Weighted Average
2,544		37.87% Pervious Area
4,174		62.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 11S: Roadway



Summary for Subcatchment 13S: Roadway

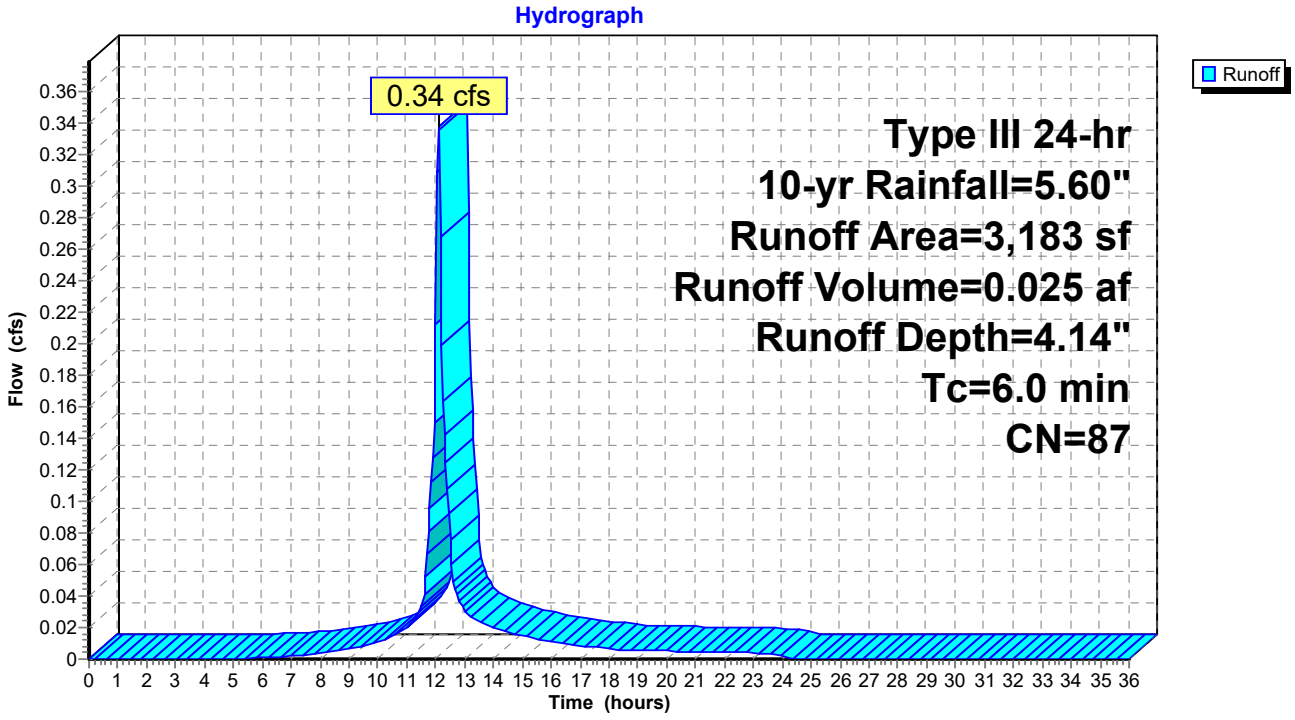
Runoff = 0.34 cfs @ 12.09 hrs, Volume= 0.025 af, Depth= 4.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.60"

Area (sf)	CN	Description
1,788	98	Paved parking, HSG C
0	98	Roofs, HSG C
1,395	74	>75% Grass cover, Good, HSG C
3,183	87	Weighted Average
1,395		43.83% Pervious Area
1,788		56.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 13S: Roadway



Summary for Subcatchment 14S: Roadway

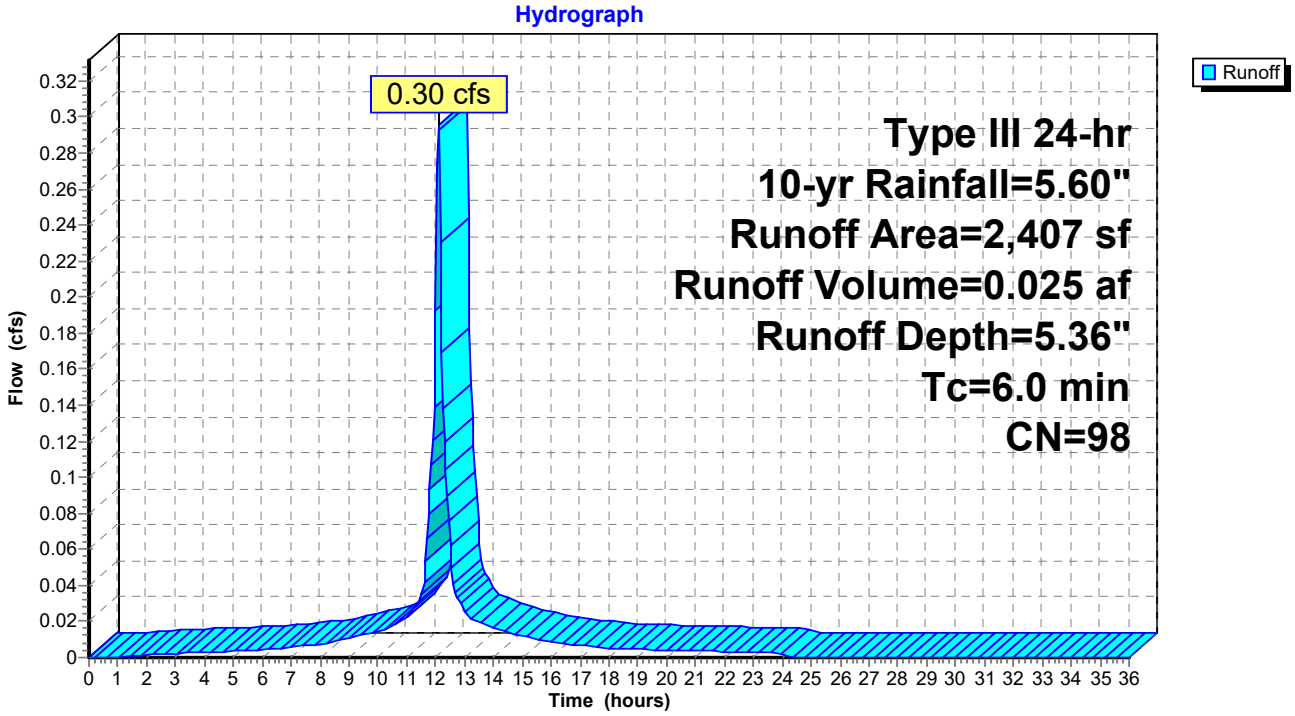
Runoff = 0.30 cfs @ 12.09 hrs, Volume= 0.025 af, Depth= 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.60"

Area (sf)	CN	Description
2,407	98	Paved parking, HSG C
0	98	Roofs, HSG C
0	74	>75% Grass cover, Good, HSG C
2,407	98	Weighted Average
2,407		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 14S: Roadway



Summary for Subcatchment 15S: 19S

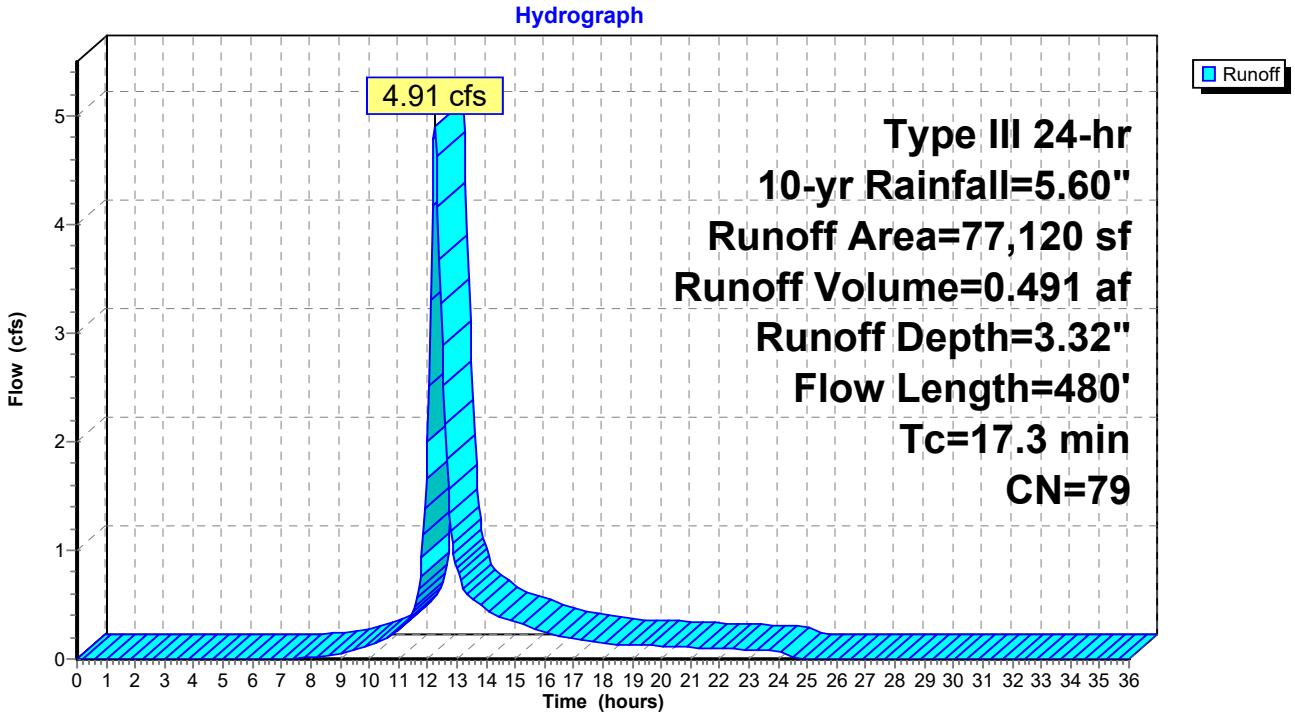
Runoff = 4.91 cfs @ 12.24 hrs, Volume= 0.491 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.60"

Area (sf)	CN	Description
5,444	98	Paved parking, HSG C
10,000	98	Roofs, HSG C
61,676	74	>75% Grass cover, Good, HSG C
77,120	79	Weighted Average
61,676		79.97% Pervious Area
15,444		20.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.69"
2.0	315	0.0300	2.60		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	65	0.0600	10.80	45.37	**Channel Flow,** Area= 4.2 sf Perim= 5.0' r= 0.84' n= 0.030 Earth, grassed & winding
17.3	480	Total			

Subcatchment 15S: 19S



Summary for Subcatchment 16S: Cul-de-sac

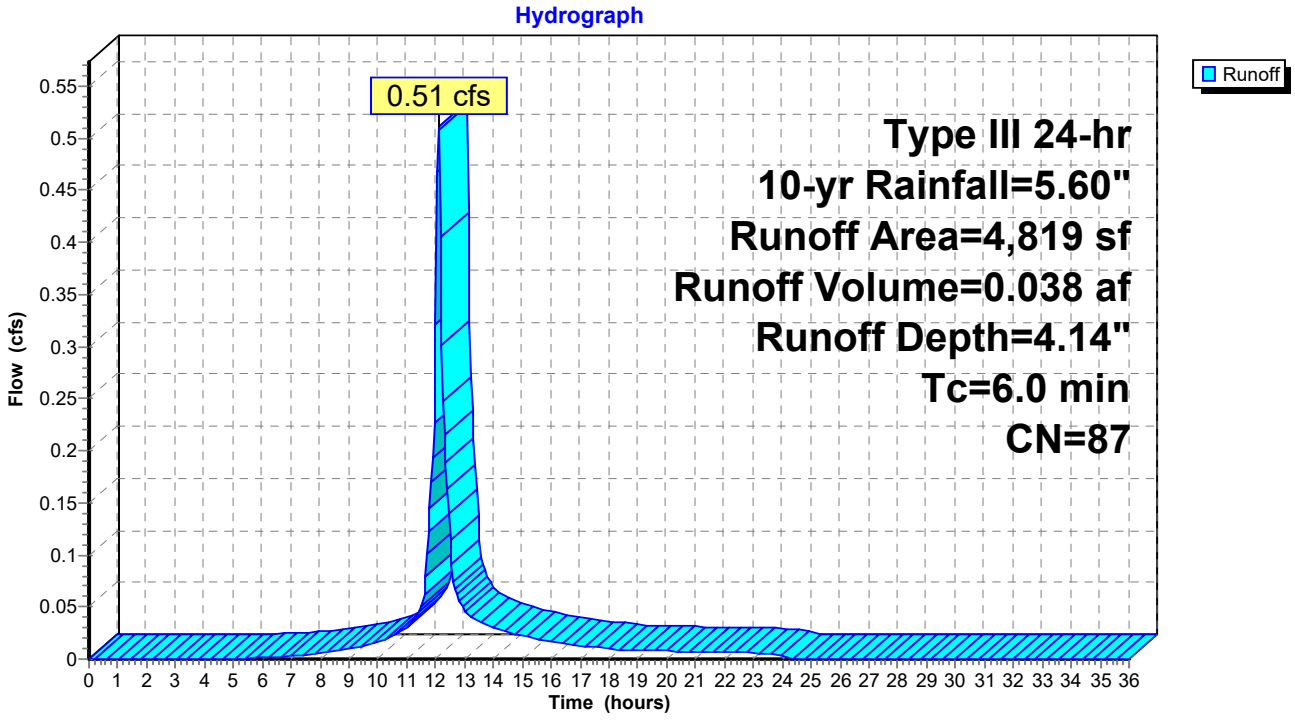
Runoff = 0.51 cfs @ 12.09 hrs, Volume= 0.038 af, Depth= 4.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.60"

Area (sf)	CN	Description
2,696	98	Paved parking, HSG C
0	98	Roofs, HSG C
2,123	74	>75% Grass cover, Good, HSG C
4,819	87	Weighted Average
2,123		44.05% Pervious Area
2,696		55.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 16S: Cul-de-sac



Summary for Subcatchment 20S: Remaining Land

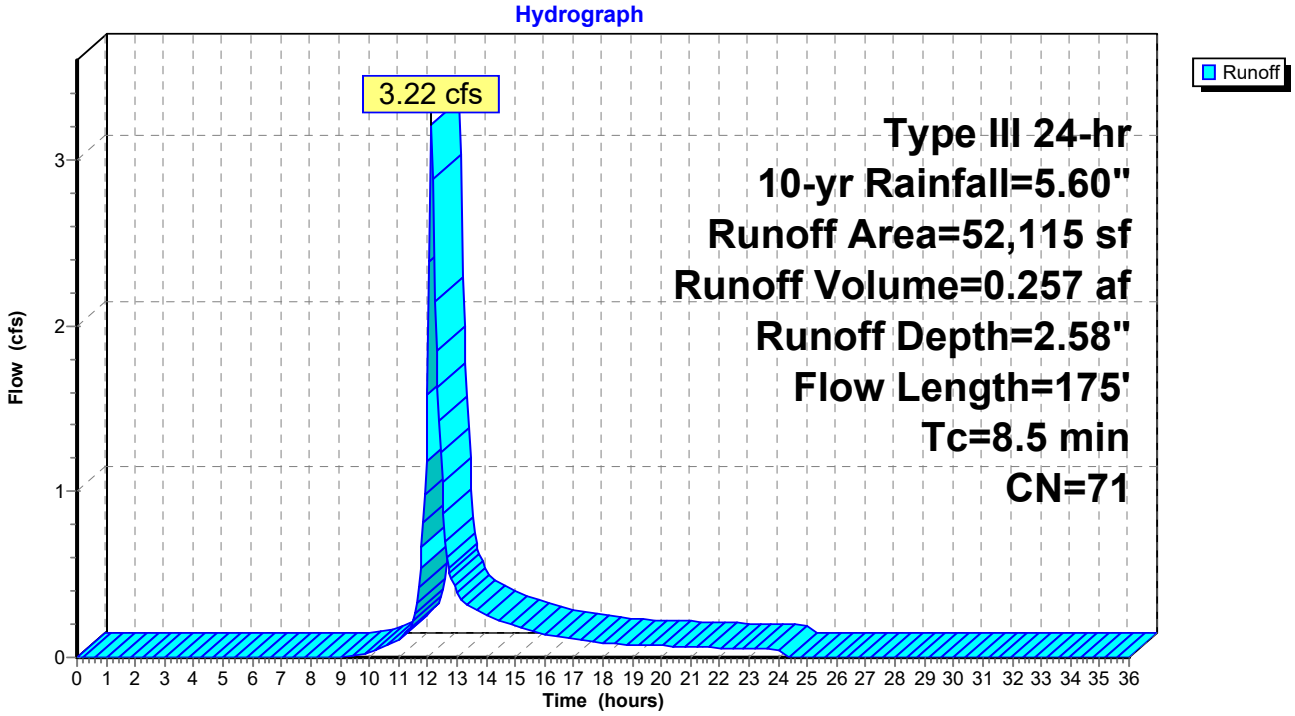
Runoff = 3.22 cfs @ 12.13 hrs, Volume= 0.257 af, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.60"

Area (sf)	CN	Description
40,658	70	Woods, Good, HSG C
11,457	74	>75% Grass cover, Good, HSG C
52,115	71	Weighted Average
52,115		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	35	0.0850	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.69"
5.3	50	0.1400	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.69"
1.0	90	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.5	175	Total			

