CB-1
Worksheet for Combination Inlet In Sag

Project Description	
Worksheet	CB-1
Type	Combination Inlet In
Solve For	Spread

Input Data		
Discharge	2.46	cfs
Local Depression	2.0	in
Local Depression W	1.70	ft
Gutter Width	1.70	ft
Gutter Cross Slope	0.119000	ft/ft
Road Cross Slope	0.024000	ft/ft
Curb Opening Leng	3.10	ft
Opening Height	0.25	ft
Curb Throat Type	Horizontal	
Grate Width	1.70	ft
Grate Length	3.10	ft
Grate Type	0 mm (P-1-7/8")	
Clogging	0.0	%

Options	
Calculation Opti se	Both

Results		
Spread	1.16	ft
Throat Incline Angle	90.00	degree
Depth	0.08	ft
Gutter Depression	1.9	in
Total Depression	3.9	in
Open Grate Area	4.7	ft²
Active Grate Weir Le	6.50	ft

GUTTER FLOW ANALYSIS

The Gutter Flow analysis is performed using a computer program from the Federal Highway Administration HEC-12 manual, 1984.

The following parameters are used in this analysis. Flow rates to each inlet are those determined in Section of this report.

Approach Gutter "N" Value .016

Gutter Longitudinal Slope (road slope)

Pavement Cross Slope 0.0208 (ft/ft)

Amount of grate depression = 2 (in.)

Depressed Gutter Cross Slope = 0.119 (ft/ft) (Single Basin)

Depressed Gutter Cross Slope = 0.07 (ft/ft) (Double Type I Basin)

Width of Grate = 1.7 (ft) (single basin)

Length of Grate = 3.1 (ft.) (single basin)

Width of Double Grate - DOT Type I = 3.4 (ft)

Width of Double Grate - DOT Type II = 1.7 (ft)

Length of Double Grate - DOT Type I = 3.1 (ft)

Length of Double Grate - DOT Type II = 6.2 (ft)

CB-1 TO MH-1
Worksheet for Circular Channel

Project Description	
Worksheet	Circular Channel
Flow Element	Circular Channel
Method	Manning's Formul
Solve For	Channel Depth

Input Data		
Mannings Coeffici	0.010	
Slope	.010000	ft/ft
Diameter	12	in
Discharge	2.46	cfs

Q50

Results		
Depth	0.52	ft
Flow Area	0.4	ft²
Wetted Perime	1.61	ft
Top Width	1.00	ft
Critical Depth	0.67	ft
Percent Full	51.8	%
Critical Slope	0.004495	ft/ft
Velocity	5.99	ft/s
Velocity Head	0.56	ft
Specific Energy	1.08	ft
Froude Numbe	1.65	
Maximum Discl	4.98	cfs
Discharge Full	4.63	cfs
Slope Full	0.002821	ft/ft
Flow Type	Supercritical	

MH-1 TO EXISTING CB-A
Worksheet for Circular Channel

Project Description	
Worksheet	Circular Channel
Flow Element	Circular Channel
Method	Manning's Formul
Solve For	Channel Depth

Input Data		
Mannings Coeffici	0.013	
Slope	.028700	ft/ft
Diameter	12	in
Discharge	2.46	cfs

Q50

Results		
Depth	0.44	ft
Flow Area	0.3	ft²
Wetted Perime	1.46	ft
Top Width	0.99	ft
Critical Depth	0.67	ft
Percent Full	44.5	%
Critical Slope	0.007596	ft/ft
Velocity	7.29	ft/s
Velocity Head	0.83	ft
Specific Energy	1.27	ft
Froude Numbe	2.21	
Maximum Disc	6.49	cfs
Discharge Full	6.04	cfs
Slope Full	0.004768	ft/ft
Flow Type	Supercritical	

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Regardless of the method that is utilized, all computations shall include a Drainage Analysis Map which clearly delineates the drainage area and flow path used for determining the time of concentration to each proposed drainage facility and each existing downstream drainage structure that may become hydraulically overloaded or damaged. The drainage analysis map shall show existing topography of the drainage areas (based on the best available existing mapping), existing and proposed roads, watercourses, wetlands, flood hazard zones, existing and proposed vegetation (woods, fields, lawns, etc), existing and proposed drainage facilities and structures, and the proposed area of development. When U.S. Soil Conservation Service methods are used, the drainage analysis map should also show soil types as shown on the most currently available soils maps as prepared by the U.S. Soil Conservation Service.

