

140 HAVERHILL STREET 10 YEAR PIPE CAPACITY CALCULATIONS
 10-1-2024 BENJAMIN C OSGOOD JR.
 REVISED 12-23-2024
 REVISED 2-21-25
 REVISED 3-31-2025

REACH NUMBER	UPSTREAM STRUCTURE	DOWNSTREAM STRUCTURE	PEAK FLOW CFS	PIPE SIZE	SLOPE '/'	PIPE CAPACITY CFS	STRUCTURE RIM ELEVATION	PEAK WATER ELEVATION
NORTH DRAINAGE SYSTEM								
1R	CB2	DMH8	2.59	12"	0.0059	2.72		
2R	DMH8	DMH1	2.59	12"	0.0132	8.29		
3R	CB1	DMH1	1.2	12"	0.0094	3.46		
4R	DMH1	DMH2	1.98	12"	0.0147	4.32		
5R	DMH2	DMH3	2.16	15"	0.0071	5.44		
6R	CB3A	DMH3	1.5	12"	0.0072	3.02		
7R	CB3	DMH3	1.49	12"	0.0077	3.12		
8R	DMH3	DMH4	6.12	18"	0.0066	7.43	87.75	85.19
10R	CB4	DMH4	3.81	8"	0.0055	0.9	PARKING LOT PONDING WILL OCCUR	
12R	CB5	DMH4	1.51	12"	0.0618	8.86		
9R	DMH4	DMH5	6.84	18"	0.0046	7.15	87.4	85.81
11R	CB6	DMH10	1.53	12"	0.125	12.6		
16R	OCS2	DMH10	1.42	12"	0.0307	6.24		
18R	DMH10	DMH5	2.59	12"	0.0375	6.9		
13R	DMH5	JELLYFISH FILTER	9.44	18"	0.0045	7.08	87.35	84.81
19R	JELLYFISH FILTER	FES	9.44	18"	0.005	7.43		
SOUTH DRAINAGE SYSTEM								
14R	CB10	DMH9	1.1	8"	0.0048	0.83	102.84	101.79
15R	DMH9	JELLYFISH FILTER	1.82	12"	0.0046	2.41		
17R	CB9	DMH9	0.99	8"	0.0229	1.83		
17R	JELLYFISH FILTER	FES	2	12"	0.0119	4.21		

Summary for Reach 5R: DMH2 TO DMH3

[52] Hint: Inlet/Outlet conditions not evaluated

[88] Warning: Qout>Qin may require smaller dt or Finer Routing

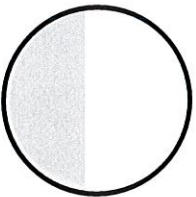
[61] Hint: Exceeded Reach 4R outlet invert by 0.29' @ 11.95 hrs

Inflow Area = 0.545 ac, 71.76% Impervious, Inflow Depth > 4.27" for 10 YEAR event
Inflow = 2.15 cfs @ 11.97 hrs, Volume= 0.194 af
Outflow = 2.16 cfs @ 11.98 hrs, Volume= 0.194 af, Atten= 0%, Lag= 0.3 min
Routed to Reach 8R : DMH3 to DMH4

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.15 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.45 fps, Avg. Travel Time= 0.4 min

Peak Storage= 16 cf @ 11.97 hrs
Average Depth at Peak Storage= 0.55', Surface Width= 1.24'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 5.44 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 31.0' Slope= 0.0071 '
Inlet Invert= 84.25', Outlet Invert= 84.03'



Summary for Reach 16R: ocs-2 to dmh5

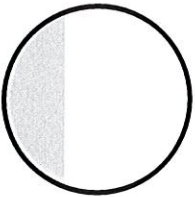
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.203 ac, 100.00% Impervious, Inflow Depth > 3.90" for 10 YEAR event
Inflow = 1.42 cfs @ 11.98 hrs, Volume= 0.066 af
Outflow = 1.40 cfs @ 11.98 hrs, Volume= 0.066 af, Atten= 1%, Lag= 0.5 min
Routed to Reach 18R : DMH10 to DMH5

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.40 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.09 fps, Avg. Travel Time= 1.0 min

Peak Storage= 28 cf @ 11.98 hrs
Average Depth at Peak Storage= 0.32', Surface Width= 0.94'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.24 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 127.0' Slope= 0.0307 %
Inlet Invert= 88.30', Outlet Invert= 84.40'



Summary for Reach 18R: DMH10 to DMH5

[52] Hint: Inlet/Outlet conditions not evaluated

[61] Hint: Exceeded Reach 16R outlet invert by 0.02' @ 11.90 hrs

Inflow Area =	0.394 ac, 100.00% ImperVIOUS, Inflow Depth >	4.37"	for 10 YEAR event
Inflow =	2.59 cfs @ 11.92 hrs, Volume=	0.143 af	
Outflow =	2.58 cfs @ 11.92 hrs, Volume=	0.143 af, Atten= 0%, Lag= 0.1 min	

Routed to Reach 13R : DMH5 TO JELLYFISH

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.10 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.32 fps, Avg. Travel Time= 0.2 min

Peak Storage= 8 cf @ 11.92 hrs

Average Depth at Peak Storage= 0.42', Surface Width= 0.99'

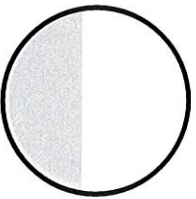
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 6.90 cfs

12.0" Round Pipe

n= 0.013 Corrugated PE, smooth interior

Length= 24.0' Slope= 0.0375 %

Inlet Invert= 84.00', Outlet Invert= 83.10'



Summary for Reach 20R: JELLYFISH TO FES

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.258 ac, 100.00% Impervious, Inflow Depth > 4.86" for 10 YEAR event
Inflow = 2.00 cfs @ 11.90 hrs, Volume= 0.104 af
Outflow = 1.98 cfs @ 11.90 hrs, Volume= 0.104 af, Atten= 1%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.29 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.56 fps, Avg. Travel Time= 0.2 min

Peak Storage= 8 cf @ 11.90 hrs
Average Depth at Peak Storage= 0.48', Surface Width= 1.00'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.21 cfs

12.0" Round Pipe
n= 0.012 Concrete pipe, finished
Length= 21.0' Slope= 0.0119 1/1
Inlet Invert= 99.05', Outlet Invert= 98.80'