Subcatchment 20S: Remaining Land



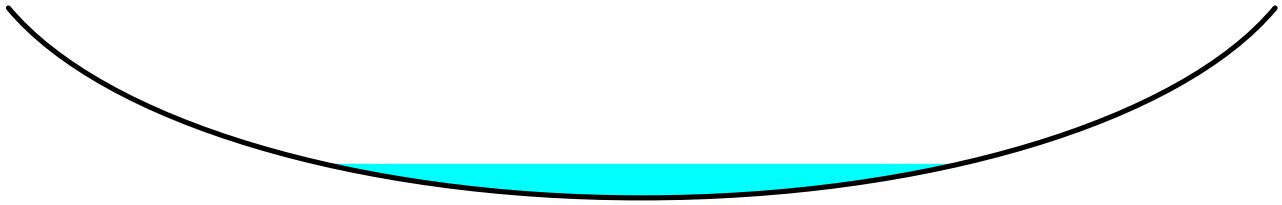
Summary for Reach 16R: Outfall

Inflow Area = 2.276 ac, 29.67% Impervious, Inflow Depth > 0.73" for 10-yr event
Inflow = 0.12 cfs @ 12.24 hrs, Volume= 0.138 af
Outflow = 0.12 cfs @ 12.28 hrs, Volume= 0.138 af, Atten= 0%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.78 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.63 fps, Avg. Travel Time= 2.0 min

Peak Storage= 11 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 0.50' Flow Area= 2.0 sf, Capacity= 4.89 cfs

6.00' x 0.50' deep Parabolic Channel, n= 0.100 Earth, dense brush, high stage
Length= 75.0' Slope= 0.1200 '/'
Inlet Invert= 14.00', Outlet Invert= 5.00'



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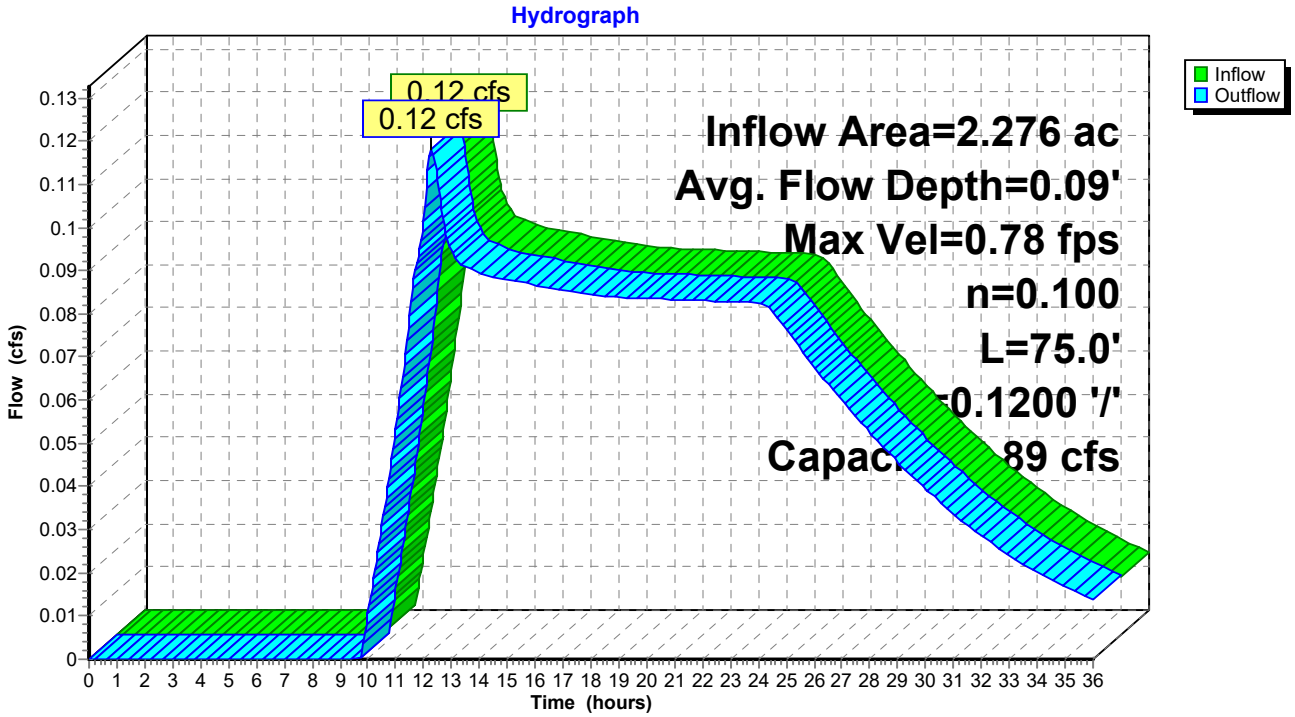
Reach 16R: Outfall



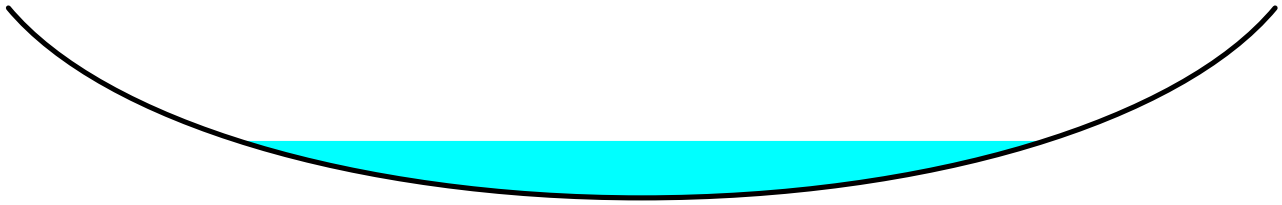
Summary for Reach 100R: POA #1

Inflow Area = 3.472 ac, 19.45% Impervious, Inflow Depth > 3.14" for 10-yr event
Inflow = 8.87 cfs @ 12.17 hrs, Volume= 0.907 af
Outflow = 8.87 cfs @ 12.17 hrs, Volume= 0.907 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.03 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.60 fps, Avg. Travel Time= 0.0 min

Peak Storage= 4 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 1.00' Flow Area= 26.7 sf, Capacity= 120.83 cfs

40.00' x 1.00' deep Parabolic Channel, n= 0.025 Earth, clean & winding
Length= 1.0' Slope= 0.0100 '/'
Inlet Invert= 1.00', Outlet Invert= 0.99'



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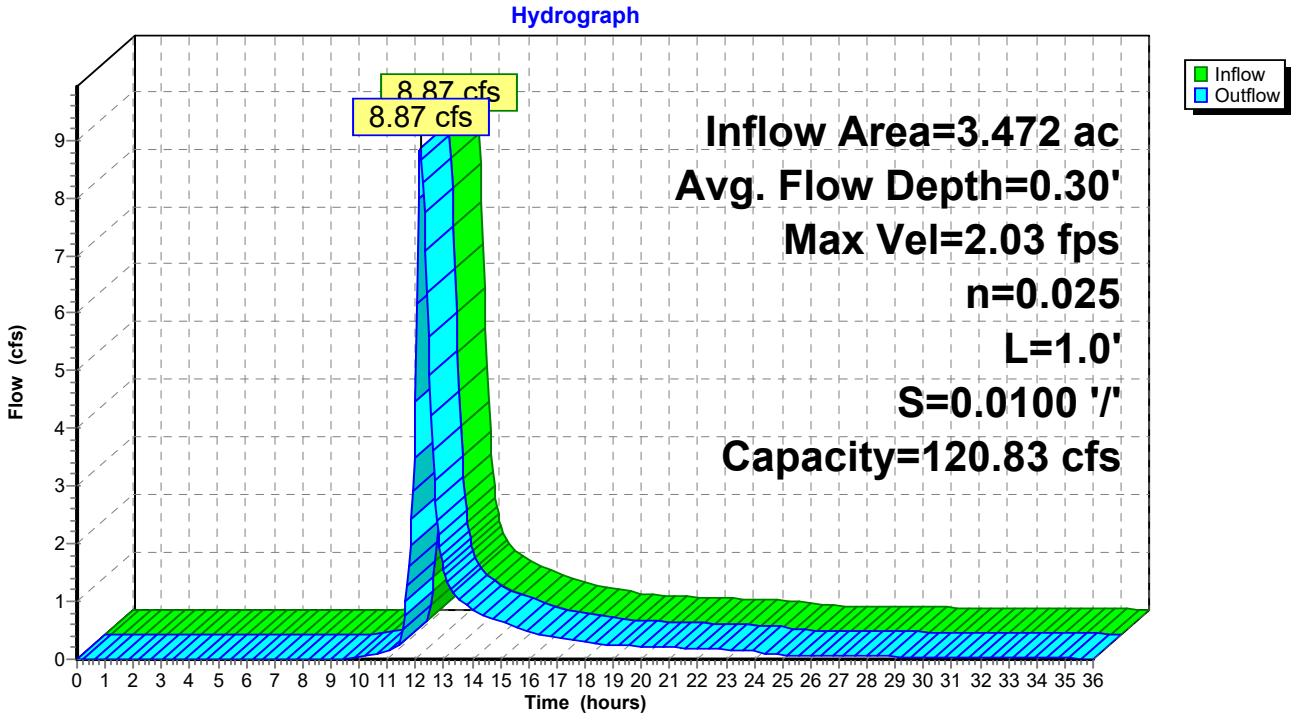
Reach 100R: POA #1



Summary for Pond 10P: PCB #10

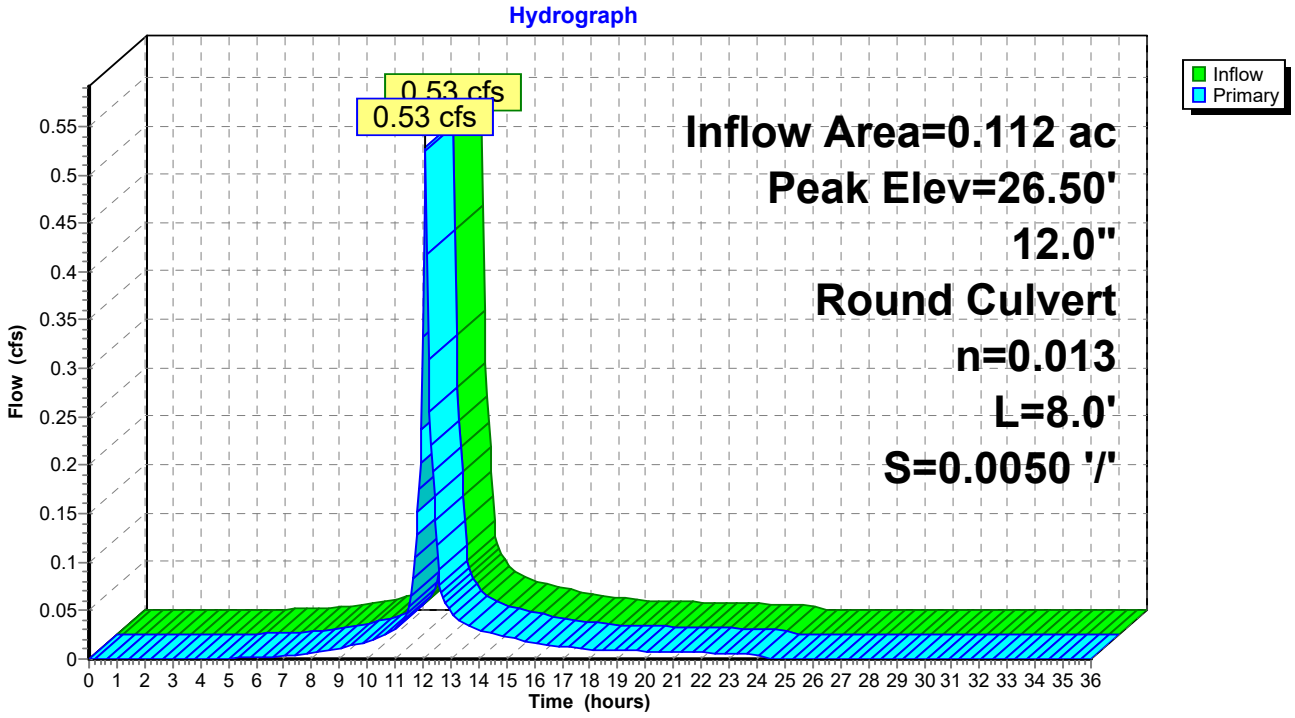
Inflow Area = 0.112 ac, 59.56% Impervious, Inflow Depth = 4.24" for 10-yr event
Inflow = 0.53 cfs @ 12.09 hrs, Volume= 0.040 af
Outflow = 0.53 cfs @ 12.09 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min
Primary = 0.53 cfs @ 12.09 hrs, Volume= 0.040 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 26.50' @ 12.09 hrs
Flood Elev= 29.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.05'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.05' / 26.01' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.51 cfs @ 12.09 hrs HW=26.49' (Free Discharge)
1=Culvert (Barrel Controls 0.51 cfs @ 2.27 fps)

Pond 10P: PCB #10



Summary for Pond 11P: PCB #11

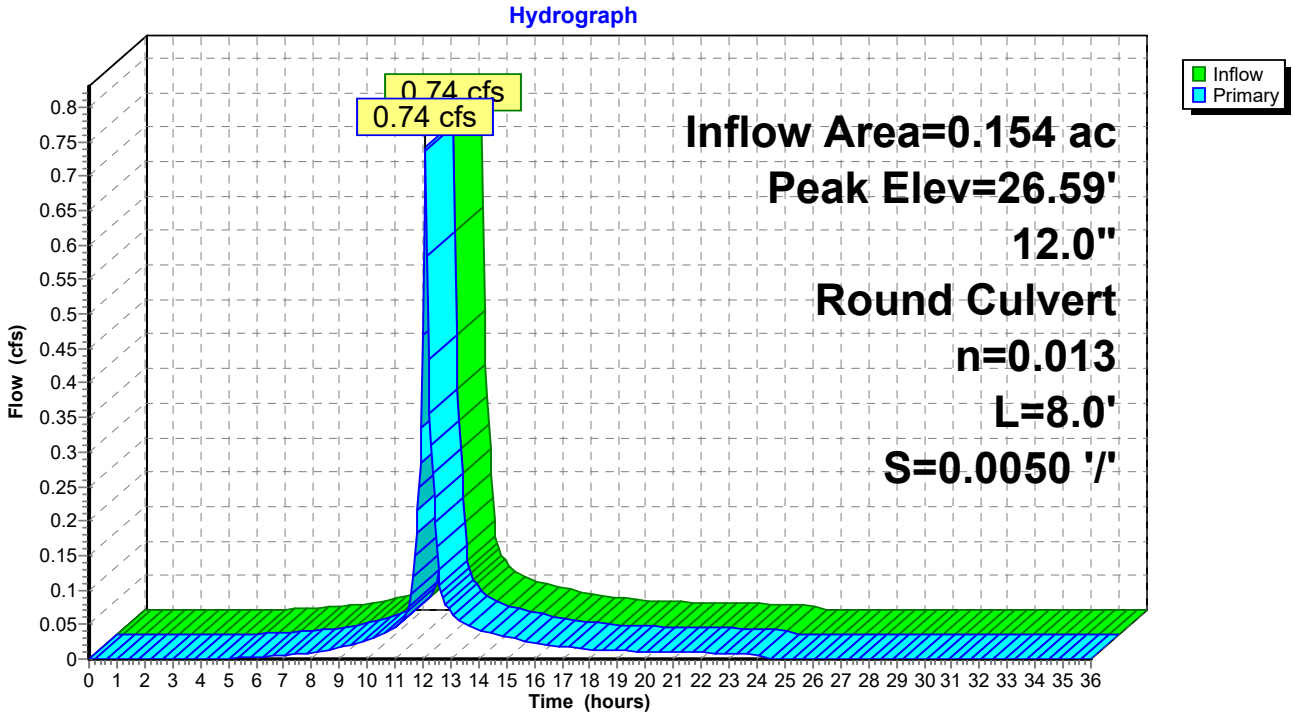
Inflow Area = 0.154 ac, 62.13% Impervious, Inflow Depth = 4.35" for 10-yr event
Inflow = 0.74 cfs @ 12.09 hrs, Volume= 0.056 af
Outflow = 0.74 cfs @ 12.09 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min
Primary = 0.74 cfs @ 12.09 hrs, Volume= 0.056 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 26.59' @ 12.09 hrs
Flood Elev= 29.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.05'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.05' / 26.01' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.72 cfs @ 12.09 hrs HW=26.58' (Free Discharge)
1=Culvert (Barrel Controls 0.72 cfs @ 2.48 fps)