90B.2 Rational Method Computations

Where the Rational Method formula is used, computations shall conform with the following guidelines:

(A) Runoff Coefficients

Where the Rational Method formula is used, the following runoff coefficients ("C" values) shall be the minimum values utilized for each type of surface, and a composite "C" value computed for each tributary drainage area. In any case, a composite "C" value of less than 0.30 shall not be used for single family residential developments.

Type of Surface	Runoff Coefficient "C" (1) (10-year Storm)
Pavement, roofs and impervious surfaces	0.90
Embankment Slopes (cuts and fills)	0.40
Lawns:	
Flat Slope (2% or less)	0.17
Average Slope (2% to 7%)	0.22
Steep Slope (7% or greater)	0.35
Cultivated Fields	0.45
Pasture	0.30
Meadows (moist, level grassland)	0.10
Forested Areas	0.20

For 25-year storm increase runoff coefficients by 20%, for 50-year storm increase by 35%, and for 100-year storm increase by 55% (except for pavement, roofs and impervious surfaces).

(B) Time of Concentration

Time of concentration (t) shall be determined by the Technical Release No. 55 Method.

DURATION (min)	DURATION (hr)	RAINFALL INTENSITY (in/hr)					
		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
5	0.08	4.6	5.5	6.0	6.7	7.3	7.8
6	0.10	4.4	5.2	5.8	6.5	7.0	7.5
7	0.12	4.2	5.0	5.5	6.2	6.8	7.2
8	0.13	4.0	4.8	5.3	6.0	6.5	7.0
9	0.15	3.8	4.6	5.1	5.7	6.2	6.7
10	0.17	3.6	4.3	4.8	5.5	6.0	6.5
11	0.18	3.4	4.2	4.7	5.3	5.8	6.3
12	0.20	3.3	4.0	4.5	5.1	5.6	6.1
13	0.22	3.1	3.8	4.3	5.0	5.4	5.9
14	0.23	3.0	3.7	4.2	4.8	5.3	5.7
15	0.25	2.8	3.5	4.0	4.6	5.1	5.5
16	0.27	2.8	3.5	3.9	4.5	5.0	5.4
17	0.28	2.7	3.4	3.8	4.4	4.9	5.4
18	0.30	2.7	3.3	3.8	4.4	4.8	5.3
19	0.32	2.6	3.2	3.7	4.3	4.7	5.2
20	0.33	2.5	3.2	3.6	4.2	4.6	5.1
21	0.35	2.5	3.1	3.5	4.1	4.5	5.0
22	0.37	2.4	3.0	3.4	4.0	4.4	4.9
23	0.38	2.3	2.9	3.4	3.9	4.3	4.8
24	0.40	2.3	2.9	3.3	3.8	4.2	4.7
25	0.42	2.2	2.8	3.2	3.7	4.2	4.6
26	0.43	2.2	2.7	3.1	3.7	4.1	4.5
27	0.45	2.1	2.7	3.0	3.6	4.0	4.4
28	0.47	2.0	2.6	3.0	3.5	3.9	4.3
29	0.48	2.0	2.5	2.9	3.4	3.8	4.2
30	0.50	1.9	2.4	2.8	3.3	3.7	4.1

Rainfall Intensity/Duration/Frequency Relationship for Connecticut (English Units)
Table B-2.1

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Residential, Commercial & Industrial
Surveying & Civil Engineering Services

JOB _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

- CB-1

- A = 17,110 SF = 0.39 AC
- Tc < 5 min, i_{50} = 7.3 in/hr.
- C: IMPERVIOUS = 10,634 SF = 0.24 AC, C = 0.90
  GRASS = 6476 SF = 0.15 AC, C = 0.22

$$\bar{C} = \frac{(0.24)(0.90) + (0.15)(0.22)}{0.39} = 0.64$$

$$Q_{50} = CiA$$
$$= (0.64)(0.35)(7.3)(0.39) = 2.96 \text{ cfs.}$$

- DESIGN FOR FIRST FLUSH EVENT 1" RAINFALL:
  PARKING LOT 7150 SF
  VOLUME = (7150 SF)(1"/12)
  = 596 CF

USE: 40 LF OF 4'x4' CONCRETE GALLERIES
V = (40')(4x4) = 640 CF
(THIS DOES NOT INCLUDE STONE)