Pond 11P: PCB #11



Summary for Pond 12P: PDMH #13

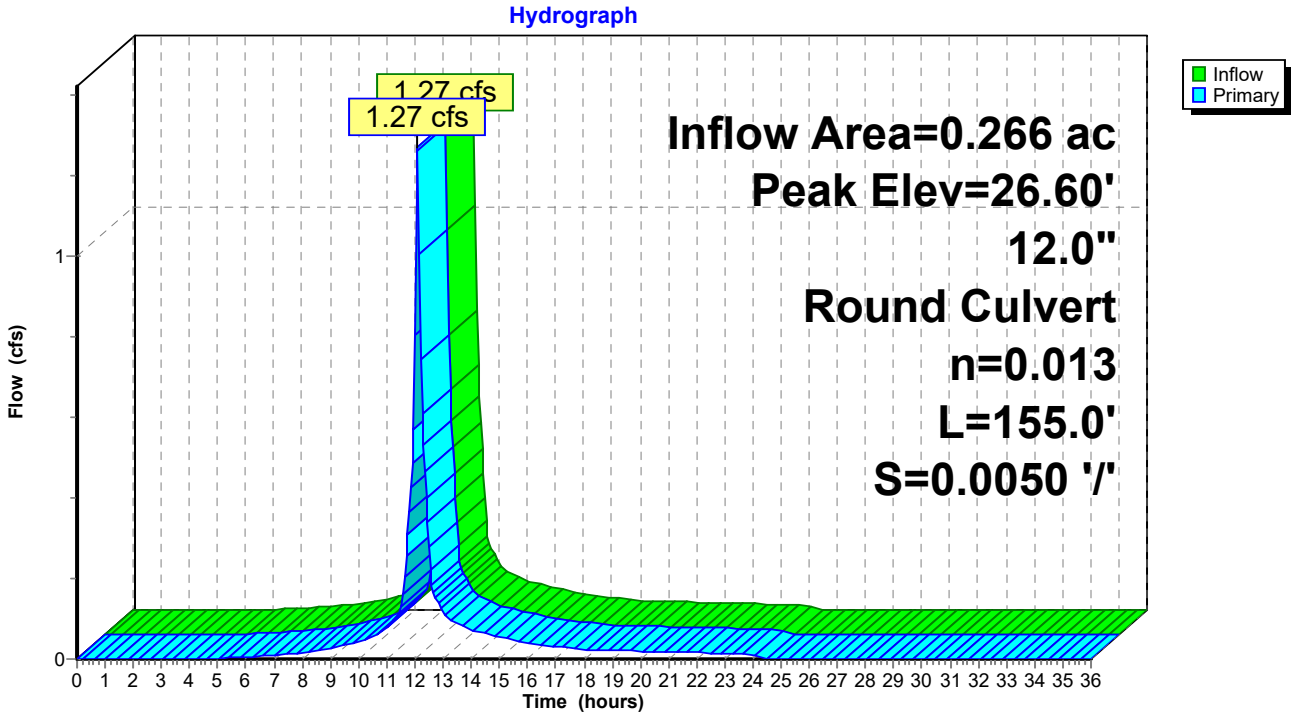
Inflow Area = 0.266 ac, 61.05% Impervious, Inflow Depth = 4.30" for 10-yr event
Inflow = 1.27 cfs @ 12.09 hrs, Volume= 0.095 af
Outflow = 1.27 cfs @ 12.09 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.0 min
Primary = 1.27 cfs @ 12.09 hrs, Volume= 0.095 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 26.60' @ 12.09 hrs
Flood Elev= 29.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	25.91'	**12.0" Round Culvert** L= 155.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 25.91' / 25.14' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=1.24 cfs @ 12.09 hrs HW=26.59' (Free Discharge)
1=Culvert (Barrel Controls 1.24 cfs @ 3.10 fps)

Pond 12P: PDMH #13



Summary for Pond 13P: PCB #12

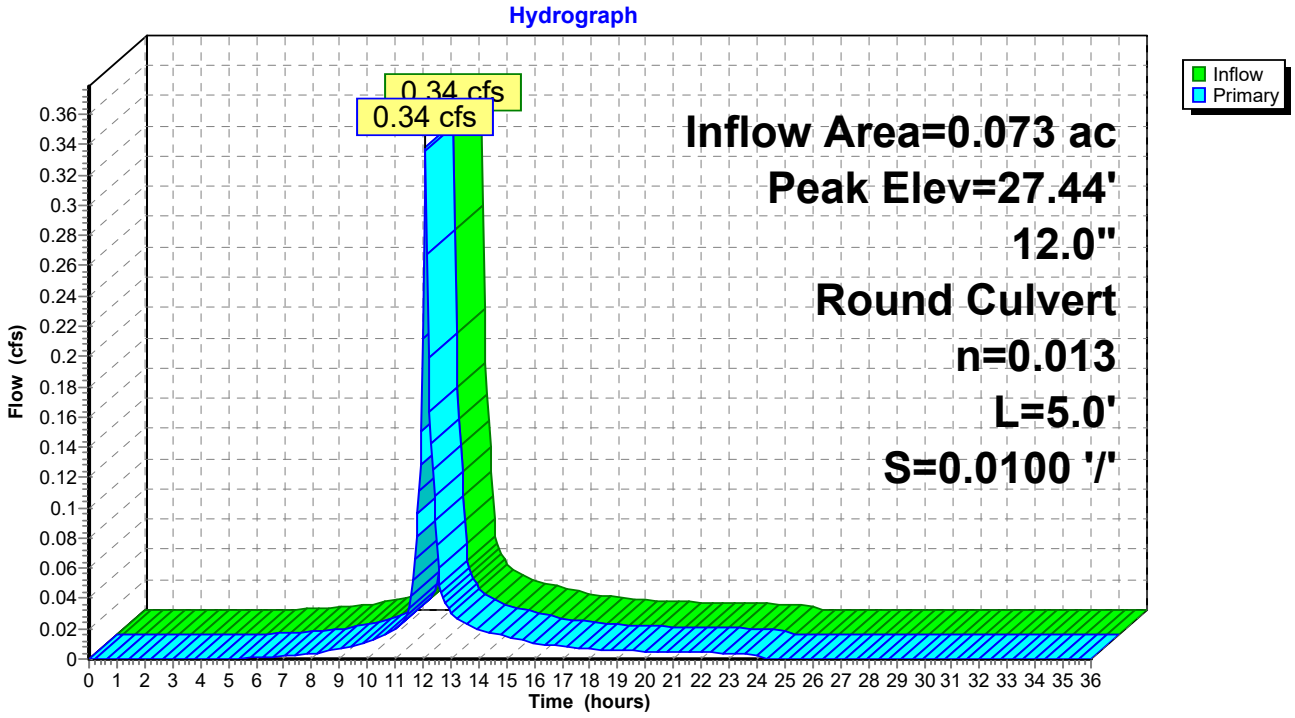
Inflow Area = 0.073 ac, 56.17% Impervious, Inflow Depth = 4.14" for 10-yr event
Inflow = 0.34 cfs @ 12.09 hrs, Volume= 0.025 af
Outflow = 0.34 cfs @ 12.09 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.09 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 27.44' @ 12.09 hrs
Flood Elev= 31.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	27.10'	**12.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 27.10' / 27.05' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.33 cfs @ 12.09 hrs HW=27.43' (Free Discharge)
1=Culvert (Barrel Controls 0.33 cfs @ 2.17 fps)

Pond 13P: PCB #12



Summary for Pond 14P: PCB #13

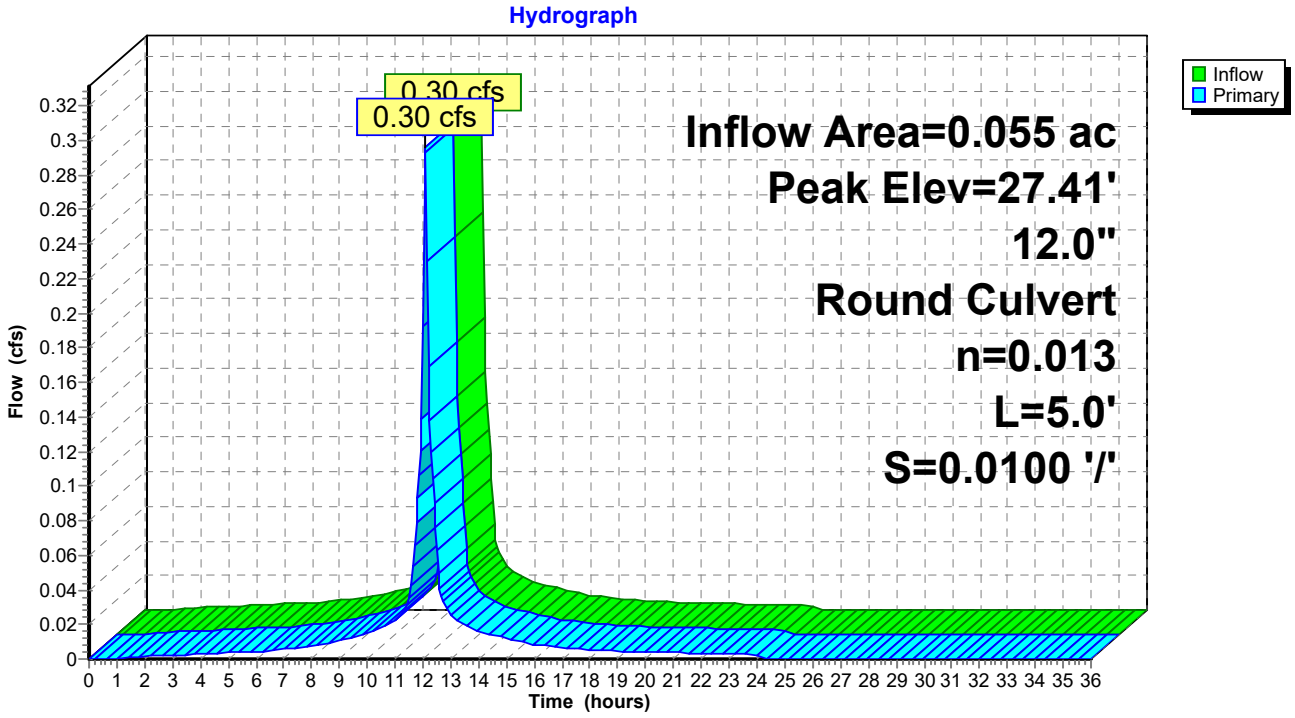
Inflow Area = 0.055 ac,100.00% Impervious, Inflow Depth = 5.36" for 10-yr event
Inflow = 0.30 cfs @ 12.09 hrs, Volume= 0.025 af
Outflow = 0.30 cfs @ 12.09 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min
Primary = 0.30 cfs @ 12.09 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 27.41' @ 12.09 hrs
Flood Elev= 31.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	27.10'	**12.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 27.10' / 27.05' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.29 cfs @ 12.09 hrs HW=27.41' (Free Discharge)
1=Culvert (Barrel Controls 0.29 cfs @ 2.10 fps)

Pond 14P: PCB #13



Summary for Pond 15P: PDMH #15

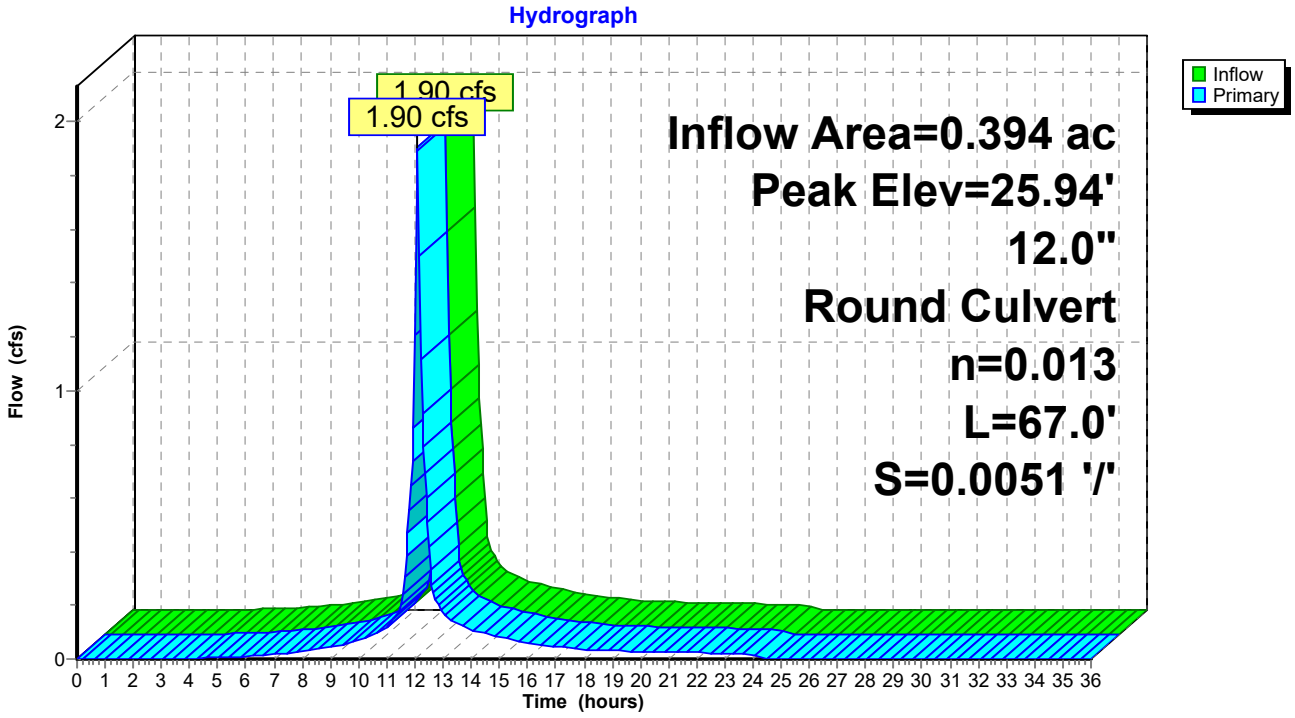
Inflow Area = 0.394 ac, 65.60% Impervious, Inflow Depth = 4.42" for 10-yr event
Inflow = 1.90 cfs @ 12.09 hrs, Volume= 0.145 af
Outflow = 1.90 cfs @ 12.09 hrs, Volume= 0.145 af, Atten= 0%, Lag= 0.0 min
Primary = 1.90 cfs @ 12.09 hrs, Volume= 0.145 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 25.94' @ 12.09 hrs
Flood Elev= 31.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	25.04'	**12.0" Round Culvert** L= 67.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 25.04' / 24.70' S= 0.0051 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=1.86 cfs @ 12.09 hrs HW=25.93' (Free Discharge)
1=Culvert (Barrel Controls 1.86 cfs @ 3.35 fps)

Pond 15P: PDMH #15



Summary for Pond 16P: PCB #14

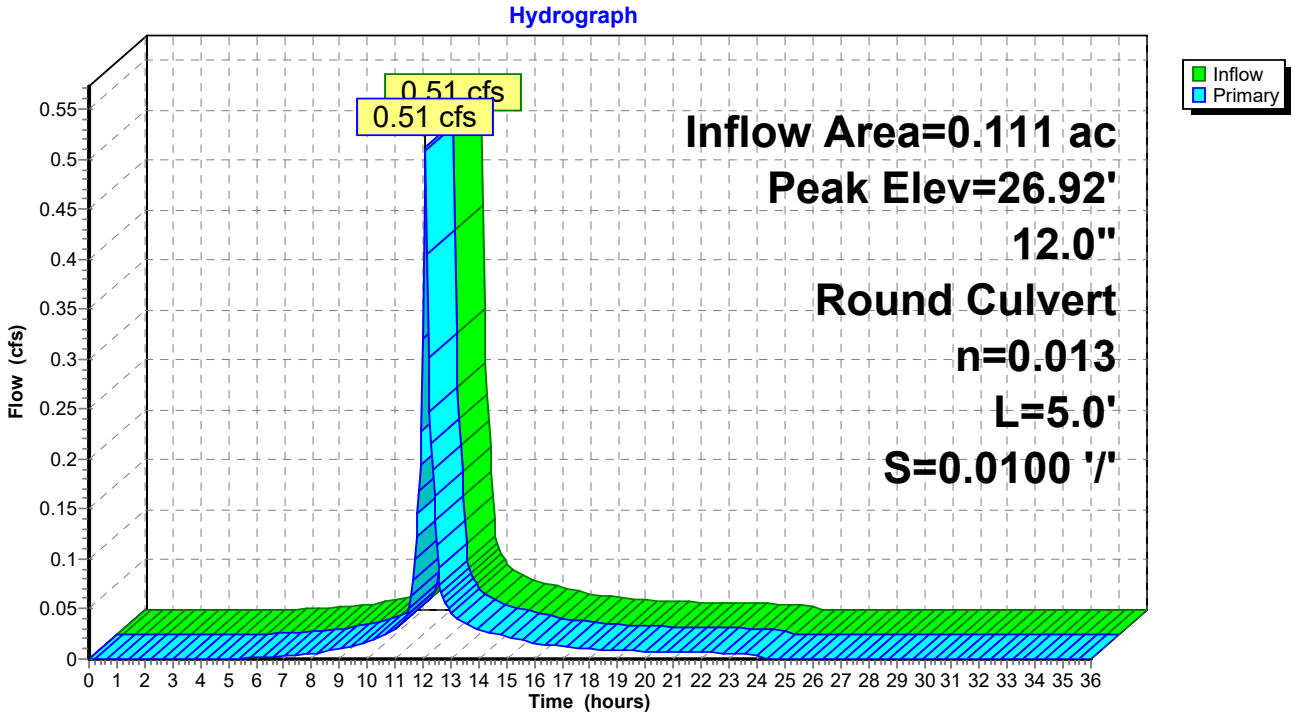
Inflow Area = 0.111 ac, 55.95% Impervious, Inflow Depth = 4.14" for 10-yr event
Inflow = 0.51 cfs @ 12.09 hrs, Volume= 0.038 af
Outflow = 0.51 cfs @ 12.09 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min
Primary = 0.51 cfs @ 12.09 hrs, Volume= 0.038 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 26.92' @ 12.09 hrs
Flood Elev= 30.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.50'	**12.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.50' / 26.45' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.50 cfs @ 12.09 hrs HW=26.92' (Free Discharge)
1=Culvert (Barrel Controls 0.50 cfs @ 2.38 fps)

Pond 16P: PCB #14



Summary for Pond 17P: PDMH #17

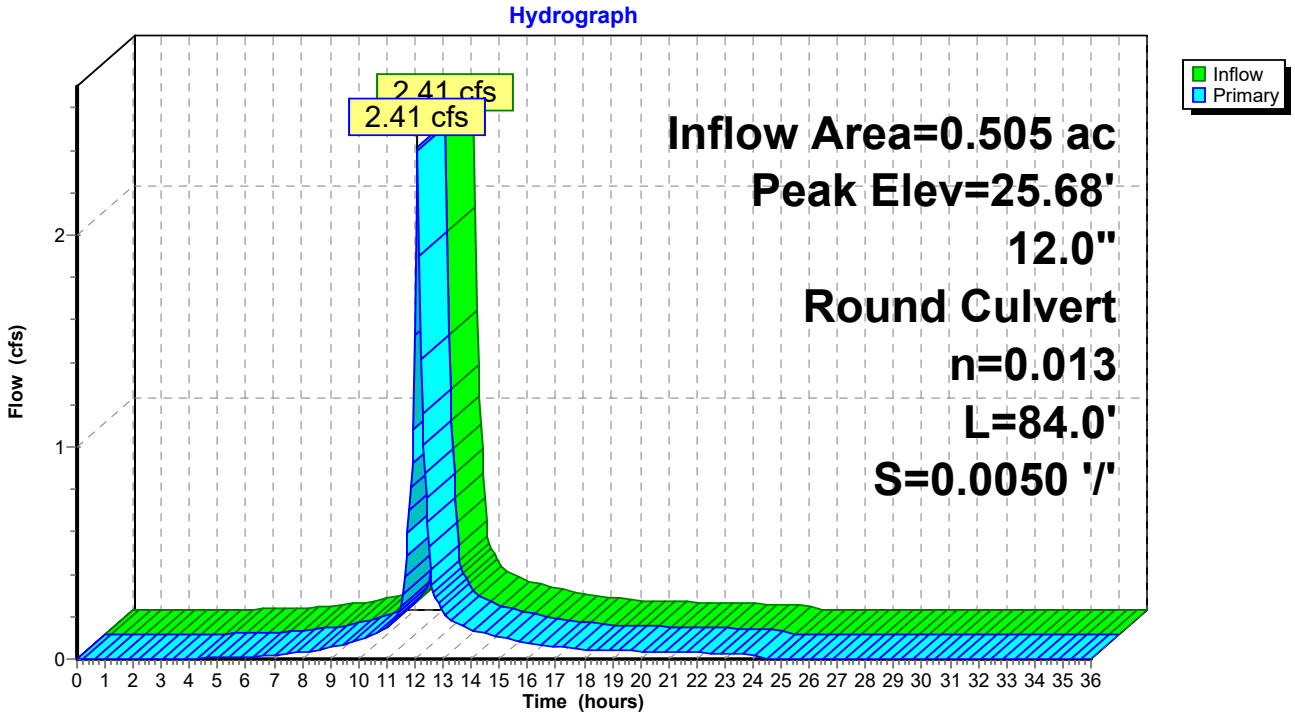
Inflow Area = 0.505 ac, 63.49% Impervious, Inflow Depth = 4.36" for 10-yr event
Inflow = 2.41 cfs @ 12.09 hrs, Volume= 0.183 af
Outflow = 2.41 cfs @ 12.09 hrs, Volume= 0.183 af, Atten= 0%, Lag= 0.0 min
Primary = 2.41 cfs @ 12.09 hrs, Volume= 0.183 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 25.68' @ 12.09 hrs
Flood Elev= 30.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.60'	**12.0" Round Culvert** L= 84.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 24.60' / 24.18' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=2.36 cfs @ 12.09 hrs HW=25.66' (Free Discharge)
1=Culvert (Barrel Controls 2.36 cfs @ 3.53 fps)

Pond 17P: PDMH #17



Summary for Pond 18P: PDMH #15

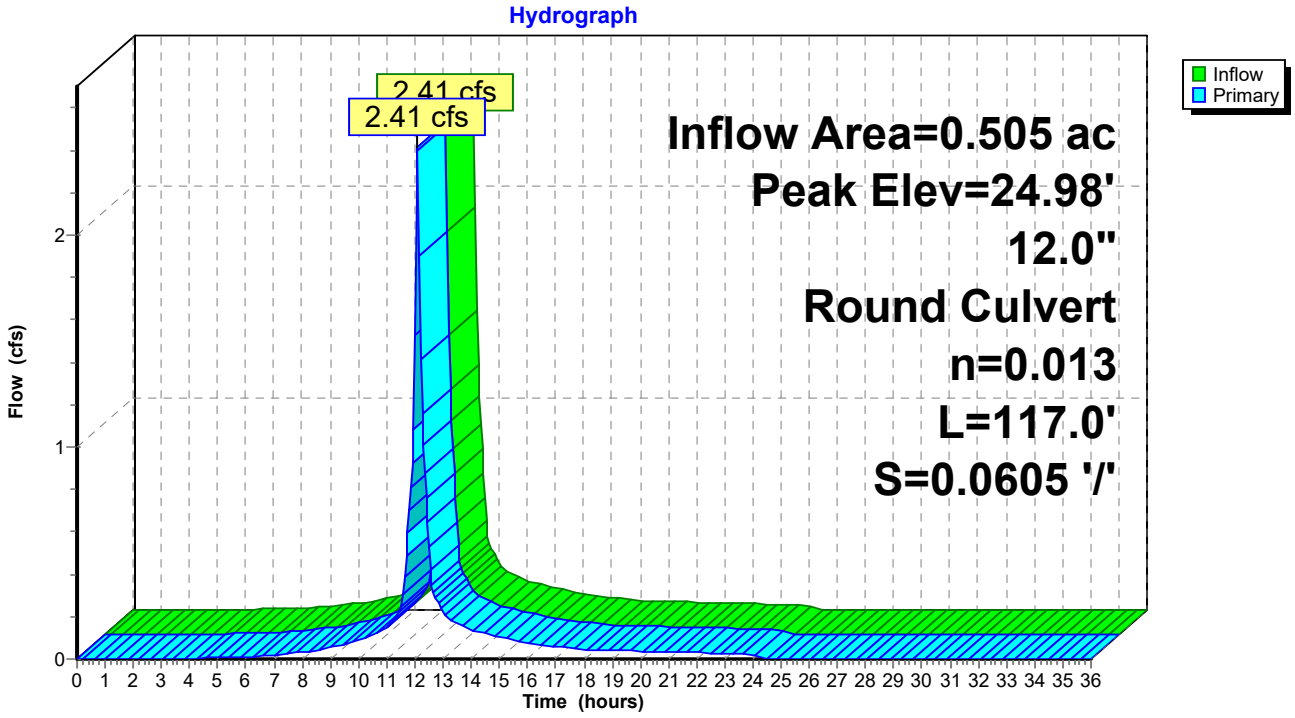
Inflow Area = 0.505 ac, 63.49% Impervious, Inflow Depth = 4.36" for 10-yr event
Inflow = 2.41 cfs @ 12.09 hrs, Volume= 0.183 af
Outflow = 2.41 cfs @ 12.09 hrs, Volume= 0.183 af, Atten= 0%, Lag= 0.0 min
Primary = 2.41 cfs @ 12.09 hrs, Volume= 0.183 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 24.98' @ 12.09 hrs
Flood Elev= 30.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.08'	**12.0" Round Culvert** L= 117.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 24.08' / 17.00' S= 0.0605 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=2.36 cfs @ 12.09 hrs HW=24.97' (Free Discharge)
1=Culvert (Inlet Controls 2.36 cfs @ 3.20 fps)

Pond 18P: PDMH #15



Summary for Pond 19P: Raingarden #1

Inflow Area = 2.276 ac, 29.67% Impervious, Inflow Depth = 3.55" for 10-yr event
Inflow = 6.20 cfs @ 12.20 hrs, Volume= 0.674 af
Outflow = 6.12 cfs @ 12.24 hrs, Volume= 0.650 af, Atten= 1%, Lag= 2.4 min
Primary = 0.12 cfs @ 12.24 hrs, Volume= 0.138 af
Secondary = 6.00 cfs @ 12.24 hrs, Volume= 0.512 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 18.38' @ 12.24 hrs Surf.Area= 3,364 sf Storage= 3,949 cf

Plug-Flow detention time= 99.6 min calculated for 0.649 af (96% of inflow)
Center-of-Mass det. time= 80.5 min (899.0 - 818.5)

Volume	Invert	Avail.Storage	Storage Description
#1	14.00'	6,360 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

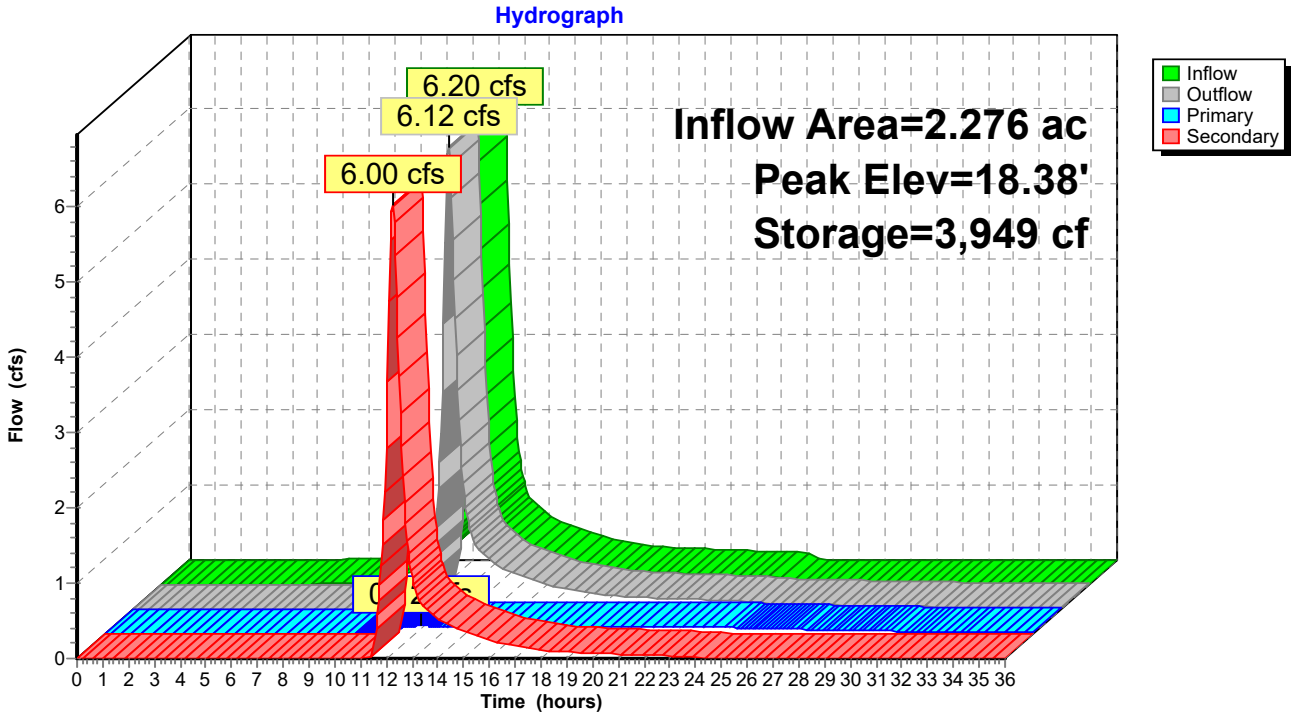
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.00	1,240	0.0	0	0
15.25	1,240	40.0	620	620
15.50	1,240	33.0	102	722
17.00	1,240	5.0	93	815
18.00	2,715	100.0	1,978	2,793
19.00	4,420	100.0	3,568	6,360

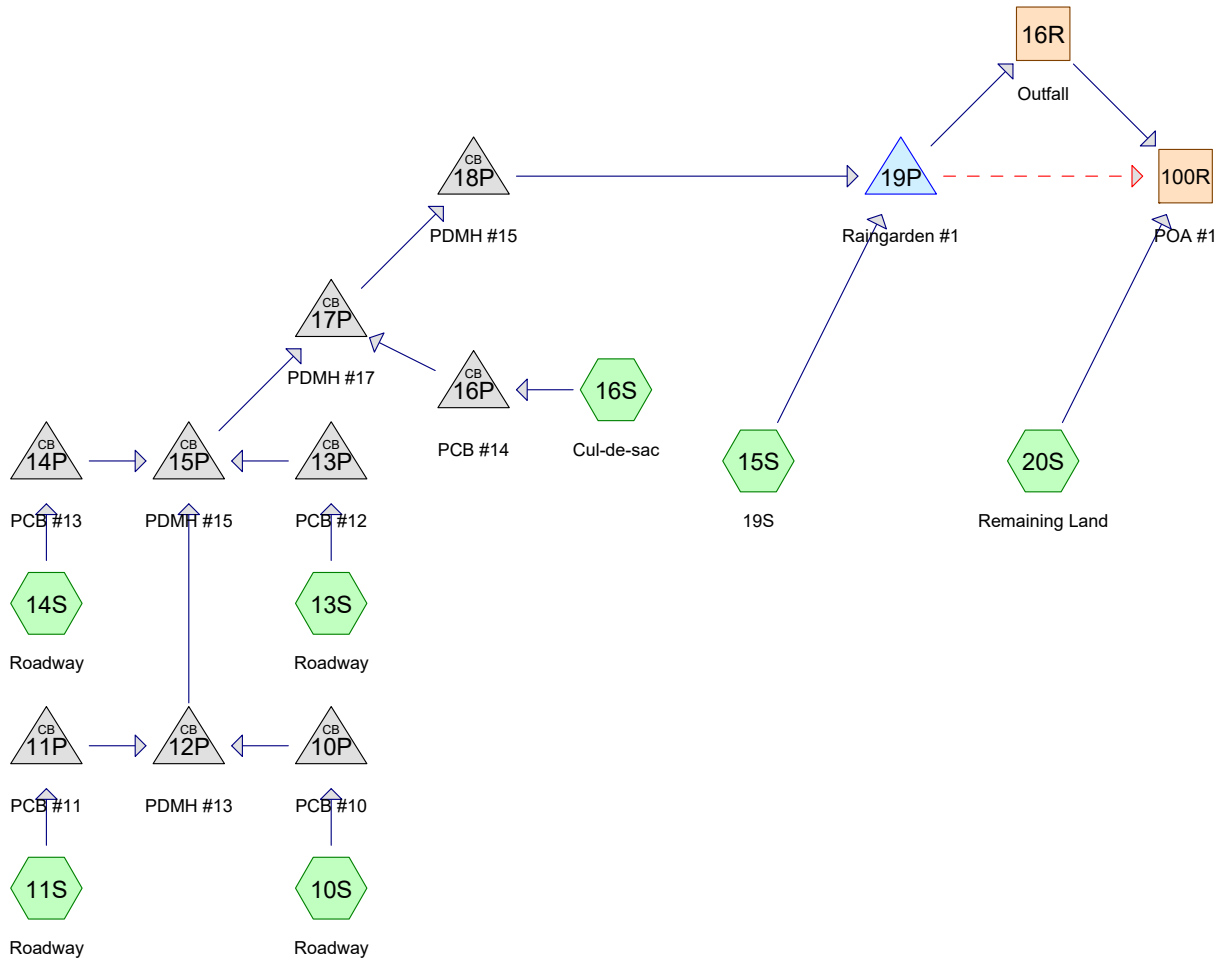
Device	Routing	Invert	Outlet Devices
#1	Primary	14.50'	**6.0" Round Culvert** L= 47.0' Ke= 0.500 Inlet / Outlet Invert= 14.50' / 14.03' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	17.00'	**2.410 in/hr Exfiltration over Surface area above 17.00'** Excluded Surface area = 1,240 sf
#3	Secondary	18.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.12 cfs @ 12.24 hrs HW=18.38' (Free Discharge)
↑—**1=Culvert** (Passes 0.12 cfs of 1.43 cfs potential flow)
↑—**2=Exfiltration** (Exfiltration Controls 0.12 cfs)

Secondary OutFlow Max=5.96 cfs @ 12.24 hrs HW=18.38' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Weir Controls 5.96 cfs @ 1.57 fps)

Pond 19P: Raingarden #1





Subcat Reach Pond Link

Routing Diagram for 5090 Post
Prepared by Altus Engineering, Inc., Printed 1/19/2021

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: Roadway Runoff Area=4,876 sf 59.56% Impervious Runoff Depth=5.69"
Tc=6.0 min CN=88 Runoff=0.70 cfs 0.053 af

Subcatchment 11S: Roadway Runoff Area=6,718 sf 62.13% Impervious Runoff Depth=5.81"
Tc=6.0 min CN=89 Runoff=0.97 cfs 0.075 af

Subcatchment 13S: Roadway Runoff Area=3,183 sf 56.17% Impervious Runoff Depth=5.58"
Tc=6.0 min CN=87 Runoff=0.45 cfs 0.034 af

Subcatchment 14S: Roadway Runoff Area=2,407 sf 100.00% Impervious Runoff Depth=6.86"
Tc=6.0 min CN=98 Runoff=0.38 cfs 0.032 af

Subcatchment 15S: 19S Runoff Area=77,120 sf 20.03% Impervious Runoff Depth=4.68"
Flow Length=480' Tc=17.3 min CN=79 Runoff=6.87 cfs 0.690 af

Subcatchment 16S: Cul-de-sac Runoff Area=4,819 sf 55.95% Impervious Runoff Depth=5.58"
Tc=6.0 min CN=87 Runoff=0.68 cfs 0.051 af

Subcatchment 20S: Remaining Land Runoff Area=52,115 sf 0.00% Impervious Runoff Depth=3.81"
Flow Length=175' Tc=8.5 min CN=71 Runoff=4.83 cfs 0.380 af

Reach 16R: Outfall Avg. Flow Depth=0.09' Max Vel=0.80 fps Inflow=0.13 cfs 0.146 af
n=0.100 L=75.0' S=0.1200 '/' Capacity=4.89 cfs Outflow=0.13 cfs 0.146 af

Reach 100R: POA #1 Avg. Flow Depth=0.35' Max Vel=2.26 fps Inflow=12.63 cfs 1.290 af
n=0.025 L=1.0' S=0.0100 '/' Capacity=120.83 cfs Outflow=12.63 cfs 1.290 af

Pond 10P: PCB #10 Peak Elev=26.57' Inflow=0.70 cfs 0.053 af
12.0" Round Culvert n=0.013 L=8.0' S=0.0050 '/' Outflow=0.70 cfs 0.053 af

Pond 11P: PCB #11 Peak Elev=26.68' Inflow=0.97 cfs 0.075 af
12.0" Round Culvert n=0.013 L=8.0' S=0.0050 '/' Outflow=0.97 cfs 0.075 af

Pond 12P: PDMH #13 Peak Elev=26.72' Inflow=1.67 cfs 0.128 af
12.0" Round Culvert n=0.013 L=155.0' S=0.0050 '/' Outflow=1.67 cfs 0.128 af

Pond 13P: PCB #12 Peak Elev=27.49' Inflow=0.45 cfs 0.034 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.45 cfs 0.034 af

Pond 14P: PCB #13 Peak Elev=27.46' Inflow=0.38 cfs 0.032 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.38 cfs 0.032 af

Pond 15P: PDMH #15 Peak Elev=26.15' Inflow=2.50 cfs 0.193 af
12.0" Round Culvert n=0.013 L=67.0' S=0.0051 '/' Outflow=2.50 cfs 0.193 af

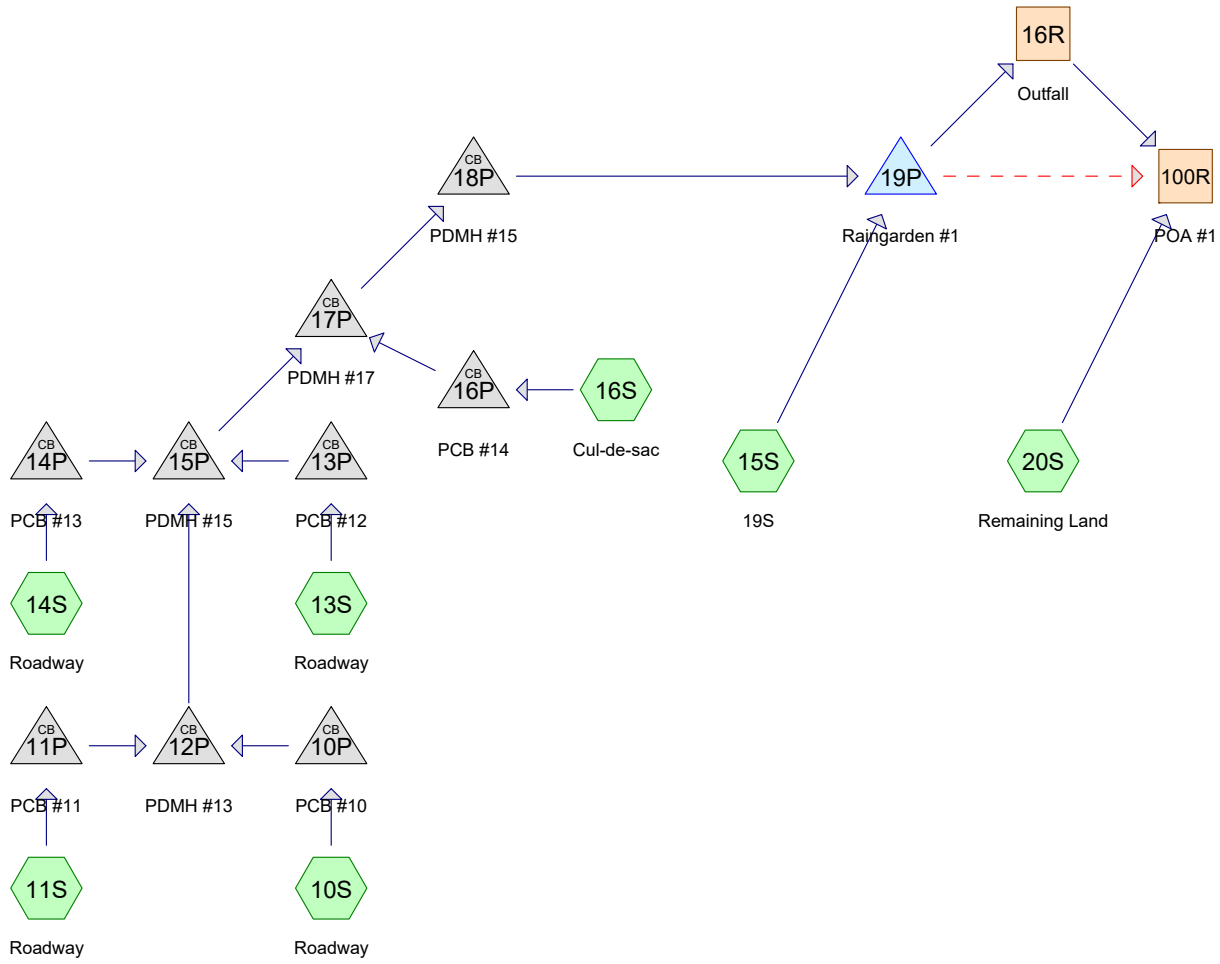
Pond 16P: PCB #14 Peak Elev=27.00' Inflow=0.68 cfs 0.051 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.68 cfs 0.051 af

Pond 17P: PDMH #17 Peak Elev=26.24' Inflow=3.18 cfs 0.245 af
12.0" Round Culvert n=0.013 L=84.0' S=0.0050 '/' Outflow=3.18 cfs 0.245 af

Pond 18P: PDMH #15 Peak Elev=25.28' Inflow=3.18 cfs 0.245 af
12.0" Round Culvert n=0.013 L=117.0' S=0.0605 '/' Outflow=3.18 cfs 0.245 af

Pond 19P: Raingarden #1 Peak Elev=18.47' Storage=4,250 cf Inflow=8.57 cfs 0.935 af
Primary=0.13 cfs 0.146 af Secondary=8.36 cfs 0.764 af Outflow=8.49 cfs 0.911 af

Total Runoff Area = 3.472 ac Runoff Volume = 1.314 af Average Runoff Depth = 4.54"
80.55% Pervious = 2.797 ac 19.45% Impervious = 0.675 ac



Subcat Reach Pond Link

Routing Diagram for 5090 Post
Prepared by Altus Engineering, Inc., Printed 1/19/2021

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: Roadway Runoff Area=4,876 sf 59.56% Impervious Runoff Depth=7.06"
Tc=6.0 min CN=88 Runoff=0.85 cfs 0.066 af

Subcatchment 11S: Roadway Runoff Area=6,718 sf 62.13% Impervious Runoff Depth=7.18"
Tc=6.0 min CN=89 Runoff=1.19 cfs 0.092 af

Subcatchment 13S: Roadway Runoff Area=3,183 sf 56.17% Impervious Runoff Depth=6.94"
Tc=6.0 min CN=87 Runoff=0.55 cfs 0.042 af

Subcatchment 14S: Roadway Runoff Area=2,407 sf 100.00% Impervious Runoff Depth=8.26"
Tc=6.0 min CN=98 Runoff=0.45 cfs 0.038 af

Subcatchment 15S: 19S Runoff Area=77,120 sf 20.03% Impervious Runoff Depth=5.98"
Flow Length=480' Tc=17.3 min CN=79 Runoff=8.72 cfs 0.882 af

Subcatchment 16S: Cul-de-sac Runoff Area=4,819 sf 55.95% Impervious Runoff Depth=6.94"
Tc=6.0 min CN=87 Runoff=0.84 cfs 0.064 af

Subcatchment 20S: Remaining Land Runoff Area=52,115 sf 0.00% Impervious Runoff Depth=5.02"
Flow Length=175' Tc=8.5 min CN=71 Runoff=6.36 cfs 0.500 af

Reach 16R: Outfall Avg. Flow Depth=0.09' Max Vel=0.81 fps Inflow=0.13 cfs 0.153 af
n=0.100 L=75.0' S=0.1200 '/' Capacity=4.89 cfs Outflow=0.13 cfs 0.153 af

Reach 100R: POA #1 Avg. Flow Depth=0.40' Max Vel=2.44 fps Inflow=16.20 cfs 1.660 af
n=0.025 L=1.0' S=0.0100 '/' Capacity=120.83 cfs Outflow=16.20 cfs 1.660 af

Pond 10P: PCB #10 Peak Elev=26.63' Inflow=0.85 cfs 0.066 af
12.0" Round Culvert n=0.013 L=8.0' S=0.0050 '/' Outflow=0.85 cfs 0.066 af

Pond 11P: PCB #11 Peak Elev=26.75' Inflow=1.19 cfs 0.092 af
12.0" Round Culvert n=0.013 L=8.0' S=0.0050 '/' Outflow=1.19 cfs 0.092 af

Pond 12P: PDMH #13 Peak Elev=26.85' Inflow=2.04 cfs 0.158 af
12.0" Round Culvert n=0.013 L=155.0' S=0.0050 '/' Outflow=2.04 cfs 0.158 af

Pond 13P: PCB #12 Peak Elev=27.54' Inflow=0.55 cfs 0.042 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.55 cfs 0.042 af

Pond 14P: PCB #13 Peak Elev=27.49' Inflow=0.45 cfs 0.038 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.45 cfs 0.038 af

Pond 15P: PDMH #15 Peak Elev=26.55' Inflow=3.05 cfs 0.238 af
12.0" Round Culvert n=0.013 L=67.0' S=0.0051 '/' Outflow=3.05 cfs 0.238 af

Pond 16P: PCB #14 Peak Elev=27.06' Inflow=0.84 cfs 0.064 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0100 '/' Outflow=0.84 cfs 0.064 af

Pond 17P: PDMH #17 Peak Elev=26.74' Inflow=3.88 cfs 0.302 af
12.0" Round Culvert n=0.013 L=84.0' S=0.0050 '/' Outflow=3.88 cfs 0.302 af

Pond 18P: PDMH #15 Peak Elev=25.63' Inflow=3.88 cfs 0.302 af
12.0" Round Culvert n=0.013 L=117.0' S=0.0605 '/' Outflow=3.88 cfs 0.302 af

Pond 19P: Raingarden #1 Peak Elev=18.54' Storage=4,510 cf Inflow=10.80 cfs 1.184 af
Primary=0.13 cfs 0.153 af Secondary=10.57 cfs 1.007 af Outflow=10.71 cfs 1.160 af

Total Runoff Area = 3.472 ac Runoff Volume = 1.684 af Average Runoff Depth = 5.82"
80.55% Pervious = 2.797 ac 19.45% Impervious = 0.675 ac

Summary for Subcatchment 10S: Roadway

Runoff = 0.85 cfs @ 12.09 hrs, Volume= 0.066 af, Depth= 7.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-yr Rainfall=8.50"

Area (sf)	CN	Description
2,904	98	Paved parking, HSG C
0	98	Roofs, HSG C
1,972	74	>75% Grass cover, Good, HSG C
4,876	88	Weighted Average
1,972		40.44% Pervious Area
2,904		59.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 11S: Roadway

Runoff = 1.19 cfs @ 12.09 hrs, Volume= 0.092 af, Depth= 7.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-yr Rainfall=8.50"

Area (sf)	CN	Description
3,359	98	Paved parking, HSG C
815	98	Roofs, HSG C
2,544	74	>75% Grass cover, Good, HSG C
6,718	89	Weighted Average
2,544		37.87% Pervious Area
4,174		62.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 12S: Roadway

Runoff = 0.55 cfs @ 12.09 hrs, Volume= 0.042 af, Depth= 6.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-yr Rainfall=8.50"

Area (sf)	CN	Description
1,788	98	Paved parking, HSG C
0	98	Roofs, HSG C
1,395	74	>75% Grass cover, Good, HSG C
3,183	87	Weighted Average
1,395		43.83% Pervious Area
1,788		56.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 13S: Roadway

Runoff = 0.45 cfs @ 12.09 hrs, Volume= 0.038 af, Depth= 8.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-yr Rainfall=8.50"

Area (sf)	CN	Description
2,407	98	Paved parking, HSG C
0	98	Roofs, HSG C
0	74	>75% Grass cover, Good, HSG C
2,407	98	Weighted Average
2,407		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 14S: Cul-de-sac

Runoff = 0.84 cfs @ 12.09 hrs, Volume= 0.064 af, Depth= 6.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-yr Rainfall=8.50"

Area (sf)	CN	Description
2,696	98	Paved parking, HSG C
0	98	Roofs, HSG C
2,123	74	>75% Grass cover, Good, HSG C
4,819	87	Weighted Average
2,123		44.05% Pervious Area
2,696		55.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 15S: Home Sites

Runoff = 8.72 cfs @ 12.23 hrs, Volume= 0.882 af, Depth= 5.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-yr Rainfall=8.50"

Area (sf)	CN	Description
5,444	98	Paved parking, HSG C
10,000	98	Roofs, HSG C
61,676	74	>75% Grass cover, Good, HSG C
77,120	79	Weighted Average
61,676		79.97% Pervious Area
15,444		20.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.69"
2.0	315	0.0300	2.60		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	65	0.0600	10.80	45.37	**Channel Flow,** Area= 4.2 sf Perim= 5.0' r= 0.84' n= 0.030 Earth, grassed & winding
17.3	480	Total			

Summary for Subcatchment 20S: Remaining Land

Runoff = 6.36 cfs @ 12.12 hrs, Volume= 0.500 af, Depth= 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-yr Rainfall=8.50"

Area (sf)	CN	Description
40,658	70	Woods, Good, HSG C
11,457	74	>75% Grass cover, Good, HSG C
52,115	71	Weighted Average
52,115		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	35	0.0850	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.69"
5.3	50	0.1400	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.69"
1.0	90	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.5	175	Total			

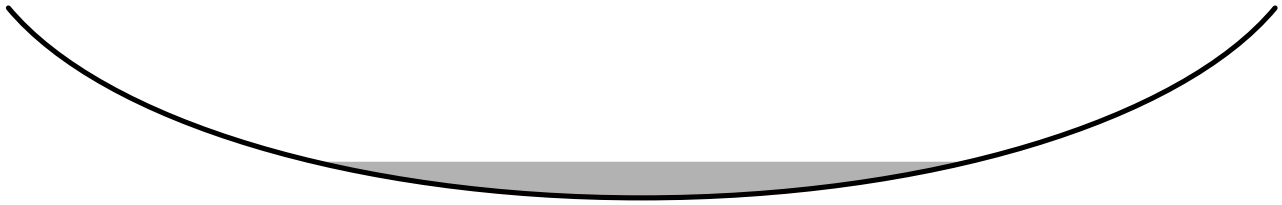
Summary for Reach 16R: Outfall

Inflow Area = 2.276 ac, 29.67% Impervious, Inflow Depth > 0.81" for 50-yr event
Inflow = 0.13 cfs @ 12.23 hrs, Volume= 0.153 af
Outflow = 0.13 cfs @ 12.27 hrs, Volume= 0.153 af, Atten= 0%, Lag= 2.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.81 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 2.0 min

Peak Storage= 12 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 0.50' Flow Area= 2.0 sf, Capacity= 4.89 cfs

6.00' x 0.50' deep Parabolic Channel, n= 0.100 Earth, dense brush, high stage
Length= 75.0' Slope= 0.1200 '/'
Inlet Invert= 14.00', Outlet Invert= 5.00'



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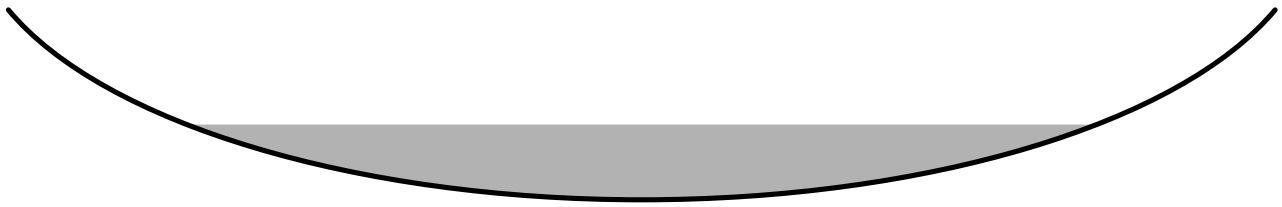
Summary for Reach 100R: POA #1

Inflow Area = 3.472 ac, 19.45% Impervious, Inflow Depth > 5.74" for 50-yr event
Inflow = 16.20 cfs @ 12.16 hrs, Volume= 1.660 af
Outflow = 16.20 cfs @ 12.16 hrs, Volume= 1.660 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.44 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.69 fps, Avg. Travel Time= 0.0 min

Peak Storage= 7 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 1.00' Flow Area= 26.7 sf, Capacity= 120.83 cfs

40.00' x 1.00' deep Parabolic Channel, n= 0.025 Earth, clean & winding
Length= 1.0' Slope= 0.0100 '/'
Inlet Invert= 1.00', Outlet Invert= 0.99'



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Summary for Pond 10P: PCB #10

Inflow Area = 0.112 ac, 59.56% Impervious, Inflow Depth = 7.06" for 50-yr event
Inflow = 0.85 cfs @ 12.09 hrs, Volume= 0.066 af
Outflow = 0.85 cfs @ 12.09 hrs, Volume= 0.066 af, Atten= 0%, Lag= 0.0 min
Primary = 0.85 cfs @ 12.09 hrs, Volume= 0.066 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 26.66' @ 12.09 hrs
Flood Elev= 28.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.08'	**12.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.08' / 26.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.09 hrs HW=26.65' (Free Discharge)
1=Culvert (Barrel Controls 0.83 cfs @ 2.62 fps)

Summary for Pond 11P: PCB #11

Inflow Area = 0.266 ac, 61.05% Impervious, Inflow Depth = 7.13" for 50-yr event
Inflow = 2.04 cfs @ 12.09 hrs, Volume= 0.158 af
Outflow = 2.04 cfs @ 12.09 hrs, Volume= 0.158 af, Atten= 0%, Lag= 0.0 min
Primary = 2.04 cfs @ 12.09 hrs, Volume= 0.158 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 26.83' @ 12.09 hrs
Flood Elev= 28.57'

Device	Routing	Invert	Outlet Devices
#1	Primary	25.90'	**12.0" Round Culvert** L= 167.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 25.90' / 25.06' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.99 cfs @ 12.09 hrs HW=26.81' (Free Discharge)
1=Culvert (Barrel Controls 1.99 cfs @ 3.47 fps)

Summary for Pond 12P: PCB #12

Inflow Area = 0.394 ac, 65.60% Impervious, Inflow Depth = 7.25" for 50-yr event
Inflow = 3.05 cfs @ 12.09 hrs, Volume= 0.238 af
Outflow = 3.05 cfs @ 12.09 hrs, Volume= 0.238 af, Atten= 0%, Lag= 0.0 min
Primary = 3.05 cfs @ 12.09 hrs, Volume= 0.238 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 26.47' @ 12.09 hrs
Flood Elev= 30.13'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.96'	**12.0" Round Culvert** L= 64.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 24.96' / 24.64' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.97 cfs @ 12.09 hrs HW=26.42' (Free Discharge)
1=Culvert (Barrel Controls 2.97 cfs @ 3.78 fps)

Summary for Pond 13P: PCB #13

Inflow Area = 0.055 ac,100.00% Impervious, Inflow Depth = 8.26" for 50-yr event
Inflow = 0.45 cfs @ 12.09 hrs, Volume= 0.038 af
Outflow = 0.45 cfs @ 12.09 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min
Primary = 0.45 cfs @ 12.09 hrs, Volume= 0.038 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 26.99' @ 12.09 hrs
Flood Elev= 30.13'

Device	Routing	Invert	Outlet Devices
#1	Primary	26.63'	**12.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.63' / 26.47' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.44 cfs @ 12.09 hrs HW=26.99' (Free Discharge)
1=Culvert (Barrel Controls 0.44 cfs @ 2.57 fps)

Summary for Pond 14P: PCB #14

Inflow Area = 0.505 ac, 63.49% Impervious, Inflow Depth = 7.18" for 50-yr event
Inflow = 3.88 cfs @ 12.09 hrs, Volume= 0.302 af
Outflow = 3.88 cfs @ 12.09 hrs, Volume= 0.302 af, Atten= 0%, Lag= 0.0 min
Primary = 3.88 cfs @ 12.09 hrs, Volume= 0.302 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 26.69' @ 12.09 hrs
Flood Elev= 28.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.54'	**12.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 24.54' / 24.11' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.78 cfs @ 12.09 hrs HW=26.61' (Free Discharge)
1=Culvert (Barrel Controls 3.78 cfs @ 4.82 fps)

Summary for Pond 15P: PDMH #15

Inflow Area = 0.505 ac, 63.49% Impervious, Inflow Depth = 7.18" for 50-yr event
Inflow = 3.88 cfs @ 12.09 hrs, Volume= 0.302 af
Outflow = 3.88 cfs @ 12.09 hrs, Volume= 0.302 af, Atten= 0%, Lag= 0.0 min
Primary = 3.88 cfs @ 12.09 hrs, Volume= 0.302 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 25.56' @ 12.09 hrs
Flood Elev= 30.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	24.01'	**12.0" Round Culvert** L= 117.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 24.01' / 17.00' S= 0.0599 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=3.78 cfs @ 12.09 hrs HW=25.51' (Free Discharge)
1=Culvert (Inlet Controls 3.78 cfs @ 4.82 fps)

Summary for Pond 16P: Raingarden #1

Inflow Area = 2.276 ac, 29.67% Impervious, Inflow Depth = 6.24" for 50-yr event
Inflow = 10.80 cfs @ 12.20 hrs, Volume= 1.184 af
Outflow = 10.71 cfs @ 12.23 hrs, Volume= 1.160 af, Atten= 1%, Lag= 2.0 min
Primary = 0.13 cfs @ 12.23 hrs, Volume= 0.153 af
Secondary = 10.57 cfs @ 12.23 hrs, Volume= 1.007 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 18.54' @ 12.23 hrs Surf.Area= 3,637 sf Storage= 4,510 cf

Plug-Flow detention time= 63.1 min calculated for 1.158 af (98% of inflow)
Center-of-Mass det. time= 52.0 min (855.6 - 803.7)

Volume	Invert	Avail.Storage	Storage Description
#1	14.00'	6,360 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.00	1,240	0.0	0	0
15.25	1,240	40.0	620	620
15.50	1,240	33.0	102	722
17.00	1,240	5.0	93	815
18.00	2,715	100.0	1,978	2,793
19.00	4,420	100.0	3,568	6,360

Device	Routing	Invert	Outlet Devices
#1	Primary	14.50'	**6.0" Round Culvert** L= 47.0' Ke= 0.500 Inlet / Outlet Invert= 14.50' / 14.03' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	17.00'	**2.410 in/hr Exfiltration over Surface area above 17.00'**

Excluded Surface area = 1,240 sf

#3	Secondary	18.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.13 cfs @ 12.23 hrs HW=18.54' (Free Discharge)
↑—**1=Culvert** (Passes 0.13 cfs of 1.46 cfs potential flow)
↑—**2=Exfiltration** (Exfiltration Controls 0.13 cfs)

Secondary OutFlow Max=10.50 cfs @ 12.23 hrs HW=18.54' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Weir Controls 10.50 cfs @ 1.95 fps)

Section 5

BMP and Riprap Calculations

ALTUS
ENGINEERING, INC.

FILTRATION PRACTICE DESIGN CRITERIA
(Env-Wq 1508.07)

Type/Node Name: **Pond 16P - Raingarden 1**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable

Yes		Have you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.07(a)?	
2.25	ac	A = Area draining to the practice	
0.68	ac	A_I = Impervious area draining to the practice	
0.30	decimal	I = percent impervious area draining to the practice, in decimal form	
0.32	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.72	ac-in	WQV= 1" x Rv x A	
2,630	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
657	cf	25% x WQV (check calc for sediment forebay volume)	
1,972	cf	75% x WQV (check calc for surface sand filter volume)	
Deep Sump CB		Method of Pretreatment? (not required for clean or roof runoff)	
	cf	V_{SED} = sediment forebay volume, if used for pretreatment	← ≥ 25%WQV
2,427	sf	A_{SA} = surface area of the practice	
-	iph	$Ksat_{DESIGN}$ = design infiltration rate[1]	
Yes	Yes/No	If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided?	
-	hours	T_{DRAIN} = drain time = V / (A_{SA} * I_{DESIGN})	← ≤ 72-hrs
15.50	feet	E_{FC} = elevation of the bottom of the filter course material[2]	
14.50	feet	E_{UD} = invert elevation of the underdrain (UD), if applicable	
12.00	feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
12.00	feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
1.00	feet	$D_{FC\ to\ UD}$ = depth to UD from the bottom of the filter course	← ≥ 1'
3.50	feet	$D_{FC\ to\ ROCK}$ = depth to bedrock from the bottom of the filter course	← ≥ 1'
3.50	feet	$D_{FC\ to\ SHWT}$ = depth to SHWT from the bottom of the filter course	← ≥ 1'
18.54	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
19.00	ft	Elevation of the top of the practice	
YES		50 peak elevation ≤ Elevation of the top of the practice	← yes

If a surface sand filter or underground sand filter is proposed:

YES	ac	Drainage Area check.	← < 10 ac
	cf	V = volume of storage[3] (attach a stage-storage table)	← ≥ 75%WQV
	inches	D_{FC} = filter course thickness	← 18", or 24" if within GPA
Sheet		Note what sheet in the plan set contains the filter course specification	
	Yes/No	Access grate provided?	← yes

If a bioretention area is proposed:

YES	ac	Drainage Area no larger than 5 ac?	← **yes**
2,793	cf	V = volume of storage[3] (attach a stage-storage table)	← **≥ WQV**
18.0	inches	D_{FC} = filter course thickness	← **18", or 24" if within GPA**
Sheet		Note what sheet in the plan set contains the filter course specification	
3.0	:1	Pond side slopes	← **≥3:1**
Sheet		Note what sheet in the plan set contains the planting plans and surface cover	

If porous pavement is proposed:

		Type of pavement proposed (concrete? Asphalt? Pavers? Etc)	
	acres	A_{SA} = surface area of the pervious pavement	
	:1	ratio of the contributing area to the pervious surface area	← **≤ 5:1**
	inches	D_{FC} = filter course thickness	← **12", or 18" if within GPA**
Sheet		Note what sheet in the plan set contains the filter course spec.	← **304.1 sand**

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.

2. See lines 34, 40 and 48 for required depths of filter media.

3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes:

RIPRAP CALCULATIONS

Location: PDMH #15 - 12" Culvert (HydroCAD Pond #15P)

Date: 12/31/2020 By: EBS

La	Apron Length, Ft.	Calculated
Tw	**Tailwater, Ft.**	**1.4**
Q	**Flow, 10 Yr Storm, CFS**	**2.41**
D50	Median Stone Dia., Ft.	Calculated
D	Depth of Stone, In	Calculated
Do	**Pipe Diameter, Ft**	**1.00**
W1	Width @ Start, Ft.	Calculated
W2	Width @ End, Ft	Calculated
W	**Width of Channel**	**5**

W1:

3(Do)= 3 Ft.

Width @ Start: 3 Ft.

D50: $\frac{0.02(Q)^{4/3}}{Tw(Do)}$

D50= 0.05 Ft.

or 0.6 In.

Median Stone Size: 6 In.

D: 2.25*D50

Depth of Riprap: 14 In.

La: If Tw<= Do/2:

Do/2= 0.5 Ft.

$La=1.8Q/Do^{3/2} + 7Do$

Tw= 1.38 Ft.

and W2=width of channel

or

W2=3Do+La

If Tw>Do/2:

$La=3Q/Do^{3/2} + 7Do$

and W2=width of channel

or

W2=3Do+0.4La

Length of Apron: 15 Ft.

Width @ End: 5 Ft.

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Section 6

NRCC Extreme Precipitation Table

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Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New Hampshire
Location	
Longitude	70.763 degrees West
Latitude	43.072 degrees North
Elevation	0 feet
Date/Time	Wed, 23 Dec 2020 12:00:25 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	Add 15%		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.50	0.65	0.81	1.04	**1yr**	0.70	0.98	1.21	1.56	2.03	2.66	3.06		2.35	2.81	3.22	3.94	4.55	**1yr**
2yr	0.32	0.50	0.62	0.81	1.02	1.30	**2yr**	0.88	1.18	1.52	1.94	2.49	3.21	3.69		2.84	3.43	3.94	4.68	5.33	**2yr**
5yr	0.37	0.58	0.73	0.98	1.25	1.61	**5yr**	1.08	1.47	1.89	2.43	3.14	4.07	4.68		3.60	4.40	5.04	5.94	6.70	**5yr**
10yr	0.41	0.65	0.82	1.12	1.45	1.89	**10yr**	1.25	1.73	2.23	2.89	3.75	4.87	5.60		4.31	5.32	6.09	7.11	7.98	**10yr**
25yr	0.48	0.76	0.97	1.34	1.77	2.34	**25yr**	1.53	2.14	2.78	3.63	4.74	6.17	7.10		5.46	6.83	7.80	9.03	10.05	**25yr**
50yr	0.54	0.86	1.10	1.54	2.07	2.76	**50yr**	1.79	2.53	3.29	4.32	5.66	7.39	8.50		6.54	8.25	9.42	10.81	11.98	**50yr**
100yr	0.60	0.97	1.25	1.77	2.42	3.26	**100yr**	2.09	2.98	3.90	5.16	6.77	8.85	10.18		7.83	9.98	11.38	12.96	14.27	**100yr**
200yr	0.67	1.10	1.43	2.05	2.82	3.83	**200yr**	2.44	3.52	4.62	6.13	8.08	10.61	12.55	**200yr**	9.39	12.07	13.76	15.55	17.02	**200yr**
500yr	0.80	1.31	1.71	2.48	3.48	4.76	**500yr**	3.00	4.38	5.76	7.70	10.22	13.48	16.14	**500yr**	11.93	15.52	17.67	19.78	21.49	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.23	0.36	0.44	0.59	0.72	0.88	**1yr**	0.63	0.86	0.92	1.33	1.68	2.24	2.49	**1yr**	1.98	2.40	2.87	3.18	3.90	**1yr**
2yr	0.31	0.49	0.60	0.81	1.00	1.19	**2yr**	0.86	1.16	1.37	1.82	2.34	3.06	3.45	**2yr**	2.71	3.32	3.82	4.55	5.08	**2yr**
5yr	0.35	0.54	0.67	0.92	1.17	1.40	**5yr**	1.01	1.37	1.61	2.12	2.73	3.79	4.19	**5yr**	3.35	4.03	4.72	5.53	6.24	**5yr**
10yr	0.39	0.59	0.73	1.03	1.33	1.60	**10yr**	1.14	1.56	1.80	2.39	3.06	4.37	4.86	**10yr**	3.87	4.67	5.44	6.41	7.20	**10yr**
25yr	0.44	0.67	0.83	1.19	1.56	1.90	**25yr**	1.35	1.86	2.10	2.75	3.53	4.72	5.89	**25yr**	4.18	5.66	6.65	7.79	8.68	**25yr**
50yr	0.48	0.73	0.91	1.31	1.76	2.17	**50yr**	1.52	2.12	2.35	3.07	3.93	5.33	6.80	**50yr**	4.72	6.54	7.72	9.04	10.02	**50yr**
100yr	0.54	0.81	1.01	1.47	2.01	2.47	**100yr**	1.73	2.41	2.63	3.41	4.35	6.00	7.85	**100yr**	5.31	7.55	8.98	10.51	11.56	**100yr**
200yr	0.59	0.89	1.13	1.63	2.28	2.81	**200yr**	1.96	2.75	2.93	3.78	4.79	6.72	9.06	**200yr**	5.95	8.71	10.42	12.22	13.37	**200yr**
500yr	0.68	1.02	1.31	1.90	2.71	3.36	**500yr**	2.34	3.29	3.41	4.31	5.45	7.82	10.94	**500yr**	6.92	10.52	12.69	14.96	16.19	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.44	0.54	0.72	0.89	1.08	**1yr**	0.77	1.06	1.26	1.74	2.21	2.98	3.16	**1yr**	2.64	3.04	3.58	4.37	5.04	**1yr**
2yr	0.34	0.52	0.64	0.86	1.07	1.27	**2yr**	0.92	1.24	1.48	1.96	2.51	3.42	3.70	**2yr**	3.03	3.56	4.09	4.84	5.63	**2yr**
5yr	0.40	0.62	0.77	1.05	1.34	1.62	**5yr**	1.15	1.58	1.88	2.53	3.25	4.34	4.96	**5yr**	3.84	4.77	5.38	6.37	7.16	**5yr**
10yr	0.47	0.72	0.89	1.25	1.61	1.98	**10yr**	1.39	1.93	2.28	3.11	3.95	5.34	6.20	**10yr**	4.72	5.96	6.82	7.84	8.75	**10yr**
25yr	0.58	0.88	1.09	1.56	2.05	2.57	**25yr**	1.77	2.51	2.95	4.07	5.15	7.78	8.34	**25yr**	6.88	8.02	9.15	10.34	11.41	**25yr**
50yr	0.67	1.02	1.27	1.83	2.46	3.13	**50yr**	2.12	3.06	3.60	5.00	6.32	9.74	10.46	**50yr**	8.62	10.06	11.44	12.72	13.96	**50yr**
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200yr	0.92	1.39	1.76	2.55	3.56	4.65	**200yr**	3.07	4.55	5.34	7.58	9.54	15.28	16.44	**200yr**	13.53	15.81	17.92	19.35	20.92	**200yr**
500yr	1.15	1.71	2.19	3.19	4.53	6.04	**500yr**	3.91	5.90	6.93	10.02	12.56	20.65	22.20	**500yr**	18.27	21.34	24.13	25.51	27.34	**500yr**

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Section 7

NRCS Soils Report

ALTUS
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United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Rockingham County, New Hampshire

PROPOSED SUBDIVISION

December 23, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Map Scale: 1:2,160 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rockingham County, New Hampshire
Survey Area Data: Version 22, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Sep 9, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
799	Urban land-Canton complex, 3 to 15 percent slopes	5.2	91.2%
W	Water	0.5	8.8%
Totals for Area of Interest		**5.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Rockingham County, New Hampshire

799—Urban land-Canton complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9cq0
Elevation: 0 to 1,000 feet
Mean annual precipitation: 42 to 46 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 120 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 55 percent
Canton and similar soils: 20 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Parent material: Till

Typical profile

H1 - 0 to 5 inches: gravelly fine sandy loam
H2 - 5 to 21 inches: gravelly fine sandy loam
H3 - 21 to 60 inches: loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Udorthents

Percent of map unit: 5 percent
Hydric soil rating: No

Squamscott and scitico

Percent of map unit: 4 percent
Landform: Marine terraces

Hydric soil rating: Yes

Boxford and eldridge
Percent of map unit: 4 percent
Hydric soil rating: No

Chatfield
Percent of map unit: 4 percent
Hydric soil rating: No

Scituate and newfields
Percent of map unit: 4 percent
Hydric soil rating: No

Walpole
Percent of map unit: 4 percent
Landform: Depressions
Hydric soil rating: Yes

W—Water

Map Unit Setting
National map unit symbol: 9cq3
Elevation: 200 to 2,610 feet
Farmland classification: Not prime farmland

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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Section 8

Stormwater Operations & Maintenance Plan

ALTUS
ENGINEERING, INC.

STORMWATER INSPECTION AND MAINTENANCE MANUAL

1 Clark Drive
Assessor's Map 209, Lot 33

OWNER:
Frederick W. Watson Revocable Trust
Robert D. Watson, Trustee
53 Sleepy Hollow Drive
Greenland, NH 03840

Proper inspection, maintenance, and repair are key elements in maintaining a successful stormwater management program on a developed property. Routine inspections ensure permit compliance and reduce the potential for deterioration of infrastructure or reduced water quality. The following responsible parties shall be in charge of managing the stormwater facilities:

RESPONSIBLE PARTIES:

Owner: _____
Name *Company* *Phone*

Inspection:_____
Name *Company* *Phone*

Maintenance:_____
Name *Company* *Phone*

NOTE: Inspection and maintenance responsibilities transfer to future property owners.

RAINGARDENS

Function – Raingardens and infiltration ponds provide treatment to runoff prior to directing it to stormwater systems by filtering sediment and suspended solids, trapping them in the bottom of the garden and in the filter media itself. Additional treatment is provided by the native water-tolerant vegetation which removes nutrients and other pollutants through bio-uptake. Stormwater detention and infiltration can also be provided as the filtering process slows runoff, decreases the peak rate of discharge and promotes groundwater recharge.

Detention ponds temporarily store runoff and allow for its controlled release during and after a storm event, decreasing peak rates of runoff and minimizing flooding.

Raingardens shall be managed (Per AGR 3800 and RSA 430:53) to: prevent and control the spread of invasive plant, insect, and fungal species; minimize the adverse environmental and economic effects invasive species cause to agriculture, forests, wetlands, wildlife, and other natural resources of the state; and protect the public from potential health problems attributed to certain invasive species.

Maintenance

- Inspect annually and after significant rainfall event.
- If a raingarden does not completely drain within 72-hours following a rainfall event, then a qualified professional should assess the condition of the facility to determine measures required to restore its filtration and/or infiltration function(s), including but not limited to removal of accumulated sediments and/or replacement or reconstruction of the filter media.
- Replace any riprap dislodged from spillways, inlets and outlets.
- Remove any obstructions, litter and accumulated sediment or debris as warranted but no less than once a year.
- Mowing of any grassed area in or adjacent to a raingarden shall be performed at least twice per year (when areas are not inundated) to keep the vegetation in vigorous condition. The cut grass shall be removed to prevent the decaying organic litter from clogging the filter media or choking other vegetation.
- Select vegetation should be maintained in healthy condition. This may include pruning, removal and replacement of dead or diseased vegetation.
- Remove any invasive species, Per AGR 3800 and RSA 430:53.
- Remove any hard wood growth from raingardens.

CULVERTS AND DRAINAGE PIPES

Function – Culverts and drainage pipes convey stormwater away from buildings, walkways, and parking areas and to surface waters or closed drainage systems.

Maintenance

- Culverts and drainage pipes shall be inspected semi-annually, or more often as needed, for accumulation of debris and structural integrity. Leaves and other debris shall be removed from the inlet and outlet to insure the functionality of drainage structures. Debris shall be disposed of on site where it will not concentrate back at the drainage structures or at a solid waste disposal facility.
- Riprap Areas - Culvert outlets and inlets shall be inspected during annual maintenance and operations for erosion and scour. If scour or creek erosion is identified, the outlet owner shall take appropriate means to prevent further erosion. Increased lengths of riprap may require a NHDES Permit and/or local permit.

CATCH BASINS

Function – Catch basins collect stormwater, primarily from paved surfaces and roofs. Stormwater from paved areas often contains sediment and contaminants. Catch basin sumps serve to trap sediment, trace metals, nutrients and debris. Hooded catch basins trap hydrocarbons and floating debris.

Maintenance

- Remove leaves and debris from structure grates on an as-needed basis.
- Sumps shall be inspected and cleaned (as needed) on an annual basis to protect water quality and infiltration capacity. Catch basin debris shall be disposed of at a solid waste disposal facility.

LEVEL SPREADERS AND RIP RAP OUTLETS

Function – Level spreaders and rip rap outlets covert concentrated stormwater flows into less-erosive sheet flow, minimizing erosion and maximizing the treatment capabilities of associated buffers. Vegetated buffers, either forested or meadow, slow runoff which promotes and reduces peak rates of runoff. The reduced velocities and the presence of vegetation encourage the filtration of sediment and the limited bio-uptake of nutrients.

Maintenance

- Inspect level spreaders and buffers at least annually for signs of erosion, sediment buildup, or vegetation loss.
- Inspect level for signs of condensed flows. Level spreader and rip rap shall be maintained to disperse flows evenly over level spreader.
- If a meadow buffer, provide periodic mowing as needed to maintain a healthy stand of herbaceous vegetation.
- If a forested buffer, then the buffer should be maintained in an undisturbed condition, unless erosion occurs.
- If erosion of the buffer (forested or meadow) occurs, eroded areas should be repaired and replanted with vegetation similar to the remaining buffer. Corrective action should include eliminating the source of the erosion problem and may require retrofit or reconstruction of the level spreader.
- Remove debris and accumulated sediment and dispose of properly.

VEGETATIVE SWALES

Function – Vegetative swales filter sediment from stormwater, promote infiltration, and the uptake of contaminates. They are designed to treat runoff and dispose of it safely into the natural drainage system.

Maintenance

- Timely maintenance is important to keep a swale in good working condition. Mowing of grassed swales shall be monthly to keep the vegetation in vigorous condition. The cut vegetation shall be removed to prevent the decaying organic litter from adding pollutants to the discharge from the swale.
- Fertilizing shall be bi-annual or as recommended from soil testing.
- Inspect swales following significant rainfall events.
- Woody vegetation shall not be allowed to become established in the swales or rock riprap outlet protection and if present shall be removed.

- Accumulated debris disrupts flow and leads to clogging and erosion. Remove debris and litter as necessary.
- Inspect for eroded areas. Determine cause of erosion and correct deficiency as required. Monitor repaired areas.

LANDSCAPED AREAS - FERTILIZER MANAGEMENT

Function – Fertilizer management involves controlling the rate, timing and method of fertilizer application so that the nutrients are taken up by the plants thereby reducing the chance of polluting the surface and ground waters. Fertilizer management can be effective in reducing the amounts of phosphorus and nitrogen in runoff from landscaped areas, particularly lawns.

Maintenance

- Have the soil tested by your landscaper or local Soil Conservation Service for nutrient requirements and follow the recommendations.
- Do not apply fertilizer to frozen ground.
- Clean up any fertilizer spills.
- Do not allow fertilizer to be broadcast into water bodies.
- When fertilizing a lawn, water thoroughly, but do not create a situation where water runs off the surface of the lawn.

LANDSCAPED AREAS - LITTER CONTROL

Function – Landscaped areas tend to filter debris and contaminates that may block drainage systems and pollute the surface and ground waters.

Maintenance

- Litter Control and lawn maintenance involves removing litter such as trash, leaves, lawn clippings, pet wastes, oil and chemicals from streets, parking lots, and lawns before materials are transported into surface waters.
- Litter control shall be implemented as part of the grounds maintenance program.

DE-ICING CHEMICAL USE AND STORAGE

Function – Sand and salt are used for de-icing of drives.

Maintenance

- Salt is highly water-soluble. Contamination of fresh water wetlands and other sensitive areas can occur when salt is stored in open areas. Salt piles shall be covered at all times if not stored in a shed. Runoff from stockpiles shall be contained to keep the runoff from entering the drainage system.
- When shared driveways and walks are free of snow and ice, they should be swept clean. Disposal shall be in a solid waste disposal facility.
- **Salt use shall be minimized.** Sand shall be used for de-icing activities when possible. Salt is highly water-soluble. Contamination of fresh water wetlands and other sensitive areas can occur when salt is stored in open areas. Owner shall not store salt piles on site.

CONTROL OF INVASIVE PLANTS

Function – Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area. Some exotic plants are imported for human use such as landscaping, erosion control, or food crops. They also can arrive as "hitchhikers" among shipments of other plants, seeds, packing materials, or fresh produce. Some exotic plants become invasive and cause harm by:

- becoming weedy and overgrown;
- killing established shade trees;
- obstructing pipes and drainage systems;
- forming dense beds in water;
- lowering water levels in lakes, streams, and wetlands;
- destroying natural communities;
- promoting erosion on stream banks and hillsides; and
- resisting control except by hazardous chemical.

Maintenance

During maintenance activities, check for the presence of invasive plants and remove in a safe manner as described in the attached “Methods for Disposing Non-Native Invasive Plants” prepared by the UNH Cooperative Extension.

GENERAL CLEAN UP

Upon completion of the project, the contractor shall remove all temporary stormwater structures (i.e., temporary stone check dams, silt fence, temporary diversion swales, catch basin inlet basket, etc.). Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required shall be dressed to conform to the existing grade, prepared, and seeded. Remove any sediment in catch basins and clean drain pipes that may have accumulated during construction.
Once in operation, all paved areas of the site should be swept at least once annually, preferably at the end of winter prior to significant spring rains.

APPPENDIX

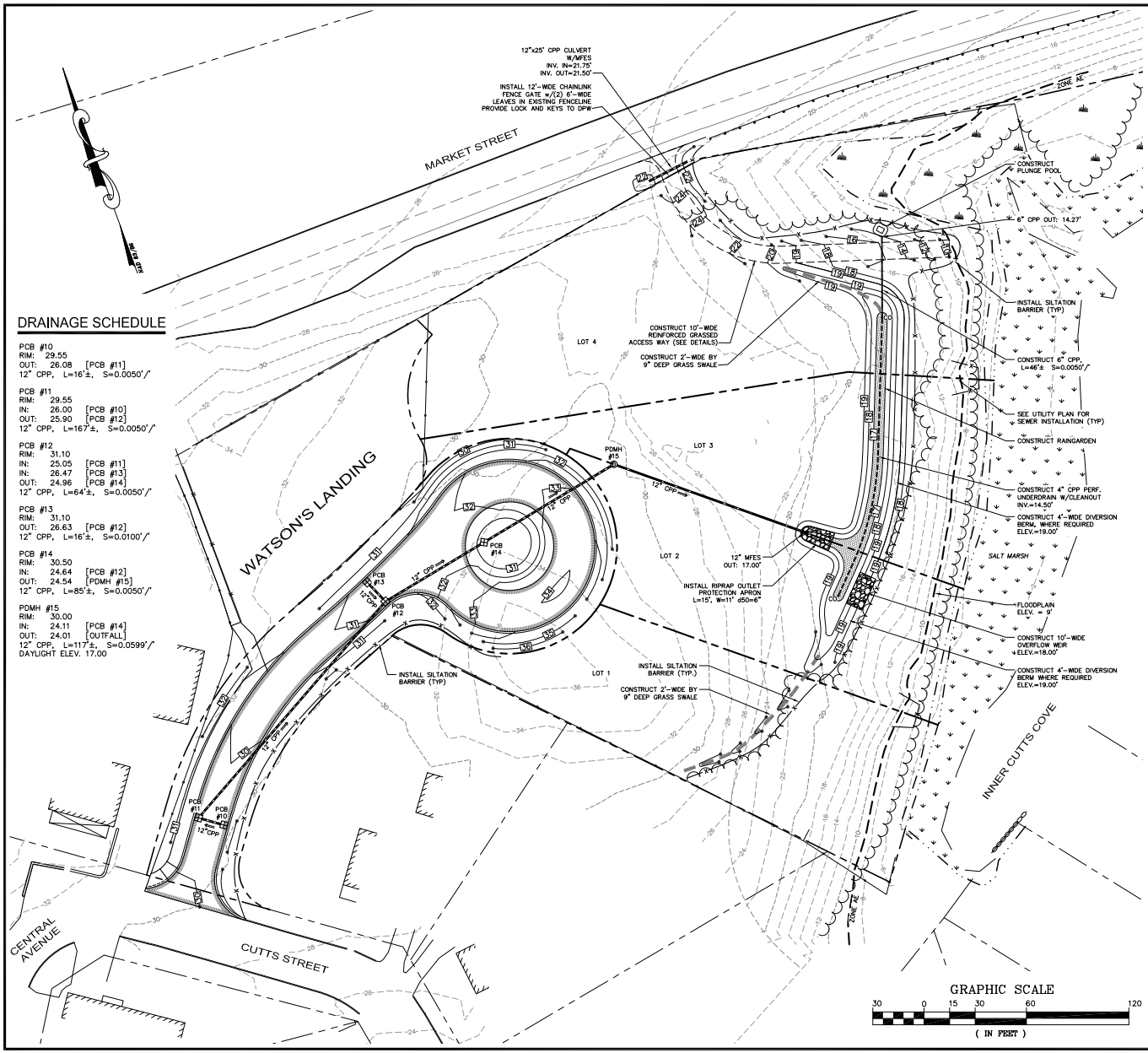
A. Stormwater System Operations and Maintenance Report
B. Site Grading and Drainage Plan

STORM WATER SYSTEM OPERATION AND MAINTENANCE REPORT

General Information		
Project Name		
Owner		
Inspector's Name(s)		
Inspector's Contact Information		
Date of Inspection	**Start Time:**	**End Time:**
Type of Inspection: ☐ Annual Report ☐ Post-storm event ☐ Due to a discharge of significant amounts of sediment		
Notes:		

General Site Questions and Discharges of Significant Amounts of Sediment			
Subject		**Status**	**Notes**
A discharge of significant amounts of sediment may be indicated by (but is not limited to) observations of the following. Note whether any are observed during this inspection:			*Notes/ Action taken:*
1	Do the current site conditions reflect the attached site plan?	❑Yes ❑No	
2	Is the site permanently stabilized, temporary erosion and sediment controls are removed, and stormwater discharges from construction activity are eliminated?	❑Yes ❑No	
3	Is there evidence of the discharge of significant amounts of sediment to surface waters, or conveyance systems leading to surface waters?	❑Yes ❑No	

Permit Coverage and Plans				
#	**BMP/Facility**	**Inspected**	**Corrective Action Needed and Notes**	**Date Corrected**
	Rain Garden	❑Yes ❑No		
	Catch Basin	❑Yes ❑No		
	Drainage Pipes	❑Yes ❑No		
	Riprap Aprons	❑Yes ❑No		
		❑Yes ❑No		
		❑Yes ❑No		



DRAINAGE SCHEDULE

PCB #10
RIM: 29.55
OUT: 26.08 [PCB #11]
12" CPP, L=16'±, S=0.0050'/'

PCB #11
RIM: 29.55
IN: 26.00 [PCB #10]
OUT: 25.90 [PCB #12]
12" CPP, L=167'±, S=0.0050'/'

PCB #12
RIM: 31.10
IN: 25.05 [PCB #11]
IN: 26.47 [PCB #13]
OUT: 24.96 [PCB #14]
12" CPP, L=64'±, S=0.0050'/'

PCB #13
RIM: 31.10
OUT: 26.63 [PCB #12]
12" CPP, L=16'±, S=0.0100'/'

PCB #14
RIM: 30.50
IN: 24.64 [PCB #12]
OUT: 24.54 [PDMH #15]
12" CPP, L=85'±, S=0.0050'/'

PDMH #15
RIM: 30.00
IN: 24.11 [PCB #14]
OUT: 24.01 [OUTFALL]
12" CPP, L=117'±, S=0.0599'/'
DAYLIGHT ELEV. 17.00

STORMWATER MANANGEMENT NOTES

1. TOTAL AREA OF PROJECT DISTURBANCE: ±47,550 S.F.
2. DO NOT BEGIN CONSTRUCTION UNTIL ALL STATE AND LOCAL PERMITS HAVE BEEN APPLIED FOR AND RECEIVED.
3. CONTRACTOR SHALL OBTAIN A "DIGSAFE" NUMBER AT LEAST 72 HOURS PRIOR TO COMMENCING CONSTRUCTION.
4. ALL CONSTRUCTION SHALL MEET THE MINIMUM CONSTRUCTION STANDARDS OF THE CITY OF PORTSMOUTH AND NHDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION. THE MORE STRINGENT SPECIFICATION SHALL GOVERN.
5. ALL BENCHMARKS AND TOPOGRAPHY SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO INITIATING CONSTRUCTION.
6. UNLESS OTHERWISE AGREED IN WRITING, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING AND MAINTAINING TEMPORARY BENCHMARKS (TBM) AND PERFORMING ALL CONSTRUCTION SURVEY LAYOUT.
7. PRIOR TO CONSTRUCTION, FIELD VERIFY JUNCTIONS, LOCATIONS AND ELEVATIONS/INVERTS OF ALL EXISTING STORMWATER AND UTILITY LINES. PRESERVE AND PROTECT LINES TO BE RETAINED.
8. TEMPORARY INLET PROTECTION MEASURES SHALL BE INSTALLED IN ALL EXISTING AND PROPOSED CATCH BASINS WITHIN 100' OF THE PROJECT SITE WHEN SITE WORK WITHIN CONTRIBUTING AREAS IS ACTIVE OR SAID AREAS HAVE NOT BEEN STABILIZED.
9. PROTECTION OF SUBGRADE: THE CONTRACTOR SHALL BE REQUIRED TO MAINTAIN STABLE, DEWATERED SUBGRADES FOR FOUNDATIONS, PAVEMENT AREAS, UTILITY TRENCHES, AND OTHER AREAS DURING CONSTRUCTION. SUBGRADE DISTURBANCE MAY BE INFLUENCED BY EXCAVATION METHODS, MOISTURE, PRECIPITATION, GROUNDWATER CONTROL, AND CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL TAKE PRECAUTIONS TO PREVENT SUBGRADE DISTURBANCE. SUCH PRECAUTIONS MAY INCLUDE DIVERTING STORMWATER RUNOFF AWAY FROM CONSTRUCTION AREAS, REDUCING TRAFFIC IN SENSITIVE AREAS, AND MAINTAINING AN EFFECTIVE DEWATERING PROGRAM. SOILS EXHIBITING HEAVING OR INSTABILITY SHALL BE OVER EXCAVATED TO MORE COMPETENT BEARING SOIL AND REPLACED WITH FREE DRAINING STRUCTURAL FILL. IF THE EARTHWORK IS PERFORMED DURING FREEZING WEATHER, EXPOSED SUBGRADES ARE SUSCEPTIBLE TO FROST. NO FILL OR UTILITIES SHALL BE PLACED ON FROZEN GROUND. THIS WILL LIKELY REQUIRE REMOVAL OF A FROZEN SOIL CRUST AT THE COMMENCEMENT OF EACH DAY'S OPERATIONS. THE FINAL SUBGRADE ELEVATION WOULD ALSO REQUIRE AN APPROPRIATE DEGREE OF INSULATION AGAINST FREEZING.
10. IF SUITABLE, EXCAVATED MATERIALS SHALL BE PLACED AS FILL WITHIN UPLAND AREAS ONLY AND SHALL NOT BE PLACED WITHIN WETLANDS. PLACEMENT OF BORROW MATERIALS SHALL BE PERFORMED IN A MANNER THAT PREVENTS LONG TERM DIFFERENTIAL SETTLEMENT. EXCESSIVELY WET MATERIALS SHALL BE STOCKPILED AND ALLOWED TO DRAIN BEFORE PLACEMENT. FROZEN MATERIAL SHALL NOT BE USED FOR CONSTRUCTION.
11. ALL CATCH BASIN, MANHOLE AND OTHER DRAINAGE RIMS SHALL BE SET FLUSH WITH OR NO LESS THAN 0.1' BELOW FINISH GRADE. ANY RIM ABOVE SURROUNDING FINISH GRADE SHALL NOT BE ACCEPTED.
12. IN ORDER TO PROVIDE VISUAL CLARITY ON THE PLANS, DRAINAGE AND OTHER UTILITY STRUCTURES MAY NOT BE DRAWN TO SCALE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER SIZING AND LOCATION OF ALL STRUCTURES AND IS DIRECTED TO RESOLVE ANY POTENTIAL DISCREPANCY WITH THE ENGINEER PRIOR TO CONSTRUCTION.
13. ALL CPP PIPE SHALL BE ADS N-12 OR APPROVED EQUAL.
14. PROJECT SUBJECT TO EPA NPDES PHASE II. NOI, SWPPP AND MINIMUM WEEKLY INSPECTIONS REQUIRED.
15. NO EARTHWORK, STUMPING OR GRUBBING SHALL COMMENCE UNTIL ALL APPROPRIATE SEDIMENT AND EROSION CONTROL MEASURES HAVE BEEN INSTALLED. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE PROPERLY MAINTAINED IN GOOD WORKING ORDER FOR THE DURATION OF CONSTRUCTION AND THE SITE IS STABILIZED.
16. SEE DETAIL SHEETS FOR PERTINENT SEDIMENT AND EROSION CONTROL DETAILS AND ADDITIONAL NOTES.
17. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH THE DESIGN STANDARDS AND SPECIFICATIONS SET FORTH IN THE NHDES NH STORMWATER MANUALS, VOL. 1-3, DATED DECEMBER 2008 AS AMENDED.
18. CONTRACTOR SHALL CONTROL DUST BY SPRAYING WATER, SWEEPING PAVED SURFACES, PROVIDING TEMPORARY VEGETATION, AND/OR MULCHING EXPOSED AREAS AND STOCKPILES.
19. THE CONTRACTOR SHALL TAKE WHATEVER MEANS NECESSARY TO PREVENT EROSION, PREVENT SEDIMENT FROM LEAVING THE SITE AND/OR ENTERING WETLANDS AND ENSURE PERMANENT SOIL STABILIZATION.
20. ALL EROSION CONTROL BLANKETS AND FASTENERS SHALL BE BIODEGRADEABLE.
21. ALL SWALES AND DETENTION PONDS SHALL BE STABILIZED PRIOR TO DIRECTING RUNOFF TO THEM.
22. ALL DISTURBED AREAS NOT TO BE PAVED OR OTHERWISE TREATED SHALL RECEIVE SIX (6") INCHES OF COMPACTED LOAM, LIMESTONE, FERTILIZER, SEED, AND MULCH USING APPROPRIATE SOIL STABILIZATION TECHNIQUES.
23. UPON COMPLETION OF CONSTRUCTION, ALL DRAINAGE INFRASTRUCTURE SHALL BE CLEANED OF ALL DEBRIS AND SEDIMENT AND ALL TEMPORARY EROSION AND SEDIMENT CONTROLS REMOVED AND ANY AREAS DISTURBED BY THE REMOVAL SMOOTHED AND REVEGETATED.

P5090

ALTUS ENGINEERING, INC.
133 Court Street Portsmouth, NH 03801
(603) 433-2335 www.altus-eng.com

NOT FOR CONSTRUCTION

ISSUED FOR: TAC

ISSUE DATE: JANUARY 18, 2021

REVISIONS

NO.	DESCRIPTION	BY	DATE
0	TAC WORK SESSION	EBS	12/01/20
1	TAC	EBS	01/18/21

DRAWN BY: EBS
APPROVED BY: EDW
DRAWING FILE: 5090-SITE.dwg

SCALE:
22" x 34" 1" = 30'
11" x 17" 1" = 60'

OWNER:
FREDERICK W. WATSON REVOCABLE TRUST, ROBERT D. WATSON, TRUSTEE
53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

APPLICANT:
FREDERICK W. WATSON REVOCABLE TRUST, ROBERT D. WATSON, TRUSTEE
53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

PROJECT:
WATSON'S LANDING
TAX MAP 209, LOT 33
1 CLARK DRIVE PORTSMOUTH, NH 03801

TITLE:
STORMWATER MANAGEMENT PLAN

SHEET NUMBER:
C-4

Section 9

Watershed Plans

Pre-Development Drainage Area Plan
Post-Development Drainage Area Plan

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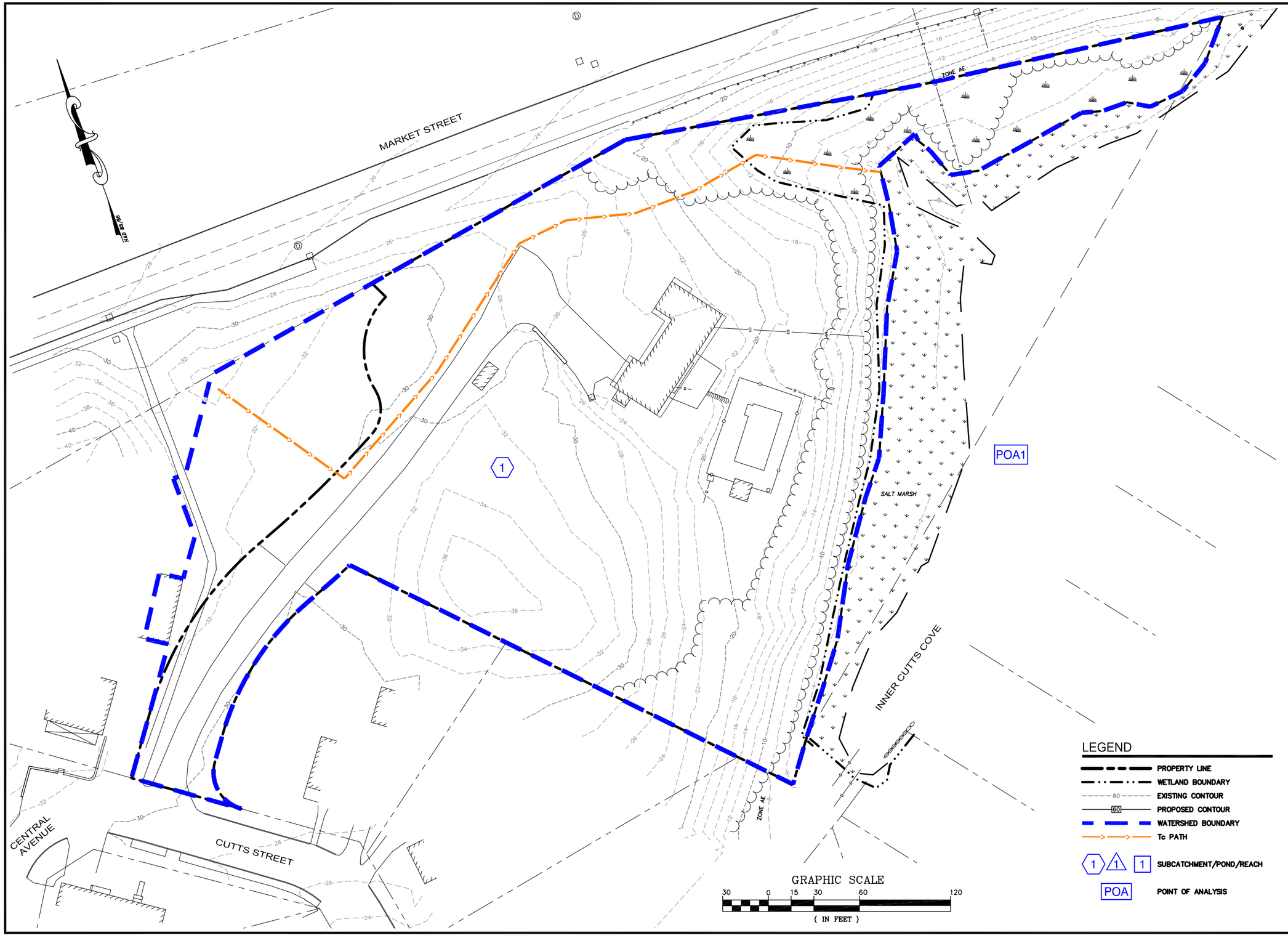

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ISSUE DATE: JANUARY 18, 2021

REVISIONS

NO.	DESCRIPTION	BY	DATE
0	TAC	EBS	01/18/21

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APPROVED BY: EDW
DRAWING FILE: 5090-SITE.dwg

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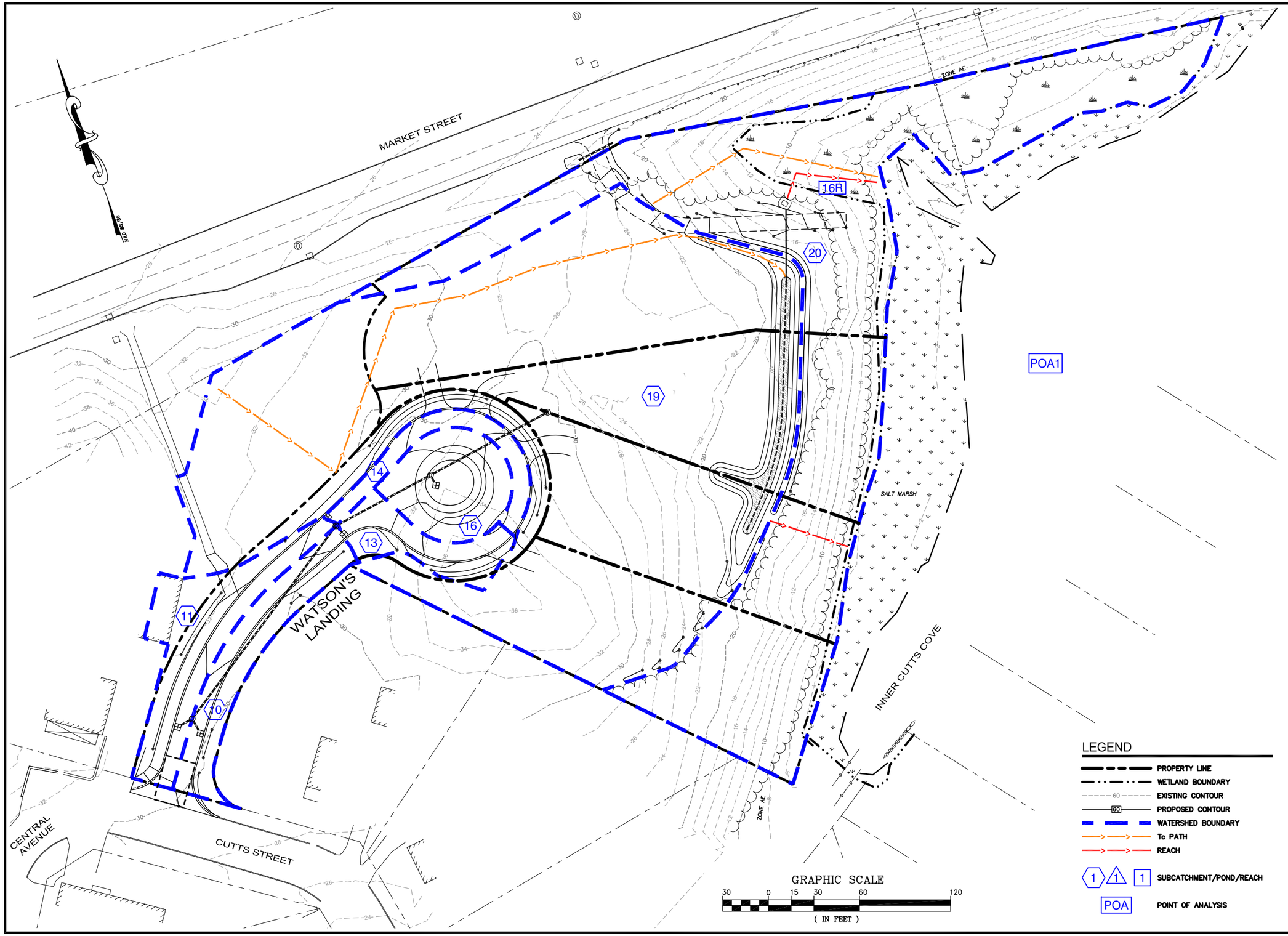
53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

PROJECT:
WATSON'S LANDING
TAX MAP 209, LOT 33
1 CLARK DRIVE PORTSMOUTH, NH 03801

TITLE:
PRE-DEVELOPMENT WATERSHED PLAN

SHEET NUMBER:
WS-1

P5090



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NOT FOR CONSTRUCTION

ISSUED FOR: TAC

ISSUE DATE: JANUARY 18, 2021

REVISIONS

NO.	DESCRIPTION	BY	DATE
0	TAC	EBS	01/18/21

DRAWN BY: EBS
APPROVED BY: EDW
DRAWING FILE: 5090-SITE.dwg

SCALE: 22" x 34" 1" = 30'
11" x 17" 1" = 60'

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53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

APPLICANT:
FREDERICK W. WATSON REVOCABLE TRUST, ROBERT D. WATSON, TRUSTEE
53 SLEEPY HOLLOW DRIVE GREENLAND, NH 03840

PROJECT:
WATSON'S LANDING
TAX MAP 209, LOT 33
1 CLARK DRIVE PORTSMOUTH, NH 03801

TITLE:
POST-DEVELOPMENT WATERSHED PLAN

SHEET NUMBER:
WS-2

P5090